

**Handbook on Civil Registration and Vital
Statistics Systems:
Management, Operation and Maintenance**

Revision 1



United Nations • New York, 2018

Preface

The present *Handbook on Civil Registration and Vital Statistics Systems: Management, Operation and Maintenance, Revision 1*, has been developed as a companion volume to the revised set of United Nations principles and recommendations for vital statistics systems.¹ It aims to provide guidance and assistance to national authorities in establishing a holistic system of civil registration, vital statistics and identity management. This is the first revision of the original handbook, which was issued in 1998.

This revision of the handbook offers background information, specifications and practical examples for the establishment – or, where already in existence, improvement – of civil registration, vital statistics and identity management systems. It presents model organizational and legal arrangements, together with descriptions of exemplary processes and protocols that are considered to be the gold standard in this domain. Although a number of national examples are presented in support and as examples of successful approaches, this handbook is not a technical report describing and analysing country practices; it elaborates the international standard and describes in detail the resulting operational holistic model. It aims to encourage countries to undertake long-term self-sustaining programmes designed to strengthen the management and interoperability of their civil registration, vital statistics and identity systems.

In its scope, the handbook covers the entire range of vital events – live births, deaths (including causes of death), fetal deaths, marriages, divorces, annulments, judicial separations, adoptions, legitimations and recognitions – although emphasis is placed on live births, deaths and fetal deaths, since these are given first priority under the third revision of the *Principles and Recommendations for a Vital Statistics System*. It must be emphasized that this handbook does not elaborate in detail issues related to the correct assignment and classification of causes of death, as guidelines on that matter have been published by the World Health Organization (WHO) and proper references to existing literature are provided throughout the text. In addition, the importance of including cause-of-death data in a comprehensive civil registration and vital statistics system is frequently highlighted, in particular in the context of intersectoral collaboration initiatives needed to establish the role of the health sector as both a notifier of events and to ensure that cause-of-death data form an integral part of a country's civil registration and vital statistics system.

There is a clear distinction between vital statistics as a set of data crucial for policymaking and its source, the civil registration system, as a critical element for establishing the basic human rights and legal identity of individuals. In view of the heightened importance of assigning a unique identity document to each individual, the handbook addresses the recommended information flow and institutional arrangements for ensuring effective civil registration, quality vital statistics and warranted rights and services for the population, notwithstanding possible security issues.

Applications of registration and statistical data and records at all levels of government, and also in the public, private and academic domains, are highlighted throughout the handbook. Specific functions are described within both centralized and decentralized structures. In addition, continuous monitoring and evaluation are presented as valuable components essential for good management, efficient operation and effective maintenance. A new chapter on methods for assessing the completeness and coverage of civil registration has been introduced in this revision of the handbook. Another innovation is the chapter on digitizing civil registration and vital statistics, prepared in response to the need for governments to modernize their approaches and operations, the wide availability of information technology and the consequent need for guidance.

The handbook consists of seven chapters. Chapter I provides an overview of civil registration and vital statistics systems, including centralized or decentralized structures, the necessary legal framework and their interaction with population registers and identity management systems. Chapter II details the activities of the civil registration system and outlines its essential functional components and relations with the vital statistics system. Chapter III describes the operational requirements for sound civil registration and vital statistics systems. Chapter IV builds on the material presented in the third revision of the *Principles and Recommendations for a Vital Statistics System* and examines in detail the issue of quality in the context of civil registration and vital statistics systems. Chapter V focuses on issues emanating from the proliferation of population registers, identity management systems and their interlinkages with civil registration and vital statistics systems. Chapter VI describes a wide range of applications and uses of data and information from civil registration and vital statistics systems. Chapter VII focuses on technical details of the implementation of the enterprise information system

¹ *Principles and Recommendations for a Vital Statistics System*, Statistical Papers, Series M, No. 19, Rev. 3 (United Nations publication, Sales No. E.13.XVII.10).

paradigm and the adaptation of its features for civil registration, vital statistics, population registers and identity management. For a full understanding of the management, operation, and maintenance of civil registration, vital statistics and identity management systems we recommend perusal of the full text, although the chapters have been designed in such a way that they can be consulted independently if a more targeted review is necessary.

The handbook has drawn not only on the third revision of the *Principles and Recommendations for a Vital Statistics System*, but also on the e-learning course on civil registration and vital statistics systems² developed in partnership with the Global Civil Registration and Vital Statistics Group³ and the civil registration and vital statistics digitization guidebook⁴ developed for the purpose of supporting the Africa Programme on Accelerated Improvement of Civil Registration and Vital Statistics Systems.⁵ All these resources are consistent with one another in their conceptual approach and it is possible to use them jointly.

The process of revising the *Handbook on Civil Registration and Vital Statistics Systems: Management, Operation and Maintenance* comprised several stages. In the first stage, an initial draft was prepared by the United Nations Statistics Division. Second, this draft was presented at the United Nations Expert Group Meeting on Management and Evaluation of Civil Registration and Vital Statistics Systems, held in New York from 20 to 24 February 2017.⁶ Third, based on the proceedings of that meeting, a second draft of the revised handbook was prepared by the United Nations Statistics Division and circulated to the members of the Expert Group and the Global Civil Registration and Vital Statistics Group for further comments and suggestions, which were incorporated in a third draft. This draft, in turn, was circulated to all members of the Expert Group, whose final input was solicited. The final draft was submitted to the Statistical Commission at its forty-ninth session, held in March 2018.

² Hosted by the Open Learning Campus of the World Bank, available at <https://olc.worldbank.org/content/civil-registration-and-vital-statistics-systems-basic-level-self-paced-format>.

³ More information on this Group may be found at <https://unstats.un.org/unsd/demographic/crvs/globalcrvs.html>.

⁴ Available at www.crvs-dgb.org/en/.

⁵ Details on the programme may be found at www.apai-crvs.org/.

⁶ All the papers and presentations are available at <https://unstats.un.org/unsd/demographic-social/meetings/2017/new-york--egm-on-management-and-evaluation-of-crvs-systems/>.

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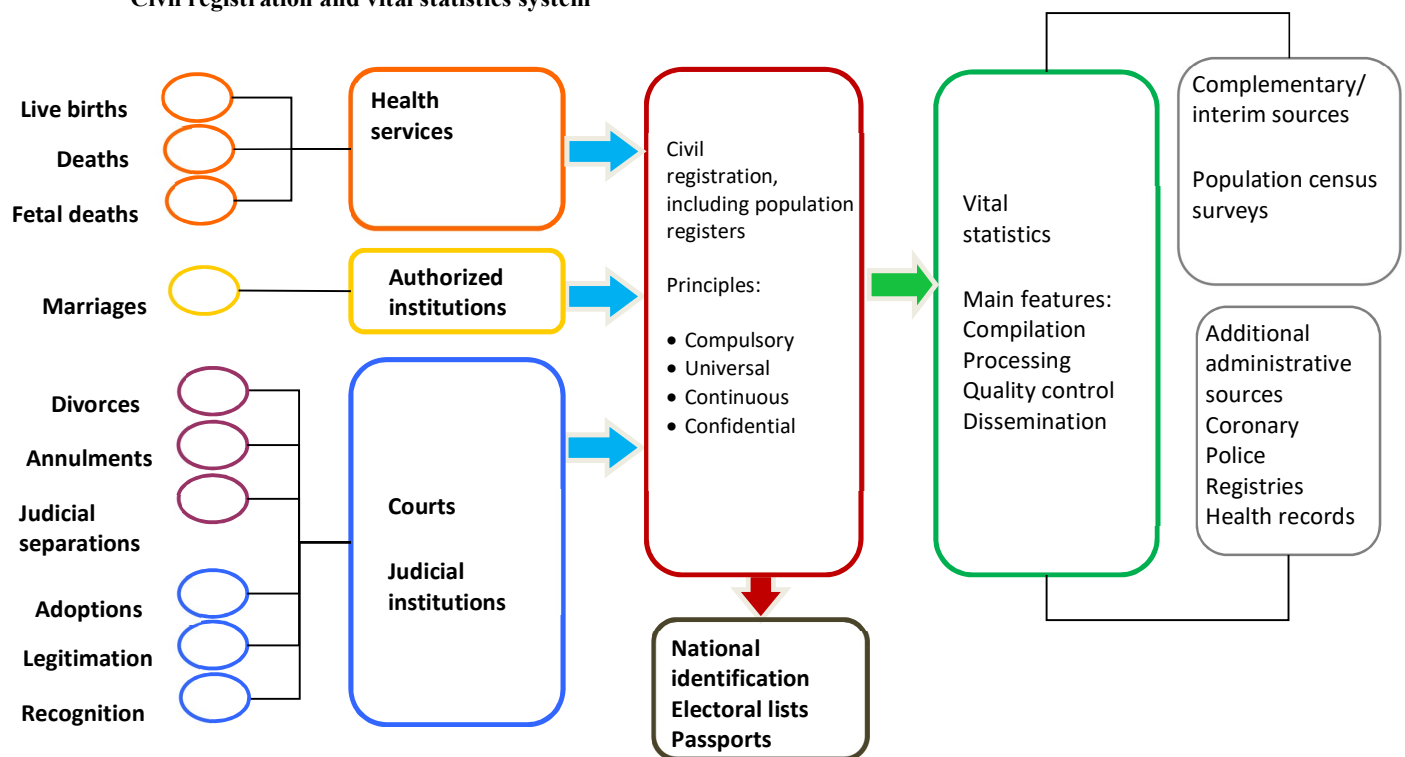
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I. Institutional arrangements for civil registration and the interface with the vital statistics system

A. Introduction

1. The current revision of the *Principles and Recommendations for a Vital Statistics System*, effective as of 2014, is essentially designed to present vital statistics and civil registration as separate entities, with the ultimate aim of establishing, maintaining and applying these two entities as components of a coordinated and coherent system for registering and producing vital statistics. The procedures for recording births and deaths are equally important for civil registration as a legal exercise and for vital statistics as a source of statistical information; hence the tasks performed by civil registrars and those of statisticians are interdependent.⁷ In addition, the emergence of interconnections between civil registration and contemporary identity management systems adds yet one more dimension to the structure of the civil registration and vital statistics system. These relationships and their functioning are presented below, in figure 1.

Figure 1
Civil registration and vital statistics system



Source: *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 26.

2. Civil registration is defined as the continuous, permanent, compulsory, universal recording of the occurrence and characteristics of vital events pertaining to the population, as provided through decree or regulation in accordance with the legal requirements in each country, with full respect for the rules regulating the protection and privacy of individual information.⁸ It is important to highlight the quality of universality in relation to people's rights regarding the registration of vital facts. Everyone has the right to be recognized as a

⁷ *Principles and Recommendations for a Vital Statistics System*, Statistical Papers, Series M, No. 19, Rev. 3 (United Nations publication, Sales No. E.13.XVII.10), para. 274.

⁸ *Ibid.*, para. 279.

person before the law, as enshrined in article 6 of the Universal Declaration of Human Rights and reaffirmed in several other global accords and international human rights instruments.⁹ As civil registration establishes the existence of a person under law, it has traditionally been the fundamental means of granting legal identity. In this regard, laws, policies, rules and regulations must not be a hindrance to the realization of this right. In particular, the registration of events must be performed even if the time frame given by law has expired, and regardless of migratory status, citizenship and any other request that may act as an obstacle to registering the vital facts occurred in the territory. Civil registration is carried out primarily for the purpose of establishing the documents provided for by law. The usefulness of these records as the best source for the production of vital statistics is well established.

3. The term “civil registration method” refers to the procedure employed in gathering the basic information on the incidence and characteristics of vital events that occur in the population of a country (or area) within a specified time period, upon which the preparation of vital records with legal value and the production of vital statistics are based. This method should be distinguished from other methods of gathering data about the population because it is mandated by law to be continuous, permanent and confidential. Information collected within the framework of this system has legal authority.

4. Responsibility for the establishment or development of a civil registration system should lie with an agency or agencies of a national Government.¹⁰ The term “civil registration system” refers to the entire administrative, legal and institutional framework, including the personnel, the registration network, the various procedures, the processes of record-keeping and retrieval, issuing of certificates, preparation of outputs, transfer of data, provision of services to other agencies, and all other activities pertaining to civil registration in a country (or state, or province). The civil registration system, therefore, encompasses both the registration method and all institutional, technical and legal settings associated with it.

5. The juridical function of civil registration is to register the occurrence of acts and events that constitute the source of civil status, and to issue certificates. Such events are called “vital events”. The vital events that most countries register, as internationally recommended, fall in the categories of live births, deaths, fetal deaths, marriages, judicial separations, divorces, annulments, adoptions, legitimations and recognitions.¹¹ In addition to the legal role of maintaining public records and performing certifying activities, the production of vital statistics is a key function that must be recognized as a matter of paramount importance in the design of national development policies.

6. Civil registration also underlies the maintenance of population registers and identity lists in countries where these exist. If population registers and identity management systems are not fed from the civil registration system with information on births and deaths, they will quickly become outdated and lose their usefulness.

7. According to international standards, certain occurrences are vital events for which data are to be collected for vital statistics purposes. These are listed below with their recommended definitions:¹²

(a) *Live birth*: the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles, whether or

⁹ 1948 Universal Declaration of Human Rights, arts. 6 and 15; 1951 Convention relating to the Status of Refugees, arts. 25 and 27; 1954 Convention relating to the Status of Stateless Persons, arts. 25 and 27; 1961 Convention on the Reduction of Statelessness, arts. 1–4; 1965; 1969 International Convention on the Elimination of All Forms of Racial Discrimination, art. 5 (d) (iii); 1966 International Covenant on Civil and Political Rights, art. 24; 1979 Convention on the Elimination of All Forms of Discrimination against Women, art. 15; 1989 Convention on the Rights of the Child, arts. 7–8; 1990 International Convention on the Protection of the Rights of all Migrant Workers and Members of Their Families, art. 29; 2006 Convention on the Rights of Persons with Disabilities, art. 18.

¹⁰ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 301.

¹¹ *Ibid.*, para. 2.

¹² *Ibid.*

not the umbilical cord has been cut or the placenta is attached; each product of such a birth is considered live born (all live-born infants should be registered and counted as such, irrespective of gestational age or whether alive or dead at the time of registration, and if they die at any time following birth, they should also be registered and counted as deaths);

(b) *Death*: the permanent disappearance of all evidence of life at any time after live birth has taken place (postnatal cessation of vital functions without capability of resuscitation). This definition excludes fetal deaths, which are defined separately below;

(c) *Fetal death*:¹³ death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles (note that this definition broadly includes all terminations of pregnancy other than live births, as defined above);¹⁴

(d) *Marriage*: the act, ceremony or process by which the legal relationship of spouses is constituted. The legality of the union may be established by civil, religious or other means as recognized by the laws of each country. Countries may wish to expand this definition to cover civil unions if they are registered; in that case, registered partnership usually refers to a legal construct, registered with the public authorities according to the laws of each country, that leads to legal conjugal obligations between two persons;

(e) *Divorce*: the final legal dissolution of a marriage, that is, that separation of spouses which confers on the parties the right to remarriage under civil, religious or other provisions, according to the laws of each country. In the case where a country recognizes registered partnerships, a legal dissolution of a registered partnership refers to the legal final dissolution of such a partnership, according to national laws, conferring on the parties the right to re-enter into another partnership or marriage;

(f) *Annulment*: the invalidation or voiding of a marriage by a competent authority, according to the laws of each country, which confers on the parties the status of never having been married to each other;

(g) *Separation, judicial*: the disunion of married persons, according to the laws of each country, without conferring on the parties the right to remarry;

(h) *Adoption*: the legal and voluntary taking and treating of the child of other parents as one's own, insofar as provided by the laws of each country;

(i) *Legitimation*: the formal investing of a person with the status and rights of a person born in wedlock, according to the laws of each country;

(j) *Recognition*: the legal acknowledgement, either voluntary or compulsory, of the paternity of a child born out of wedlock.

8. It must be emphasized that the relationship between vital statistics and health statistics is of considerable importance in modern systems. A number of variables used for vital statistics are of direct interest in the collection of health statistics, such as age of mother, number of previous live births, cause of death and so forth. Health statistics, in turn, are indispensable for developing policies and measures for improving the overall health of the population. The source of health statistics is usually the health institution (public or private) which also acts as an informant of the occurrence of vital events such as births and deaths. Efforts must be made, therefore, to harmonize definitions, classifications and data formats between civil registration, vital and health statistics, at a very early stage in the process of designing a holistic system of civil registration, vital statistics and population registers.

¹³ Also referred to as "dead-born fetus" and "stillbirth".

¹⁴ The legal requirements for the registration of fetal deaths vary from country to country. It is recommended that dead fetuses weighing 500 grams or more at birth (or those of 22 completed weeks of gestation or crown-heel body length of 25 centimetres or more if weight is not known) be registered. In addition, for statistical purposes, it is recommended that such terminology as "abortion", "early fetal death" and "late fetal death" be replaced through the use of weight-specific measures, e.g., the fetal death rate for fetuses of 1,000 or more grams or the fetal death rate for fetuses weighing between 500 and 1,000 grams, etc. See World Health Organization, *International Statistical Classification of Diseases and Related Health Problems*, tenth revision, 2010 edition, Geneva. Details available at www.who.int/classifications/icd/en/.

9. Continuous, permanent recording of vital events can best be ensured by means of proper legislation and the establishment of mechanisms for its nationwide enforcement. The civil registration law should promote the close integration of people into the community and should give them clear guidelines on how the civil registration system is organized in the country or area. It should also spell out the types of vital events that must be registered, their definitions, the designation of informants for each type of event, the time allowances for registering each type of vital event, the procedures for late registration, the registrar's duties, the rights and obligations related to registration, the penalties for non-compliance and so forth.

10. In the context of defining a system as a set of interacting or independent components forming an integrated whole and according to the third revision of the *Principles and Recommendations for a Vital Statistics System*, the components of a vital statistics system are: legal registration; the statistical reporting of vital events; and the collection, compilation and dissemination of statistics pertaining to those events,¹⁵ as illustrated in figure 1 above.

11. Taking into consideration that the institutional organization of civil registration and vital statistics significantly affects the system's interlinkages, and also its set-up and functioning, it is necessary to look more closely at the different arrangements implemented in various countries and circumstances. Both civil registration and official (vital) statistics are, in most countries, a function of the Government, yet the organizational settings for one or the other differ. In general, the organizational structure or structures for the efficient management, operation and maintenance of the system might be centralized or decentralized. In terms of its overall structure, a centralized system relies on being managed at the national level, with subnational offices at appropriate local levels. Decentralized systems are those where the primary responsibility for civil registration and local vital statistics rests with subnational authorities, such as governments of states or provinces.

B. Centralized administration for civil registration

12. A centralized administration responsible for civil registration usually has an agency for directing, coordinating and monitoring the work of nationwide civil registration. An office with such duties can promote national standards and uniform registration of all vital events occurring within the country and among various groups of the population.

13. Under this type of central arrangement, the national registration agency not only plays an administrative and legal role but also exercises a technical function in relation to the network of subnational and local civil registration offices. It establishes all local registration offices, provides written materials and standard operating procedures to local registrars to guide their daily work, coordinates the registration procedures throughout the system, and supervises and evaluates the registration work of the local offices.

14. The central office is responsible for coordination with other government agencies that support the civil registration system, including the health services that report the occurrence of vital events and certify causes of death, the courts that deal with marriages and divorces, and the national statistical service that compiles the registration data and publishes vital statistics. This is often resolved by means of a national inter-agency committee.

15. In most cases, the body at the national level of the system conducts such vital statistics functions as cleaning, coding, data processing, preparation of tables and charts, statistical and trend analyses, publishing of reports and conduct of related research. The national body then distributes that information to local government units. This approach ensures the consistency of the data and information for the country as a whole. Local agencies can then use such data for local programmes, planning and population-related activities.

¹⁵ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 26.

A number of countries, however, also conduct cleaning, coding and data processing at regional or subnational levels – which, depending on the size and specific characteristics of the country, may be much more efficient in terms of timeliness and the proximity to the original source of information; this approach necessitates uniform data cleaning and processing procedures and protocols in order to ensure standard format and content of the resulting vital statistics.

16. In a centralized system, the fact that all direction comes from above may result in a lack of incentives at the local level with the effect that there is no feedback or input from the bottom up in terms of proposals for useful innovations based on local knowledge, which may prevent a comprehensive understanding of local circumstances from reaching the central agency. This can result in a failure by local officials to put forth innovative approaches that could enhance the system. To prevent that occurring, it is essential to ensure that strong lines of communication are in place in both directions – from the central office to the local units and vice versa. This assures that knowledge from both levels is used to manage and operate the system effectively.

17. The advantages of having a central registration office to administer the system may be listed as follows:

(a) It makes possible the preparation and approval of a standard legal framework for the civil registration system, which will promote uniformity of procedures throughout the country and will, in turn, facilitate further changes in legislation, whenever needed;

(b) It facilitates the interpretation and enforcement of norms and regulations;

(c) It permits the adoption of uniform procedures for recording and reporting vital events nationwide, including ways and means of certifying registered vital events, and for releasing certificates to the public;

(d) In terms of establishing direct links with identity management authorities, it allows for more secure and uniform protocols for channelling the necessary inputs;

(e) It promotes the maintenance of direct and effective control over the entire system and facilitates the carrying out of research based on vital records kept under uniform archival techniques;

(f) It facilitates the development and channelling of advisory services and other forms of technical assistance to local civil registrars, such as periodic training courses to keep them abreast of any changes in the system and the provision of focal technical advice for solving a particular problem.

18. In a centralized administration paradigm, there are two principal options for the administration of the vital statistics system:

(a) In the one, the responsibility for both civil registration and vital statistics rests with a single government institution.¹⁶ This might be the national statistical office, the ministry of health, of internal affairs or of justice, or an independent agency;

(b) In the other, the civil registration and vital statistics functions are separated. Civil registration might be under the responsibility of the national civil registrar, the ministry of internal affairs or justice and the vital statistics system under the responsibility of another agency, most often the national statistical office.¹⁷ In turn, the vital statistics system itself can be administered in a centralized or decentralized manner. In both cases, critical importance is attached to the coordination of the two components, so as to avoid the dissemination of differing vital statistics, one set based on civil registration data and the other on official statistics.

19. A more detailed elaboration of the two models is provided in the following subsection.

¹⁶ While there are not many examples in the world, that of the Philippines stands out: in that country, the Philippine Statistical Authority is at the same time responsible for both civil registration and issuing certificates and also for generating vital statistics. In India, the functions of the Office of the Registrar General and Census Commissioner also cover both civil registration and the compiling of vital statistics, although the civil registration coverage in terms of the occurrence of vital events varies significantly between various states in the country.

¹⁷ There are a number of examples that would fall into this category, such as Costa Rica, Ethiopia, Guatemala, Mongolia, Norway and Uzbekistan, to name a few.

1. Separate administrative agencies for civil registration and vital statistics

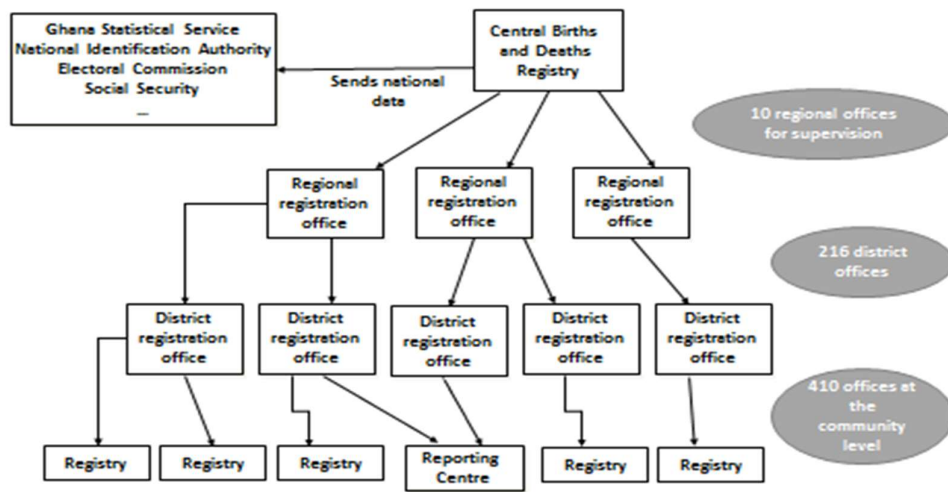
20. As presented above, in a number of cases the civil registration and vital statistics functions are assigned to separate administrative agencies. In this arrangement, these agencies have complementary functions: the civil registration agency is in charge of collecting the information that the statistics agency later analyses and uses to produce tabulations, rates and ratios. Maintaining interaction and cooperation between these agencies becomes a key factor in ensuring that the resulting civil registration and vital statistics systems are effective. Offices of civil registrars, ministries of internal affairs, justice or health or other independent agencies have responsibility for the civil registration system, while another agency, most often the national statistics office, would have the responsibility for the vital statistics system. This kind of structure requires a more complex organizational and operational arrangement than when a single agency is responsible for both systems. The vital statistics system may be centralized or decentralized.

21. In this arrangement, the first concern is how to create an interactive and collaborative relationship between the two agencies. The vital statistics function is fed with data from the daily operation of the civil registration system. The statistical agency should take the lead in establishing a working relationship with the registration programme. The best option is to have an inter-agency committee established by the laws and regulations on civil registration, or by the vital statistics law. Another option is to prepare a memorandum of agreement that designates a committee with representatives from both programmes, together with other stakeholders, such as the ministry of health. The committee's membership should be representative of the various factors affecting the civil registration and vital statistics systems. These should include the operational parts of both systems, such as the legal registration formalities and documentation and other requirements for the preparation of vital statistics. Another issue with which the committee is concerned is the set of rules and regulations needed to provide complete and accurate data for both programmes. The committee will also need to consider processing methods to ensure effective registration services and timely and relevant vital and health statistics. The committee should meet every two months or every quarter to review the completeness, accuracy, timeliness and reliability of the data for each function. It should also consider coding and data-entry activities, along with problems arising in the processing routines of each programme.

22. The data (micro level) flow from the local registration units through district and regional offices to the national level, and then to the statistical component, taking into account data confidentiality restrictions. In this context, the committee should also play a coordination role with regard to interaction with those local offices. Figures 2 and 3 present examples of the centralized model with separate agencies for civil registration and vital statistics, from Ghana and Georgia, respectively.

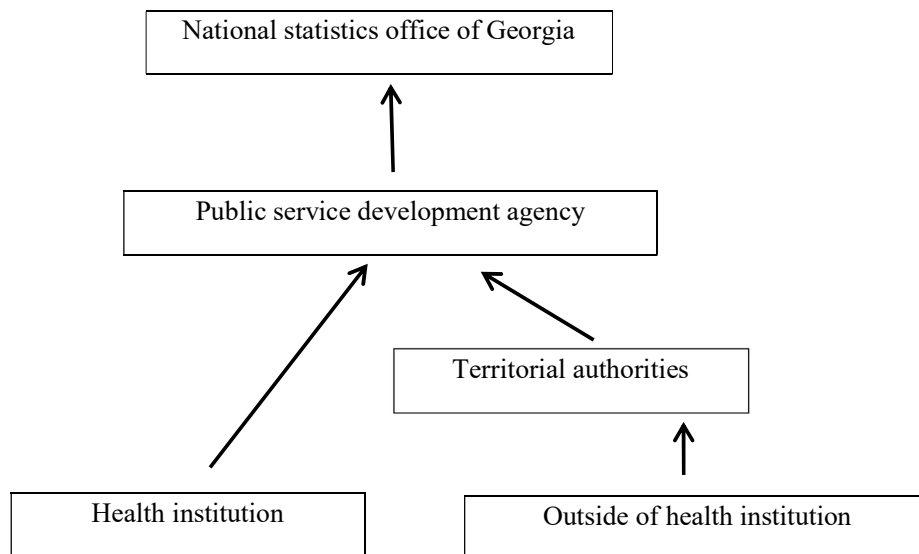
23. In addition, the importance of the routine collection of data from civil registration for use in the production of birth and death statistics (fertility and mortality), including cause of death, should be reflected in the national statistics strategy (or equivalent national strategy document).

Figure 2
Organizational structure of civil registration in Ghana



Source: Workshop on the *Principles and Recommendations for a Vital Statistics System*, Revision 3, for African English-speaking countries, held in Addis Ababa, 2–5 December 2014.¹⁸

Figure 3
Civil registration and vital statistics systems in Georgia



¹⁸ All documentation available at: https://unstats.un.org/unsd/demographic/meetings/wshops/Ethiopia/2014/list_of_docs.htm.

Source: Subregional Asian workshop on applying principles and recommendations for implementing the regional action framework for strengthening CRVS, held in Istanbul, Turkey, 15–18 September 2015.¹⁹

24. The vital statistics system derives its data from the civil registration system and the combined or separate statistical and civil registration forms (on paper or in electronic format) that are completed at the time of registration. The civil registration system brings in all the necessary information, both for registration and statistical purposes. Hence contact and interaction with local units (village, district and region) should originate from the registration office. The registration system unit responsible for field activities should consult with the committee and then initiate these contacts. In the centralized separate agency structure, the national-level body maintains the legal and statistical functions. Registration offices at the local level conduct registration activities, including the issuing of certificates, corrections, amendments and so on.

25. One advantage of having separate agencies for civil registration and vital statistics is that each agency can focus exclusively on the discharge of its own specific function. In addition, collaborative and constructive competition between the two agencies can result in more attention being given to managing each system in an effective and efficient manner. The joint or inter-agency committee maintains coordination of those separate system activities.

26. The separate agency structure has another positive feature in that it is more conducive to support for changes, modifications and improvements. Requests for resources are more often given greater consideration by government budget offices when support is requested by separate agencies for the same activity than when a single agency seeks support on its own. One negative aspect is the necessity for the two agencies to agree on the specific needs to be addressed and the resulting distribution of available resources. This is particularly the case when the civil registration agency views the statistical function as just another by-product and not a critical component.

27. Agreement between the two agencies may be difficult to reach on any number of issues. For example, when civil registration and vital statistics systems are both automated, there could be duplication of data entry and other processing activities, not to mention incompatibility of the technologies applied and the need for harmonization. There could also be problems reaching agreement on the data-collection process, the forms used and the data items included, the definitions employed and the procedures for assessing the completeness, validity and accuracy of information. Those issues are best resolved at the time the memorandum of agreement is drawn up and through the established committee responsible for addressing such issues and concerns.

28. Within a centralized system, the major difference between a system where a single agency is responsible for both civil registration and vital statistics and one with two agencies is the need for a legal mandate for cooperation and coordination or official agreement and a coordinating committee. The combination of committee and agreement assures each system an operational structure that can produce high-quality results.

2. Single agency for civil registration and vital statistics

29. Another type of arrangement for the civil registration and vital statistics systems is for both responsibilities to be placed in a single government organization, based on the reasoning that the two systems are closely linked. Vital statistics come from data on combined civil registration and vital statistics forms, or from the pairing of civil registration forms with statistical forms filled out at the time of registration. Their completeness and accuracy depend on the data collection and data processing methods used in registration. It is more efficient to maintain control of the forms and processes within a single organization. For example, in countries in which a single agency is responsible for both systems it is easier to operate with a single data-collection form that combines data for both legal and statistical purposes.

¹⁹ All documentation available at: https://unstats.un.org/unsd/demographic/meetings/wshops/Turkey/2015/list_of_docs.htm.

30. The advantage here is that the agency responsible for both systems controls any modifications that will affect either system, thus eliminating the need to resolve differences about the systems between the agencies. This approach is also conducive to closer intra-agency collaboration and means that effective changes can be made more swiftly.

31. A committee made up of representatives from both the civil registration and the vital statistics units within the agency can be very effective in providing guidance for monitoring and operating each functional area. While, in their daily activities, the civil registration and vital statistics units pursue their own specific goals, attainment of these goals and objectives is in a single agency setting.

32. The single agency approach also has the advantage of overall management of the total system of registration and vital statistics. A single agency in a centralized structure can initiate, develop and achieve each functional and operational task. Single administrative control allows for the appropriate distribution of staff and other resources. In those cases where the local staff are not employees of the central agency, the agency must provide regulations and standards for the operational aspects of the system, ensuring that local offices operate in a manner consistent with central office protocols. The assignment of local offices and local registrars to carry out registration activities in the different geographical areas is essential for an effective system.

33. Direct control over each component of the system enhances the ability to operate the system in an efficient and cost-effective manner. A single administrative agency with oversight over both civil registration and vital statistics is in a good position to accomplish such efficiencies. The design of forms, the selection of data items, the development of coding structures, the establishment of processing methods and the choice of statistical measures and indicators are more efficiently executed within a single agency. A more focused, coordinated and uniform approach is also followed to the development and use of contemporary information technology. A single administrative body can more effectively provide services to the public, the research community and other government programmes.

34. In a centralized system, the primary resources for operating and maintaining the system at the national level are concentrated in a central office. It is important to note that, under a single, centralized system, the designated central agency has responsibility for each operational and functional activity conducted by offices at the national, regional and local levels. This makes the registration activities at the regional or local levels more consistent. The centralized national structure minimizes any local bias or difference in process.

35. The central agency needs to establish an organizational structure with specific operational roles clearly defined at each level. It also needs to establish, at each level, standing monitoring and evaluation protocols to assure the quality and completeness of data collection and the timely reporting of vital events. A centralized programme presents a systematic structure with all parts of the programme within a single administrative unit. This will result in a unified programme, with all operational units functioning in accordance with a single, coordinated mode of operation. It will provide both the necessary registration services to the public and will produce the vital statistics for national, regional and local use.

36. As the centralized registration authority, the agency directs civil registration throughout the country. It also sources vital statistical data from the civil registration forms, on such matters as births, deaths, fetal deaths, marriages and divorces. The data derived from those records and used for both registration services and vital statistics are reviewed, validated, coded and processed at the central site. This ensures that standards and criteria are used for both registration and vital statistics needs in a consistent fashion and represents a very important attribute of the system.

37. The national system may use district and regional offices to direct the flow of records from the local registration offices. The offices at each level may retain copies of the records completed for each vital event to provide services to the population. The national office, however, prepares the vital statistics derived from those forms and then provides the information to users at different levels.

38. Thus, within the single agency configuration, the registration functions of record retention and copy preparation for public access may occur at each level of government – local, district and regional. The vital statistics component is primarily a national office activity. As district and regional offices develop the ability to prepare vital statistics data locally, some efficiency may be gained if the units abstract data from the registration records as they pass through their offices on their way to the national office; this would become an even more efficient and routine operation if the system is digitized.²⁰ This flow of registration records provides an incentive for local units to develop the capacity to use the data in a proactive manner, while also playing an active role in civil registration.

39. Since the centralized system has both civil registration and vital statistics functions, it serves as the single source for information from either system. Thus other agencies, both public and private, and related programmes may seek direct access to the centralized data source. As the harvesting of anonymized microdata is becoming one of the major sources for the detailed analysis of population dynamics and for related economic and social research, the consolidation of all the records under one roof enables the more stringent development of protocols on the use of microdata and protection of their confidentiality and privacy. In addition, this makes all the processes more effective and eliminates the difficulties in resolving differences between various aspects of the system which could arise if the components were divided among a number of agencies.

40. The centralized single agency configuration may give rise to concerns as to whether there is adequate representation and access for other programmes or government agencies seeking both registration and statistical information. The health sector, in particular, other statistical and research organizations and government agencies in the social and health service areas all rely to some degree on information from the registration and vital statistics systems. Input from those disciplines is essential, so the single administrative agency will need to formulate a comprehensive programme to meet their needs.

41. In more general terms, this concern can be addressed through the establishment of an inter-agency committee, with representation from appropriate programmes and organizations. The committee may include such programmes as maternal and child health, family planning, social services, population registers, identity management agencies, electoral rolls, immigration and naturalization, demography and population dynamics, and police. In this way, the needs and issues of other programmes can be included as part of the administration and operation of the registration system.

42. Another possible disadvantage of the single-agency approach is related to the agency's need to reconcile two different methodological concepts in discharging its official responsibilities; the civil registration method is oriented to a case-by-case approach, which refers to applying rules and regulations according to the facts and characteristics of each particular situation. The statistical approach is all about the quantification of individual cases into aggregates, in which process each entry is given equal treatment. Translated into the operational arrangement, this difference is reflected in the necessity for much closer and much more frequent interaction of registrars with the public – an interaction which is not really necessary in the production of statistics. Hence, if a single agency approach is chosen, additional efforts will have to be made and structures established to accommodate the efficient delivery of both functions.

C. Decentralized administration of civil registration

43. Decentralized civil registration has more than one model – in fact, the distinction is made based not only on the manner and institution or institutions administering the registration of vital events, but primarily on the uniformity of procedures, protocols, content of records and harmonization of processes. For example, in a number of European countries the actual registration of vital events and the issuance of relevant certificates are the sole authority of local governments, such as municipalities, and in most cases even the funding for

²⁰ See chapter VII below.

these services comes from the local government budget; at the national level, however, the civil registration law and accompanying regulations ensure that the registration process, in terms of procedures, content and all other aspects is identical. Accordingly, while the actual administering of civil registration is decentralized, that is, without a national agency and accompanying hierarchical structure, the registration process is uniform in terms of protocols, deadlines, forms, and certificates and so forth.

44. In another model of a decentralized administration for civil registration, civil registration is administered at the level of the major civil divisions, such as the state, province or department. In the capital city of each major division, an authority for civil registration is established to direct and monitor the civil registration work of the major division. Many countries with a federated political system, a large territory or a large population may adopt this mode of decentralized administration for civil registration. See box 1 for an example of this model, from Canada.

Box 1

Canada: decentralized system of civil registration and vital statistics

Canada's national vital statistics system is based on cooperation and collaboration between the 13 provincial and territorial registrars and the federal Government represented by Canada's central statistical agency, Statistics Canada. Together, they form the Vital Statistics Council for Canada, the advisory group governing civil registration and vital statistics in Canada.

Civil registration of births, deaths, stillbirths and marriages is the responsibility of the provinces and territories. Each operates under its own provincial or territorial vital statistics act. The collection and dissemination of national vital statistics are the responsibility of Statistics Canada, whose operation is governed by the federal Statistics Act.

The provincial and territorial vital statistics registrars collect data on births, deaths, and stillbirths and send an agreed upon subset of these data to Statistics Canada using the National Routing System. The National Routing System was developed as a joint partnership between three federal departments, Statistics Canada, the Canada Revenue Agency and Service Canada, to enable the vital statistics registrars to provide information to the three federal departments by using common technical and data standards. Use of the National Routing System makes it possible to transmit data in close to real time.

45. Although recommended, not all countries with decentralized systems for the administration of civil registration have adopted uniform legal provisions and procedures for civil registration. A number of such countries have made provisions to develop a model law and implementing regulations, so that each major civil division may promulgate its own laws and regulations on the basis of that model. It is recommended that a model law be developed and that each subnational jurisdiction be encouraged to follow it. This model law should cover data access issues, in order to facilitate the national compilation of vital statistics. More detailed guidance on the legal framework may be found in section D of the present chapter.

46. It should be noted that the processes of producing and disseminating vital statistics, along with the standardization of identity management at the national level, where the administration of civil registration is fully decentralized, usually requires at least one agency at the national level to enforce and standardize the work of civil registration and vital statistics, and another to handle identity management and the issuance of resulting legal tenders (passports, for example).

47. Within a decentralized administrative structure for civil registration, the organizational options for the vital statistics system may be centralized or decentralized. A centralized system refers to a model whereby there is a national statistical office at the central level of government in charge of consolidating all inputs from various institutions at the subnational level. This approach requires strict compliance with harmonized definitions, classification and data formats.

48. Another configuration is represented in some of the other models in place today. In this decentralized structure, the state or provincial government has responsibility for both civil registration and vital statistics within its jurisdiction, independent of the national Government. The individual states or provinces make arrangements with the national Government to provide data, which are then aggregated at the national level. Those data are used to prepare national vital statistics and civil status information, and to address national issues related to legal, health and population programmes. A national government agency is designated to conduct the vital statistics system. In any event, there must be only one entity entitled by law to publish official statistics and figures.

49. As mentioned above (see paragraph 46), in decentralized systems it is essential to establish relationships between the states or provinces and the national government organization responsible for the use of the national data for vital statistics purposes and national civil registration information. In any decentralized modality, collaboration at all levels is key to avoiding fragmentation. There is a need at the state or provincial level for consistency in the interactions of civil registration with national programmes. Such programmes as immigration and naturalization, identity management, passport control, national health and social benefits, population registers, education, conscription, identification services and electoral rolls may have requirements with which civil registration must be consistent.

D. Legal framework for civil registration and vital statistics²¹

50. Establishing the legal basis for civil registration and vital statistics systems requires the incorporation of definitions of each element and component into the statutes, rules and regulations of the country. These must cover all the administrative and technical aspects of establishing, operating and maintaining the systems. The civil registration and vital statistics statutes may be set out in sections of the law related to the specific ministries that are responsible for notification, registration and statistics. When more than one agency is involved, the specific functions of each should be defined in the law covering that agency.

51. It must be noted that the legal aspects of the civil registration system and the vital statistics system are very different in nature and purpose. They are frequently subject to different laws, often conflicting. The most practical means of addressing this conflict is via lower-level legal instruments, such as rules and regulations, memorandums of understanding among agencies and so forth. Conflicts between laws can also be resolved through legal reforms; the associated legislative processes, however, may take a long time.

52. The specific definitions relating to birth, death, fetal death, marriage, divorce, adoptions, legitimations and other vital events, and the related reporting time periods are essential for an effective programme. The United Nations specifies that the definitions should be consistent with international standards.²² The stipulated time frames for the registering of events must be sufficient to ensure that the information is complete, accurate and consistent with other related functions of the system. The law should also specify some type of punitive action should the responsible reporting sources and registration units fail to comply with requirements.

1. Organizational infrastructure and related legal status

53. When there is a centralized structure and the national registration office administers the registration system, the legal requirements of the national office can directly address all registration activities. If, however, the registration programme is under the auspices of another agency, such as the ministry of health or internal affairs, the legal issues may be included in the relevant sections of the national laws governing that agency.

²¹ The issue of the legal framework is thoroughly examined in the *Handbook on Civil Registration and Vital Statistics Systems: Preparation of a Legal Framework* (United Nations publication, Sales No. E.98.XVII.7) and its first revision, *Guidelines on the Legislative Framework for Civil Registration, Vital Statistics and Identity Management Systems* (United Nations publication, forthcoming).

²² *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 2.

Conversely, the national civil registration law may indicate the roles and responsibilities of the various ministries. The differences resulting from this diversity of administration approaches are described below.

54. For the decentralized structure, the legal framework is set out in the laws of the state or province. In cases where the national Government establishes specific requirements for registration, then the state or province must also incorporate these into its laws. When the national Government is not involved in the registration system, the state or province forms the laws laying down specific requirements for the programme. In instances where city or regional offices control the registration process, the state or province establishes requirements for the local programme.

55. Laws are, almost without exception, adopted by the representative body and usually require considerable time for adoption. Hence rules and regulations – enacted by the executive branch of the Government – are often used to deal with specific issues identified during the operation of the registration programme. The registration units generally develop such rules and regulations. They address legal issues, such as delayed registration, adoption, paternity or other record changes that occur after the original recording of the event. The use of rules and regulations ensures the more timely operation and adaptation to real-life circumstances.

56. There are specific issues that should be covered by these laws at every level, including matters relating to adoption, filiation, procedures for corrections and amendments, paternity, delayed registration specifications, legitimation and civil status. The law, rules and regulations should also cover such issues as access to records, confidentiality of selected information, fees for record searches, copy preparation and changes, and the security, storage and retention of records. For all these issues, the law should also specify details and requirements regarding the different formats in which the registration records might exist (paper and different electronic formats).

57. The legal framework should define the required legal documents, court decisions, and other information sources acceptable for adoption and filiation. The laws should address access to the registration records for vital statistics purposes and research activities (more information on confidentiality requirements may be found in chapter VI, paras. 486 ff.). It should define permissible use of the records by health programmes and other government agencies for administrative purposes. The law should specify fees for certain activities, such as late registration, certified copies, legal changes to the record and the preparation of data for research, and also for legal or administrative uses.

58. Many countries include the above components in the laws governing their existing legal and administrative system. The first step to be taken in streamlining the civil registration and vital statistics systems is to obtain information concerning the current legal structure. Then an analysis should be made to determine that the necessary components are present for sound civil registration and statistics systems. If the analysis indicates deficiencies in the legal framework, a thorough revision of this framework should be made and government support sought to enhance the law and regulations. This may take time but it is a fundamental step.

59. When working to improve the civil registration law and regulations, vulnerable groups such as refugees and internally displaced and stateless persons should not be overlooked: civil registration should cover the whole population of a country, including those who might not be citizens or recognized permanent residents, yet this is often not the case. Some countries have discriminatory laws and practices which do not allow certain groups to register their vital events. It can also happen that displaced persons are not aware of the importance of registering vital events or have no access to the national systems because of financial, social, or physical barriers to civil registration. There could also be a reluctance to register because of fear of being expelled or suffering other negative consequences. Making provision for refugees and internally displaced and stateless persons in the legal framework of civil registration and vital statistics will help to ensure their protection and integration in the country of refuge and in the event of their repatriation. It also helps to combat human trafficking.

2. Purpose, function and utility of a legal framework

60. The inclusion of the components of a civil registration system in the laws of the country or a particular state or province serves a number of very important purposes. It makes specific agencies responsible for registration activities and for establishing and maintaining reporting systems. It specifies standards and quality control conditions for the use of the records and information collected through the system. The legal framework also offers a consistent and structured basis for performing all the tasks associated with the legal uses of the records of events. Legally underpinning the programme in this way is essential to ensuring its ability to operate successfully throughout the country.

61. Another important purpose of the legal framework is to ensure that the registration system is a high quality data-collection medium for the development of vital statistics. The legal framework for the civil registration system establishes a continuous source of information, serving a broad range of activities and programmes. Thus the legal framework should also specify the conditions for data sharing with other government agencies. Without a legal basis for the system, the continuity, quality and consistency of reporting can over time be affected by changes that have an impact on resources and staff. The system's operation is sustained by the fact that registration is a legal requirement.

62. The specific provisions in the sections covering registration in the laws, rules and regulations ensure that information is provided to the population. Individuals and families can determine what steps must be taken to resolve problems arising in connection with the registration system. The law provides the public with a description of required legal documents, information sources or court actions to address a particular issue. If those specific areas were not covered by the law, it would be difficult to determine what actions or strategies to take.

63. A legal framework for the processes and procedures of civil registration ensures that results are comparable throughout the country. For this purpose, the law provides detailed descriptions of the registration functions, thus preserving the integrity of the system and guaranteeing that legal issues, wherever they arise, will be handled in a consistent manner. Whether the issues being addressed occur in different geographical locations, under different administrative conditions or for whatever social or economic reasons, the use of the legal specifications (set out, for example, in rules and regulations) applicable to the issue remains constant. For this reason, it is important that the items in the laws that address registration issues should be carefully reviewed.

64. Establishing the civil registration programme within the laws of the country, state or province serves multiple purposes and will ensure an effective, consistent and productive system. The benefits are clear. But significant difficulties can arise if only portions of the system are incorporated into the laws, rules and regulations.

E. Civil registration, population registers and vital statistics²³

65. The term “population register” is defined²⁴ as “an individualized data system, that is, a mechanism of continuous recording, or of coordinated linkage, of selected information pertaining to each member of the resident population of a country in such a way to provide the possibility of determining up-to-date information concerning the size and characteristics of that population at selected time intervals”. Thus the population register is the product of a continuous process, in which notifications of certain events, which may have been recorded originally in different administrative systems, are automatically linked on a current basis. The

²³ Substantive portions of chapter III of the *Principles and Recommendations for a Vital Statistics System*, Rev. 3, are incorporated in this subsection; as this is only a summary, readers interested in the full text are encouraged to refer to the original.

²⁴ *Methodology and Evaluation of Population Registers and Similar Systems* (United Nations publication, Sales No. E.69.XVII.15), chapter I.A.

method and sources of updating should cover all changes so that the characteristics of individuals in the register remain current. Because of the nature of a population register, its organization, and also its operation, must have a legal basis.

66. The linkage of the population register with the civil registration system makes it possible to reconstruct the history of the life events of single individuals. When the date of the events is properly recorded, this high level of detail can also be used for the estimation both of the duration of a demographic state (for example, duration of such states as “married” or “parity one”,²⁵ and so forth) and of the related probabilities of transition, and also for longitudinal studies. In addition, it may make it possible to define specific geographical aggregates of interest, such as population living in the coastal areas, or in particular disadvantaged localities, whose boundaries do not necessarily conform to the administrative boundaries.

67. In practice, a population register cannot be described as such without being linked with the registration of vital events, which constitute information fundamental to its updating, together with changes of address. In this respect, population registers are a kind of continuous census, encompassing the structure of the population at any given point in time, with all modifications occurring within it on a moment-to-moment basis. For example, the population register makes it possible to produce population stock information – in other words, information on population by sex and age – at any given time. In a perfect system, the accounting of the demographic balance would be intrinsically correct for any given interval of time, be it a year, a month, a week, and so forth. In fact, however, factors such as registration delays, lack of coordination, difference in definitions, among others, may diminish the quality of the population register. Thus making the civil registration system a vital component of a computerized population register would offer the most appropriate and advanced means of generating relevant, accurate, timely and comprehensive vital statistics. While building such a system would initially be resource-intensive, its dividends would extend over a prolonged period of time.

68. For decades, population registers have been effectively used as a statistical data source and they may be considered the logical product of the evolution of a civil registration and vital statistics system. The interest in population registers dates back to the nineteenth century, when the International Statistical Congress recommended their introduction.²⁶ Some forms of population registers already existed in various societies at that time and, over the course of the nineteenth and twentieth centuries, several countries subsequently established such systems. Full exploitation of the population register as a statistical source, however, has become more feasible with computerization.

69. The essential premise of population registers and their functioning is that the civil registration system is uniquely positioned to provide reliable data to be entered into the population registers. Specifically, population registers are initially built up from an inventory of information on the inhabitants of a certain area (often census information) and the continuous updating of the facts of births, deaths, adoptions, legitimations, recognitions, marriage, divorce, annulments and judicial separations, change of name or sex, and change of residence.

70. Information about place of residence is an important part of a population register. It is recommended that the definition of usual place of residence to be used should be that found in the United Nations *Principles and Recommendations for Population and Housing Censuses*,²⁷ to ensure consistency with international standards. Information on residential address is used at the subnational level for administrative and statistical processes. Address changes are usually reported to the population register by the residents themselves and, in

²⁵ In demographic contexts, the “parity” of a female at a given point in time may be defined as the number of live births of babies to the female up to that point.

²⁶ See *Report of the Delegates to the International Statistical Congress held at St. Petersburg in August, 1872* (Washington, D.C., Government Printing Office, 1875), p. 46.

²⁷ *Principles and Recommendations for Population and Housing Censuses*, Rev. 3, 2015, (United Nations publication, Sales No. E.15.XVII.10), available from https://unstats.un.org/unsd/publication/seriesM/Series_M67rev3en.pdf.

certain countries, this is required by law (or rules and regulations). This is the case in such countries as Bhutan, Mongolia and Norway.²⁸ Furthermore, in some countries, a married spouse is not allowed to register a change of address if it is not also registered by the other spouse (for example, in Norway).

71. The incentive for registering a change of address is provided by the need to receive mail, income cheques and social security transfers, and to exercise the right to vote in local elections. There may be cases where residents may try to avoid registering a change of address, such as when they move to an area with a higher tax rate, or when there are tax deductions associated with the costs of commuting.

72. It is, therefore, of paramount importance for the quality and the usefulness itself of a population register that it be continuously updated. For this purpose, the authority operating the population register must at the very least receive timely information about live births, deaths and changes of residence (including of immigrants and emigrants). An efficient connection with the civil registration authority is therefore a fundamental element for the proper functioning of the population register. In this context, see box 2 for a brief description of the Central Population Register of Norway.

Box 2

Norway: population register

The Central Population Register of Norway was established in 1964, based on the 1960 population census. A unique 11-digit PIN was introduced at the same time. The register includes everybody who has ever been a legal resident of Norway since 1960, regardless of their citizenship. Persons who die or emigrate are not deleted from the register, but the code indicating their status is changed.

The most important stock (or status) variables in the Central Population Register are: PIN (includes date of birth and sex), residence status (resident, deceased, emigrated, no permanent address, disappeared), address, municipality, dwelling number, place of birth (municipality or country), name (including first and middle names), surname prior to marriage, citizenship, country of immigration, country of emigration, marital status, PIN of spouse, mother and father.

All vital events and also migrations and address changes are logged in the Central Population Register. The most important flow variables are births, deaths, marital changes (including same-sex marriages, separations, divorces and annulments), emigrations and immigrations, internal moves in Norway, address changes, name changes, citizenship changes, gender changes and PIN changes. When a report of a change is received by the register, a check is carried out, for example, that the spouses of a new marriage are not already married.

The inclusion in the register of the PINs of parents and spouses makes it possible to establish links between siblings, cousins, children, grandparents and other relatives. This is very useful for statistics and research in such areas as hereditary diseases and behaviours (e.g., early childbearing and marriage, divorce, and long life).

The PIN is used in a large number of other administrative registers, which makes it possible to link information in different registers for statistics and research. The Central Population Register is also used to draw samples for sample surveys. The contents, coverage and quality of the administrative registers have become so comprehensive that it is no longer necessary to conduct traditional population and housing censuses for statistical purposes. The last regular census was conducted in 2001, whereas the 2011 census was completely based on register data.

73. It has to be stressed that the primary function of the population register is to provide reliable information for government administrative purposes, particularly for programme planning, budgeting and taxation. The registers are also useful in other administrative areas, such as establishing personal

²⁸ For the procedures to report an address change in Norway, see www.skatteetaten.no/en/person/National-Registry/Moving/.

identification,²⁹ voting, education and military service, social insurance and welfare, and for police and court reference.

74. In general terms, a population register is not required to be an itemized list (either in paper or electronic format) of individuals, which is made available in a defined place. A population register can take the form of a network of local registers, but they need to be linked in a coordinated way. Furthermore, an overall, consolidated population register may well refer to units other than individuals (such as families), but in such a way as to ensure that the information related to individuals within such units is also always retrievable. To assist in locating a record for a particular person, household or family in a population register, an identification number could be provided for each entity.

75. At the minimum, a population register includes an array of individuals with whom the local or national administrations of the country need to communicate. Although the national population register may very well be a virtual entity created by linking together population registers established at the local level (following the decentralized system), its overall geographical coverage must include the entire territory of the country. If this condition is not met, the national population register will not be an appropriate system for the production of statistical data for the country.

76. Likewise for specific territories, the entire resident population, regardless of migration status, must be included in the main population registers, whether these are centralized or local. At the same time, over-coverage errors may occur in a population register if data are not properly filtered during the data compilation process. For instance, in a decentralized system based on local registers there may be a higher risk of the duplication of records of individuals when the data are consolidated at the national level.

77. In the recent practices of countries and areas introducing and maintaining population registers, assigning a unique identification number, most commonly referred to as a personal identification number, or PIN, to each individual upon birth and retiring it only after the individual's death, has proved to be a critical instrument for ensuring the quality of individual information, the linkages between various registers, the avoidance of duplication and more reliable control of the quality of the registers' content. The importance of the PIN is even more pronounced in the context of identity management mechanisms that are being developed in a growing number of countries for the purpose of issuing secure identification to all.

78. From the point of view of generating regular, accurate, timely and reliable vital statistics, the introduction and functioning of population registers represent a substantial step in the right direction. As noted above, population registers are operated by the government for administrative purposes; this approach results in systematic procedures where all the protocols and responsibilities of all involved institutions (public and private health institutions, registrars, population registers' operators, official statistical offices) are well developed and integrated as everyday routine. Population registers used as a source of vital statistics ensure up-to-date access to individual information, together with an opportunity to link individual information with other sources of data, enhancing the quality of the information in the process.

79. For example, a significant advantage of computing vital statistics from population registers is the possibility of directly calculating specific demographic rates with potentially no numerator-denominator bias. For instance, it could be possible to compute specific fertility rates for particular disaggregations, such as employed or immigrant women, parity progression ratios, life expectancy by educational attainment, indicators on mixed marriages by ethnic group or foreign background, and divorce rates by social and economic class of the spouses. This requires full matching between civil registration and population register data and the same level of detail of information in the two sources, meaning that the certificate of the event (such as birth) must contain the same topics (variables), with the same classifications, as those available in the

²⁹ Further details of the relationship between civil registration, population registers and identity management systems may be found in section F below.

population register. In general, the use of the population register widens the chances of correctly identifying the population at risk of an event.

F. Civil registration, identity management and vital statistics

80. While there is no internationally agreed definition of identity management, the term most commonly refers to the issuance of a proof or legal tender of identity to each individual and the maintenance of systems for managing information and documents associated with such identity. Various estimates have been made of the number of people in the world without any official confirmation of their identity. Irrespective of the sources of such estimates, in all cases a substantial number of people are unable to prove their identity and, accordingly, to gain access to a number of services, including both government and private sector services.

81. With the accelerated development of advanced technologies for identity management, increased prominence is being gained by such concepts as “digital identity” for all individuals, building on the original notion of individual identity, which was primarily analogue in nature and expressed in the form of such physical documents as birth and death certificates. The computing power extraordinaire available nowadays to both public and private institutions enables the extremely fast and efficient manipulation and processing of those digital identities for a large number of different purposes, including taxation, education, conscription and state security, to name just a few. Thus growing importance has been attached to the development and implementation of modern identity management systems as a tool for protecting and serving the population.

82. At the same time, this is by no means a one-way process that serves only the government’s administrative and related purposes; quite the contrary: documented personal identity is an essential prerequisite of the present-day social and economic paradigm. Without it, individuals are deprived of access to services that are or may be available to them, from basic health care to banking accounts. That fact alone, properly presented and documented, provides a powerful incentive for eventually achieving the ultimate goal of leaving no one behind.

83. In that context, and in line with the third revision of the *Principles and Recommendations for a Vital Statistics System*,³⁰ the essential purpose of civil registration is to furnish legal instruments of direct interest to individuals. Societies today, even the least developed among them, exhibit considerable complexity in interpersonal relations and increasing bureaucratization in dealings between individuals and the State. Hence it is important, to ensure certainty in legal matters, that individuals be provided with probatory instruments which allow them to prove, with ironclad certainty, the facts relating to their existence, identity, and personal and family situation. The principal reason for the existence of civil registration – its basic purpose and one that must be facilitated by the State – is to serve as an institution capable of disclosing facts relating to civil status based on technical legal principles, through which individuals can be assured of the legitimacy and authenticity of civil status-related facts in order to accredit them to other individuals or the administration itself, by means of public registration documents known as certifications.

84. Consequently, in the contemporary paradigm, civil registration provides both the certification of identity for a newborn child and also critical entry into the identity management system, whether through the stand-alone population register or, in the case where population registers are subsumed by the identity management system, directly into it. At the other end of the life cycle, civil registration also plays a critical role in notifying the occurrence of deaths to the population register and the identity management system, so that the records can be amended accordingly and those identities are withdrawn or marked as “deceased”.

85. Moving on from there, the identity management agency will, in due course, add layers of additional and relevant information, as prescribed by law, including photographs, fingerprints and other biometric elements. The issuance of identity cards, which, in turn, will give individuals access to government and private services, together with other documents, such as drivers’ licences, passports, bank cards and so forth, will be within the

³⁰ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 286.

authority of the identity management agency. In a number of countries, the integration of the civil registration system with the identity management system has been a key factor in the creation and maintenance of a secure, efficient and interoperable population data system. This integration has reaped benefits for both the government and individuals in terms of access to social rights, improved control of public expenditures and improved underlying data quality for the production of vital statistics.

86. In countries where the civil registration system has been neglected for prolonged periods of time, the identity management agency will initially have to respond to a particularly substantive challenge: issuing identity documents to living individuals, both adults and children, whose birth was never registered or who never received their birth certificates. Thus the agency will have to develop mechanisms to ensure the registration of every single birth – and every single death – in the country, while at the same time issuing identity documents to those that never had one. This in particular affects late birth registrations that need to be tabulated separately from the current events. It is important to have provisions in the law that allow for the registration of deaths of individuals whose births had never been registered. Ultimately, however, it is expected that the agency will turn its operations into routine procedures for issuing birth and death certificates and identity cards.

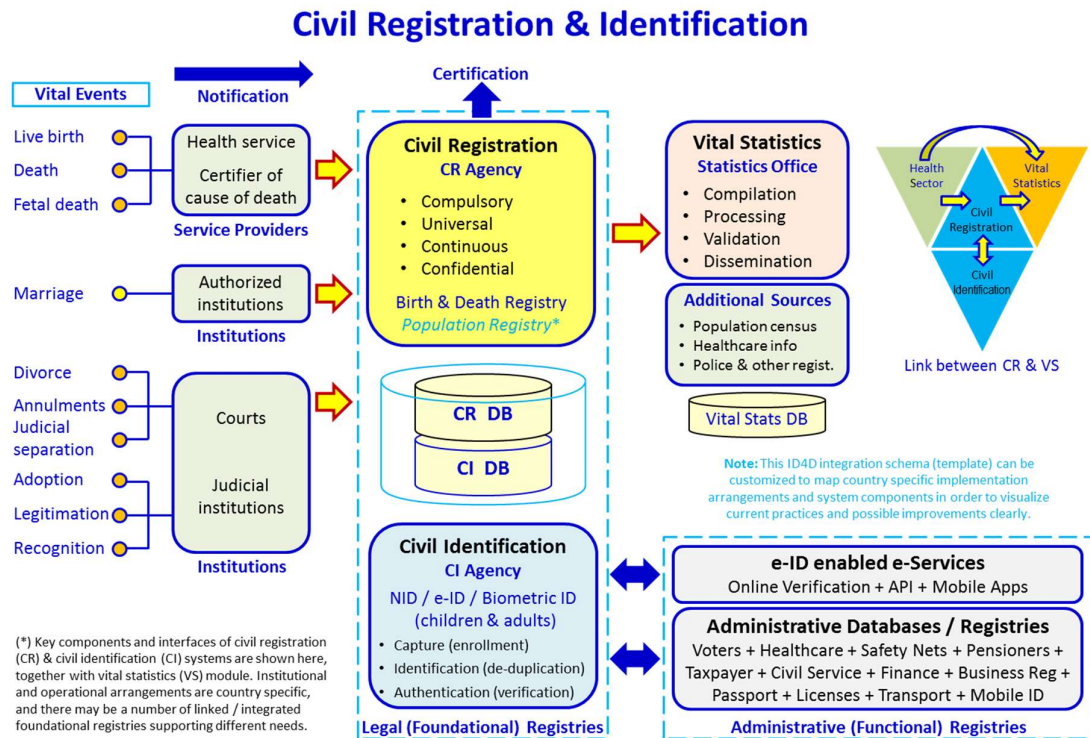
87. Another challenge faced by an identity management agency, in particular if it has subsumed the civil registration function, will be to ensure the production of regular, accurate and reliable vital statistics. All the information regarding the occurrence of the event and the characteristics of the relevant stakeholders as per international statistical standards need to be incorporated into the reporting protocols and procedures. Establishing the regular channels of communication with the national statistical authority is yet another critical component of the whole process of instituting a holistic civil registration, vital statistics and identity management system at the national level.

88. Figure 4 below presents one of the models that are currently being introduced and implemented in a number of countries developing holistic approaches to this process by linking the civil registration function, identity management and vital statistics function.³¹ By its very nature, the civil registration function, in terms of its legal implications, is still distinct as its procedures for issuing legal tenders related to civil status of individuals, by definition, require adequate and strict protocols. The establishment and maintenance of population registers, in this model, go hand in hand with the civil registration function. The vital statistics function remains with the national statistical authority, which is responsible for producing regular vital statistics based on records submitted by the population register or the civil registration agency.

³¹ Further information on identity management systems may be found in the CRVS e-learning course, available at <https://olc.worldbank.org/content/civil-registration-and-vital-statistics-systems-advanced-level-facilitated-1> and <https://olc.worldbank.org/content/civil-registration-and-vital-statistics-systems-basic-level-self-paced-format>.

Figure 4

Overview of the civil registration, vital statistics and identity management interlinkages



Source: Civil registration and vital statistics e-learning course, World Bank Group Open Learning Campus, 2017.³²

89. The underlying logic of this model, as in the civil registration and vital statistics systems that were developed in a number of countries at the end of the twentieth century, is that the occurrence of all vital events, such as births and deaths, and all their relevant characteristics, is reported by the authorized and responsible institution to the civil registration authority; the civil registration authority verifies the actual occurrence of the event and the identities of persons involved, officially registers the occurrence of the event and issues a certificate that is a legal tender; it also collects all the relevant information for statistical purposes and forwards it to the national statistical authority. The civil registration component then makes an entry in the population register based on the change in the civil status of the individual concerned. The identity management agency uses the population register to provide additional biometric information, as prescribed by law, and to maintain the civil identification database, together with issuing the basic personal identity document. In this model, assignment of a PIN to each newborn child and the retirement of the PIN of each deceased person (by flagging the PIN or changing its status from “living” to “deceased”) is the function of the civil registration component. The assignment of a PIN to each registered person makes it much easier to link the occurrence of vital events to particular individuals, notwithstanding the requirement for a sound legal underpinning, data security and protection of confidentiality.

90. A number of countries³³ have integrated their civil registration, vital statistics and identity management systems. An important advantage of this model is that it makes it easier to assign a PIN at birth, rather than requiring individuals to reach a certain age before one is assigned (usually at age 15, 16 or 18, when they need to obtain an ID card). Late assignment of PINs makes it harder to capture children who die before the

³² Available at <https://olc.worldbank.org/>.

³³ Examples include Bhutan, Botswana, Mongolia and the Nordic countries.

threshold age and to link their deaths to other data sources, such as the population register. Introduction of a PIN at birth will increase registration coverage of infant deaths and improve estimates of infant mortality.

II. Civil registration operational functions and activities

A. Introduction

91. Irrespective of whether the civil registration function is established as an independent centralized or decentralized system or whether it is incorporated into the larger institution that also manages the identification of individuals, there are a number of operational standards that need to be established and set in operation. Consequently, this chapter looks at the specific details of the daily operations of the civil registration and vital statistics systems. Section B, “Functional components”, examines the detailed procedures for gathering, storing and editing information. Section C, “Civil registration system activities”, examines how to respond to the public and its needs concerning the vital records in the system. It also considers the needs of those who are reporting the data to the system, and discusses how to manage the use – and confront the fraudulent use – of personal documents issued by the civil registration authorities. Following this discussion, section C considers methods of integrating the functions of registration and statistics under the various structural arrangements explored in chapter I above. The section ends by considering how data are brought into the system, and how they are stored within it. Guidance on how to check data for accuracy and completeness may be found in chapter IV below.

92. As mentioned in the previous chapter, the national agencies in charge of vital statistics and civil registration are separate entities, but it is crucial that they be established, maintained and developed as components of a coordinated and coherent system for registering and producing vital statistics. In addition, the emergence of interconnections between civil registration and identity management systems adds yet another dimension to the structure of the civil registration and vital statistics system. A graphic representation of these relationships and functioning is presented in figure 1 (chapter 1). Civil registration is defined as the continuous, permanent, compulsory, universal recording of the occurrence and characteristics of vital events pertaining to the population, as provided through decree or regulation in accordance with the legal requirements in each country, with full respect for the rules regulating the protection and privacy of individual information.³⁴ It is important to highlight the quality of universality in relation to people’s rights regarding the registration of vital facts. Everyone has the right to be recognized as a person before the law, as enshrined in article 6 of the Universal Declaration of Human Rights and reaffirmed in several other global accords and international human rights instruments.³⁵ In this regard, laws, policies, rules and regulations must not be a hindrance to the realization of this right. In particular, the registration of events must be performed even if the time frame given by law has elapsed, regardless of migratory status, and any other request that may act as an obstacle to registering the vital facts that have occurred in the territory. Civil registration is carried out primarily for the purpose of registering vital events and therefore establishing documents in accordance with national law. The usefulness of these records as the best source of vital statistics is well established. The procedures for recording vital events are equally important for civil registration as a legal requirement and for vital statistics as a source of statistical information; hence the tasks performed by civil registrars and those of statisticians are interdependent.³⁶

B. Functional components

³⁴ *Principles and Recommendations for a Vital Statistics System*, Statistical Papers, Series M, No. 19, Rev. 3 (United Nations publication, Sales No. E.13.XVII.10), para. 279.

³⁵ 1948 Universal Declaration of Human Rights, articles 6 and 15; 1951 Convention relating to the Status of Refugees, articles 25 and 27; 1954 Convention relating to the Status of Stateless Persons, articles 25 and 27; 1961 Convention on the Reduction of Statelessness, articles 1–4; 1965; 1969 International Convention on the Elimination of All Forms of Racial Discrimination, article 5 (d) (iii); 1966 International Covenant on Civil and Political Rights, article 24; 1979 Convention on the Elimination of All Forms of Discrimination against Women, article 15; 1989 Convention on the Rights of the Child, articles 7–8; 1990 International Convention on the Protection of the Rights of all Migrant Workers and Members of Their Families, article 29; 2006 Convention on the Rights of Persons with Disabilities, article 18.

³⁶ *Principles and Recommendations for a Vital Statistics System*, , Rev. 3, para. 274

93. The present section describes the procedures for registering births and deaths occurring in various settings. Consideration is also given to special processing requirements, the matching of registration records, and the work of units for processing record changes and responding to users' requests.

94. The appropriate informant or source of information, and suggested alternates, in priority order of preference for the different types of vital event, are given below, based on the guidance in the third revision of the *Principles and Recommendations for a Vital Statistics System*.³⁷

Live birth and fetal death: The head of the institution (or designee) if the birth occurred in an institution, or the mother, the father, the attendant at the delivery, the nearest relative of the mother, or any other adult person having knowledge of the facts.

Infant death: The head of the institution (or designee) if the death occurred in an institution, or the mother, the father, the nearest relative of the mother, or any other adult person having knowledge of the facts.

Death of an adult person: The head of the institution (or designee) if the death occurred in an institution, or the nearest relative of the decedent, or any other adult person having knowledge of the facts.

Marriage: The bride and the bridegroom.

Divorce: Either one of the parties, or the petitioner of divorce.

1. How to register vital events

95. The manner in which the record of a vital event is registered and transmitted from where the event occurs to the civil registration and vital statistics system depends on three major factors that cause variations in the process. The first is the type of vital event involved: whether the event is a birth, a death, a fetal death, a marriage or a divorce will make a difference in the registration and transmission process. The second is the type of structure of the system: whether the system is centralized, decentralized or a local plays a key role in the registration and transmittal processes. The third is the place of occurrence: whether the event took place in a health facility or not.

96. Vital events may be registered by place of occurrence or by place of usual residence. Most countries have adopted the place of occurrence as the norm for the registration of births, deaths and fetal deaths. The registration of vital events by place of occurrence facilitates and accelerates the registration process. As electronic systems become more advanced and networked within countries, a degree of flexibility is possible, allowing registration at any point from which the registrants can gain access to the system. This can improve access and therefore coverage. In any event, when recording information, it is important to include both place of occurrence and place of residence, so that tabulation by both places can be produced.

(a) Registration of births

(i) Birth in a health facility under a centralized system

97. In this case, it is best to use the hospital's medical record procedure for the reporting of the event to the local registrar. Information is gathered from the mother using a birth notification form (or a medical certificate form) to supply answers that will be placed on the official registration record. If the birth notification includes statistical data, medical information may be sought about the prenatal history of the mother. In any event, it is best to obtain data from records submitted to the hospital or medical records unit by the patient's doctor just before the expected delivery date. The information required for legal purposes of the birth registration is a subset of the information that may be provided in the birth notification form, which in all likelihood will include a great deal of health statistics information, such as birth weight, type of birth, and so forth.

³⁷ Ibid., para. 355.

98. The completed document should include certification by the hospital administrator or that person's designee that the birth did take place as stated in the document. This provides the evidentiary proof that a birth has occurred on that date.

99. The hospital keeps a copy of the notification form, gives another copy to family members and then sends the original notification form to the local registrar (by physical or electronic means). The local registrar reviews it for accuracy and completeness, then prepares the registration record (which is, in principle, different from this notification form as it includes additional information that accompanies all official records) and signs or approves it (physically or electronically). The birth is now considered registered and the birth certificate is issued. The local registration office retains a copy of the birth record and files it so that the registrar can issue copies of it. In view of the possible legal implications, the registration system requires the act of registering a birth to be a formal one, performed by the parents or authorized persons and based on a birth notification form certified by the hospital, medical doctor or midwife who attended the birth. Although the presence of both parents is important, efforts (at administrative or regulatory levels) need to be made to remove obstacles to the registration of births out of wedlock, as the civil registration system should be universal.

100. The process of hospitals reporting events to the local registrar can be very efficient in terms of information quality and timeliness. This may be affected, however, by the extent to which hospitals comply with the requirement to forward notifications to the registrar. This is particularly relevant in countries where health care is provided by private and public institutions, or where the health sector is fragmented. The procedures of some health institutions may be stricter than those of others. This highlights the importance of defined roles and data-sharing between health and registration authorities (in both directions) to avoid processes that are onerous and discourage completion of registration topics. An impressive solution to this problem is offered by the Jamaican bedside registration system described in box 3, where registration is completed at the bedside and hospital records can subsequently be updated with the legal identity of the child.

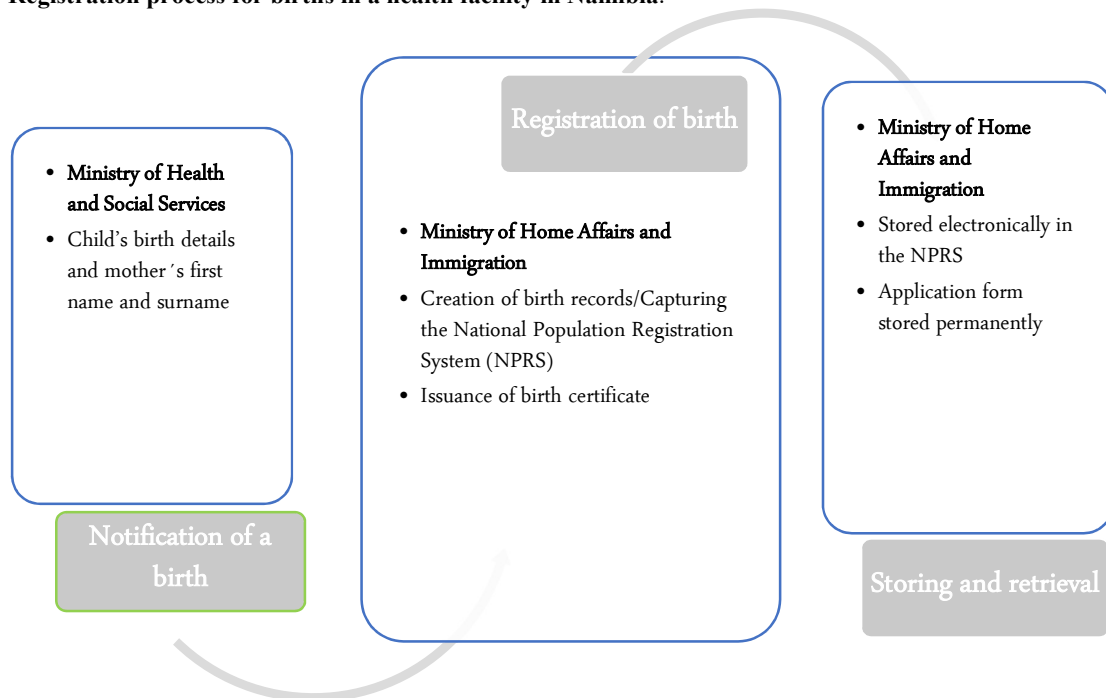
101. If the civil registration of the country is not automated at all, or only partly automated (only in major cities, for example), the copy of the registration record that remains at the local office may be a photocopy, a carbon copy or an entry in a bound book – and it should be recalled that entry in such a book would require the preparation of a separate statistical birth form. The original record is then forwarded to the national registration office or authority for review, indexing, processing, storage and other procedures. If the national office also operates a statistical system and uses a combined civil registration and vital statistics form, the civil registration office can forward the birth record once it is computerized. In order to avoid duplication, normally the civil registration authority at the central level has the responsibility to report to the national statistics office. In countries where there is no Registrar General, the civil registration offices at subnational level (state, province or other major civil division) report to the central level statistics authority. Regardless of how a country and its civil registration and vital statistics system are organized, to avoid having fragmented or duplicated flows of information, it is essential that the approach be holistic and integrated.

102. These days, all the transactions and transmissions are expected to be digital, using local area networks or the Internet. Upon the occurrence of the event, the hospital will send an electronic notification form to the local registrar, who will verify the information for accuracy and completeness, log it as an official registration record and issue the birth certificate to the family; that registrar will then forward the record to two addresses: the central civil registration authority and either the provincial or central statistical service (depending on the arrangements and the structure of the national statistical system). The central authority will maintain the civil registration database and will submit it as an input into the national identity management system on a regular basis – a daily update is now the frequency of choice in many national settings (as an example, see the process map for the case of Namibia in figure 5). In the digital scenario, it is much easier to assign a PIN at the time of the registration of birth.

103. In principle, locating a local civil registration office within a major hospital or health facility where the births and deaths most often take place is the most advantageous approach in terms of efficiency and accuracy, and service to the public. This option speeds up registration and improves the accuracy, timeliness and

completeness of registration. In this case, the reporting of vital records and statistical forms is made directly to the national authorities for civil registration and vital statistics by staff members of the hospital who are, by virtue of their responsibilities, directly familiar with the event and the persons involved. An example of this practice is found in the Bedside Registration Programme operated by the Registrar General’s Department of Jamaica (see box 3 for details).

Figure 5
Registration process for births in a health facility in Namibia.



Source: Workshop on the *Principles and Recommendations for a Vital Statistics System*, Revision 3, for African English-speaking countries, held in Addis Ababa, 2–5 December 2014.³⁸

Box 3

Jamaica: experience in improving civil registration and vital statistics coverage through the Free First Birth Certificate Initiative and Bedside Registration Programme

The Government of Jamaica, through the Registrar General’s Department, has launched two initiatives to enhance its civil registration system: the Free First Birth Certificate Initiative and the Bedside Registration Programme. In the former, all children born on or since 1 January 2007 who are registered with a name are entitled to one free copy of their birth certificate. In the latter, the Department has placed registration officers in hospitals to conduct birth registration at the bedside to improve coverage.

Before the advent of these initiatives, there were several issues plaguing birth registration, including lengthy delays in receiving birth notifications from hospitals or, in some cases, failure to submit any notification at all. This was because many institutions withheld birth notifications for mothers who had outstanding hospital payments. In addition, in the case of registrations based on notifications received from the hospitals, many children were registered by the Department without names, as their mothers had failed to visit the registrar’s office to complete the registration formalities. Lastly, a large percentage of fathers were not providing their particulars on the birth records of their children.

These initiatives significantly improved civil registration on many levels, in particular by:

³⁸ All documentation available at: https://unstats.un.org/unsd/demographic/meetings/wshops/Ethiopia/2014/list_of_docs.htm.

Increasing the percentage of fathers including their particulars in the child’s birth record at the time of registration;
 Increasing the percentage of children named at birth;
 Reducing previous delays in birth registration, since registration is now being completed, so to speak, “at the bedside”.

See below the average percentages for hospital births before and after the Bedside Registration Programme was launched:

On average	Before Bedside Registration (2005)	After Bedside Registration (2017)
Percentage of fathers providing their particulars at registration	51.0%	70.6%
Percentage of children named at birth	27.8%	98.7%
Percentage of births registered within three months	90.0%	99.7%

(ii) Birth outside a health facility under a centralized system

104. In the case of a home birth where the civil registration system is centralized, the person attending at the birth is responsible by law for completing the notification form. The order of preference as set out in the third revision of the *Principles and Recommendations for a Vital Statistics System* is for the document to be completed by the mother; the father; the attendant at the delivery (a medical doctor, a midwife, or a traditional birth attendant, if literate); the nearest relative of the mother; or by any other adult person having knowledge of the facts, if no one else is able or available. This document is then brought to the local registrar, who prepares the birth registration record and signs it. If those attending the birth are unable to complete the notification form, then the mother, the father or a close relative should report the event (orally) within a stipulated period to a local registrar, who prepares the official birth record. Many countries require one or more witnesses in order to register a birth where no notification form exists. The original birth record is transmitted directly to the national registration and vital statistics authorities, and a copy is retained for the local registrar files for the issuance of the certificate and other registration functions.

105. In the case of a home birth, the information provided in the registration record may not be as accurate as that in the case of a hospital birth, in particular if it was not attended by a medical doctor or midwife. This is one of the reasons why the third revision of the *Principles and Recommendations for a Vital Statistics System* includes “Attendant at birth” as a core topic.

106. It is important to ensure that a birth is registered within the time frame stipulated by the registration law. In general, the shorter the stipulated time frame the more accurate the information provided in the birth record. The time frame stipulated for a live birth may range from the date of occurrence to one month. According to the size of the jurisdiction in question, however, an informant may not report a home birth for a considerable length of time after the event and it would then be categorized as a late registration. It should be noted that “late registration” is the registration of a vital event after the prescribed time period, but within a specified grace period (usually one year after the occurrence of the event), whereas “delayed registration” is the registration of a vital event after the expiry of the period prescribed determined in existing laws, rules or regulations, including any grace period.³⁹

107. By keeping the number of delayed registrations to a minimum, the likelihood of errors creeping into the statistical reporting of births will be reduced. A country that in principle has many home births should take a

³⁹ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, paras. 369–370.

series of actions to ensure the reporting of such events as soon as they occur. The active involvement of local registrars within the society and their working in collaboration with community health and social workers are indispensable to this process.

(iii) Births in and outside health facilities under a decentralized system

108. In a decentralized system, the registration of births is handled in much the same way as in a centralized system. The difference is that the local registrar transmits the original vital record directly to the state or province registration office instead of the national office. Then the state or provincial registration office forwards the information to the national office for the production of vital statistics for the country as a whole.

109. It is important to register events in a standard way in all provinces, states or other major civil divisions. It must be emphasized however, that, in a decentralized system, registration records or forms may not be identical in content in the different provinces or states, as this content is determined by provincial and state legislation, rather than by uniform national provisions. To ensure such uniformity would require a substantive effort at the national level, to harmonize both the legal aspect of civil registration (for example, the information that must be presented in the birth certificate for it to be recognized by all provinces or states) and for the production of comprehensive vital statistics (for example, what variables must be included in all the records from all the provinces or states).

110. Equally important, each record or form needs to have a harmonized and unique identifier, which is more successfully achieved in a centralized system or a decentralized system with uniform legislation, than in a fully decentralized system. As elaborated in chapter I above, contemporary civil registration systems in many countries are authorized to assign a unique PIN at birth and to retire that number upon the death of the individual, which makes possible the exact matching of records from different sources and, by definition, enhances the quality and accuracy of the information. Not all countries assign PINs to individuals, however; hence the importance of the unique identifier of each record or form that can be used for computer matching and for spotting duplications and omissions.

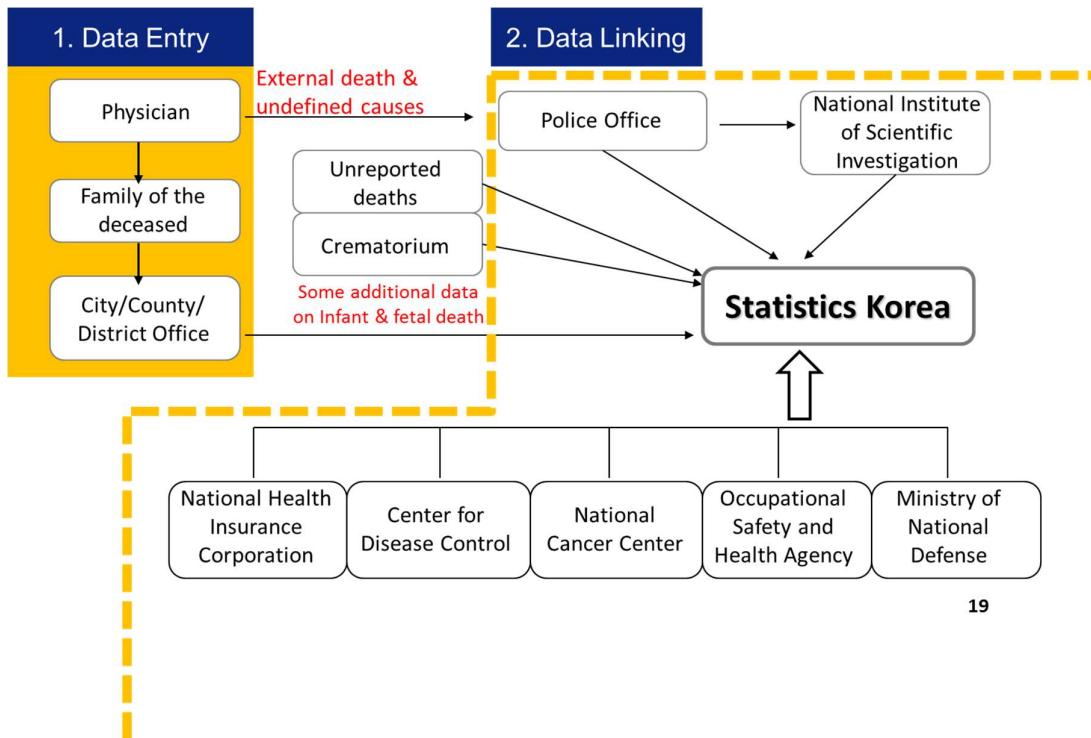
(b) Registration of deaths

111. The registration process for deaths depends on the particular arrangements for such events in each country. It may be common to have a countrywide system of professional morticians, funeral directors, medical examiners or coroners. In these cases, a coroner or medical examiner reviews every unattended or sudden death. In other instances, the family is responsible for notifying authorities about the death. Depending upon the circumstances of the event, the method of registering and reporting deaths will vary. Another factor to be considered is whether the legal death certificate is required for the processing of legal claims for insurance or inheritance. This is often the case in developed countries or in the large metropolitan areas of many countries. If this is the case for most deaths, then it will encourage families to report the occurrence of a death and provide the data promptly and as completely as possible.

112. Building a sustainable data collection system for the registration of a death, including cause-of-death data, can involve multiple agencies and records (as examples, see the process map for the cases of the Republic of Korea and Australia in figures 6 and 7, and for Canada in box 4). Since the process for collating mortality data is critical, and sometimes complex, it is important that an inter-agency committee be established, which includes the civil registration authority, ministry of health, national statistics office and other stakeholders, to identify the appropriate process for collecting mortality information, including death registration data and cause-of-death data, using the guidance provided in the third revision of the *Principles and Recommendations for a Vital Statistics System*, and advice on the International Classification of Diseases and the application for a verbal autopsy from WHO. The national civil registration and the multisectoral coordination committee for vital statistics should include representatives of the police and judicial authorities so that they are aware of their roles in the system.

Figure 6

Registration of deaths and cause-of-death statistics system in the Republic of Korea



Source: Statistics Korea.

113. A technique that is used to promote the accurate registration of deaths is requiring the institution where the deaths occur (such as hospitals, clinics, nursing homes or elderly care centres) to prepare listings of deaths occurring in the institution each week or month. These lists can then be used by the local registrar to determine whether the death was reported and the death record prepared. In addition, the requirement of a death registration prior to the issuance of a burial permit is often used to encourage universal registration: this is particularly useful in urban settings where regulated cemeteries perform the majority of inhumations and cremations. Further details on this practice may be found in subsection (vi) below.

(i) Cause of death

114. The third revision of the *Principles and Recommendations for a Vital Statistics System* includes the rubrics “Certifier”, “Type of certification” and “Cause of death” as core topics to be collected on deaths. This is significant, among other things, in relation to the quality of the information contained in the registration record. The circumstances and medical causes of death are of utmost importance for the vital statistics system, which explains the requirement, in principle, that the civil registrar should issue a death certificate only if the notification of the cause of death is accompanied by a completed medical certificate on the cause of death.⁴⁰ Despite efforts of the health sector and the registration authority, there will be deaths that have no medical certification of their cause, in particular those occurring without medical attention and in rural areas. In these cases, the event must be registered and the field for cause of death should be marked “pending” by the local registrar at the time of registration. The local registrar must subsequently follow up until a cause of death is established, update the death record accordingly and forward such information to the statistics office.

115. In order to provide a comprehensive and comparable tool for identifying causes of death and diseases in general, WHO has developed and maintains the International Statistical Classification of Diseases and Related

⁴⁰ Ibid., para. 491.

Health Problems (ICD),⁴¹ including a start-up mortality list⁴² designed as an entry point to the full classification. The purpose of the Classification is to permit the systematic translation of the underlying cause of death specified in the medical certificate of cause of death into a statistical code in order to facilitate the analysis, interpretation and comparison of the mortality and morbidity data that is collected by countries and that they agree to report to WHO. The Classification is designed to translate diagnoses of diseases and other health problems from words into a code, which permits the easy storage, retrieval and analysis of data.

116. The original use of the Classification was to categorize causes of mortality as recorded at the time of the registration of death and only later was its scope extended to include diagnoses for morbidity. Mortality data coded using the Classification make a substantial contribution to national and global public health policies.

117. For deaths attended by a medical doctor (mostly occurring in hospitals), physicians complete the international medical certificate of cause of death form,⁴³ recommended by the World Health Assembly. It is the responsibility of the medical practitioner signing the medical death certificate to indicate the sequence of morbid conditions leading directly to death from the tentative underlying cause to the immediate cause of death.

118. Once the form has been filled out and signed by the medical practitioner, it is the responsibility of the civil registrar to ensure that the form (either in paper or electronic format, depending on the prevailing system) is combined with other information needed for statistical purposes and submitted to the statistical authorities for processing and the production of vital statistics. It must be emphasized that the cause of death as specified by the medical practitioner may be disclosed to the closest relatives only. Statistical authorities may, however, share anonymized cause-of-death data with government and international agencies for epidemiological and public health purposes, in line with privacy and confidentiality agreements in place in the country.

119. Coding takes place as the last step in the process, being a separate activity from cause-of-death certification. Coding staff, often situated in the central health or statistical agencies, use the Classification to assign and code the underlying cause of death, defined as “(a) the disease or injury which initiated the train of morbid events leading directly to death, or (b) the circumstances of the accident or violence which produced the fatal injury”.⁴⁴

120. When deaths occur at home or where medical certification of the cause of death is not possible, WHO has developed international standards on the use of verbal autopsy⁴⁵ (for further details, see paras. 126 ff. in subsection (iii) below, on death outside health facilities).

121. In cases of external causes of death, there will be a police investigation or coronial enquiry, which inevitably takes time to finalize. In order to ensure the registration of these deaths it is crucial that the coronial and the civil registration and vital statistics systems be linked. If this is not achieved, epidemiological studies may, for example, show misleadingly low levels of deaths attributed to road traffic accidents and violence.

122. As mentioned above, building a sustainable data collection system for cause of death, including death registration data and cause of death, can involve multiple agencies and records. As the Australian example illustrates (figure 7), when a coroner certifies the cause of death, it is important to have a process in place whereby the coroner informs the civil registration authority and the statistics office, so that their databases are updated and harmonized. In turn, the Canadian (box 4) example shows how the central and the provincial level interact with each other and with certifiers in order to code the causes of death accurately.

⁴¹ See www.who.int/classifications/icd/en/ for the history of the Classification, its different versions and other details.

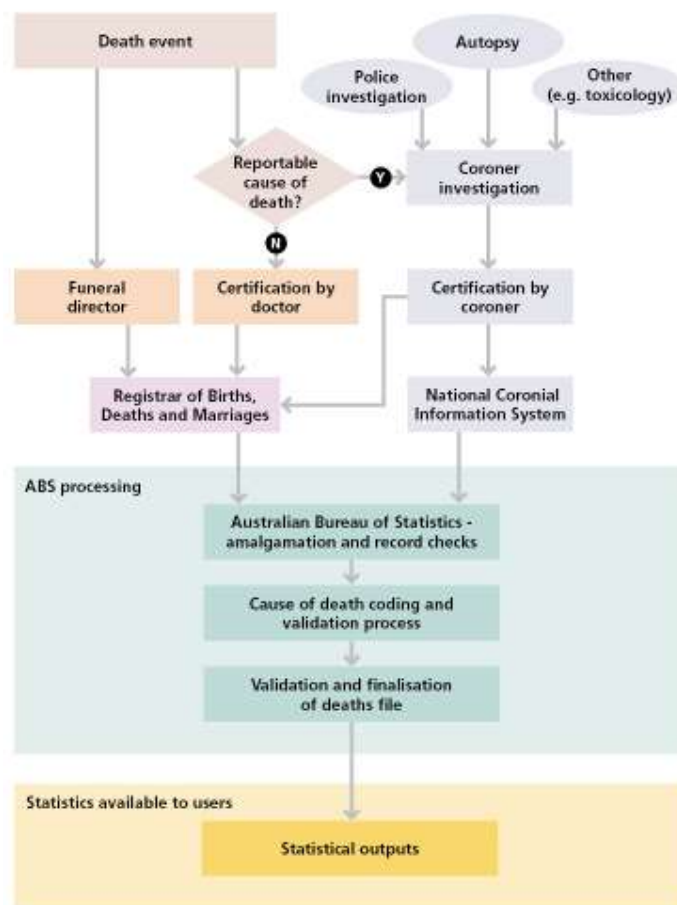
⁴² See www.who.int/healthinfo/civil_registration/smol/en/ for further information on the start-up mortality list.

⁴³ Available from www.who.int/healthinfo/civil_registration/ICD_10_SMoL.pdf?ua=1. See also annex I below.

⁴⁴ World Health Organization, *International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10)* (Geneva, 1992), vol. 2. Details available at www.who.int/iris/handle/10665/246208.

⁴⁵ WHO, 2016. Available at www.who.int/healthinfo/statistics/verbalautopsystandards/en/.

Figure 7
Cause-of-death statistics system in Australia



Source: WHO/Statistics Australia.

Box 4

Canada: cause-of-death querying

Cause-of-death coding is done centrally in Canada; however, the provincial and territorial vital statistics offices screen the medical death certificates before submitting them to Statistics Canada. A querying process is performed at the provincial level, whereby certifiers are contacted in order to resolve cases presenting the situations listed below:

- Illegible entries
- Abbreviations (missing the full text)
- Missing age of decedent
- Missing sex of decedent
- Missing manner of death
- Missing or unclear circumstances in which the injury was sustained (if injury is reported)
- Missing or unclear condition for which the surgery was performed (if surgery is mentioned)
- Missing or unclear condition for which the drug was taken (if drugs are mentioned; this does not include drug poisonings)

(ii) **Death in a health facility**

123. If the death occurred in a hospital, the attending physician at the institution will be responsible for supplying the medical certification of cause of death, filling out the notification of death and informing the

civil registration authority of the occurrence of the death. The hospital keeps a copy of the notification form, gives another copy to family members and then sends the original notification form to the local registrar (by physical or electronic means). As mentioned above, one copy of the notification of death is issued to the decedent's family in order for them to complete the death registration process and request the death certificate and, if applicable, the burial permit (see subsection (vi) on burial permits below). The local registrar reviews it for accuracy and completeness, then prepares the registration record and signs or approves it (physically or electronically). The death is now considered registered and the death certificate is issued.

124. A member of the family or someone close to the deceased individual must supply personal facts about the decedent to ensure accuracy of the information contained in the notification of death. Those facts are generally reported separately from the medical certification information completed by the physician or coroner. The personal data are provided to the hospital, which forwards the notification of death to the local registrar. Coordinating the filing processes and eventual matching of the information contained in the medical certification of cause of death with that in the notification of death in a timely manner may not be an easy task. Many factors will influence the choice of procedure for doing so. For example, how is the hospital system organized? Are many individuals brought for care from rural areas to a central hospital in a large city? When individuals die far from their residence, the family may report the event to a local registrar geographically remote from the point where the medical certification information for the death is completed. Inclusion of the same information about the decedents' place of residence and PIN, if they have one, on both the death registration record and the medical certificate of cause of death will be of particular importance in this situation for matching the separate records.

125. There will also be situations in which a death occurs outside facilities, mostly at home, where neither a physician nor a coroner is available. In such instances, frequently occurring in rural areas, an arrangement should be made between the local registrar and the local law enforcement authority. The law enforcement authority assumes the coroner's duties, and the local registrar gathers the necessary information from a close relative of the deceased to complete the remainder of the death record and issue the death certificate. Sometimes the local registrar may need to assume both roles to guarantee the completeness of the death record system.

(iii) Death outside a health facility

126. It is highly likely that natural deaths occurring outside a health facility will have no medical certification of the cause of death. In this case, the event must be registered and the field for cause of death should be marked "pending" by the local registrar at the time of registration. The local registrar must subsequently follow up until a cause of death is established, update the death record accordingly and forward such information to the statistics office.

127. For unnatural deaths, such as a suicide, homicide or accident, the coroner, medical examiner or investigating authority supplies the cause of death certification after completion of an examination of the facts surrounding the death. Coronial investigations usually take a long time and the cause may not be determined until sometime after the event. Thus these deaths should be registered without a medical cause and marked as "pending investigation".

128. As mentioned above, when deaths occur at home or where a medical certification of the cause of death is not possible, WHO has developed international standards on the use of verbal autopsy.⁴⁶ Verbal autopsy is an interview carried out with family members or caregivers of the deceased using a structured questionnaire to elicit signs and symptoms and other pertinent information which can later be used to assign a probable underlying cause of death. Verbal autopsy is an essential public-health tool for obtaining a reasonable direct estimation of the cause structure of mortality at a community or population level, although it has not been validated as a method for attributing causes of death at the individual level. For studies, it is essential that the

⁴⁶ WHO, 2016. Available at www.who.int/healthinfo/statistics/verbalautopsystandards/en/.

collated database clearly indicate the source of the information on the cause of death (medical certificate versus verbal autopsy) to ensure that it can be analysed properly at a statistical level.

129. For this purpose, verbal autopsies involve the use, by trained interviewers, of a questionnaire designed to enable them to collect information about signs, symptoms and demographic characteristics for a recently deceased person from an individual familiar with the deceased. Under the WHO standards for verbal autopsy, any of three questionnaires may be used: for a death of a child aged less than 4 weeks, for a death of a child aged 4 weeks to 11 years, and for a death of a person aged 12 years or above. To minimize recall bias, it is recommended that verbal autopsies are conducted as close to the death date as is culturally appropriate, through a meeting with a close family member no later than one year after the death.

130. It is important to note that a medical certificate for the cause of death or a verbal autopsy record may be used by a registrar as notification of death, where the death has not been otherwise notified.

131. The question arises whether the verbal autopsy method should form part of civil registration in cases where there is no possibility of obtaining a medical certification of the cause of death. In this regard, it should be pointed out that the verbal autopsy method is fairly complex, and it involves the selection and thorough testing of a sample population. The interview needed for the filling out of the appropriate questionnaire is time-consuming, and cultural traditions might not favour such an engagement with a government official. This results in the need for substantial investments in data collection and supervision, along with the comprehensive training of civil registrars and health workers in the verbal autopsy method to identify a population-level cause of death for individuals without medically certified deaths. All these factors must be taken into account when attempting to answer the above question.⁴⁷

132. The cause-of-death findings yielded by the verbal autopsy method differ from medically certified deaths and require careful determination in their presentation at the individual level on medical death certificates and at the population level in the vital statistics reports in which causes of death are presented. Verbal autopsy is by no means a replacement for a medical certificate of cause of death. A cause of death derived by the verbal autopsy method should never be included in any legal document.

(iv) Disposal of the deceased

133. In the event that a funeral director – or comparable official, such as a professional mortician, crematorium officer or cemetery manager – is responsible for processing most dispositions, responsibility for filing the death notification form is likely to rest with the funeral director. In this situation, the funeral director obtains the necessary personal information from a close relative or person that lived with the decedent, the cause of death and medical certification from the attending physician or coroner, if available. The funeral director presents a completed death notification form to the local registrar, who completes the death record and signs and issues a burial or transit permit (sometimes called a final disposition permit). The latter enables the funeral director to proceed with final disposition of the body. To facilitate this process, a good practice followed in some countries is to establish a local registration office inside or next to large funeral homes.

134. Not all national systems have fully functioning networks of morticians or professionals responsible for funeral homes or crematoriums. There are, however, local registrars to whom the family submits the information regarding the death and from whom it receives an authorization for burial. Such local registration offices must be sited in convenient locations and open at all times. They perform the same function relative to the burial permit as the funeral director.

135. Obtaining a burial permit or proof of registration as a precondition for disposing of the deceased in the cemetery is not a universal practice. This means that, in a number of countries, the burial occurs without any official trail. The first step in establishing such a practice would be to incorporate this requirement into the

⁴⁷ For a comprehensive discussion on the integration of verbal autopsy and civil registration, see Don de Savigny and others, “Integrating community-based verbal autopsy into civil registration and vital statistics (CRVS): system-level considerations”, *Global Health Action*, vol. 10, No. 1, p. 1272882.

civil registration law; it would then be incumbent on the local authorities managing cemeteries to ensure the enforcement of these rules.

136. Procedures such as those described here usually set specific time limits for obtaining medical certification of the death and for filing the completed death notification form with the local registrar. Generally, such requirements specify that the physician or coroner must sign the certificate before burial, cremation or removal can take place. That requirement guarantees that all necessary information about the nature of the death is obtained while the body is still available for testing. Depending on the cultural practices surrounding death and the final disposition of the body, those time limits can vary. If it is normal cultural practice to dispose of the remains quickly, then a time limit of 24 hours may be imposed. Normally, where a professional is handling the final disposition, the time limit for obtaining certification of the cause of death is no more than three days. The time limit within which the complete notification form is to be filed with the local registrar may be five days. The local registrar completes the death registration record and forwards the original to the national registration office in a centralized system, or to the state or provincial registration office in a decentralized system. Fixed time limits should be set for reporting to the higher level and these limits should be rigorously observed.

(v) Alternative procedures

137. Alternative procedures refer to protocols that are established in the absence of funeral directors, professional morticians or even cemeteries for the purposes of obtaining the necessary details about a death. If there was a physician attending the decedent for the illness that led to death, that physician should complete the medical certificate of the cause of death. If that was not the case, various types of community and health workers may be assigned a formal role in the civil registration system as notifiers. In addition, informal notifiers may include religious authorities and other local leaders. Such informal notifiers do not normally have legal responsibilities in the registration process, however, which makes them less than ideal as sources able accurately and sustainably to provide the necessary details about the death. For a start, they will be unable to provide cause-of-death information. At best, the practice of using informal notifiers of deaths might be useful as an interim measure in cases where the level of completeness of death registration is very low, in particular in rural and remote areas.

138. Thus the death certificate is an essential document which not only provides a final and permanent confirmation of the fact of death but also makes possible the inheritance and settlement of an estate and, in many jurisdictions, the burial of the deceased, along with other entitlements pursuant to the legal arrangements in force (such as a pension).

(vi) Use of a burial or transit permit

139. This method can be useful in enhancing the completeness of death registration. It makes provision for an additional check to guarantee that the physician or coroner provides certification of cause of death on the death medical certificate in a timely fashion. A burial permit is usually issued by a local registrar once the death record is correctly completed, including the signed and completed cause-of-death certification. In settings where the immediate disposal of the body is a legal or religious stipulation, the requirement for an accurate and completed medical certificate of cause of death at the time of registration may lead to distortion and an inaccurate cause of death. To ensure that the cause-of-death entry is reliable, the medical practitioner may call for biochemical tests or a clinical autopsy. This will delay final determination of the cause of death. In such cases, the event of the death should be registered, and the cause-of-death information may be marked as “pending investigation” and added once the results are available.

140. The crematorium or cemetery requires the permit or a proof of registration before final disposition of the body. This system will be truly effective only in jurisdictions where the cemetery or crematorium is properly fenced and guarded and a sexton or some similar individual is on duty to collect the permit. If the registration of death is a mandatory requirement for burial, it is essential that the registration processes be facilitated by providing more registration points or by having electronic systems in place.

141. One variation on the issuance of the permit by the local registrar is the use of self-issued permits. This is accomplished by having a carbon sheet placed behind the section of the death record that lists name and date of death and behind the box where the certifier's signature is placed. The carbon copy can then be used as the burial or transit permit. It will show that the physician or coroner has completed a medical certification of death. This variation solves the problem of a local registrar or recorder not being available outside business hours, at weekends or during holidays. The death record must be completed, however, with the local registrar on the next working day.

(c) Registration of marriages

142. As stated in the third revision of the *Principles and Recommendations for a Vital Statistics System*,⁴⁸ a marriage is the act, ceremony or process by which the legal relationship of spouses is constituted. The legality of the union may be established by civil, religious or other means as recognized by the laws of each country. Countries may wish to expand the definition to cover civil unions. In that case, the term "registered partnership" usually refers to a legal construct, entailing registration with the public authorities according to the laws of each country that becomes the basis for legal conjugal obligations between two persons. The registration of marriages provides tangible proof of the official recognition of the process of family formation.

143. Thus, unlike births and deaths, marriages are social constructs and are conducted in a manner that is completely dependent on particular societal conventions. Accordingly, there is no standard registration procedure that is valid across countries. As figure 1 in chapter I shows, marriages can be celebrated by a variety of authorized individuals and institutions, the most common being religious leaders, justices of peace, court clerks and community leaders. These authorized individuals or the spouses themselves have the obligation to inform the civil registration authority about the event in order for it to be properly registered.

144. A more specific recommendation regarding the information process and flow cannot be suggested, given the wide diversity of marriage practices, including common law marriages. Nevertheless, the key recommendation is that all marriages occurring in the country need to be accounted for and registered according to the law.

2. Special processing requirements for registration records

145. The present subsection considers some special processing requirements and methods used to amend records, register adoptions, and process legal changes to records. Most of these methods are concerned with birth records, but there are some changes that must be processed for deaths too. Some countries may also maintain amendment procedures, for marriage records, for example, to note when a marriage ends in divorce or in a judicial separation.

(a) Amendment of records

146. Amendment of records refers to corrections made to records that contain incorrect information; amendments are specified and stipulated in the law. Usually administrative procedures are much more expeditious than judicial procedures when amending a record, the choice of procedure will depend, however, on the legal and normative framework in place. Recently, and for certain types of amendments, countries have favoured administrative procedures in order to improve their services to the public and response times. There are several levels at which corrections are made, depending on how much time has elapsed since the event in question was registered. Some mistakes can be caught almost immediately when the record is first processed in the local registration office. This level may be termed the "early query level". There is a second set of errors that are also dependent on the provision of additional or corrected information by an individual outside the office. This second set cannot usually be detected immediately, although many such errors become apparent during the first year of the record's existence.

⁴⁸ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 2.

147. An administrative procedure is best suited for the amendment of manifest mistakes or omissions, whereas a legal procedure is the optimum path for amendments that might have legal consequences, such as those related to maternity, paternity or change of sex. Consequently, it is advisable to have separate methods for amendments during the first year of the record's existence, distinct from those made further along in the existence of the document. The one-year mark can also be useful in determining the approach to be followed in the filing of a delayed registration of birth.

148. A log should be kept of all changes. In addition, the system for referencing amendments must allow for the reconstruction of the record's history, in other words, make it possible to trace back chronologically to an original record. This process is explored in further detail in chapter III below.

149. The local registrar may be empowered to take care of early query corrections. It might be noted, for example, on inspection of the birth record, that a parent's date of birth is listed with the same year as that of the child. This is an obvious clerical error. A telephone call to the hospital or a note to the informant will usually enable the local registrar to obtain the correct information. In addition, in most contemporary registration systems, the local registrar will have a set of computer tools to assist in this early query editing. As the records are created or transferred digitally, a series of computer edits will alert the registrar to the existence of a potential error, such as that described above. In this situation, the early query corrections will be incorporated in the computer application for the creation of a registration record. Digital validations and alerts minimize errors when information is entered in the civil registration system, as does the use of a unique identifier (PIN), because there are certain fields and pieces of data that are attached to every individual PIN that cannot be easily modified, such as the parents' date of birth, as in the example cited above.

150. There would still be a need however, to carefully check the content of the registration record before it is submitted as a final entry in the system. The spelling of the names needs to be carefully checked, for example, and while computer applications can be helpful in this process, the final decision has to be made by the registrar and individuals involved.

151. Aside from early corrections, there might be a need for amendments that fall in the "current year" category. One of these would refer to the establishment (recognition, or legal acknowledgement, either voluntary or compulsory) of the maternity or paternity of a child born out of wedlock. The particular laws governing a country (or state or province) will cover how paternities are established. Some jurisdictions will allow the addition of a father to a record by affidavit of the unwed parents. Other jurisdictions may require some sort of court or legal action to establish the paternity. In any event, a method of adding the father's information to the birth record must be developed and used consistently throughout the civil registration system. The civil registration authority must prepare instruction manuals detailing the procedures, rules and regulations pursuant to the laws on the establishment of paternity, the use of a surname and other related subject matters. In the same spirit, a series of training measures for local civil registrars, medical record officers, foreign service officials and other concerned staff must be conducted by the civil registration authority to ensure the uniform implementation of the laws, rules and regulations.

152. The simplest case is that where no previous information concerning a father appears on the record. Here, once the appropriate legal requirements have been met (affidavits or court determination), the information can be added directly to the original record. Copies of the required legal documentation are placed in a file. This file must be connected to the birth record by use of the unique record number already assigned to the birth. When making changes to current year records, it is important to forward the amended records to the statistical agency, so that the vital statistics accurately mirror the content and the information in the civil registration database.

153. In some cases, another man's name and information may already appear on the birth record as father. It may be that the mother was married at the time of birth but the husband was not the natural father. There might have been a court case contesting the paternity of the child. In such cases, a new birth record must be prepared, reflecting the new facts of parentage. The original record should be placed in the file with the associated legal documents used to establish the amendment. For traceability purposes, the new birth record

must bear the same number as the original, sealed birth record, including the PIN assigned to the newborn infant (if a PIN was assigned). It is particularly important to ensure that the new record is forwarded to the central civil registration database and to the statistical agency, while the old one is removed.

154. Other amendments during the first year may include the addition of first or middle names for the child, changes to the parents' age or birthplace, or spelling corrections. According to the type of system that is in place, these corrections follow the same logic as that presented in the preceding paragraphs: correcting the records and ensuring that the corrections are reflected in the main civil registration and vital statistics databases, and that a log is kept of all such amendments.

155. Other amendments may be made at a later stage, such as change of name or sex, and may typically involve some sort of court decision. If legally available, the procedure for a change of sex must be dealt with as an amendment, not a replacement of records. It may trigger the issuance of a new PIN, if the country uses PINs that contain an indication of sex.⁴⁹ In any event, a link file must be created to ensure a permanent connection between the original and the new identities.

156. In many communities across different countries children are named only after a certain period of time following their birth. This gap between the date of birth of a child and the child's actual naming can range from a few days to even several weeks and is mainly linked to – and can vary according to – religious practices and social norms of different communities. In many countries registration laws provide that every child has to be registered with a name. This often acts as a serious hindrance in the registration of birth in such countries. Often the period of delay in naming exceeds the cut-off period for registration as provided for in the law. This causes significant hardship to parents, as in such cases they have to follow the more complicated process of late or delayed registration. With the increasing number of institution-based deliveries, more and more countries are providing registration facilities within health institutions for the delivery of prompt registration services, including the issuance of birth certificates to mothers before they are discharged from the hospital. In countries where the delayed naming of children is common, however, the whole purpose of creating such services within a health facility is defeated as such mothers (those who do not name the children before or immediately after their birth) are denied registration, resulting in a huge missed opportunity.

157. In order to overcome this bottleneck some countries are encouraging parents to decide the name of their children before or immediately after birth. Religious practices and social norms cannot be quickly changed, however, and such change may not even be desirable. Some countries have found a way round this problem by making provision for the registration of birth without a name, for example, as “Baby Girl” or “Baby Boy”, and then providing a separate cut-off date for insertion of a name following a due process. In such situations, however, it would be incumbent on the registrar to obtain a written request with accompanying documents if needed and, having verified that the request is bona fide, to insert the name of the child and also to make an appropriate annotation in the remark column of the register indicating, among other details, the date of insertion. Following this method, a certificate of birth showing the name of child can be issued promptly to the parents.

(b) Adoption and other legal changes

158. Adoption is another major class of record changes that should be considered here. Again, the practices of countries (or states or provinces) will vary in accordance with their legal regulations and arrangements for adoption. Most jurisdictions will have a provision for sealing from view the pre-adoption facts of birth, and will keep the adoption as a confidential matter. Where the birth record is concerned, this is accomplished by preparing a new birth record reflecting the new parents' birth facts. In principle, the place and date of birth of the child remain unchanged, as does the child's PIN, if one is assigned. The unique identifier or number of the new record should also remain unchanged. The original record and the supporting legal documents surrounding the adoption are sealed using the unique record number as a cross-reference. This is important

⁴⁹ For this reason, it is recommended that the PINs contain no indication of sex, geographical area, date of birth or any other personal details.

should it be necessary to retrieve the original if the adoption is later annulled or if it is necessary to refer to it for administrative purposes. The original information regarding the parents of the adopted child may be of crucial importance in the event, for example, of genetically transmitted diseases, where unsealing the original record can be of critical importance for medical treatment.

159. Mention should also be made here of the illegal practice known as “simulated births”, which is aimed at avoiding the lengthy and complex legal adoption procedure. In these cases, the adoptive parents, with or without the consent of the natural mother or father, register the birth directly in their own names, as though they were the child’s birth parents. If the adoptive mother is still within child-bearing age, and since the function of the local registrars is purely administrative, the registration of a simulated birth may not be detected. Procedural safeguards must be in place to prevent this practice.

Box 5

Surrogate motherhood

Surrogacy, an arrangement between a woman who agrees to carry a pregnancy for another person or persons who, after birth, become the newborn’s parents, is becoming more common in the contemporary world. National laws regulating surrogacy vary substantially, ranging from totally banning the practice, to allowing it, specifying conditions to include in the agreement between parties.

By definition, surrogacy raises a number of ethical issues, primarily related to the fact that women are compensated for initiating or maintaining the pregnancy of a baby to be adopted by unrelated individuals. Equally important is the moral dimension of the core arrangement: to what extent are women’s rights over the use of their own bodies affected by surrogacy agreements? What are the ethical implications of an induced abortion in such an arrangement, or if a health issue arises in the woman or the fetus during the pregnancy? It also raises a number of questions about motherhood in both natural and social terms.

From the point of view of legal theory, the legal arrangements for surrogacy are also subjects of increased discussion. The core of the issue is the nature of the surrogacy contract: is it akin to contracting labour? Such an arrangement requires the specification of rights and obligations for each contracting side. In addition, should both altruistic surrogacy (when pregnancy-related expenses are reimbursed) be treated in the same legal framework as commercial surrogacy (when compensation extends beyond pregnancy-related expenses)?

Irrespective of how and if surrogacy is regulated, the essential logic of civil registration, in the cases where surrogacy is legal, would call for the registrar to complete a birth registration record with all the information on the birth mother, as the legal assumption is that she is the child’s legal mother. Only after that would the surrogate parents initiate the process of legal adoption and the procedures described above be implemented.

160. Delayed birth registrations represent another group of records that should be considered within the category of amendments and corrections. A late registration is the registration of a vital event after the legally specified time period but within the grace period; the grace period is usually considered to be one year following the vital event.⁵⁰ Delayed registration is the registration of a vital event after the grace period has expired. Even in the best of civil registration systems, delayed registrations are likely to occur. Depending on the extent of the delay, these registrations may result in omissions from the tabulated vital statistics if they are made after the file of records for a particular year has undergone final processing.

161. It must be stressed that, strictly speaking, delayed birth registration is neither an amendment nor a correction. It is considered here, however, because it has similarities to a corrected record in that specific documentation is required beyond that normally required for the filing of an original birth record. The process of registering a birth after the legally stipulated time for its registration has elapsed is generally broken down into several categories, depending on the length of delay.⁵¹ If the delayed birth is filed within one year of the date of birth, the procedure is simplest. It may happen that, while a physician or midwife was present at the birth or the birth took place at an institution, for some reason the record was not registered in a timely manner.

⁵⁰ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 369.

⁵¹ *Ibid.*, paras. 369–373.

In such cases, completion of the birth record by the appropriate attendants and by the local registrar is generally acceptable.

162. If the birth was a home birth, the record can usually be completed with the help of the local registrar during the first year. After a year has passed, it is usual for additional proof of the facts of birth to be required, given the legal nature of the record. It is not unusual for affidavits to be required of those present at the birth. A medical record during pregnancy or a record of a subsequent paediatric visit would prove that a pregnancy had occurred. A utility, tax or rent bill may serve as proof of residence at the time of birth. These requirements are designed to ensure not only that the information supplied is accurate but also to prevent the filing of a false birth record for fraudulent purposes.

163. For longer delays, the placing of a delayed record of birth on file requires several substantial additional proofs of the facts of birth. In some instances, it may require judicial procedures and decisions. The filing of a delayed record so many years after the event is a service to citizens who would otherwise have to supply alternative proofs of birth to various requesting agencies throughout their lifetime. In designing the list of required documents for late registration of a birth, the registration law should therefore require, as a minimum, the documents that the most stringent outside agency would require. The registration office lists on the delayed birth record the specific documents presented as proofs and guarantees their authenticity. Thus the citizen only needs to go through this procedure once. The imposition of less stringent requirements would be a risk to the integrity of the registration system.

164. Delayed registrations filed more than one year after the event are not generally included in the vital statistics for the year of occurrence. If there is a large percentage of such cases, vital statistics can be distorted. Public relations campaigns should try to keep delayed registrations to a minimum so that the accuracy of vital statistics remains high. In countries where PINs are assigned to every individual at the time of birth registration, and this PIN is required by all service providers, in particular those of health care, the proportion of delayed registrations is almost negligible.

C. Civil registration system activities

165. This section elaborates on ways to respond to the public's need for vital records; it also looks at the needs of those who are reporting legal, demographic or statistical data to the system, and it considers record flow and the prevention of fraudulent use of the documents in the custody of the civil registration authorities.

1. Services to the public

166. At the time of a vital event – birth, death, fetal death, marriage or divorce – the careful and detailed recording of the facts surrounding the event is a decisive confirmation that the event actually occurred. Accordingly, the free registration of the vital events occurring in the jurisdiction is the bureau's first service to the public. In this respect, it is the responsibility of the registration authority to reach even the most remote and hard-to-reach geographical areas of the country. In such areas, where the population has limited access to registration centres, mobile registration units can enhance the coverage of registration. In this technique, registration staff travel – for example, by boat, small aircraft or other vehicle – to various rural sites at scheduled times and register events occurring during the interval since the previous visit. Village leaders, local health workers, traditional birth attendants or families themselves may report the information. This strategy is considered an interim measure until it becomes possible to maintain permanent local registration offices in such areas.

167. The second service is issuing a certificate free of charge that confirms not only the occurrence of the event, but also the identities of all persons concerned. Preserving the records is an equally important service to the public – ensuring that they are safe from disasters, both natural and human-caused.

168. Nowadays, the civil registration records are, in most cases, digital in nature. They are stored in servers maintained by the civil registration office. The preservation of the records essentially entails undertaking all the procedures necessary to ensure that servers are backed up regularly and that a fully developed mechanism

is in place for that purpose. The practice of installing servers with identical content and update procedures in different geographical locations in the country has proved advantageous in the event of disasters, as it is seldom the case that the whole country is affected by one such event. In certain circumstances, those mirror servers have been located in a distant country, thus ensuring even more certainty in preserving the records. The privacy and confidentiality risks arising in these cases – and the measures needed to minimize them – must be thoroughly studied.

169. Computerization of the civil registration process is a recent development and in many countries civil registration records have been preserved with the use of analogue technologies, such as microfilms. This has resulted in a hybrid approach, combining elements of two or more systems, where the current system is maintained, while a more efficient system is gradually introduced. It is a common practice for microfilm to be used as a backup as the switch is gradually made to a computerized system of issuance. A dual system combining computerization and optical disk technology can offer the best features of both systems.

170. Production of certified copies of the records that have been registered and preserved is another major activity of civil registration offices. This service can vary from the preparation of abstracts hand copied from a paper record (in the case of old records that were not computerized) to issuance of the record from the computer in a choice of formats. The size of the jurisdiction's file, the level of demand from the public and the availability of resources will determine the response in this area. There should be a policy directive, established in law and regulations, stating that information on individual vital event records is not to be disclosed except to specifically authorized persons, such as the registrants themselves; their legal representatives; a close relative, such as a spouse, parent or a son or daughter; or other person having a direct and tangible right to the facts set out in the record.⁵² Checks and safeguards should be put in place for the retrieval of records (both hard copy and electronic) to minimize fraud. An example of effective checks and safeguards may be found in the electronic retrieval system, implemented by the Civil Registration and Identification Service of Chile (see box 6 for details).

Box 6

Chile: checks and safeguards in the production of certified copies, implemented by the Civil Registration and Identification Service

The Civil Registration and Identification Service performs the registration and certification of vital events by means of a centralized database. When the registrant's PIN is introduced, the system automatically fills in the fields that can be retrieved from family members' records. These fields are hard-coded, so only authorized registrars can modify them. In order to obtain certified copies, users can access a public database online, where documents can easily be retrieved. Downloaded documents contain a digital verification code that can be read and validated by other service providers, such as health, insurance and education institutions, among others. Thus the security features of the paper are given diminished attention in comparison with the digital seal, chain or code, which enables not only verification of the validity of the information contained in the document, but also electronic transmission of the data. This system also makes it possible to obtain certified copies, recognized by the Convention Abolishing the Requirement of Legalisation for Foreign Public Documents (Apostille Convention), from overseas.

171. With modern equipment, the issuance of certified copies is based on a fully automated procedure whereby the search engine identifies the appropriate record in the database, retrieves it and sends it to the printer. The paper used for the printing must have features that are difficult if not impossible to replicate, which protect against forgery, counterfeiting or tampering. These include watermarks, intaglio printing and holograms, among others.

172. Another consideration in a copy issuance programme is the format that may be offered to the customer. Offices can provide full-size copies and wallet-size copies. Of course, the more options offered, the more resources are needed. In a computer-based system, it is feasible to offer both a full-size computer copy and a

⁵² *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 394.

wallet-size computer copy. It needs only an additional computer program to generate the wallet-size copy and, usually, an additional printer on which the wallet-size paper can be loaded. Depending on its capacity, the system could also be calibrated to produce and disseminate soft copies or digital identities.⁵³

173. Where the traditional method for retrieving a certified copy of a civil registration record involved visiting the local civil registration office and requesting the copy at the counter, contemporary circumstances require the development of a range of different procedures to accommodate the public. Requests by mail, for example, would require a manual check of each such request to verify whether all the necessary items are included, such as the details of the requester, the fee and so forth. The option of submitting requests for certified copies of civil registration records by telephone must also be carefully weighed against a number of factors, such as the modality for processing the fee and checking the identity of the requester.

174. More specifically, the civil registration system must ensure that requests can be made online; the omnipresent and growing use of the Internet for transactions of all kinds makes developing such services a necessity. Development of the Internet option is also complementary to that of e-government, that is, the use of current information and communication technologies to improve the service delivery and functioning of public sector services – in essence, the process of digital interactions between citizens and their government. To that end, the civil registration authority must invest in developing online electronic forms for the submission of requests for certified copies of civil registration records, together with delivery mechanisms and thorough safeguards. An electronic portal that offers multiple services to the public, including requests for copies of certificates, with a secure logging-in system is highly recommended.⁵⁴

175. Concerns that need to be addressed in developing such interfaces range from ensuring the privacy and confidentiality of transactions and maintaining efficiency in terms of delivery to mobilizing the resources necessary to guarantee uninterrupted communications, meeting the costs of maintenance and backup and providing appropriate staffing.

176. See box 7 below for an overview of civil registration services rendered to the public in India, and box 8 on lessons learned in New Zealand from a cross-agency project to improve civil registration services.

Box 7

India: services to the public

The records of registration of births and deaths are permanent records in India. The registrar of births and deaths at the local level is required to maintain the registers of births and deaths and to send periodic reports based thereon to the relevant higher level authority, such as the district registrar, for the compilation of requisite vital statistics. The registration of births and deaths is carried out both online and offline. In some states, registration is conducted by use of the civil registration system software. The chief registrar of births and deaths is required to publish a statistical report on the registered births and deaths during the year for the public. A vital statistics report based on the civil registration system has been published at the national level by the Office of the Registrar General.

Despite mandatory registration, the country has not yet achieved the target of 100 per cent registration of births and deaths. In India, to evaluate the completeness of the civil registration system, the level of registration for births and deaths is calculated in percentage terms, by measuring the number of registered births and deaths against the estimated number of actual births and deaths. The estimated number of births and deaths is calculated by use of the sample registration system. The level of registration determines the performance at the level of individual states and at that of the nation as a whole.

In accordance with the latest registration data released by the Office of the Registrar General for the year 2014, at the national level the level of registration of births is 88.8 per cent and that of deaths 74.3 per cent. In 2000, the level of registration of births was only 56 per cent and of deaths even lower, at 49 per cent.

⁵³ For a more detailed discussion of the notion of “digital identity”, see chapter VII below.

⁵⁴ Norway, for example, has such a portal, called “Altinn” (www.altinn.no/).

Box 8

New Zealand: lessons learned from the first cross-agency life event project (SmartStart)

With SmartStart, parents have access to an online tool that facilitates access to services and support during their pregnancy and the baby's first years. SmartStart provides parents and caregivers with easier access to relevant information and services for themselves and their babies from conception to early childhood, through the delivery of customer-centred, cross-agency digital tools and processes.

SmartStart is a multi-agency initiative delivered by the Department of Internal Affairs, the Inland Revenue, the Ministry of Social Development and the Ministry of Health. The initiative went live on 5 December 2016. In the first month, 15,000 people had interacted with this life event service (more information may be found at the website smartstart@dia.govt.nz).

At the project level, it has been learned that:

- Customers know what they need and want. Early communication with them is necessary, together with a mechanism to obtain frequent feedback on the project's progress.
- Delivering a working prototype for feedback will have a profoundly positive impact on the scope and quality of the life event service.
- The relevant government institutions will need to change how they are organized and how to lead work. They must accept that there will be new roles and teams created within their own organization and across the agencies involved.

At a system level, it has been learned that:

- A new funding model to meet the needs of an iterative service delivery project delivered by multiple agencies is beginning to emerge.
- Meeting the governance requirements across partner agencies should not be underestimated.

Checklist that could help with decision-making:

- Agree on a lead agency and respect the decision-making authority that this entails.
- Find the customers, meet them regularly and authentically nurture those relationships throughout the programme.
- Go to customers with a working prototype early, and go back often to get their feedback on development.
- Value employees and recognize their success.
- Co-design the governance approach with partner agencies, taking care to incorporate each agency's specific requirements.
- Schedule time for the people working on the project to get to know one another and establish connections that they can call on.
- Design and implement an approach to sharing project progress openly, consistently and on demand.
- Build a team of stellar story-tellers to passionately share the vision and encourage others to participate in or support your work.
- Engage widely to gather ideas and generate supporters.
- Transformation is not complete until customers are using the product.

177. An amendment programme is also a necessary part of the vital records response to the public. Vital records are dynamic documents that require correction and change. Addition of a father's information, preparation of new documents in cases of adoption, updates to reflect legal name changes, corrections of erroneous information and annotations on the records are all actions that would fall under the amendment programme. Subsection B.2 above outlines the specific methods to be used in the special processing that this programme requires. A special fee is customarily charged for these time-consuming and detailed activities.

178. The civil registration system needs a delayed registration programme for members of the public whose events, for one reason or another, are not registered in a timely manner. It can be applied to any type of vital event. The most common cases are delays in reporting births for registration. The registration law and regulations should provide instructions for processing these cases, including fees. Long delays might also occur. For example, a customer 45 years of age may request his birth to be recorded. This request will set the delayed registration programme in motion.

179. Where delays are very long and given the legal nature of the birth record, a judicial procedure is necessary to prove the facts of birth. To accelerate the process, submission of the following elements may be helpful: an old school record, a baptismal record, a voting record, a hospital record or a combination of these records that shows the individual's facts of birth. Before the judicial order is issued, the local registrar proceeds to record the birth. The system should specify the fees for delayed registration. A scaled fee is recommended, in accordance with to the length of delay.

180. By design and according to international standards, the civil registration system should serve the public universally, neither discriminating against nor targeting particular population groups. In practice, however, there are certain population groups that need to be catered for with special procedures and considerations.

181. Where refugees are concerned, legislation and practice in different countries may vary in the way that citizenship is registered at birth. In some countries, children born in the country of asylum of refugee parents are registered as refugees, while, in others, they become ordinary residents or citizens. If the legislation allows refugees to become residents, civil registration should not pose any problems. In countries where they are accorded special status, the civil registration system needs to be flexible enough to accommodate this, either through a specific variable which specifies this status or by assigning a different type of identity number.⁵⁵ In any event, civil registration must be universal and all vital events occurring in the territory of a country must be registered.

182. The Office of the United Nations High Commissioner for Refugees (UNHCR) and other humanitarian organizations have established systems for registering vital events and providing identification documents for refugees. Authentication of an event is usually more effective, however, if the event is registered with a national civil registration system. In Kenya and Uganda, work is currently under way on transferring the UNHCR refugee registration data to the Government. It will be up to the Government to decide whether these registers will continue to exist as separate registers or whether they can be integrated into the national civil registration system.

183. In some countries, stateless persons find it difficult or impossible to register their vital events, often because the local registration officers are not aware of the right which all people have to register their vital events, and in other cases because of national legislation. Stateless persons are particularly vulnerable if they have no access to civil registration, since a birth certificate is an essential document for acquiring a legal status in the country of residence, including the right to acquire an identity card, to live in the country and to become a citizen.

184. For internally displaced persons the issue of citizenship does not arise, but they often face obstacles to proper identification as they may be unable to obtain copies of vital records at their place of origin. It might be too dangerous to go there or the records might have been destroyed in an armed conflict or a natural disaster. In consequence, they may face the same challenges as refugees and stateless persons. An electronic civil registration system with a nationwide database (or network of databases) enabling access to records throughout the country can alleviate the situation of internally displaced persons. Box 9 presents the case study of Norway on the special cases of refugees, stateless and displaced persons in the context of civil registration.

Box 9

Norway: refugees, stateless and displaced persons and civil registration and vital statistics

All vital events that occur in Norway, including those of refugees, asylum-seekers, and stateless persons, are registered in the Central Population Register. A birth certificate is sent to the parents of a child if they have recorded an address, or it is issued on demand. The same applies to family members of a deceased person.

⁵⁵ Helge Brunborg, "Civil registration and vital statistics for refugees", in Office of the United Nations High Commissioner for Refugees, *Statistical Yearbook 2014*, chap. 5, pp. 67–73. Available at www.unhcr.org/56655f4c16.html.

There are, however, differences in how these events are handled by the Central Population Register: all those formally residing in Norway, including foreign citizens, are given a unique PIN and are registered in the Central Population Register. Asylum-seekers, on the other hand, are given a temporary PIN (known as a “D-number”), issued to non-residents with obligations or rights in Norway. This includes children born while their parents’ asylum applications are being considered. If the parents are later recognized as refugees and given a permit to live in Norway, the child will be registered as an immigrant. Children born in Norway of refugee parents are not considered to be refugees but their residence status is identical to the status of their parents if both are foreign citizens.

Persons living in Norway, but who are non-residents, including those who are born in Norway, are not included in the annual vital statistics.

185. It is also necessary to establish a programme to respond to the internal uses of records; properly speaking, there should be two programmes to respond to internal uses. There are internal uses that will generally need a response from the certification unit of the registration bureau, and there are other internal uses that will more appropriately need a response from the monitoring and operations unit.

186. From the point of view of internal use of the records, there is a whole set of operational statistics that are usually generated by the civil registration office with the purpose of assessing and monitoring operations in terms, for example, of the average workload of registrars – in other words, how many entries they make per day; the average time needed to process and enter a civil registration record; the number of edits and corrections that are introduced on average; and the number of late and delayed registration by region and civil registration district. All these are critical pieces of information needed for improving the services and functioning of civil registration offices. Further details on this area may be found in subsection 3 below, on monitoring.

187. Another part of the programme for internal uses needs to deal with appropriate ways of making the data available to researchers and relevant officials within the civil registration and vital statistics system. From a statistical point of view, internal use of the vital records data includes the production, by the national statistics office, of an annual statistical report concerning birth rates, death rates, leading causes of death and so on. Data should be available to researchers in the maternal and child health programmes, the epidemiology programmes, and the planning and evaluation sections of the registration department, the ministry of health or the national statistical agency, among other pertinent governmental agencies. Further details on the applications and use of civil registration information may be found in chapter VI below.

188. In addition to these governmental uses of the vital records data, the programme must also be able to respond to public users of the data. This involves reviewing their right to have access to the data with regard to confidentiality and privacy concerns. It also involves the review of research protocols to assess the value of the proposed research and the researchers’ qualifications. Another necessary element is the development of efficient methods of sharing the data with approved external users. More details on the release of data, anonymity and other considerations may be found in chapter VI below.

189. Some external uses may be mandated by statute. For example, the demographer in the jurisdiction may need data to prepare population estimates. There may be a statutory requirement that death records must be linked with voter records, to purge the voting rolls.

190. The programme for internal and external use of the data is a varied one that must respond to many different requests from a wide assortment of users. It serves a very important function and justifies the investment of considerable resources in the proper collection of data so that these data can be successfully used in operating the many services required by society.

2. Field programme

191. The notion of “field programme” refers to a set of activities aimed at enhancing the efficiency and coverage of civil registration at the local level. The field programme is a necessary component of the management of the registration services and efficient operation of the system. This is true for both centralized

and decentralized systems. The programme's importance is particularly evident in view of the individuals that the field system will be designed to help. They are the local registrars, the morticians, the hospital medical records personnel, the coroners, the physicians, the midwives, court personnel and any others who might be involved in recording or reporting a birth, death, fetal death, marriage or divorce. In either a centralized or decentralized system, reporting is made to local registrars who register the events. In addition, the other individuals will be part of the system and will need the services of a good field programme.

192. There are several essential components of a good field programme. An initial product of the field programme is the set of instruction manuals and standard operating procedures needed by local registrars and by each of those who supply notifications to the system. These should very carefully spell out the specific responsibilities of local registrars and each of those notifiers. Since the majority of civil registration systems rely on local registrars, the first instruction manual to be prepared is one for this group, because the local registrar must have oversight of the entire array of activities for correctly registering vital events. The instruction manual should include such functions as preparing and filing the records, handling the legal requirements for their preparation, keeping the records safe, issuing certificates, making amendments and corrections, transmitting vital records to the registration authority and collecting data for statistical purposes.

193. The local registrars need to be familiar with the laws and regulations governing civil registration and vital statistics in the country or state or province, and copies should be made available to them. This is only achieved through training and continuous education.⁵⁶ An important part of the manual will be the description of their duties and responsibilities, since they are the cornerstones of the registration system. As the vital records are legal instruments, local registrars must have solid knowledge of family law so that they will be able to participate efficiently in the process of family organization to which civil registration contributes. The local registrars should be furnished with all necessary instructions to make them competent to deal with a range of registration-related matters, including the possibility of modifying the vital records in those cases provided by law, without the need to consult the higher authority for civil registration.

194. The manuals and standard operating procedures for notifiers (morticians, coroners, midwives, hospital personnel, physicians, court clerks, marriage officers) will be specific to the responsibilities of those individuals. The funeral director or mortician manual, for example, will deal only with the requirements for filing death notification records. On the other hand, the physician manual will need to have sections on recording the cause of death and cause of fetal death, and sections on completing birth records. All the manuals should include copies of the specific documents for which that notifier will be responsible. Besides specific instructions on how to complete each item, an explanation of the importance and use of the item is required. Such explanations, combined with training, will help elicit more complete and accurate responses.

195. Preparation of the manuals and standard operating procedures is a time-consuming task but one that is likely to pay real dividends. To continue reaping these dividends, it is essential to keep the manuals updated. Manuals must reflect changes in forms or in administrative policies as soon as they occur. Consequently, if hard copies are being produced, it is advisable to issue them in loose-leaf format, in which new pages or updated pages can be inserted in appropriate places without the need to reprint the entire document. While these days electronic formats and online versions of the handbooks (soft copies, wiki-type guides and other online resources and interactive software, among other options) will be the vehicle of choice, printing may still be needed for local registrar offices with limited access to the Internet. Regardless of the type of manuals deemed appropriate, provision needs to be made for the possibility of updating and revising their content as effortlessly as possible, and in a consistent manner across the entire country.

196. A helpful adjunct to the instruction manuals, with a view to keeping local registrars and notifiers informed, is a monthly or quarterly newsletter, which serves a number of useful purposes. It can keep staff up to date on changes and alert them all to any common errors that are being detected. It can also provide a medium in which questions can be asked and answered, and can present motivational material, such as

⁵⁶ Further details may be found below, in chapter III, subsection B.4, on the maintenance of field operations (, paras. 273 ff).

timeliness reports or helpful hints from local providers. The newsletter can also give notification of educational meetings or seminars throughout the jurisdiction. Other channels for discussion and exchange among peers could include communication through an intranet, a dedicated electronic forum (e-forum) or a more generic electronic bulletin board, on which registrars can post comments and queries.

197. Field visits are a crucial part of the civil registration programme. Serving both educational and motivational purposes, field visits let the local registrars and the providers in the field know that they are an important part of the civil registration records team. Periodic checks of the local registration offices should form part of the annual work plan of the system's administering office, verifying that local registrars are recording and reporting vital events in strict compliance with the law. Since these visits to the field are costly, careful planning is necessary to maximize their benefit while keeping their frequency within resource limitations.

198. There are several types of visits. Routine visits should be made to ensure strict compliance with laws and regulations, checking that such items as logs and registers are being kept up to date, that register files are being maintained in order and in a secure fashion, and that the reporting of vital events runs smoothly. Routine visits also answer any problems that may have come up in the particular area. When making these routine visits, staff members should try to hold meetings not only with local registrars but also with as many key providers and notifiers in the area as possible. In other words, they should visit the local registrar and also make calls on any midwives, morticians, coroners or hospitals in the area. If physicians are experiencing problems with reporting vital events, this is the right occasion to visit them.

199. Initial visits are made when new registrars, coroners, morticians or medical records personnel appear on the scene in a particular area. An early start with on-the-spot training will make the transition more efficient.

200. Educational visits need more preparation and are more formal in nature, and may involve a full team of trainers from office staff. Examples of this type of visit are regional seminars and annual meetings. Both are worthwhile investments of staff time. The regional seminar might be preferred if the geography of the jurisdiction is such that it is easier for a particular group of individuals from one section of the jurisdiction to gather for in-depth training. Several such seminars may be held in different geographical areas during the year, responding to the particular needs of each area. For its part, the annual meeting may be used to bring together as many local registrars in the entire jurisdiction as possible, together with a provider. This will make possible a free exchange of ideas and experiences that can be very beneficial to general communication throughout the registration system. Developing e-learning tools to complement educational visits enlarges the impact of the learning process for all levels of staff. Details on how the Philippine Statistics Authority carries out its educational events may be seen in box 10 below.

Box 10

Philippines: national workshop on civil registration

The Philippine Statistics Authority (PSA) organizes a national workshop on civil registration every two years. Participants include local civil registrars, local executives (mayors, village captains), PSA staff and other stakeholders. The national workshop serves as a venue for updating the local civil registrars on the latest laws, rules and regulations and disseminating memorandum circulars and other information on civil registration. Papers on topics using vital statistics are also presented.

Awards for the best local civil registrar offices are also presented during the national workshop. Local civil registrar offices are rated on the timeliness and complete submission of civil registration documents to PSA, and also on the quality of the information on the documents, in terms of accuracy and completeness.

In between successive national workshops, PSA organizes a National Convention of Solemnizing Officers. Target participants include religious ministers, mayors, judges, sharia court judges, imams, tribal chieftains and other persons authorized to solemnize marriages. Local civil registrar's offices may also participate in the National Convention of Solemnizing Officers, at which participants discuss

updates on marriage laws, rules and regulations on the registration of marriages and other related topics on marriages.

201. The maintenance of the field programme of civil registration is particularly vital in emergency situations. A child's vulnerability to abuse is very high when an emergency is unfolding; boys and girls routinely become separated from their families or caregivers and are vulnerable to physical abuse, neglect, sexual and economic exploitation, discrimination, violence and recruitment into armed groups. Civil registration as a functional system can help build a protective environment for children in many ways. If vital events, predominantly births, are registered and the records are well kept, family tracing for separated children becomes easier as there is documentation of their parents and their origin. In cases of child marriage or the worst forms of child labour, proof of age can help children and facilitate the prosecution of perpetrators. Birth registration can also help children to claim their inheritance rights. A set of good practices in the context of emergencies is presented in box 11, drawn from a report published by Plan International on this issue.⁵⁷

Box 11

Civil registration and vital statistics in emergencies

Emergencies pose specific challenges to formal civil registration and vital statistics systems. Infrastructure may be damaged, documents destroyed or lost and pre-existing weaknesses in the formal registration systems may be exacerbated. These challenges require actions from government and non-government stakeholders, such as the revision, adaptation or development of systems, measures and techniques for civil registration.

To ensure effective civil registration in emergencies in current and future disaster responses, it is recommended that:

- Governments ensure that civil registration and vital statistics line ministries work closely with disaster risk management line ministries and humanitarian actors, to identify appropriate measures for preparedness and for strengthening civil registration and vital statistics systems in emergencies;
- Humanitarian stakeholders ensure that a situation analysis for civil registration and vital statistics becomes an integral part of humanitarian assessments, and that they incorporate civil registration actions as part of emergency preparedness, response and recovery;
- Donors allocate funding for civil registration as part of preparedness in humanitarian response and recovery. While civil registration may not be an immediate, life-saving priority in humanitarian response, it is clearly an important tool for protection before, during and after emergencies. Funding for civil registration efforts in emergencies may, however, need to link to longer-term funding initiatives.

Good practices in preparing civil registration in emergencies:

- Work in child protection alliances with United Nations agencies and non-governmental organizations.
- Conduct a situation analysis or baseline assessment.
- Raise community awareness.
- Use information to develop action plans.
- Involve children and communities in the design of civil registration interventions.

Good practices in conducting civil registration in emergencies:

- Build on existing systems to make them accessible to affected populations.
- Establish systems for issuing vital events notifications.
- Exploit the use of mobile phone technology.
- Integrate civil registration with primary health-care services.

Good practices in ensuring sustainability of civil registration systems:

- Adapt or formalize temporary civil registration mechanisms.

⁵⁷ Birth registration in emergencies: a review of best practices in humanitarian action, Plan International, April 2014

- Decentralize civil registration down to subdistrict level.
- Advocate legal reform.
- Ensure continuous monitoring.

202. While it may not be possible right away to include all the above-listed components in the field programme, it is essential to work towards a programme that includes each component in as much depth as possible. The dividends for the general health of the civil registration system will be very quickly visible.

3. Monitoring

203. A performance monitoring programme must be an integral part of the civil registration system activities. Periodic information on the system performance has to be generated in order to ensure that the civil registration system is being conducted effectively. The four principles of civil registration can serve as a frame within which system performance can be understood and within which performance indicators can be formulated. As set out in the third revision of the *Principles and Recommendations for a Vital Statistics System*, civil registration must be: compulsory, universal, continuous and permanent, and confidential.⁵⁸

204. Before elaborating any further on the possible performance indicators that might be used in monitoring the effective conduct of a civil registration system, it must be emphasized that the generation of information of this kind is not related to the production of vital statistics. These performance indicators, or process statistics, are intended to serve as an aid in the management of a civil registration system.

205. The first issue to be considered here is that of the principles of compulsoriness and universality. For this, it is recommended that the total number of registrations of each type of vital event be tracked at least on a monthly basis, and at every geographical or administrative level. Similarly, the total number of certificates issued for each type of vital event should be tracked periodically and at every geographical and administrative level. With these simple indicators, a manager, national or local, will be able to detect unexpected drops or spikes in the registration flow. Comparison to the expected or historical number of vital events, in particular at the local level, will also shed light on the extent of registration. In the same fashion, comparison of vital events reported by hospitals (primarily births) against the events actually registered can provide useful insights. The computation of crude and net rates will indicate whether the levels of demographic phenomena are within expected ranges, and will pinpoint certain areas or types of event where the registration system is falling short. The ratio of registrars to the size of the population in each locality and the average distance to the local registration centre can also serve as useful indicators in the task of monitoring the capacity of the system to serve the entire population.

206. For determining the extent to which the system is continuous and permanent, other performance indicators can be formulated. A manager, at the national and local level, must know the average (monthly, weekly) number of registrations undertaken per registrar, or the average time that each type of vital event requires to be registered. These quantities may be used as benchmarks for monitoring the actual output of registrars and identifying areas for improvement, and for making adjustments to workloads or other administrative arrangements in order to improve services to the public. In addition, reports on time usage of the registration software in each registration centre may be employed to monitor the actual time that local or remote offices are open to the public. The availability of an online system for the registration of a vital event and its consequent efficiency can also be an indicator of a continuous and permanent civil registration system.

207. Finally, where confidentiality is concerned, performance indicators may be embedded in the registration process and subsequent flow. For example, the following questions may be raised: Is there a protocol in place for protecting information on cause of death from being disclosed? Are there safeguards in place for accessing online records? Are the physical settings of the local registrar and registration centre facilities conducive to confidentiality? Are records made anonymous before being transmitted to other agencies? Are staff trained in confidentiality and disclosure rules and regulations?

⁵⁸ See *Principles and Recommendations for a Vital Statistics System*, Rev. 3, chapter II.

4. Civil registration and vital statistics system: coordination activities and functional relations

208. Whether the structure is centralized or decentralized, coordination activities must be built into the civil registration and vital statistics systems from the start. This is true whether or not the civil registration system is in a separate agency from the vital statistics system. It is in the very nature of the vital statistics function to use the local registrars, providers and notifiers and the same records to collect information for legal purposes and for statistical uses. This necessitates close coordination and collaboration among the various components of the civil registration and vital statistics systems. The health sector, the certification unit, the registration unit, the statistics unit and local offices must coordinate activities for an efficient operation. In centralized systems or under the single agency configuration, leaders of the central offices involved (certification, registration, statistics, health and justice) should meet together at least every two weeks to discuss matters of an overlapping nature. As mentioned in chapter I, an inter-agency committee, with representation from appropriate programmes, can be established to deal with coordination issues. It will often be discovered at the committee meetings that changes planned by one unit may drastically affect another unit in ways that, without open discussion and coordination, would never have been anticipated. Committee meetings are even more important when the units are in separate agencies. Coordination efforts should be as strong as possible. By way of illustrative examples, some instances where coordination is crucial are outlined below.

209. The design and use of collection forms is an area where all stakeholders (the civil registration authority, the national statistics office and the ministry of health, at the very least) of the civil registration and vital statistics systems must be in close coordination. Some jurisdictions will have forms for collecting legal information distinct from those used to collect statistical information. Other jurisdictions may use a single form (electronic or paper), which has clear advantages. In either case, the certification and the statistics agencies must contribute to the initial design of the collection instruments to guarantee that the information that they need to collect is on the form.⁵⁹ The registration agency needs to be directly involved in the structuring of the instruments. This will make the data collection much easier and the transfer of the data to the master files much more efficient. Similarly, all three stakeholders must be involved in any changes to the collection instruments.

210. In the configuration where the notification function, the civil registration function, the vital statistics agency and the identity management agency are connected in a holistic manner, coordination is still of crucial importance, not only in the initial development of the system and formatting of the electronic records and their content, but also in the operational phases, in terms of establishing and perfecting editing procedures and protocols, correcting entries and harmonizing products. Successful examples include the establishment of inter-agency coordination committees that meet at regular intervals, the exchange of field visits and the organization of joint seminars involving registrars, statisticians, health personnel, information technology and identity management experts. Given that there is an extensive set of international standards for civil registration and vital statistics, establishment of an inter-agency coordination committee will make possible the more efficient and comprehensive implementation of these standards at the national level. Details of this type of coordination committee in the Philippines, Uzbekistan, Chile and Canada are set out in box 12 below.

Box 12

Inter-agency coordination mechanisms for civil registration and vital statistics

- In the Philippines, there is an Inter-Agency Committee on Civil Registration and Vital Statistics. Members are permanent representatives from the Department of Health, the Department of Education, the Department of Justice, the Department of Foreign Affairs, the Department of Interior and Local Government, the National Commission on Muslim Filipinos, the National Commission on Indigenous

⁵⁹ The topics and themes to be covered in a vital statistics system are comprehensively spelled out in chapter III of the third revision of the *Principles and Recommendations for a Vital Statistics System*.

People and the Philippine Statistics Authority (PSA). PSA serves as the technical secretariat of the Inter-Agency Committee on Civil Registration and Vital Statistics, which will tackle the implementation of the work plans for the Asian and Pacific Civil Registration and Vital Statistics Decade 2015–2024 (proclaimed at the Ministerial Conference on Civil Registration and Vital Statistics in Asia and the Pacific). It will also be entrusted with generating the Sustainable Development Goals indicators for civil registration and vital statistics, among others.

- In Uzbekistan, a resolution was approved instructing the Ministry of Justice (responsible for civil registration), the Ministry of Health and the State Statistics Committee to conduct quarterly comparisons of figures at the regional level. This resolution is aimed at achieving complete and accurate compilation of vital statistics.
- In Chile, an inter-institutional agreement was signed in 1982 by the Ministry of Health, the Civil Registration and Identification Service and the National Statistics Institute for the elaboration of vital statistics. Pursuant to this agreement, a tripartite committee was created to oversee the vital statistics system. The Civil Registration and Identification Service is tasked with collecting statistical data when registering vital events using the layouts and forms agreed by the tripartite committee. Thus all required information (health-related, legal and statistical) is included in a single form for each type of event, and is collected from the registrant at the time of the occurrence of the event (if the event occurred in a medical facility) or at the time of registration. The Civil Registration and Identification Service grants both the National Statistics Institute and the Ministry of Health secure electronic access to its database, for the compilation of vital and health statistics. The publication of all official statistics is the exclusive responsibility of the National Statistics Institute. This agreement has proved to be a dynamic model conducive to successful inter-agency cooperation, and has improved vital statistics coverage and timeliness.
- In Canada, the cornerstone of the national system of vital statistics is the cooperation and collaboration among provincial and territorial civil registrars and the federal Government. This partnership was created in 1919 following two conferences on the establishment of a national system of vital statistics, at which the principles of mandatory registration and national-provincial collaboration were affirmed. In 1945, the Vital Statistics Council for Canada (VSCC), which comprises representatives from all provinces and territories and from Statistics Canada, was established as the official body responsible for ensuring the uniform collection, compilation and dissemination of vital statistics across the country. Although Canada is a mosaic of cultural backgrounds, with two languages, a vast geographical area, small population and many jurisdictions, VSCC is able to surmount these challenges in ensuring reliable information sources. More information may be found at the website: www.statcan.gc.ca/eng/health/vital/vscc.

211. In recent years, a number of countries have undertaken the formation of national agencies entrusted with issuing identity cards to all individuals in those countries, a process that includes collecting photographs, fingerprints and other biometrics (such as an iris scan). These agencies usually incorporate the civil registration function, namely, registering births, deaths, marriages and divorces and maintaining a population register, including addresses of usual residence of residents and other characteristics. In this context, it is of paramount importance to apply international standards related to both civil registration and vital statistics, producing comprehensive and regular vital statistics, while at the same time ensuring compliance with compulsory, universal, continuous and confidential principles of civil registration.

212. The civil registration function should not be treated as secondary to the identity management function. These functions must interoperate and mechanisms should be put in place so that vital statistics can be generated on the basis of civil registration information. The production of relevant and regular vital statistics is assured by the regular – even daily – transmission of new records to the statistical agency for editing and processing, and by ensuring that all the information, in line with international standards, is incorporated in the

record. Concurrence with international principles of civil registration must be embedded in the core functions of the identity management agency.

213. As noted previously, one of the principal objectives of this handbook is to present vital statistics and civil registration as separate entities, but with the ultimate goal being to establish, maintain and exploit these two entities as components of a coordinated and coherent system for registering vital events and for producing vital statistics. The procedures for recording births and deaths are equally important for civil registration in legal terms and for vital statistics in the context of the source of statistics; hence the work of civil registrars and that of statisticians are interdependent.⁶⁰

214. Furthermore, as indicated in the third revision of the *Principles and Recommendations for a Vital Statistics System*, vital statistics generated out of a complete civil registration system offer the most valuable regular, accurate and relevant information on fertility and mortality, including for small areas; they enable the computation of proximate population estimates and projections; they enable the identification of fertility patterns at small-area levels; and they serve as the basis for cohort studies and the construction of life tables — to name but a few of the many uses of vital statistics generated directly from civil registration which illustrate its critical importance in providing relevant statistical information.⁶¹

215. Civil registration, in turn, is defined as the continuous, permanent, compulsory and universal recording of the occurrence and characteristics of vital events pertaining to the population, as provided through decree or regulation in accordance with the legal requirements in each country. Civil registration is carried out primarily for the purpose of establishing the documents provided for by law. The usefulness of these records as the best source of vital statistics is well established.⁶²

216. None of the major components of vital statistics and civil registration systems exist in a vacuum. Civil registration and vital statistics systems must coordinate with other functional units of government. To do this effectively, members of the vital statistics and civil registration staff must serve on various committees throughout the government. For example, if there is a birth defects register, it is important that a member of the staff attend the major organizational or board meetings of such register. This will help to coordinate what input can be mutually provided, and to find out if there are any ways in which the birth defects register can be of help to the civil registration system. Since the register will most likely be the recipient of information from other sources besides the birth record, it can probably serve as a check on the completeness and accuracy of data on the birth record.

217. There are also a number of systems in which the civil registration and the vital statistics components are located in separate government institutions. Efforts to maintain open communication in such situations are essential and can pay many dividends. Duplication of effort can be kept to a minimum when each component knows what the other is doing or is planning. Furthermore, redundant registration data and overlapping and inconsistencies in data files will thereby be minimized. In such structures, coordination can best be achieved by establishing an inter-agency committee for civil registration, vital and health statistics that operates on a permanent and continuous basis. Mutual cooperation and collaboration are essential among the collectors of data and producers of vital statistics. It is in the interests of countries to establish such committees and to give them all necessary support. The inter-agency committees will have an advisory role too. The ultimate goal of all such undertakings is to develop and maintain a single database or population register at the civil registration authority that can be used in statistical and health-related contexts, in the compilation of electoral rolls and in the provision of identification services, among other purposes.

218. Review committees provide another framework for coordination with other health agencies. It is advantageous that staff members of the civil registration authority and the statistics office serve on committees that review maternal deaths or perinatal deaths. They will help to familiarize these committees with some uses

⁶⁰ *Principles and Recommendations for a Vital Statistics System*, Rev. 3., para. 274.

⁶¹ *Ibid.*, para. 275.

⁶² *Ibid.*, para. 279.

of the vital statistics data and the civil registration system and, in turn, their attendance at these committee meetings will also broaden their own perspective and alert them to the needs of other areas of the health field.

219. Besides coordinating with other agencies in the health and juridical fields, it is also important that the vital statistics and registration programmes should coordinate their activities with similar programmes on a national and international level. By assigning their staff members to serve on committees and to join associations of professionals, civil registration agencies and statistical offices will be enriched with new ideas and new methods.

220. The use of standard classifications, nomenclature and common codes is a sine qua non of a holistic system of civil registration, vital statistics and identity management. Standardization of these functions is premised on the consistent use of a unique code for localities and administrative subdivisions of the country. If the designated territory of a civil registration district differs from that delineated for an administrative subdivision, it will not be possible to harmonize and present small-area statistics that are crucial for decision-making at the local level. The code that refers to the place of residence of the mother, in the case of births, for example, and that forms part of the registration record, must come from the same codebook that is consistently used by all the components of the system, including the health system, and is compatible with other data collection exercises, such as population censuses. The principal sources where cartography and geographical coding are concerned are the *Handbook on Geographic Information Systems and Digital Mapping* (ST/ESA/STAT/SER.F/79)⁶³ and the *Handbook on Geospatial Infrastructure in Support of Census Activities* (ST/ESA/STAT/SER.F/103).⁶⁴

221. The same requirements apply to the definitions of vital events. These definitions are presented in detail in the international standards⁶⁵ and should be fully implemented as such in national practices. The importance of using the same definition for the same event cannot be overemphasized, not only by all components of the system, but also throughout the entire country.

222. Where the application of standard classifications is concerned, the classification most pertinent for civil registration and vital statistics is that of the International Statistical Classification of Diseases and Related Health Problems.⁶⁶ The Classification is a system of categories to which morbid entities of either external or pathological causation are assigned according to the established criteria.⁶⁷ It is important that the specialists in disease classification, or nosologists, applying the ICD codes for cause of death have training in the universal methods of translating the literal causes listed on the death record (sequence of morbid events) into an underlying cause of death code from the Classification. Such consistency is necessary to make the data comparable throughout the system. This effort to coordinate the activities of individual nosologists is being alleviated by technology. Computer software for the selection and coding of underlying cause of death is available⁶⁸ and is used widely but cannot completely replace nosologists. The use of computer software for coding requires support from trained coders to analyse the cases that the software was unable to process.

223. Aside from the International Statistical Classification of Diseases and Related Health Problems, a number of other relevant classifications need to be firmly incorporated into all the components of the system. Some of these classifications are developed at the international level and are implemented in national statistical practice. This is the case with the International Standard Classification of Occupations (ISCO). The

⁶³ United Nations publication, Sales No. 00.XVII.12, available at https://unstats.un.org/unsd/publication/SeriesF/SeriesF_79E.pdf.

⁶⁴ United Nations publication, Sales No E.09.XVIII.8, available at https://unstats.un.org/unsd/demographic/standmeth/handbooks/Series_F103en.pdf.

⁶⁵ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 2.

⁶⁶ Now in its tenth revision (ICD-10); the eleventh revision is currently being launched. Details are available at www.int/classifications/icd/en/.

⁶⁷ Further details available in the presentation at www.cdc.gov/nchs/ppt/nchs2012/li-14_minino.pdf.

⁶⁸ Examples of such software include Iris, the Mortality Medical Data System, STYX and the Automated Classification of Medical Entities, among others. A brief description and features of some computer applications for assisting in the coding of the underlying cause of death may be found in annex II to the present handbook.

current version, ISCO-08, comprises 43 sub-major groups, 131 minor groups and 425 unit groups of occupations. Similarly, the International Standard Classification of Education (ISCED), a statistical framework for presenting information on education, in its current revision (ISCED 2011), which consists of nine levels (as compared to seven levels in the previous version), needs to be fully implemented throughout all components of the national statistical system.

224. Aside from the inter-agency coordination described above, intra-agency coordination also requires particular attention, as each office implementing registration, certification and statistics activities needs to have a sound understanding of the other components' needs and responsibilities. For example, when the certification component completes a new record following an adoption, it must be aware of the importance of communicating the information to the registration component. It must communicate exactly what changes have been made to the document so that the registration component can have those changes reflected in the registration record and, ultimately, the master file. In turn, the registration component must be aware of the needs of the statistical component concerning the changes to the statistical database necessitated by the adoption. Although the child's name or the parents' names changes are not of particular interest to the statistical component, the demographic characteristics associated with the birth certainly are. The adoptive parents may be of ages different from those of the natural parents, but the statistical component does not need this reflected in the statistical database: for statistical purposes, the data on the natural parents are those that are needed. At the same time, the certification component needs the age of the adoptive parents to appear in the copies of the certificate that it issues. The registration component must be aware of these disparate needs relating to the same data item and routine protocols in order to be able to respond to them in an appropriate manner.

225. Although this is a particularly compelling example of the need for communication among system components, because it involves all the components, it is not the only instance where such communication is essential. Other examples where communication from one component to the others is indispensable are highlighted above, in the discussion of the delayed registration programme and the correction and amendment programme.

226. If the registration component is to run a successful field programme with a view to ensuring completeness and accuracy in reporting, it is essential that each of the other components discuss exactly what each question on the vital records is designed to obtain. The third revision of the *Principles and Recommendations for a Vital Statistics System* presents, in paras. 70 ff. and in annex II, clear definitions and characteristics for vital statistics tabulations. For example, a question on the death record seeks to know the educational level of the deceased. The statistics component knows that this is an important variable which it uses as an indicator of socioeconomic status. It is essential that this be communicated to the registration component, which in turn must explain this to responders, local registrars and other collectors of information. Furthermore, an effective way to ensure and maintain the collection of certain topics is to have them inserted in the legal framework. This minimizes the risk that important topics will be suppressed without due consideration of the repercussions. Of course, the legal framework should mirror international standards, as elaborated in chapter I.

227. Examples of the importance of communication are legion. In this process, as demonstrated above, smooth and effective intra-agency communication is of particular significance. Managers must encourage cross-communication and cross-training among the different components of the system, to ensure an efficient workflow and to enable the teams to produce work of a high quality. To that end, each member of each component should know as much as possible about the workings of each other component.

III. Maintenance of civil registration and vital statistics components

A. Introduction

228. The topics covered in the present chapter relate to the maintenance of established civil registration and vital statistics systems. Particular attention is given to the operational requirements of maintaining effective and reliable systems. The operational requirements of a maintenance programme include the modification of records; internal review of the system's functions; preservation of stored records; and the maintenance of field operations. Modernizing and maintaining the operational requirements is a prerequisite of contemporary government functions, essential to improving services to the public at the individual level, and also to enhancing the efficiency of the State at the macro level. A detailed discussion of the process of digitizing civil registration and vital statistics may be found in chapter VII below.

229. As already noted, vital statistics and civil registration are separate entities, but it is crucial that they be established, maintained and used as components of a coordinated and coherent system for registering and producing vital statistics. In addition, the emergence of interconnections between civil registration and identity management systems adds yet another dimension to the civil registration and vital statistics system. A graphic representation of these relationships and functioning is presented in figure 1, in chapter 1 above.

230. Civil registration is defined as the continuous, universal recording of the occurrence and characteristics of vital events pertaining to the population, as provided through decree or regulation in accordance with the legal requirements in each country.⁶⁹ It is important to highlight the quality of universality in relation to people's rights regarding the registration of vital facts. As established in the 1948 Universal Declaration of Human Rights and reaffirmed in other global accords, every person has the right to an identity as bestowed through civil registration. In this regard, laws, policies, rules and regulations must not be a hindrance to the realization of this right. In particular, the registration of events must be performed even if the time frame given by law has elapsed, and regardless of migratory status, and any other request that may act as an obstacle to registering the vital facts occurred in the territory. Civil registration is carried out primarily for the purpose of registering vital events and establishing the documents as per national law. The usefulness of these records as the best source for the production of vital statistics is well established. The procedures for recording vital events are equally important for civil registration as a legal exercise and for vital statistics as a source of statistics; hence the tasks performed by civil registrars and those of statisticians are interdependent.⁷⁰

B. Operational requirements

231. Currently, most countries are switching to electronic methods as the means of operating and maintaining their civil registration and vital statistics systems, as part of a general shift towards e-government. This technological transition should be accompanied and supported by an appropriate legal framework that determines and regulates the operation and design of technology-based civil registration and vital statistics systems.

1. Modification of records

232. A country's original records may be modified, in accordance with strict procedures laid down by its civil registration law and in certain circumstances, as described in chapter II, section B, above. The present subsection examines the methods of making those corrections to the file and the ways of maintaining the

⁶⁹ *Principles and Recommendations for a Vital Statistics System*, Statistical Papers, Series M, No. 19, Rev. 3 (United Nations publication, Sales No. E.13.XVII.10), para. 279.

⁷⁰ *Ibid.*, para. 274.

integrity of the file and keeping a log of all such changes. The discussion focuses on ways of accomplishing these modifications for each type of medium in which the records are stored.

(a) Hard-copy files⁷¹

233. The term “hard-copy files” refers to records stored on paper. There are several ways of making the required modification to such records. The first possibility is to prepare a completely new record. This is done, for example, in the case of an adoption where a substantial change is made to the birth record and there is a need to ensure confidentiality. The procedure employed is to remove the original birth record from its place in the file. Using the facts provided in the original, in combination with the changes necessitated by the adoption order, a new birth record is prepared. The new record shows the names of the new parents and the child’s adopted name. The new birth record should bear the same unique file number as the original. The new record then replaces the original in the birth record file. The original record and the order of adoption are then placed in a sealed file. This file can only be opened by order of a court or for administrative needs of the registrar. The sealed file is assigned a number of its own, and this number is placed inconspicuously on the new record as a reference. This will allow the registrar to locate the original record in the event of a court order to open the sealed file or the future annulment of the adoption.

234. This procedure preserves the integrity of the file since only one record remains on file for the adopted individual. The original record has been removed and placed in a sealed file, while the new record bearing the unique birth record number is now maintained in its place. At the same time, the association of the sealed file number with the new record now in the file will enable the registrar to trace the process back to the original document, should this ever be necessary.

235. A second method of correcting hard-copy files is to make an addition to an existing record in the file. This is often used to add the name of a father to a record after the parents of a child born out of wedlock are married, or after the father acknowledges paternity and requests that his name be added to the record. In such cases, the original record is retrieved from the paper copy file, and the father’s name or other missing information is added to the record. The record is marked “amended”, and the date of the amendment noted on the record. The record can be designed to include a special section for amendments. In the case of a paternity affidavit, the affidavit itself should be permanently preserved in a separate file should any question arise later which might involve amending the record.

236. A third method, often employed in the case of a legal change of name, is simply to strike through the original information. The new information is entered in the space above the struck-through text. This method is often employed in legal name changes in order to preserve an identity trail connecting the original name to the amended name. An annotation, with the date, should also be provided in the corresponding section of the record.

237. The above methods are described here to illustrate their suitability for certain types of amendments or corrections, but without suggesting that any of these methods is the only one that can be used for that type of amendment. The registrar will determine the best method to use in the given circumstances, in accordance with the instructions in the registrar’s manual and the law.

238. The methods described above are most efficient when the hard-copy records are in loose-leaf format. If the records are in bound books or bound ledgers, additional steps may be necessary.

⁷¹ While it is assumed that most contemporary civil registration systems are based on the use of computer networks and technology, this description of methods of modifying hard-copy records has two primary purposes: to provide guidance for systems that are still paper-based and, more important, to explore the essential logic and rationale behind the modification of official records.

(b) Microfilm files⁷²

239. The amendment and correction of registration records kept on microfilm presents specific challenges. For example, in the case of an adoption the copy in the file must be replaced with a new record; the question arises how this is to be done with a microfilm record. In the past, solutions included punching a hole in the microfilm where the original record resided. Besides being an intrinsically laborious task, the punched hole also weakened the microfilm, which was then liable to break at the point where the hole had been punched. A similarly impractical approach was to try to splice in the new record. This not only weakened the film in the area of the splice but often damaged adjoining records on the film.

240. Ultimately, the most appropriate solution for amending microfilm registration records is to create a separate roll of microfilm which contains the amended records only. The original record is left in its place on the original microfilm roll. The next step to be followed is a way of keeping a searcher from accidentally retrieving the original record that still remains on the microfilm. The searcher must be sent to the location of the amended record, which is now on the new roll of microfilm. The roll containing the amended record is referred to as the “relocation roll”. Each amended record, as it is assigned to the relocation roll, is given a relocation number, which may be called, for example, the “R” number. It is this “R” number that enables the searcher to locate the amended record on the relocation film. The “R” number replaces the unique birth record number in the index to the records (but not on the amended record itself, which retains the original unique number). The original number, therefore, no longer appears in the index. This prevents the searcher from accidentally going to the original record rather than the amended record.

241. To illustrate the procedure, consider this hypothetical example. A child born as John Smith is adopted by Mary and George Brown. A new record is prepared that shows the new parents’ names and the child’s new name as John Brown. The unique record number which appeared on the original record is used on the newly prepared paper record. This new record now becomes the official birth record for John Brown. A copy of the original record for John Smith is printed from the microfilm and placed in the sealed file with the adoption order. The number of the sealed file is placed in an inconspicuous place on the amended record. Thus the registrar will have a path back to the original record if this should ever be necessary in the future.

242. The newly prepared amended record showing John Brown with his parents Mary and George Brown is now placed in the relocation file and assigned the next sequential “R” number. It might, for example, be the 1,678th amended record, in which case it would be assigned the number R1678. Using the “R” as a part of the number will alert the searcher to look for the record in the relocation files. The number is placed on the record in a specific position, to facilitate searching the microfilm roll, perhaps in the lower left corner. It also becomes the number which now identifies the record in the birth index. The original number is removed from the birth index and replaced in the index by the newly assigned “R” number. When a sufficient number of “R” records have been accumulated to fill a roll of microfilm, the set of relocation records is filed and becomes the next roll of microfilm in the relocation file. There should of course be separate relocation files for live births, deaths, marriages and divorces.

(c) Computer files

243. In this context, the term “computer files” refers to entries or records in a database, not to be confused with scanned images of civil registration documents. Computer files are amended in a database (online or on local computers). For example, to accomplish the changes necessary to reflect the adoption of John Smith described above, a copy of the original record would be made and stored with the adoption documents in the sealed file, and then the corrections could be made in the database. Another example, if this is permitted under

⁷² As with the hard-copy records described in subsection (a) above, the sole purpose of describing the procedures followed in cases where civil registration records are kept on microfilm is to provide examples for those civil registration systems that still employ this medium.

the country's law, is the procedure for change of sex. This must be treated as an amendment and may trigger the issuance of a new PIN, if the country uses PINs that contain an indication of sex.⁷³ In any event, a link file needs to be created in order to have the original and the new identities (and PINs) permanently associated with each other in the master database.

244. As things currently stand, where there are interactive applications that can be used to manipulate the register database and numerous physical locations within the system where such interactions can occur, it is of critical importance to ensure that access to the database is subject to strict protocols. In the case of paper files, remarks or annotations are written on the margin of the original document; the same logic is applied to computer files in a database. Thus it is necessary to develop routines and to keep a log indicating the amendment to the record, the person who amended it and the documentation that triggered the amendment.

245. As maintaining confidentiality is one of the major principles of civil registration, access to the applications for amending the records has to be restricted to a certain number of registrars. In addition, computer routines need to be developed so that each amendment is reported to the management for quality control purposes.

2. Preservation of stored records

246. Depending on the size of the population that it serves and the organizational structure of the civil registration system, a central registration office for a district or province may process 100,000 new records each year and will, in the course of a single decade, have well in excess of 1 million records in its files (when corrections and amendments are included). Many jurisdictions will generate records at rates that will make these illustrative numbers look quite small; for that reason, the present subsection is devoted to methods for preserving stored records of different types, paper-based, microfilm and computerized.

(a) Paper-based records⁷⁴

247. Paper-based records are often the initial format in which the civil registration record appears. Whether at the local office or the central office, the paper record is subject to damage by fire or water damage or to simple wear and tear. In cases where the record is in loose-leaf form, it is also subject to loss or misfiling. This danger is reduced when the records are stored in bound books. As computerization takes hold, however, the use of bound books will gradually disappear, and only historical books will need to be preserved.

248. Guarding against fire or water damage is highly important. Often the paper record, in addition to being on a fragile medium, may also be the only existing copy of the record: even in cases where a copy is kept at both local and central levels, the loss of a copy at one level means that the other copy becomes more vulnerable. For these reasons, the digitization of all paper civil registration records, notwithstanding the complex and resource-demanding nature of the process, must be incorporated in the initial set-up of the holistic notification, civil registration, vital statistics and identity management system. Until the digitization of all records is achieved, measures to manage and protect paper records need to be put in place. To guard against fire damage, the paper records should be stored in a room or a vault constructed of materials that will resist fire and heat for long enough to allow the fire to be extinguished before damage is done. To equip the vault with a water spray would merely introduce another type of hazard. Some offices have used halon fire-extinguisher systems in the vault area, but this practice is on the decline because of its cost and environmental impact. There is also a danger of water damage resulting from floods and heavy rains.

⁷³ It is recommended that the PINs do not contain any indication of sex, geographical area, date of birth or any other personal details.

⁷⁴ As noted above, at the current time, civil registration records are predominantly computer-based and stored in databases such as population registers. The practice of keeping paper records is still followed, however; furthermore, there are a number of transitional examples where new records are computerized but not all the existing paper records have been scanned and entered in the database, as this process is so resource-intensive. That is also true of microfilms, which were – and, in some cases, still are – used for the general archiving of civil registration records. Hence the need to give consideration to all three record formats.

249. Wear and tear from the handling and refiling of paper records is also a threat to such documents. Paper records stored in a normal-sized file drawer will not easily survive the pushing and pulling that handling and refiling, and opening and closing the drawer entail. A good method is to use expandable folders, holding 75–100 records each. The folders can be labelled with the range of record numbers contained in each folder and then placed in the file drawer. This will greatly diminish the wear and tear caused by the opening and closing of the drawer; it also makes it easier to locate a particular record and easier to refile it properly without unduly disturbing the adjacent records.

250. Even these precautions are time-limited because of the innate fragility of paper. Hence the need to digitize paper civil registration records as swiftly as possible. Once digitized, the original paper records can be transferred to the national archives. The registration law should address, among other matters, the need to back up and preserve civil registration records, and also the recognition of digitized and scanned copies in lieu of original records. The option of transferring the paper copies to the national archives after a certain period, once a population register has been established, should be carefully considered where the climate conditions render the paper particularly subject to deterioration or where there is lack of storage space. The genealogical information that they contain is highly valuable and must be preserved for continued future use.

251. In turn, paper records with data on vital events from the past may be a valuable source for future statistics and research and should not be destroyed. These historical records will become more accessible if they are scanned and this will also stop the physical deterioration of records on paper and microfilm. To make old records more accessible for computer use, they must be converted to computer-readable format, using optical character recognition (OCR) software. This software generally transcribes printed paper records well, but hand-written paper records often cannot fully be converted with the use of available software. Thus some of these data may have to be entered manually into the computer. Recent methodological developments will, however, reduce the transcription costs significantly and OCR software is usually able to recognize handwritten dates. Moreover, the family name is often the same for all family members in a household, which will also reduce the amount of manual work and costs. There are many cases where old records have been computerized, relating both to vital events and population censuses. Two such examples are outlined in box 13 below, relating to Albanian⁷⁵ and Norwegian historical records.

Box 13

Importance of storing and preserving old records

Work by the Norwegian statistics authorities furnishes two interesting examples in this regard. First, in Albania, after the country's new civil register was established in 2011, Statistics Norway helped to scan the old handwritten books so that the history of each person, including the dead, would be available. This has proved very useful for, among other purposes, the determination of property rights.

Second, in Norway itself, the Historical Population Register aims to transcribe and link all recorded data on individuals in censuses and church books (parish registers) and other sources from the country's first nominal census in 1801 until the present day, including the linking of the historical data with the contemporary population register, which was established in 1964. The register aims to include as many as possible of the 9.7 million people who were born in or immigrated to Norway between 1735 and 1964. The project will in principle consist of three parts: first, the scanning of original documents; second, the transcription of data, i.e., digitizing data to make them machine-readable; and, third, the linking of records using the name, the date and place of birth and other available information as matching criteria. The Historical Population Register will be an important source for statistics and research. The linking of data from different sources will make it possible to establish links between family members and other relatives. This is essential for research in such areas as hereditary diseases, as the register will include information about parents, grandparents and other relatives.

⁷⁵ Vibeke Oestreich Nielsen and others, *Status Analysis on Civil Registration and Vital Statistics (CRVS)*. Documents 2014/41 (Oslo-Kongsvinger, 2014). Available at www.ssb.no/en/befolkning/artikler-og-publikasjoner/status-analysis-on-civil-registration-and-vital-statistics-crvs.

(b) Microfilmed records

252. Microfilming techniques were widespread tools of choice in previous decades for archiving and safekeeping a variety of documents, including civil registration records. Consequently, a number of civil registration systems hold countless rolls of microfilms containing records of births, deaths, marriages and divorces. Retrieving the information from a microfilm is a straightforward process, requiring fairly basic apparatus and a meticulous indexing system. Processing the microfilmed records for either statistical purposes or for amendments is practically impossible, however, and requires those records to be digitized.

253. The digital conversion of microfilms (including microfiche or flat sheets) requires the use of an optical scanner that captures the film in a raw digital format. OCR software will also be needed, to ensure that the digital record contains exactly the same information as the microfilm. While the equipment and the process are becoming less and less expensive as technology advances, each scanned record will still need to be carefully checked against the original record on the microfilm to ensure that the two are identical.

(c) Computerized records

254. In the case of digital civil registration records the procedures for storing and preserving records are based on general current practices for maintenance and backup. A common approach is to have two servers simultaneously online and mirroring each other so that they both record each interaction and each input of new records. Another common practice is to have daily backups from the main server maintaining the database and population register, thus ensuring the preservation of records. Frequently, the mirror or backup servers are located in a different geographical area, even a different country, as a risk mitigation strategy. If this course of action is taken, data protection measures for the mirror server must be taken, in particular if the service is outsourced to a private company.

255. As mentioned above, in a number of cases there would need to be least two systems in operation at the same time. One would be the modern approach of automated, digitized entry and storage of records using computer networks. There would also be records in the old format, however, either on paper or microfilm or both, that would need to be digitized and incorporated in the database. In addition, automation may not be an option available in all areas of the country, because they are too remote or lack the necessary infrastructure. That would entail the use of portable electronic devices to record the occurrence of vital events and to issue certificates. These records would then need to be uploaded in bulk into the main database. In addition, diplomatic and consular missions abroad will transmit files recording the occurrence of vital events involving nationals of their country. Hence the need to design appropriate protocols for inputting and storing all these entries in a consistent and routine manner.

3. Internal review mechanisms for system functions

256. The present subsection outlines certain internal review mechanisms that should be put in place to maintain the uninterrupted functioning of systems and to detect aberrations. The mechanisms need to be in place in all parts of the system: notification, registration, certification and statistics. Internal review mechanisms at both the management and staff levels are examined, looking first at those needed in the areas of notification and registration, then at those needed in that of certification and, lastly, at those needed in the vital statistics component.

(a) Notification

257. It cannot be assumed that information on the occurrence of vital events and their characteristics will automatically reach the registration offices. Nor can it be assumed that the information that does reach the registration office is thorough, complete or accurate. Accordingly, the registration agency must actively engage the notifiers and informants in this process, primarily health personnel, court personnel and marriage officers.

258. Notification protocols need to be clearly spelled out in the rules and regulations for each type of notifier, and regular training should be conducted on this matter for both registration staff and notifiers. Other information materials can be prepared for this purpose, such as instruction manuals, leaflets or targeted multimedia resources. This will ensure that health personnel, court personnel and marriage officers are aware of what is expected from them in terms of vital event notification, who their counterparts are at the registration agency and where they can find help if needed .

259. Moreover, checks and balances need to be in place to ensure that the notification protocols are being followed. Reports on the quantity and quality of information relayed by notifiers will be a helpful tool in identifying training needs and improvement areas.

(b) Registration management

260. Identifying patterns and anticipating workload are among the major responsibilities of the registration management. Consequently, the management needs to gather and analyse information regarding the monthly frequency runs from the civil registration register, with a view to assessing the completeness and accuracy of the registration process. The number of events of each kind that should be reported during a particular month can be anticipated on the basis of previous history and population levels. Similarly, a set of variable ranges can be developed, such as age of mother, birth weight, number of deaths by cause, and, when the frequency is outside the range or in cases where a specific variable such as the mother's age is outside the expected range, a query should be initiated. The frequency checks each month can also be used by the management to monitor the number of missing or unknown values. A higher than anticipated count of missing or unknown values could signal some failure in the reporting system, which will then require immediate attention.

261. It is also important that the patterns (in term of frequency and type) of edits made to records during the process of data entry should be carefully monitored by producing periodic reports. Nowadays, editing applications are being developed for use when information is entered in electronic forms that will become registration records in the civil registration register. For example, if the person entering the data erroneously enters "male" under the sex of the mother, or provides a birthdate for the mother that is not plausible (indicating, for instance, that the mother is aged 10 or younger), the embedded editing procedure will stop the data entry and signal the need for correction. The report of each such intervention will serve as a valuable source of guidance to management staff, enabling them to improve training in data entry, or shedding light on the cause of data entry errors.

262. A long list of other operational management statistics needs to be generated on a regular basis. For example, the timeliness with which data are being reported from field offices or suppliers needs to be tracked: are the prescribed time limits for completing the cause-of-death certification being met? Are local registrars reporting events to the central office in a timely manner? Are hospitals forwarding the birth data to the registrar on time? What is the average workload of a registrar office? (In this context and for additional information, see also chapter II, subsection C.3, above, on monitoring). These and other operational management statistics should be analysed and sent back to the respective local registrar offices with a view to ensuring quality improvement.

263. In areas outside the civil registration component, the management has to use other sources of information to assess how well the system is functioning. A commonly used approach in this regard is to compare the number of births and deaths with the population estimates and projections produced by demographers in the national statistical office or similar institution. Preparation of these estimates and projections is a routine exercise, usually based on population censuses and sample surveys. They are of particular use for assessing the coverage of civil registration at subnational levels, as they include estimates of

the number of births and deaths; these are then compared with the registered numbers of these events and the discrepancies indicate where remedial action needs to be taken by the civil registration component.⁷⁶

(c) Registration staff

264. As indicated throughout this handbook, the vital record is a dynamic document, even if in digital format, that is often subject to change or correction throughout the lifetime of an individual and even after death. Many of the correction procedures are effected during the period when the record is at the registration processing stage. It is therefore necessary to develop a set of applications that can be used to check that required changes to the record have in fact been made. The procedure for changing a record should have two components: in addition to entering the required change in the system, a log should be generated to indicate that the change has been made. This is of particular importance in the area of registration, where the majority of changes are processed in batch mode. When the change is made in an online system, it can be displayed immediately – the resulting visual check serves as the monitoring system. It is still necessary, however, to keep a regular log listing all the changes and the records affected, for the purpose of understanding the frequency with which records are amended and the reasons for such amendments.

265. There are two key points in the registration process when a reminder flag needs to be attached to the record. The first relates to the query process: it is often necessary to send a query to a physician regarding the information listed on the death record. Triggers for sending a query to the certifying physician include illegible entries for the cause of death; the use of non-standard abbreviations for cause of death; failure to indicate the age or sex of the decedent; circumstances of an injury (if an injury was reported); reasons for surgery (if a surgery was reported); and condition for which a drug was taken (if drugs are mentioned). The query process should include a reminder flag that will alert the nosologists if no response has been received from the physician in a reasonable period of time. Without such reminder, in the daily process of coding records, the nosologist may omit to follow up on the query in question.

266. The second situation in which a reminder flag should be inserted is similar and arises with records that arrive in the office with cause of death marked as “pending” or “pending autopsy results”. A final record with a complete cause of death should be filed within a specified and reasonable period of time (such as one month). If no such record is filed, the reminder flag should alert the registration staff to request an updated record so that processing may continue.

(d) Certification management

267. Where certification is concerned, the management has the responsibility to ensure efficient customer service for the public. To do so requires having in place internal system review mechanisms that will yield both workflow data and revenue data. Monthly workflow data should be generated by the management from each service area. These data should indicate how many adoptions, corrections and paternities were processed; how many certified copies were processed by mail; how many were done over the counter and how many online; and the turnaround time for each of these services – in other words, how many workdays it took to service each type of customer request. This type of information is necessary for management decisions concerning where best to use the office’s human resources and how to improve efficiency and service delivery. It will alert the management if a seasonal overload of business requires the recruitment of temporary help in a particular area of the operation.

268. The management also needs monthly reports on the amount of revenue generated. This information is particularly important for comparing revenue generated in the current year with that generated over the same

⁷⁶ Chapter IV is exclusively concerned with the discussion of methods to assess both the completeness of the coverage of the civil registration system, and the quality of the information that it collects. Reference to these methods is made here to highlight the need to plan and administer these methods as a regular and routine part of the operation of the civil registration system.

time period in previous years, in order to make decisions about required changes in the workforce and in fees for the various services provided.

(e) Certification staff

269. The certification staff are responsible for a number of areas where internal review is important. The increased use of fraud and counterfeit-resistant paper to issue certified copies of civil registration records has also increased the need to protect blank certificate forms from theft. This is usually achieved by the use of a preprinted control number on each form. Applications need to be developed to match each control number with the civil registration record for which the copy is issued and to store the information regarding issuance of the copy in the database, together with the control number of the paper certificate. In addition, the system should generate a daily log recording the starting and ending control numbers for each day, which should be checked against the number of copies issued and the cash register sales information system. Allowance is made for any ruined copies or copies voided for other reasons. The control system would also include a listing of all paper stored in the office. Furthermore, the paper should be stored in a secure area at all times. Should a theft occur, thanks to this internal control system, the authorities can be alerted to the exact numbers on the stolen papers, thus potentially preventing their misuse.

270. Another quality assurance mechanism in this segment involves the daily matching of the number and type of certificates issued with the cashier's receipts collected as administrative fees (for those services that carry a fee). This procedure should be incorporated as a daily matching exercise, to be carried out by each registrar's office, to ensure that all the fees have been properly collected and processed. In the event that a registration office is operating without computer support, or with only rudimentary support, the matching will of course be more cumbersome and time-consuming, but it is still essential to prevent possible fraudulent acts by staff.

(f) Statistics staff

271. The staff in the statistics component of the system are responsible for instituting a number of internal quality control mechanisms, primarily in the process of generating vital statistics. This process requires checking individual records for errors and then aggregating them into tallies at different levels of aggregation. If there is a very large volume of data, this process be carried out on a sample of records. The essential difference between the work of registration staff and statistics staff is that registration staff focus on individual civil registration records and, for that reason, follow a case-study approach. Statistics, on the other hand, is all about aggregates and comparing records – a process that requires a quantitative approach. Potential errors can be spotted using aggregated data by means of scatter plots, cross-tabulations, box plots and distribution graphs – in other words, with the careful use of descriptive and diagnostic statistics, outliers and suspicious values can be identified. This work also involves comparing the content of records for similarities across different areas of the countries. For example, tabulating the number of live births by age of mother and district where mother resides may result in the identification of a certain district as one where mothers are considerably younger than in all the others. It may be that this is due to the different population structure of that particular district, where there is a larger proportion of younger people. It may also be, however, that this is the consequence of errors in compiling the information at the stage when the original civil registration record was compiled. It may also result from a glitch in the computer application used for data entry or for data editing.

272. Furthermore, since statistics staff have extensive experience in processing individual statistical records coming from a population census or a survey, including complex editing procedures to which each record is subjected in order to ensure internal consistency, it is necessary to solicit their input during the processes of data entry and editing in the civil registration component. This is of particular importance since much of the information about the event and persons involved that needs to be collected and entered involves statistical variables, such as age, sex, marital status, educational attainment, economic activity and so forth,⁷⁷ and statisticians have already developed a checking system that will alert them, for example, when an 18-year old

⁷⁷ For the complete list, see *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 60.

is registered as holding an advanced university degree. This system should be used in developing data entry edits for a civil registration record, so that flags will indicate the need to go back to the source and identify which of the two pieces of information (age or educational attainment) needs to be corrected.

4. Maintenance of field operations (local registrar)

273. Generally speaking, the term “quality assurance” refers to all the measures undertaken in the process of delivering results aimed at minimizing errors and optimizing the quality of the final product. In the case of civil registration at the local level, in addition to the internal monitoring and review mechanisms that must be in place to maintain the civil registration and vital statistics systems in general, quality assurance is also necessary, for the development of a number of elements focusing on those operations at the local level. These elements include standard operating procedures, handbooks, the registration forms themselves, training, guidelines, seminars, newsletters and site visits. It is the purpose of the present subsection to take a close look at these components and to consider how they can be used to assure the quality of records at the local registrar level.

(a) Handbooks

274. The availability of handbooks for local registrars will help to ensure consistency throughout the system. They will maintain consistency both between operations in the central office and the local office, and among local registration areas. The handbook for local registrars should be considered a dynamic document, and the management should give it close attention. In other words, when it is prepared, it should be understood that it will need to be changed and updated on a frequent basis. For this reason, it is recommended that the hard copies of the book be constructed in a loose-leaf format rather than in bound form. This will make it possible to replace individual pages when updates are needed. New pages can be added when additional sections become necessary. While, these days, electronic formats and online versions of the handbooks (soft copies, wiki-style guides and other online resources and interactive software, among other options) will be the vehicle of choice, printing may still be needed for local registrars’ offices with limited access to the internet.

275. The handbook provides guidance on the various steps of the registration process, including recording, reporting and certification; the preservation and safekeeping of civil registration records; and security measures. It should also include copies of the laws governing the operation of civil registration and vital statistics, along with any specific rules and regulations on that matter. In addition, the handbook should include the text of any policies that have been devised to interpret or clarify the laws and regulations. For example, the law might specify that civil registration record copies can be issued “to citizens demonstrating a tangible interest in the record”. A subsequent regulation might define those having a tangible interest as “the registrant, certain members of the registrant’s immediate family, or the legal representative of one of the aforementioned”. A policy might then have been developed to define immediate family as “parents, grandparents, siblings, legal guardians and children”, in accordance with the country’s family law and other relevant pieces of legislation. It is important that each local registrar should have copies of the law, the regulation and the policy, to be able to process the issuance of certified copies in a manner that is consistent with the central office and other offices in the country.

276. Another important item to include in the handbook is the most current version of all the forms that will be needed to maintain the efficient operation of the system. These should include not only the official documents that are to be completed but also any worksheets suggested as helpful in completing the official forms, besides any administrative forms for communication between the local registrar and the central office (supply orders, order sheets for blank documents, report sheets, log sheets and others). Each of the official forms should also be accompanied by step-by-step instructions on their completion. If a form asks for date of birth, specific instructions should indicate whether abbreviations for the month will or will not be acceptable; if it is permissible to use just numbers in reporting the date; and the order to be used in giving the date, namely, whether it should be month/day/year or day/month/year.

277. When appropriate, the instructions for collecting a topic should indicate why it is being asked. For example, if a mother’s age is asked, the instructions might indicate that this is a variable to be used in

compiling statistics for studies on ages that may prove to be risk factors for a successful birth. Explanations of this kind are important guidance for registrars and can prove very valuable in the field when an informant objects to providing a certain piece of information. The explanation should also indicate how the data will be used. This is important information to include, whenever available. All these rules, regulations and short explanations need to be embedded in the software being used for the registration process and in daily registration processes.

278. Communication is the underlying theme in handbooks. A good handbook should therefore include lists of individuals who can be contacted when problems arise, not only people at the central office who can respond to questions in particular areas of expertise but also other registrars, funeral directors, coroners and health professionals who might have to be contacted to enable a specific form to be completed accurately. The management should assign someone in the central office the responsibility to ensure that changes, corrections and updates are sent to individuals possessing the handbook. This means that an up-to-date list must be maintained of every individual possessing a handbook so that updates can be forwarded to everyone in the registration network. This can be done effectively with the use of email circulars and through a dedicated e-discussion forum among registrars or an intranet bulletin board.

(b) Mini-handbooks

279. Subject-specific handbooks may be useful when a much broader guide with the scope, for example, of a local registrar's manual is neither needed nor efficient. For example, many doctors only occasionally fill out death registration forms. Hence assistance at the moment of the completion of the death record could be very useful. Few doctors would wish to take the time needed to seek that help from the full handbook. A useful approach here would be to prepare a single two-sided laminated instruction sheet specific to the task of properly completing the cause of death on the death registration form.⁷⁸ These sheets can be distributed to physicians, given to funeral directors to have at hand if a physician should need one, or left in those areas of a hospital where they are likely to be needed. Where these have been used, the feedback from physicians has been positive and appreciative. Other instructions may include a guide for coroners on how to complete the manner of death field (for example, whether it is natural, suicide, homicide, accident and so forth); step-by-step instructions for marriage officers on how to complete the marriage records; and instructions for court clerks on how to include a divorce decree in the civil registration system.

280. In addition to these purposes, the registration forms are also used by local registrars and informants on a daily basis. Thus they are in and of themselves a powerful educational tool. Registration forms need to be clear and self-explanatory, and must give precise instructions when needed. Forms should be simple and user-friendly, easy to read and to follow. It is highly recommended that special versions are developed for certain population groups, such as persons with disabilities and indigenous persons.

(c) Newsletters (electronic and hard-copy)

281. Newsletters provide another useful communication tool that will help to assure the quality of the registration process in local offices. New laws, regulations, policies and protocols must be included in the handbooks. Information about these new directives can usually be conveyed to local registrars and to those who need it more quickly and with accompanying explanations by means of a quarterly newsletter. The newsletter can also notify the reader that amendments to the handbook are in the pipeline. A newsletter can also be an excellent vehicle for keeping everyone in the system up to date on the latest staffing changes in both the central and local offices.

282. The newsletter also provides a useful means of disseminating timeliness reports. These will probably be most effective if they encourage participation by taking a positive approach. In other words, the newsletter might list the 10 most timely hospitals or local registration areas. This will then encourage competition by

⁷⁸ See World Health Organization, "Cause of death *Death* on the death certificate *Death Certificate* in line with ICD-10: Quick reference guide" (Geneva, 2010). Available at http://apps.who.int/classifications/apps/icd/icd10training/ICD-10%20Death%20Certificate/html/ICD-10_Resources/causeofdeathflyer.pdf.

other providers, eager to attain the position of a high scorer, and will not undermine the team spirit by identifying any underperforming area or institution. Another feature that has proved popular and useful in newsletters is a list of hints on how to do some aspect of the job, based on the practices of successful local registrars. It is always a good idea to include a question-and-answer section in each newsletter. As a good example, attention is drawn to the newsletter from the Registrar General of New Zealand addressed to funeral directors.⁷⁹ This newsletter contains information on preparing for and managing bereavement, new requirements for paper death registration, the birth-to-death matching process, the updated fee structure, news on the SmartStart project⁸⁰ and general reminders.

283. The ideas described above are relevant mostly to a newsletter produced by the registration section of the office. Some of those ideas are also applicable, however, to a newsletter prepared by the statistics office. This newsletter would tend to focus on how the data collected are used. By so doing, it will also encourage more careful and complete reporting of the data by professionals in the field. A vital statistics newsletter would also include a report of the studies and publications produced using the collected data. A section on quality assurance is also a popular feature of vital statistics newsletters.

(d) Training

284. The importance of continuous and comprehensive training cannot be overemphasized as a means of ensuring the quality of the civil registration and vital statistics processes. The development of training curricula must be a routine responsibility of the central office. Training programmes have to be tailored to specific audiences and refresher courses incorporated into the routine work programmes of civil registration offices countrywide.

285. The training plan should distinguish between internal training, which is oriented towards civil registrars, vital statisticians and other technical and administrative personnel, and external training, which is oriented towards policymakers, local officials, medical and health personnel and others concerned by and responsible for the quality and uses of civil registration and vital statistics. Internal training should emphasize techniques, methods, skills, processes and the filling of forms, and should address issues of professional roles and functions. External training should be designed to inform groups about the needs and functions of civil registration and vital statistics systems, and should seek to develop improved understanding and cooperation. External training is a crucial improvement mechanism and should not be neglected, to ensure the cooperation and support of those involved. In the case, for example, of medical and health personnel who provide data to the system, the quality of the information provided is contingent on their understanding of the importance of accurate data and the uses to which they will be put. For these reasons, both internal and external training programmes should be an integral part of the civil registration and vital statistics systems. The responsibility for these programmes, which should be carried out on a regular rather than an ad hoc basis, must be shared between both systems.⁸¹

286. Thus training should not be limited to civil registrars and statisticians. Specific courses need to be designed for medical personnel – separate ones for the staff members who act as informers and are filing the information regarding the event and the persons involved and for the physicians who certify the cause of death.

287. The establishment of a nationwide professional association of civil registrars and vital statisticians for the purpose of promoting, among other goals, an exchange of views on the administration of registration laws and devising strategies for the improvement of registration is an important means of improving the quality of the work of registrars, statisticians and health workers and researchers. This approach is advantageous for both centralized and decentralized civil registration systems and is especially useful when a country's

⁷⁹ March 2017 issue available at <http://createsend.com/t/j-20AF7E74C477B50F>.

⁸⁰ See box 8 in chapter II above for more information on this project.

⁸¹ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 632.

administration of civil registration is decentralized. A single professional association has the particular advantage of bringing together all the personnel engaged in the registration and analysis of a country's vital events, either physically or through written communication, so as to promote uniformity, good registration practices, problem-solving and professionalism.⁸²

288. In addition, an annual meeting of this professional association is highly recommended; this will provide an opportunity for the free exchange of ideas and experiences that can be very beneficial to the civil registration and vital statistics system. This meeting can take the form of an academic conference, with the voluntary submission of papers, presentations of study cases, innovations, lessons, posters and similar activities.

⁸² Ibid., para. 337.

IV. Evaluation of the quality of civil registration and vital statistics systems

A. Introduction

289. As things stand, over two thirds of the world's countries do not have valid and reliable vital statistics derived from civil registration, which is the optimal source for such data. Given this critical data need, there is currently a drive at the international level to strengthen civil registration and vital statistics systems, in particular in developing countries. The importance of generating complete, accurate and timely vital statistics from the civil registration system cannot be overemphasized, as these are of key importance in assessing population characteristics for planning and policy purposes and for the evaluation of various programmes. As system strengthening initiatives take shape, there will be an increasing need for robust methodologies to measure and monitor progress in data quality improvements in vital statistics at national and subnational levels.

290. The present chapter sets out a broad framework for evaluation of the quality of civil registration and vital statistics, and provides a practical guide to the implementation of various methods and techniques for that purpose.

B. Considerations on quality of the civil registration and vital statistics system

291. In considering evaluation of the quality of civil registration and vital statistics systems, particular attention will be given to two aspects of the systems: first, evaluation of the quality assurance mechanisms inherent in the legal, administrative, and technical elements that operationalize the civil registration and vital statistics systems; and, second, evaluation of the data in terms of such dimensions as their coverage, the completeness of registration and errors in data content.

292. Since data quality ultimately depends on the structure and operational status of the systems, the evaluation of the first aspect (quality assurance mechanisms) will help to identify system-wide factors that affect the quality both of civil registration services and records and of vital statistics. Taken together, evaluation across both aspects (quality assurance mechanisms and assessment of data) will assist in guiding the design of strengthening interventions, while identifying data biases that could prompt adjustment of the statistics with the aim of deriving empirical estimates of specific vital rates and indicators.

1. Importance of quality evaluation

293. Civil registration is the optimal source of information on identity and civil status and of routine and reliable vital statistics that can be used to guide human development policies and to monitor progress towards periodic targets and goals. In today's world, the vital statistics, including rates and indicators, presented for many developing countries largely comprise modelled estimates, rather than empirically derived measures from civil registration systems. This shortcoming is attributable to poorly functioning civil registration and vital statistics processes and systems in these countries. Strengthening initiatives are accordingly being mounted to improve the quality of these civil registration and vital statistics systems, to enable them to serve as reliable sources of individual registration records and of robust vital statistics.

294. Data quality evaluation is a critical primary step to be taken prior to the analysis and use of data. The evaluation of civil registration and vital statistics quality is needed to serve as a basis for planning and measuring the impact of strengthening initiatives. A standard framework of parameters and indicators is necessary to evaluate and compare quality over time and across populations.

295. Findings from data quality evaluation are useful from two perspectives:

(a) First, to identify and quantify data biases that can be corrected or adjusted to derive more reliable estimates of demographic indicators;

(b) Second, to identify system-wide issues that result in data biases, which could prompt interventions to prevent weaknesses in data quality.

Data quality evaluation is a constant requirement, even in countries with good quality vital statistics.

2. Confidentiality and privacy in the context of quality evaluation

296. Data quality evaluation should preferably be conducted with a degree of independence on the part of the evaluation team. This will help to ensure an objective assessment of system operations and data produced, free of the influence of any stakeholders whose performance may be evaluated or inferred.

297. Quality evaluation exercises will produce statistical indicators of performance and data quality. In turn, the interpretation of statistical indicators should factor in systemic issues, which should be discussed largely in terms of processes and designations rather than by naming specific institutions or staff members, to protect confidentiality and privacy and to maintain trust among stakeholders. In summary, the findings from evaluation exercises should be discussed and used in a constructive spirit, and should be stated in conjunction with clear and feasible recommendations on quality improvement.

C. Quality framework of the civil registration and vital statistics system

298. The evaluation of civil registration and vital statistics quality assumes importance to provide a basis to plan and measure the impact of strengthening initiatives. A standard framework of parameters and indicators is necessary to evaluate and compare civil registration and vital statistics quality over time and across populations. A civil registration and vital statistics quality framework would involve:

(a) Quality assurance evaluation, which would review the structural design, business processes, infrastructure, management and operations of the systems for vital event registration, issuance of legal documents, and compilation of vital statistics;

(b) Data quality assessment, which would involve several domains, including completeness, accuracy, ability to generalise the results, relevance, comparability, timeliness, and availability and accessibility of the vital statistics and data.⁸³

299. The processes and procedures that need to be implemented in applying this framework will involve a combination of quantitative and analytical (objective) methods and qualitative and observational (subjective) assessments that provide contextual evidence of data quality, along with empirical evidence on the basis of which interventions can be mounted to improve data quality.

1. Civil registration and vital statistics quality assurance

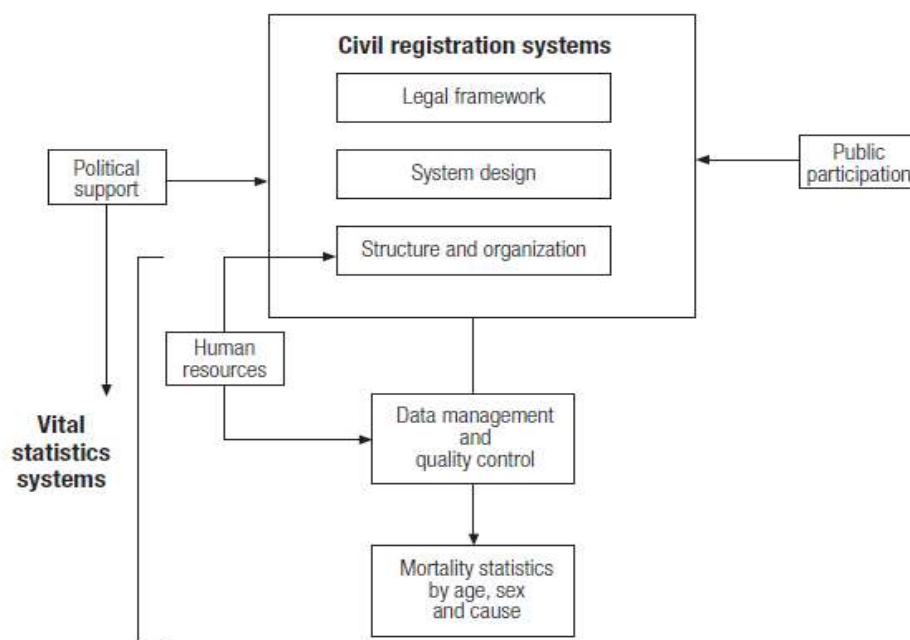
300. As recommended in the third revision of the *Principles and Recommendations for a Vital Statistics System*, civil registration and vital statistics systems should be operated by governments in accordance with a nationally mandated legal, administrative and technical framework. The civil registration and vital statistics framework in each country should conform to international operating standards for its various elements. It should also meet local specifications in regard to structure and organization to ensure the efficient operation of the system. Both these aspects – namely, conformity to international standards and compliance with local requirements – comprise the quality assurance benchmarks of the civil registration and vital statistics system, designed to ensure that the objectives and outputs of the system are fit for purpose. Hence a detailed

83 Prasanta Mahapatra and others. “Civil registration systems and vital statistics: successes and missed opportunities”. *Lancet*, vol. 370, No. 9599, pp. 1653–1663 (2007); Chalapati Rao and others, “Evaluating national cause-of-death statistics: principles and application to the case of China”, *Bulletin of the World Health Organization*, vol. 83, pp. 618–625 (August 2005); David Philips and others, “A composite metric for assessing data on mortality and causes of death: the Vital Statistics Performance Index”, *Population Health Metrics*, vol. 12, No. 14 (2014). Available at www.pophealthmetrics.com/content/supplementary/1478-7954-12-14-s1.pdf.

evaluation of these quality assurance mechanisms is required to identify potential limitations arising from either aspect. These limitations could then be addressed through appropriate interventions to ensure the quality of services and outputs from the civil registration and vital statistics system.

301. The civil registration component of the system encompasses the legal and administrative framework that organizes the registration of individual vital events, while the vital statistics component comprises activities involved in the compilation and management of data on registered events to generate vital statistics. There is some degree of overlap between the two broad components. For instance, the legal framework will include rules for individual vital event registration, together with instructions for the compilation of data. Often, institutions and personnel responsible for vital event registration have additional roles in the processing and management of registration data and vital statistics. The quality assurance of the civil registration and vital statistics system therefore consists in the appropriateness of its system design, the availability of adequate resources, and the reliability of the maintenance processes to ensure system performance, in other words, to enable the complete and accurate registration of vital events, and to ensure efficiency in the processing, compilation and analysis of vital statistics. Figure 8 provides a conceptual overview of the quality assurance elements of the civil registration and vital statistics system in Viet Nam.

Figure 8
Conceptual overview of quality assurance elements of the civil registration and vital statistics system in Viet Nam



Source: Chalapati Rao and others, “Compiling mortality statistics from civil registration systems in Viet Nam: the long road ahead”, *Bulletin of the World Health Organization*, vol. 88, No. 1 (2010), pp. 58–65.

302. Quality assurance in civil registration and vital statistics is assessed through a review of the processes relating to adherence to international standards and an evaluation of institutional and human capacity for assuring data quality, using a standard framework. The process review is carried out through the mapping of business process of civil registration and vital statistics systems, identifying the responsibilities and roles of key institutions and personnel involved, and establishing the sequence of events, from occurrence of the vital event to issuance of the relevant documents, along with its inclusion in relevant vital statistical outputs. Where relevant, the legal framework and administrative structure need to be reviewed to assess the potential for any data quality issues, relating, for example, to protocols for registration by place of occurrence or by place of

usual residence; expatriate populations; offshore registration; and the registration of vital events in disaster situations.

303. Following guidance in the third revision of the *Principles and Recommendations for a Vital Statistics System*,⁸⁴ it is recommended that consideration be given to the following dimensions in the evaluation of quality assurance systems and processes within civil registration and vital statistics:

- Overall assurance evaluation
- Civil registration structural design
- Business processes
- Infrastructure
- Management and operations
- Internal audits

Each dimension is discussed in detail in the following subsections.

(a) Overall assurance

304. The quality assurance evaluation should verify the presence of an interdepartmental coordination committee that involves all major stakeholders. The evaluation should also verify the nomination of the chair of the committee (the chair could rotate among the different agencies). There should be a specific charter of duties for the committee, with certain roles and responsibilities for different institutions: thus the ministry of health could be assigned responsibility for the coding and analysis of causes of death. There should also be a specified timeline and regular schedule for committee meetings. Lastly, the committee should require the preparation of annual overall reports on the performance of civil registration and vital statistics at local and national levels.

305. An evaluation of political support and community participation in civil registration and vital statistics quality is also needed. The evaluation should verify the presence of activities to improve public awareness and participation in civil registration. Regular announcements on local radio and television services about the need to participate in civil registration and the benefits of such participation are among the recommended actions.⁸⁵ Public participation could also be strengthened through the involvement of local community leaders, who could guide families in the procedures to be followed to complete the notification and registration process.

306. The overall quality evaluation of the civil registration and vital statistics system, including where possible both the quality assurance and the data quality assessment components, should be undertaken on a periodic basis. This is of particular importance in countries that are strengthening their systems through reforms and interventions to enhance overall performance. There are several approaches to the conduct of overall evaluations. A common approach is that of self-appraisal and the reporting of various system aspects with the use of the detailed questionnaires routinely sent to national civil registration authorities and statistical offices by the United Nations Statistics Division. Information and data from completed questionnaires are compiled in detailed reviews that analyse and compare the structure and performance of the responding national systems.⁸⁶

⁸⁴ *Principles and Recommendations for a Vital Statistics System*, Statistical Papers, Series M, No. 19, Rev. 3 (United Nations publication, Sales No. E.13.XVII.10), paras. 577–578.

⁸⁵ For a detailed elaboration, see the *Handbook on Civil Registration and Vital Statistics Systems: Developing Information, Education and Communication* (United Nations publication, Sales No. 98.XVII.4). This handbook is being revised in 2018.

⁸⁶ See *Handbook of Vital Statistics Systems and Methods*, vol. II, *Review of National Practices*, Studies in Methods, Series F, No. 35 (United Nations publication, Sales No. E.84.XVII.11). Available at https://unstats.un.org/unsd/publication/SeriesF/SeriesF_35v2E.pdf. More recently, the United Nations Statistics Division has published a series of technical reports on the status of civil registration and vital statistics in different regions of the world, available at <https://unstats.un.org/unsd/demographic-social/crvs/index.cshml#report>.

307. Another approach to civil registration and vital statistics overall evaluation is to undertake a series of national level stakeholder consultations facilitated by technical experts.⁸⁷ For this purpose, the World Health Organization (WHO), working with the University of Queensland in Australia, has developed a standard questionnaire, which it terms a rapid assessment tool,⁸⁸ for the rapid evaluation of the strengths and weaknesses of the system as it stands. More information on this rapid assessment tool may be found in box 14. The stakeholders include representatives from the officially designated national organization legally mandated to operate the civil registration system, together with representatives from the health sector, statistical office, local administration, civil society and other national and international agencies with a role or interest in civil registration and vital statistics. This approach also relies on self-reported information from public officials and the results serve as a potential basis for national strategic civil registration and vital statistics development plans. Findings from these exercises, known as rapid and comprehensive assessments (see box 14) can provide direct evidence on the administrative and technical constraints affecting system performance and improve awareness among national stakeholders about various aspects of civil registration and vital statistics operations.

Box 14

WHO: rapid assessment tool

The rapid assessment tool was developed to accompany the comprehensive guide (published previously), and countries are advised to apply it before undertaking a full review of their systems. It is available both as text and as a spreadsheet, for ease of compilation of data. Both text and spreadsheet have been extensively peer-reviewed by technical experts.

The rapid assessment tool consists of 25 questions about how the civil registration and vital statistics systems function. The questions are grouped into 11 areas:

- Legal framework for civil registration and vital statistics
- Registration infrastructure and resources
- Organization and functioning of the vital statistics system
- Completeness of birth and death registration
- Data storage and transmission
- Practices compliant with the International Statistical Classification of Diseases and Related Health Problems (ICD) and certification within and outside hospitals
- Practices affecting the quality of cause-of-death data
- ICD coding practices
- Coder qualification and training, and quality of coding
- Data quality and plausibility checks
- Data access, dissemination and use

Each question allows countries to select one of four scenarios describing a typical range of hypothetical situations. A numerical value (from 3 to 0) is assigned to each scenario, allowing a total score to be obtained. The score has no scientific value and should only be taken as a rough indication of the functionality and quality of the civil registration and vital statistics systems. Some countries might find that the score can be used to help them to decide whether there is a need to carry out the comprehensive review. The rapid assessment provides a quick overview of how well or how poorly a country's overall system is functioning.

Rather than the scores themselves, it is the process used to arrive at the scores that is important. The rapid assessment is not a questionnaire to which one person should attempt to find suitable replies; rather, it is a group exercise to be undertaken by a group of individuals knowledgeable in civil registration and vital statistics. The questions in the tool are designed to prompt a discussion among senior staff responsible for various aspects of the civil registration and vital statistics systems.

⁸⁷ World Health Organization, *Improving the Quality and Use of Birth, Death and Cause-of-Death Information: Guidance for a Standards-based Review of Country Practices* (Geneva, 2010).

⁸⁸ World Health Organization, "Rapid assessment of national civil registration and vital statistics systems" (WHO/IER/his/STM/2010.1).

308. An overall evaluation should provide specific and practical recommendations in line with the civil registration and vital statistics evaluation framework and international standards to strengthen administrative and technical aspects of the system. The evaluation also needs to touch on social influences on the system's performance, such as local and national political support and community participation.

309. In principle, a detailed overall civil registration and vital statistics evaluation is necessary at the stage when there is a clear national demand for a reliable and efficient system. This will ensure appropriate national commitment to the exercise, and also to the follow-up to the findings and recommendations. The evaluation will involve country-level exercises, including document review, consultations, field inspection visits and empirical local data quality evaluation and vital statistics analysis. The evaluation methodology and the manner in which the findings are organized should generally follow the framework presented in this chapter. The proposed reforms should address the administrative, technical and social constraints affecting the performance of the civil registration and vital statistics system. The recommendations should be tested through formative research interventions in small-scale pilot studies and subsequently built into a national-level research-based upscaling programme, with built-in monitoring and evaluation of the impact on both registration and vital statistics outcomes.

310. Once work has started on developing the civil registration and vital statistics system or its strengthening programme, the overall evaluation could be undertaken after a suitable interval (three or four years), to enable the implementation of reforms and data quality development activities across the country. Where applicable, appropriate monitoring and evaluation functions could be built into the routine field programme and internal audit activities of the system. As the system operations become standardized and system performance improves, the need for such overall assessments would be minimized and potentially restricted to instances where there are major legal reforms, changes to administrative structures or revisions to key data standards.

(b) Civil registration structural design

311. Design of the civil registration system, as explained in chapter I above, comprises several different elements that require assessment. These include the model of the structural design, the identity of institutions and their roles in the civil registration and vital statistics system, and the legal framework that mandates their operations.

312. At the outset, it is necessary clearly to define and study the structural design of the system in place in the country, according to the various models – namely, whether centralized or decentralized (see chapter I, sections B and C, above) – and the specific variations of each model. The characteristics, advantages and limitations of each of these models and their variations should be clearly understood by the team conducting the civil registration and vital statistics quality assurance evaluation exercise.

313. The model structural design must be properly understood before further analysis of its elements, in order that the potential strengths and weaknesses of the system can be fully evaluated. In decentralized models, it is essential to analyse the civil registration and vital statistics quality structural design even at the subnational level, to understand the influence of the structural design on the efficiency of the civil registration and vital statistics quality system. Based on this analysis, the quality assurance mechanisms could be developed through system strengthening interventions which address specific limitations in the structural design.

314. In evaluating the structural design model, it is also essential to identify the key government agencies or institutions responsible for or involved in specific civil registration and vital statistics activities. Civil registration records serve multiple purposes, including individual level identity management for national security and the delivery of various government services. In turn, vital statistics constitute an essential basis for population administration, planning and health policy. As a result, civil registration and vital statistics systems involve a range of government ministries or departments and personnel as stakeholders in the notification of vital events, the provision of registration services, and the processing, compilation and use of

information from registration records and vital statistics. It is necessary therefore to clearly identify the institutions and their roles and responsibilities within the structural design of the civil registration and vital statistics system.

315. Such an analysis of institutions can provide important insights into potential limitations or bottlenecks in the system structure and guide changes designed to improve system efficiency.⁸⁹ These analyses may suggest modifications to the structural design, such as the need to shift from a centralized to a decentralized model, or vice versa. Such decisions would need, however, to be taken in conjunction with the results from data quality assessment.

316. In countries which are in the design phase of establishing national civil registration and vital statistics systems, the different structural models should be considered and discussed with a view to determining which model would be most appropriate to the administrative and social environment of the country. It is essential that, at the planning stage, available material on the different structural models, along with technical experts from the United Nations or WHO or other national registration authorities are consulted, to give advice on the appropriate design. As a general principle, it is advisable to design and implement a model that is integrated with existing administrative processes and resources within the country, rather than to propose an entirely stand-alone system.

317. As explained previously, a centralized system has the advantage that standard civil registration and vital statistics rules and procedures defined at the central level can be applied in a consistent way across the country. These can be disseminated through standardized training programmes, resulting in uniform implementation and expansion of the system. In addition, any modification to the system can be designed centrally and communicated simultaneously across the country.⁹⁰ On the other hand, countries with large populations, with wide geographical dispersion or complex social structures at the subnational level may benefit from a decentralized model of the civil registration and vital statistics system.⁹¹

318. The legal framework is the key element that supports and operationalizes the structural design of the civil registration and vital statistics system.⁹² The legal framework essentially comprises the laws and regulations that mandate the procedures for registration and compilation of vital statistics. The team in charge of the quality assurance evaluation exercise would need to understand the principles of the civil registration and vital statistics legal framework, and should also be familiar with various examples of laws, rules and regulations from different countries.

319. From a quality assurance standpoint, the legal framework at national level (or subnational level in decentralized models) needs to be evaluated in terms of the availability of the following:

⁸⁹ For example, in the Indian state of Haryana, an institutional analysis of the civil registration and vital statistics system identified a need to transfer registration responsibilities from the Police Department to the Ministry of Health.

⁹⁰ One example of such implementation of a centralized model may be seen in Viet Nam, where the civil registration system is operated by a single agency, the Ministry of Justice, including the submission and compilation of records. At the central level, the General Statistics Office has a role in the tabulation and preparation of annual vital statistics from civil registration. In addition, recognizing the need for specialized handling of information on causes of death, the Government of Viet Nam has assigned specific responsibility for collecting and analysing data on registered causes of death to the Ministry of Health at the central level. Further details are available from the country's national action plan on civil registration and vital statistics for the period 2017–2024, available at http://vanban.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_id=2&_page=1&mode=detail&document_id=188102.

⁹¹ For example, India has established a decentralized model, under which each state in the country implements civil registration and vital statistics processes with its own framework of institutions and personnel, largely determined in accordance with the availability of institutions and resources at state and local levels. Detailed descriptions of the Indian system are available in annual reports (www.censusindia.gov.in/2011-Common/Annual_Report.html). See also Mamta Gupta and others, "Estimating mortality using data from civil registration: a cross-sectional study in India". *Bulletin of the World Health Organization*, 2016, vol. 94, No. 1, pp. 10–21. Decentralized models are also implemented in Australia, Brazil and Canada, among other countries.

⁹² For a detailed discussion of this issue, see the *Handbook on Civil Registration and Vital Statistics Systems: Preparation of a Legal Framework* (United Nations publication, Sales No. 98.XVII.7), which. This handbook is being revised in 2018.

- (a) Definitions of vital events as set out in the third revision of the *Principles and Recommendations for a Vital Statistics System*;
- (b) Guidelines to ensure universal coverage of civil registration and vital statistics;
- (c) Designation of specific institutions and personnel to serve as registrars at local, regional and central levels;
- (d) Recognized notifiers of vital events, including for deaths in institutions such as hotels and jails, in public transport vehicles and on other public places;
- (e) Protocols for registration by place of occurrence and place of usual residence;
- (f) Timelines for registration and specific mention of penalties for delayed registration;
- (g) Protocols for the registration of vital events involving migrants, foreigners and expatriates;
- (h) Protocols for deaths in natural and human-caused disasters, in occupational accidents and in wars, and also for deaths occurring in circumstances with possible forensic implications;
- (i) Protocols for instances of the disappearance of individuals who could be presumed to be dead;
- (j) Specific mention of procedures for reporting causes of death, in the form of medical certification of cause for deaths, and, where applicable, verbal autopsy methods for deaths in the community;
- (k) Protocols for data coding, processing and tabulation, and also for access to data, privacy and confidentiality.

320. The Data for Health Initiative has developed a detailed matrix as a tool to facilitate evaluation of the national legal framework of the civil registration and vital statistics system.⁹³

321. The legal framework is developed according to the structural design model of the civil registration and vital statistics system. In the centralized model, there is a national law for registration with supporting regulations that specify the details of personnel, procedures and resources.⁹⁴ By contrast, in the decentralized model, the legal framework provides for the drafting of a national model law and its regulations, with provision for each major civil division to promulgate its own laws and regulations according to local situations, but in close conformity with the recommended model.⁹⁵ As mentioned previously, in decentralized models, the legal framework has to be evaluated separately for each state or province which has its own laws.

322. In most instances, the regulations also cover the procedures and processes for the submission, compilation and analysis of vital statistics. Given, however, the growing demand for vital statistics and their inherent complexity, it is necessary for the civil registration and vital statistics quality assurance evaluation carefully to review the rules for vital statistics, so as to assess their compliance with the standard tabulations recommended by the United Nations.⁹⁶ In addition, WHO prescribes standard guidelines for reporting cause-of-death mortality statistics according to the International Classification of Diseases and Health-Related Problems.⁹⁷

323. Standards for the notification and registration of vital events, and also for their statistical processing, can be evaluated through a review of the forms and statistical reports used in civil registration and vital statistics processes. This can then be used as the basis for appropriate modifications.

324. The legal framework for civil registration and vital statistics systems undergoes a process of evolution over time, alongside developments in administration and technology. Concomitantly, there are changes to

⁹³ For further details, see www.bloomberg.org/program/public-health/data-health/ and www.crvslaws.org.

⁹⁴ For examples of centralized legal frameworks, see chapter I, section B, above.

⁹⁵ For examples of decentralized legal frameworks, see chapter I, section C, above.

⁹⁶ See *Principles and Recommendations for a Vital Statistics System*, Rev. 3, annex II.

⁹⁷ See World Health Organization, *International Statistical Classification of Diseases and Related Health Problems*, vol. 2, chap. 5 (Statistical presentation).

registration procedures and to statistical reporting requirements. There could even be changes to the structural design and institutional arrangements. The civil registration and vital statistics quality assurance evaluation should also document this evolutionary process, starting with the original structural design model and legal framework, and ensure the careful and systematic documentation of any modifications or additions over time. A review of the evolution provides a baseline reference for the understanding of factors that influence the current operational status of the system, and will explain patterns of vital statistics quality over time.

325. The quality assurance review should also check if the legal framework includes provisions to formulate novel strategies for civil registration in exceptional circumstances such as natural disasters, civil disturbances and war.⁹⁸

(c) Business processes

326. The second key step in the civil registration and vital statistics quality assurance evaluation is to develop a map or flow chart showing the relationships between institutions and the roles of personnel involved in notification, registration and statistical compilation at different levels in the administrative hierarchy of the system. The optimal approach is to develop a diagram that outlines the reporting processes for vital events as they occur, and depicts the flow of data from their original submission through to their ultimate compilation in vital statistics.

327. The diagram should identify all the key nodes for the notification of events, registration and issuance of relevant certificates. In most instances, there are differences in the business processes for urban and rural areas, given the variations in their administration, institutional arrangements and the availability of infrastructure. In some countries, the notification procedures could be completed at the village level, but the actual birth or death certificate is issued at a higher level (subdistrict or district). In other instances, notification and registration are conducted at the local level for usual residents, but for other individuals (such as migrants or foreigners) the procedure is to be completed at a higher level. The mapping of the business process should adequately capture and describe all variants for all vital events and, if necessary, through separate charts for urban and rural areas.

328. As for other components of the quality assurance evaluation, in decentralized models it would be necessary to map the business process separately for each state or province. It is also essential to evaluate registration data quality at different nodal points in the business process to identify potential bottlenecks in data flow or limitations in data collection procedures. This could also identify the possible risk of events being missed or duplicated, either of which could affect data quality.

329. The mapping of business processes should also review the existing procedures for notification, registration, issuance of certificates, and compilation and submission of statistics, in respect of their potential influence in assuring the goals of the civil registration and vital statistics system. In principle, the health sector is a major source for vital event notification and also for the coding and analysis of causes of death. It is of critical importance to recognize the importance of the health sector in this process and to involve it in strengthening the procedures, management and operations of the system at both local and national levels.⁹⁹ The quality assurance evaluation should investigate the existing roles and responsibilities of the health sector and make recommendations as necessary.

⁹⁸ An example of a special legal framework for civil registration may be seen in Sri Lanka, which adopted such a framework during the management of the humanitarian crisis following the 2004 Asian tsunami. This regulation provided for registration of deaths of missing persons for the purposes of securing appropriate legal closure, financial support and other social services.

⁹⁹ World Health Organization, "Strengthening civil registration and vital statistics through innovative approaches in the health sector", report of a technical meeting, Geneva, 17–18 December 2013, document WHO/HIS/HSI/2014/1. Available at www.who.int/healthinfo/civil_registration/crvs_meeting_dec2013_report.pdf.

330. The business process should include the procedures for medico-legal cases relating to deaths due to injuries or other events requiring police and forensic investigation. Where necessary, the process for updating the vital statistics to reflect the results of a medico-legal investigation into the cause of death should be specified and ensured, to enhance the accuracy of cause-specific mortality statistics. Since these investigations are known to take time, the business process and related regulations could specify a period (such as one year) after which the national statistics agency would be required to produce an updated version of vital statistics for the country.¹⁰⁰

(d) Infrastructure

331. The availability of adequate infrastructure is a critical element of the quality assurance of the civil registration and vital statistics system. There are several dimensions of infrastructure that need to be assessed. Key among these is the specific budgetary allocation for operations at the national and local level. While the exact budget allocation may be difficult to gauge because of the sharing of resources between different government programmes, the evaluation of available infrastructure according to the dimensions outlined below might provide sufficient insight on this aspect.

332. First, the location and distribution of registration points should be assessed to evaluate the accessibility of registration services to the population. Poor access to registration services either in terms of geographical distance or limited working hours (for example, they may only be available on certain days of the week) acts as a limitation in the overall performance of the registration system. The evaluation of accessibility might require some form of qualitative inquiry among key stakeholders in the community, to understand their specific needs, with a view to developing expansion and outreach measures to improve access and availability of registration services. A detailed discussion of this issue may be found in chapter II, section C, above.

333. Another dimension of infrastructure is the availability of adequate office space, basic equipment (such as furniture, electricity and means of communication) and the required official stationery. Evaluation of this aspect could form part of the field programme component for management and operations and would entail field visits to some registration units and periodic inspections, together with feedback from registration staff during review meetings. The availability of information and communication technology resources, including computers, printers and telephone and internet services, has vastly improved across the world over the past two decades, and these resources should be properly harnessed to improve vital event notification, registration and issuance of certificates and the processing of vital statistics. Thus the implementation of these technologies at all levels and for all functions of the civil registration and vital statistics system should be evaluated, with the formulation of recommendations to enhance the quality assurance of the system.

334. The availability of trained human resources for implementing the civil registration and vital statistics programme should also be evaluated at all levels of the system. Institutional and human capacity can be assessed through a review of the staffing patterns. This has important implications where the completeness of vital event registration is concerned, but also – and more importantly – for the accuracy of data variables recorded at registration. In addition, during the processing and compilation of vital statistics, a number of different ways may be used to code and classify specific variables, including age groups, ethnicity, educational and occupational characteristics, and causes of death. Training programmes for registration staff should be evaluated to ensure the inclusion of adequate time and materials that emphasize the importance of ensuring the completeness of event registration and the accuracy of data recording. Training programmes for health sector staff should also be assessed in terms of the time allocated for them, the materials provided and the teaching methods employed for correctly completing the medical certificate of cause of death, and the use of verbal autopsy questionnaires, if these are used in the country. Local physicians should also receive training in the medical certification of cause of death. Lastly, training programmes for statistical staff should be evaluated in terms of their coverage of the current standards for the coding, classification, aggregation and tabulation of data.

¹⁰⁰ This is the practice followed in Australia.

335. A third aspect of infrastructure that should be evaluated for quality assurance is the budget allocation for infrastructure, including human resources, civil registration and vital statistics operations and local travel for data verification purposes or to attend training programmes and review meetings. In some countries, civil registration operations share infrastructure and resources with other local administration programmes (on such matters as revenue, land records and security establishments). Thus the quality assurance evaluation should weigh whether adequate attention is being given to the operation of the civil registration system, when such resource-sharing mechanisms are in place.

336. At the central level, the infrastructure should also be evaluated for the availability of resources to conduct a detailed analysis of vital statistics. This would require a team or specified unit within the national statistics office, along with research staff from government departments who specialize in the demographic and epidemiological analysis of vital statistics. The technical staff should be proficient in the evaluation of data quality using the standard framework described below in the present chapter, and also in the computing of adjusted estimates of key vital statistics indicators for population administration, health policy and evaluation.

(e) Management and operations

337. The materials and procedures used in civil registration and vital statistics operations should be appropriate for the quality assurance of the system. The quality assurance evaluation should include a detailed review of the design of forms against international standards. The third revision of the *Principles and Recommendations for a Vital Statistics System* includes a set of minimum essential variables that should be included on forms for the registration of live births, deaths, fetal deaths, marriages, divorces and all other vital events.¹⁰¹ It is also necessary for the attending physician to complete the International Medical Certificate of Cause of Death, which permits the listing of direct, antecedent, underlying and contributory causes of death, depending on the information available.¹⁰²

338. Along with the forms for all types of vital events, the procedures for notification, registration, issuance of certificates, maintenance of records, submission of statistical returns, compilation and submission of statistics should be evaluated for their potential efficiency in attaining the goals of the civil registration and vital statistics system. In this context, and as mentioned in chapter II, section C, above, civil registration and vital statistics systems must routinely implement standard operating procedures for all their functions. These standard operating procedures include specifications relevant to operations at different levels of the system (local, district and central levels). The quality assurance evaluation should carefully review all existing standard operating procedures and their alignment with the business processes for civil registration and vital statistics operations, and suggest modifications or updates to enhance operational efficiency. This element of the quality assurance evaluation should be performed in conjunction with the review of business processes, as discussed in paragraphs 314–316 above.

339. The importance and value of involving the health sector in efforts to strengthen the procedures, management and operations of civil registration and vital statistics systems at both local and national levels cannot be overemphasized.¹⁰³ In principle, the health sector is a major source both for vital event notification and for the coding and analysis of vital statistics, in particular on causes of death. The quality assurance evaluation should investigate the existing roles and responsibilities of the health sector and make recommendations as necessary.

340. In decentralized models, there is a need to check the uniformity of forms and registration procedures across the country, to meet the essential requirements of both civil registration and vital statistics. In some countries, in particular those with a history of some form of colonial-based systems, the historical evolution of civil registration and vital statistics could have taken different trajectories in different territorial entities,

¹⁰¹ See *Principles and Recommendations for Vital Statistics Systems*, Rev. 3, table III.1.

¹⁰² See *Principles and Recommendations for Vital Statistics Systems*, Rev. 3, chap. 4, for relevant definitions and details.

¹⁰³ World Health Organization, “Strengthening civil registration and vital statistics through innovative approaches in the health sector”.

resulting in variations across the country.¹⁰⁴ If that is the case and the civil registration and vital statistics operations are fragmented, it will be necessary to develop a national standard set of forms and procedures to be implemented across the country.

341. In countries which are currently establishing or strengthening their civil registration and vital statistics systems there is a considerable backlog of vital events from preceding years (even decades). While the legal framework may stipulate specific timelines within which currently occurring events should be registered, it often arises that these are not observed. This complicates the process of including these delayed registrations in summary vital statistics reports, which ideally should be presented according to date of occurrence, rather than by date of registration. The quality assurance evaluation should review the procedures for delayed registration and the subsequent process for their inclusion in vital statistics reports and other dissemination vehicles, with the appropriate separation of delayed registration for events registered outside the reference period of the report.

342. In parallel to the evaluation of civil registration operations, there is a need to review vital statistics operations in terms of the formats used and the instructions provided for statistical tabulations and summary statistical reports. For the purposes of quality assurance of vital statistics operations, it would be ideal if individual vital records were computerized at the initial point of registration. This would permit ready access to individual records for ensuring data accuracy, and also for data validation, management, display and dissemination. The quality assurance review should assess the status of computerization of individual records and the availability of specific computer programmes for data verification, data amendment and the management of delayed registration.

343. The review of computerized operations should also assess the public availability of database functions and data management programs for the display of statistical data for specific variables, in response to user needs. These might include the possibility for users to have access to annual data sets freely via the Internet, and also to be able to customize their data requests in accordance with specific variables and aggregations and to download the output. Countries which offer public access to vital statistics databases maintained by a government agency include Brazil¹⁰⁵ and Sri Lanka.¹⁰⁶

344. The statistical operations review should also evaluate the availability of instructions for a minimum set of standard statistical tables to be included in an annual vital statistics report. As noted above, in paragraph 322, recommended standard tabulations may be found in the third revision of the *Principles and Recommendations for a Vital Statistics System*, and are also available from WHO. For example, the vital statistics regulations should specify the reporting of the frequency (absolute counts) of live births by age of mother, a metric necessary for the measurement of age-specific and total fertility rates. The civil registration and vital statistics quality assurance evaluation should review the existing formats for statistical tables in respect of their compliance with international standards and make any necessary recommendations to ensure compliance.

(f) Internal audits

345. Routine maintenance of the civil registration and vital statistics system and its operations is best achieved through a regular internal audit programme. The internal audit programme should be overseen by an interdepartmental coordination committee. As already noted, the quality assurance evaluation should verify that an interdepartmental coordination committee has been established that includes representatives from all

¹⁰⁴ For example, a review of the mortality registration system in Brazil in 1975 identified 43 versions of death registration and cause-of-death reporting forms across different municipalities in the country. To enhance the quality assurance of the system, a team of national experts reviewed the available documents and developed a national standard set of forms and procedures, which were subsequently implemented across the country. For more details, see Brazil, Ministry of Health, National Health Foundation, *Manual de procedimento do sistema de informações sobre mortalidade* (Mortality information system handbook), (Brasília, 2001). Available at http://bvsmis.saude.gov.br/bvs/publicacoes/sis_mortalidade.pdf.

¹⁰⁵ Brazil, Ministry of Health, Departamento de Informática do Sistema Único de Saúde, DATASUS database. Available at <http://datasus.saude.gov.br/informacoes-de-saude/tabnet/estatisticas-vitais>.

¹⁰⁶ Sri Lanka, vital statistics for the period 1970–2003 available at http://nada.statistics.gov.lk/index.php/catalog/Demography#_r=&collection=&country=&dtype=&from=1970&page=1&ps=100&sk=&sort_by=titl&sort_order=&to=2013&topic=&view=s&vk=.

major stakeholders, namely, those agencies or institutions that have a direct role in the notification and registration of vital events and in the compilation of vital statistics

346. Civil registration and vital statistics systems should have a routine plan for internal audits to assess system performance, in particular at the level of the registration units. The quality assurance evaluation should check for any available guidelines on the inspection of individual registration units to review operations, performance and maintenance, and on the frequency of such inspections. These guidelines should form part of the field programme (as described in chapter II, section C, above) and should specify the topics to be covered in the internal audits, which should essentially include all the items listed for review under infrastructure and under management and operations.

347. In particular, the instructions for the audit should include monitoring of the submission of statistical returns, together with certain basic elements of the data quality assessment process described below, such as regular monitoring (on for instance, a monthly basis) of the registration coverage of different villages, urban wards and other territorial divisions, and also of the accuracy of data recording for specific variables. The quality assurance evaluation should make specific mention of the need for the internal audit team to pay special attention to the frequency and accuracy of registration of fetal, neonatal and infant deaths, events which are sometimes overlooked in civil registration and vital statistics systems. A detailed exploration of the internal audit process may be found in chapter III, section B, above.

348. The quality assurance evaluation should also include instructions for the internal audit to check if the data standards and coding procedures prescribed in the legal framework are being implemented at the local level. The audit guidelines should also specify the preparation and submission of internal audit reports for review by the local and national civil registration and vital statistics coordination committees. Where applicable, information from the audit reports should be used in making adjustments designed to strengthen the system, such as alterations to the business processes, or in the implementation of capacity-building programmes.

349. The internal audit component of the field programme should also identify the existence of mechanisms for feedback from registration units about workload, specific infrastructure needs or for troubleshooting in relation to the registration of difficult cases, such as those involving migrants, medical and legal issues and others. This could be obtained through qualitative approaches, such as discussions and key informant interviews during field inspection visits. The evaluation should also gauge the interest and motivation of registration staff in the performance of their tasks and the support and guidance provided by their departmental supervisors, from both administrative and technical standpoints.

2. Data quality assessment

350. The evaluation of data quality is the second component of the overall civil registration and vital statistics quality framework. The present subsection provides a definition of specific statistical indicators of data quality and discusses a range of methods and techniques to evaluate data quality. The techniques described are largely focused on the evaluation of data on live births, deaths and fetal deaths, but additional aspects of vital statistics, such as the accuracy of data on causes of death, are also considered. Where necessary, the relevant principles of the interpretation of data quality measures are described.

351. Data quality needs to be evaluated across the following broad dimensions: completeness and coverage; accuracy; relevance; timeliness; and availability and accessibility.

352. The completeness and coverage of the civil registration system and the resulting vital statistics reflect the ability to make generalizations and indicate the extent to which a set of vital statistics indicators is actually representative of the population to which they refer. In addition, it is essential to establish the accuracy and validity of the data, namely, the extent to which they capture details of vital events as they actually occur in the population. The importance of data timeliness and their relevance for policy development and evaluation cannot be overemphasized. Lastly, the potential usefulness of data is directly contingent on their availability and accessibility. Each of these dimensions is discussed in detail below.

(a) Completeness and coverage of vital statistics

356. The ability to generalize vital statistics is assessed across two dimensions: coverage and completeness. Establishing the completeness and coverage of data is critically important to ensuring that relevant priorities, policies and decisions are correctly targeted. For example, using only data from urban areas, or data with a low registration of events in certain age groups would be conducive to the adoption of decisions that neglect the needs of excluded populations. It is essential to distinguish clearly between coverage and completeness, in line with the definitions provided below. In previous literature, these terms have been used interchangeably, giving rise to potential misinterpretation of the actual performance of the vital statistics system.

357. The term “coverage” refers to the population to which the civil registration laws and procedures are applicable; it can also refer to the actual populations whose vital statistics are being compiled and processed. The term could also be used in several different dimensions, including administrative coverage and reporting coverage. For all these definitions, the essential statistical figure is computed as a simple proportion, namely, the population which is covered relative to the total national population. These various definitions of coverage are likely to be of particular relevance for countries that are in the process of developing and scaling up their civil registration and vital statistics systems in a phased and incremental approach. It is essential that, at each stage of revision, the corresponding definition and extent of coverage is indicated in the technical report.

358. The term “administrative coverage” refers to defined geographical or administrative areas or population groups that may be included or excluded from the registration system by law, or may be included from a legal perspective, but dealt with separately for the compilation of vital statistics. In principle, all countries should mandate total coverage of their national population for the purposes of vital event registration, but there are some exceptions to this principle, in particular where certain events are concerned, or for the compilation of vital statistics. For example, in certain countries, deaths among expatriates are legally registered, but not included in vital statistics reports. The application of registration laws may also vary in accordance with the nature of events. In some countries, for example, registration laws do not cover fetal deaths.¹⁰⁷

359. The term “reporting coverage” designates the performance of the registration system in terms of the proportion of primary registration units that submit returns of vital events registered each year, with the number of reporting units as the numerator and the total reporting units in the civil registration system as the denominator. The monitoring of reporting coverage is an integral part of the routine evaluation of the functional status of the registration system and vital statistics system or, where applicable, of sample registration and vital statistics systems. The monitoring of reporting coverage should be linked with local procedures to ensure that missing statistical reports are rigorously followed up, to ensure that such reports are eventually collected from all primary registration units. Suitable norms should be established to ensure that a nil return is filed for periods where no vital events occurred within a specific registration unit area, so that the statistical reporting coverage can be correctly estimated. A detailed elaboration of this process may be found in chapter II, section C, above.

360. The term “completeness” is defined as the vital events registered by the civil registration and vital statistics system as a proportion of the total estimated number of vital events that would have occurred within the population which is to be covered by the system. When calculating completeness, reporting coverage should be taken into account, with a view to excluding non-reporting units from the computational process, to get an understanding of actual system performance in the reporting units. In addition to an assessment of system performance, measures of completeness are also required to derive adjusted vital rates for demographic studies and for policy and planning purposes.

361. The measurement of the completeness of civil registration has been the subject of demographic research for over a century, starting with such evaluations in the United States of America and Canada in the early twentieth century. The key element of this measurement consists in the estimation of the total vital events

¹⁰⁷ For instance, in India, the legal provisions for medical certification of cause of death were initially applied selectively to health institutions in certain areas only. Over time, this coverage is being gradually widened.

(mainly births or deaths) that would have occurred in the population. This value then serves as the denominator in deriving the proportion of registered events. A range of methods have been designed and tested to measure completeness and these can be broadly divided into two groups, depending on the approach used to derive the denominator.

362. These are, first, record matching or record linkage mechanisms which are based on the matching of individual events from two different sources, followed by data reconciliation or the estimation of events missed by both data sources, leading to a total number of events which could serve as the denominator in estimating completeness; and, second, analytical techniques based on known empirical regularities or on mathematical relationships between age distributions of vital events and population, which are used to derive the expected number of total vital events that would serve as the denominator.¹⁰⁸ These two approaches – record linkage or matching, on the one hand, and analytical techniques on the other – are also referred to as direct and indirect methods. The data requirements for the two approaches differ: in the first case, information at the individual record level is required from at least two sources, while, in the second, descriptive statistics and basic tabulations for the key variables of interest will suffice. They are also subject to different sets of assumptions and conditions that should be fulfilled for their correct application and for the interpretation of their results. These factors should be considered carefully prior to the selection of one or other approach.

363. Record linkage is generally considered to produce an accurate estimate of registration completeness if the requirements of both independence and quality of the two sources are met. This approach may also indicate the roots of underregistration or overregistration. The choice of an independent source of records can affect the accuracy of the results, however. The requirement that the two data sources must be independent may never be achieved in practice. In practice, if not automated, the matching process can be slow and laborious and the selection of appropriate matching criteria is not always straightforward. If automated, the detailed rules for computer matching will need to be specified with even greater precision than is needed for a manual process. Other important limitations of record linkage exercises include their cost and the amount of time needed to carry them out.

364. In turn, one important advantage of the analytical approach is that the level of completeness of vital statistics can be readily assessed as soon as data become available. Ease of application makes some of these methods suitable for several purposes, such as the regular monitoring of completeness levels and the provision of estimates of completeness for campaigns designed to promote improvements in civil registration. On the other hand, the applicability of analytical methods is limited by a variety of necessary assumptions and other requirements. For example, some of the methods require a stable population, that is, constant fertility and mortality over a period of time; others require data from two censuses, assumptions of a closed population or an absence of any variation in completeness across population subgroups.

(i) Record matching

365. Apart from their methodological differences, the two approaches also differ in terms of their purpose and the potential outcomes of their use. The analytical techniques provide only an estimated measure of completeness. In contrast, record matching exercises can be used to evaluate completeness, and also to enable data reconciliation that will augment the empirical total number of observed events in the study population. Added to this, the linkage also provides additional variables from each of the sources of matched records, which will enable more detailed analyses beyond the measurement of data completeness. The additional variables from either of the two sources could be used for broader demographic and epidemiological analyses of vital rates, for policy and planning purposes. In addition, linked records could be analysed to identify factors associated with event recording in either source, which could then be used in designing interventions to strengthen the civil registration and vital statistics system.

¹⁰⁸ Kenneth Hill, “Analytical methods to evaluate the completeness and quality of death registration: current state of knowledge”, Technical Paper No. 2017/2 (New York, United Nations, Department of Economic and Social Affairs, Population Division, 2017). Available at www.un.org/en/development/desa/population/publications/pdf/technical/TP2017-2.pdf.

366. Record matching mechanisms are based on a number of concepts which take into account the following:

- (a) Nature of the data sources used in the linkage exercise;
- (b) Data collection procedures used in each source;
- (c) Accuracy of variables recorded for each event in each source;
- (d) Processes and rules used for matching;
- (e) Statistical method for deriving the completeness measure.

When planning an exercise in record linkage to evaluate data completeness, each of these aspects need to be carefully considered and accounted for, in order to establish a valid statistical measure of completeness.

367. Where data sources are concerned, civil registration is the standard primary data source for which completeness needs to be measured. Alternative secondary sources which may be used to link civil registration records include data on vital events from other administrative and social records (health service records, immunization registers, social insurance registers, school enrolments, burial or crematorium records and others) and population censuses and surveys. Each of these alternative sources is often characterized by specific definitions of coverage, except for censuses, which are universal from a legal and administrative perspective. The coverage of the alternative source will have implications for the overall generalizability of the completeness measure. Sources with partial population coverage are best used for record linkage and data reconciliation. Sources which are representative of the population can be used to evaluate the overall completeness of the civil registration system, but if they are based on representative samples, then an appropriate statistical assessment of the precision of the completeness estimate should also be conducted.

368. In a record matching exercise, the design and characteristics of both civil registration and the alternative sources should be carefully reviewed and documented. In addition to ensuring the compatibility of population coverage, a particular effort should also be made to ensure compatibility of the reference time period for the data in each source. This will minimize the potential for the introduction of bias in the matching process by out-of-scope events.

369. The data collection process is also relevant, whether it is a continuous recording process as in civil registration and other administrative records, or based on recall as in censuses and surveys. Continuous recording systems result in more reliable data quality. It must also be noted whether the civil registration system registers events according to place of usual residence, or place of occurrence, or both. Other administrative records also include events in accordance with their place of occurrence. On the other hand, censuses and surveys usually record events by their place of usual residence. The source of address variables in the respective data sets should be clearly identified as such in both data sources, to ensure their compatibility for matching.

370. Prior to linkage, an inventory of the variables available in each source should be prepared and, if a unique identifier number is not available, a defined set of variables should be selected for testing and subsequently establishing the match. Subsequently, the data set should be assessed for missing data for each of the matching variables, in particular those such as date of birth or death; age; and address. Data quality in the recording of complete names (first, middle and last, or surname), and also spelling variations of common names should be noted, as they could affect the matching process, and may have to be dealt with in an iterative manner in the linkage exercise.

371. A set of deterministic criteria should be established to define matched (or linked) records. The criteria usually involve matching using a unique PIN or, if this is not available, across multiple variables including address variables, vital event dates, names and, in the case of deaths, the age at death. For births, the names of parents could be used in the linkage process, when matching birth records with administrative health records or school enrolment records. Another important consideration in setting the linkage criteria is the geographical or administrative level at which the linkage exercise would be conducted. This is because of the likelihood that individuals and villages in different subnational areas may have the same names, creating the potential for

erroneous matches or non-matches. As mentioned above, care should be taken to match address variables according to the same definition of place of occurrence or residence.

372. The linkage criteria can be set to accommodate what could be termed a fully matched, a partially matched, or a fully non-matched event. Certain relaxations or ranges can be applied to different criteria, with a view to resolving partially matched cases in order to improve the accuracy in matching. Such modifications to the criteria are often necessary where data are missing, necessitating some form of judgment in the adjudication of matched events. For instance, while event dates in continuous recording systems such as civil registration or other administrative records are likely to be accurate, those based on recall as in censuses or surveys are subject to recall bias, in relation to the date or even month of birth or death. Hence some form of range in the recorded date or month of the event is required in one or both data sources. In addition, the age at death is sometimes subject to misreporting, in particular of the kind known as “age-heaping”, where intervals of 5 or 10 years are used, in societies where knowledge of actual age is limited. Case studies of record linkage implemented to evaluate completeness of death records in Oman and Viet Nam (see boxes 15 and 16 below) illustrate the practical aspects of applying ranges to specific variables for the linkage process. When linkage is conducted at the local administrative or geographical level, there is greater veracity in the relaxation of criteria for age at death or date of event, given that it is rare for two individuals within the same narrow interval of dates or from the same age bracket to have the same name and address variables.

373. The method used in conducting the matching exercise is also an important factor. Manual processes of matching are routinely used in the sample registration and vital statistics systems of Bangladesh, China and India at the registration unit level. In such instances, minor variations in the spellings of names along with small differences in event dates or ages are readily accounted for. Besides, additional field visits may also be conducted to verify partially matched events and to complete the adjudication of matched and unmatched events. On the other hand, the routine availability of electronic data sets from civil registration systems and of other administrative records can facilitate speedy and efficient linkage operations. Where feasible, as in the case study in Oman (see box 15), it is recommended that the electronic data sets be divided according to registration subunits and then that the linkage is conducted, to improve the accuracy of matching in line with geographical location. This will be possible if there is compatibility in the registration of place of event, either by usual residence or occurrence, and the linkage is processed with the same criteria for both sources.

374. Linkage is often an iterative process, undertaken in an effort to improve the matching of records. As already noted, it may be necessary to consider testing several ranges for different variables, to enable more accurate matching. For each set of criteria, it will be necessary to evaluate the results in terms of matched and unmatched records, and also to evaluate a sample of each, to verify the accuracy and plausibility of the matching. This evaluation should identify true matches and true non-matches, besides doubtful or potentially erroneous matches or erroneous non-matches. The difference between erroneous matches and non-matches is termed the net matching error, and can be used in estimating the overall error in the completeness estimate, as discussed below. The different iterations of linkage criteria should be tested to improve the matching rates and to minimize the potential net matching error.

375. Following the final or best iteration, the record matching process would yield results as labelled in the table and definitions below (table 1).

Table 1
Conceptual model for results from record linkage or matching across two data sources

Source 2	Source 1		Total
	Reported	Not reported	
Reported	M	U ₂	N ₂
Not reported	U ₁	Z	
Total	N ₁		N

M = events that are matched across the two sources, i.e., recorded in both sources

N₁ = total events reported in source 1 = M + U₁ where U₁ = records in source 1 not matched in source 2

N₂ = total events reported in source 2 = M + U₂ where U₂ = records in source 2 not matched in source 1

376. If the primary purpose of the record linkage was only for the reconciliation of data, then the sum of records from the three cells M , U_1 and U_2 will provide the total number of events that are estimated to have occurred in the population.¹⁰⁹

377. In some instances, an additional step could be taken to estimate the completeness of either source, using the total number of events from the data reconciliation as the denominator. The number of events recorded in either source (N_1 or N_2) would serve as the numerator in estimating the completeness of its vital event recording.¹¹⁰

378. Statistical methods are also available to account for the likelihood of events having been missed by both data sources, in the measurement of completeness. These methods are applicable under certain specific conditions, including the assured statistical independence of the two sources, accuracy of data in each source, and zero matching error. More details of these conditions and the overall methodology of this computation are available in the literature.¹¹¹ Given that these conditions are fulfilled, the estimate of events missed by both sources (represented by Z in table 1) is calculated as:

$$Z = \text{number of events estimated to be missed by both sources; computed as } Z = \frac{U_1 U_2}{M}$$

and, as a result, the total estimated events in the population (represented by N in table 1) is:

$$N = \text{estimate of total events} = M + U_1 + U_2 + Z$$

and:

$$\text{completeness of source 1} = C_1 = N_1 / N$$

$$\text{completeness of source 2} = C_2 = N_2 / N$$

379. The computation of completeness measures described above can be conducted separately for different subgroups within the population, for example, by sex, age group, geographical division or any other characteristic for which a separate completeness estimate is required. This could help in identifying specific subgroups that are particularly affected by low registration, which could be followed up through targeted interventions to strengthen the registration of events in those subgroups. In addition, separate measures of completeness will make possible a more detailed weighted adjustment of vital rates for the overall population. Examples of such subgroup analysis of completeness may be seen in the record linkage studies in Oman and Viet Nam described in boxes 15 and 16 below.

380. Important elements of the estimation of completeness are the measurement of standard error and the confidence interval of the completeness estimate. Based on all the conditions being met for the computation of events missed by both sources, Chandrasekaran and Deming¹¹² propose that the standard error (SE) could be computed as follows:

¹⁰⁹ The Indian sample registration system adopts this approach in deriving its estimates of vital events and vital rates. In certain other countries (Islamic Republic of Iran and Turkey), data record matching and reconciliation are routinely practised across different sources (usually the civil registration system and health records) in order to compile the overall data set of vital events for their national population.

¹¹⁰ Such an approach has been adopted in a record linkage analysis conducted for Kiribati, although the resulting completeness estimate was only used to assess the performance of the civil registration and vital statistics system, and not to adjust the vital rates, which were computed only from the reconciled data. For further details see Karen Carter and others, "Mortality and life expectancy in Kiribati based on analysis of reported deaths", *Population Health Metrics*, vol. 14, No. 3 (2016).

¹¹¹ Chalapati Rao and Matthew Kelly, "Overview of the principles and international experiences in implementing record linkage mechanisms to assess completeness of death registration", Technical Paper No. 2017/5 (New York, United Nations, Department of Economic and Social Affairs, Population Division, 2017).

Available at www.un.org/en/development/desa/population/publications/pdf/technical/TP2017-5.pdf.

¹¹² Chidambara Chandrasekaran (spelled here: Chandra Sekar) and William Edwards Deming, "On a method of estimating birth and death rates and the extent of registration", *Journal of the American Statistical Association*, vol. 44, No. 245 (March 1949), pp. 101–115.

$$SE = \sqrt{\frac{Nq_1q_2}{p_1p_2}}$$

where:

N = total number of events estimated by the method (see table 1)

p_1 = the probability that an event is recorded in data source 1 ($p_1 = N_1/N$)

p_2 = the probability that an event is recorded in data source 2 ($p_2 = N_2/N$)

q_1 = the probability that an event is missed in data source 1 (U_1/N)

q_2 = the probability that an event is missed in data source 2 (U_2/N)

The 95% confidence interval (CI) for the completeness estimate denoted $C = C \pm 2SE$

381. In most instances, however, all the conditions for applying the method for estimating the events missed by both sources are not met. In such situations, the computation is still processed under the assumption that these conditions have been met, giving rise to the potential for the completeness estimate to be affected by bias. In addition, in many instances, the record linkage evaluation of completeness is conducted in only a sample of the population, as a result of which the completeness estimate is also likely to be affected by sampling variance. Accordingly, it has been proposed that the error in the completeness estimate could be expressed as a “root mean square error” (RMSE) according to the following formula:

$$RMSE(C) = \sqrt{variance + bias^2}$$

382. A range of statistical methods have been proposed for the measurement of bias, which could arise from three potential sources: lack of statistical independence between the two sources; presence of events in either source which are not in the same reference space or time period; and matching error. In summary, these three sources of bias tend to cancel one another out, so the net bias is less than the sum of that from all three sources. Verification of a sample of fully matched, partially matched, and unmatched events is recommended as a basis for evaluating the overall accuracy of the matching process and for estimating bias from matching error. Under current circumstances, these methods for evaluating bias need to be tested and adapted for routine application.

383. At this point, it is recommended that, in applying record matching mechanisms to evaluate the completeness of vital statistics, attention should be paid to minimizing the potential for bias from the three identified sources. When there are data from multiple clusters or subgroups within the population, statistical methods applying the bootstrap or jackknife principles could be used to measure the standard error of the completeness estimate. In summary, it is essential for every measure of completeness to be supplemented with an estimate of its error, to enable appropriate interpretation and subsequent use of the estimate for adjusting vital rates, or to evaluate the performance of the civil registration and vital statistics system.

384. Two recent case studies are presented in boxes 15 and 16, to illustrate key aspects of the use of record linkage mechanisms to evaluate the completeness of civil registration. The Oman study provides an example of a national-level exercise and illustrates the value of using routinely available data sets. The Viet Nam study illustrates the principles of using multiple locally available data sources for compiling mortality data through linkage reconciliation across the sources, and also analysis of the completeness of data in order to derive adjusted mortality rates.

Box 15

Oman: evaluation of completeness of mortality data

A comprehensive national-level evaluation of the completeness of mortality data was conducted in Oman for the year 2010. Data from the national birth and death notification database maintained by the Ministry of Health were linked with census reports of deaths that occurred during the same reference period. The study employed a combination of electronic and manual processes, and included the following methodological characteristics:

- Use of deterministic criteria with ranges for age and date variables
- Use of field verification to verify missing variables

- Field verification of matched and unmatched events using manual query and clarification with local authorities and key informants
- Detailed subgroup analysis of completeness by sex, age and geographical registration area
- Calculation of standard errors for completeness measures and their application in adjusting sex and age-specific mortality rates

The record linkage exercise involved three iterations of matching, with intervening field verification and modifications to matching criteria to improve final linkage outcomes. The analysis included deaths among Omani citizens residing abroad, and excluded deaths among foreign citizens who were residing in Oman during the reference period.

Where data quality is concerned, the census mortality responses had larger proportions of missing data for key variables such as age, event dates and addresses. In the case of some deaths with missing ages, the age was inferred from the strong association of the registered cause with the neonatal period (such as prematurity; birth asphyxia; very low birth weight).

One limitation of the census data set was that it did not include the personal names of reported deceased individuals; instead, however, the names of the heads of the household along with their tribal names were used as proxies in the matching exercise. Similarly, the names of missing geographical subdivisions were inferred from the name of the hospital notifying the death event. These inferences were facilitated by conducting the linkage process at the subnational level of the governorates of Oman. The accurate recording of complete names of deceased individuals, including the tribal name, greatly enhanced the matching process, particularly in the case of notification of deaths in major urban health facilities.

The results identified that underreporting was more prevalent for deaths at early ages, followed by deaths of the elderly. Underreporting was observed to be higher in Muscat, the capital city, and in two other locations (Al Buraymi and Musandam) with low population density.

In summary, the availability of a robust routine electronic national data set of death notifications from the Ministry of Health enabled an efficient linkage process and analysis. The results made possible the detailed adjustment of mortality rates and the identification of subgroups which required greater attention with relation to death notification procedures and practices.

Box 16

Viet Nam: record-matching mechanisms to improve data compilation from multiple sources

In a situation where the national civil registration system is yet to develop into a routine source of vital statistics, the case study in Viet Nam represents an example of record linkage mechanisms used to improve data compilation from multiple sources through reconciliation, and also an example of the application of methods to evaluate completeness of the reconciled data. Data compilation of deaths was conducted in 192 communes across the country in 2009, covering a population of approximately 2.6 million. Death records were sourced from the local civil register maintained by the justice clerk, the mortality register from the commune health station, records from the commune population office, and several other local citizen welfare groups which maintained records for specific population subgroups such as women, farmers and the elderly.

Owing to close interaction between the commune health and population offices, records from these sources were merged into a single list and linked with the record lists from the justice register in a standard two-source analysis of completeness.

Subsequently, the completeness of this list was computed in the following way: the number of death records in the combined list (created by reconciling the data across the two sources) was expressed as a proportion of the total number of estimated deaths derived by use of the standard two-source analysis, following the method described in paragraphs 375–378 above.

Since these data were derived from separate record linkage analyses across 192 population clusters (communes), and there was a likelihood that the assumed statistical independence between the data sources had been infringed, the bootstrapping technique was used to derive the variance and standard error, and to compute the 95 per cent confidence intervals for the completeness estimate.

The results showed similar levels of completeness across three age groups (15–59, 60–74 and 75+) for both males and females. Record matching was not attempted for the age group 0–14 years, owing to the

uniformly very low level of reporting in all sources. Hence the analysis was also instrumental in highlighting the need to strengthen infant mortality registration in Viet Nam.

385. Record matching mechanisms are also routinely used when a sample civil registration and vital statistics system has been established. Two examples are observed in the sample-based vital statistics systems in India¹¹³ and China¹¹⁴ (see box 17 below for details).

Box 17

India and China: sample civil registration and vital statistics systems

Two examples are observed in sample-based vital statistics systems in India and China. In the sample registration system in India, a dual record system approach is used, comprising the continuous records of vital events from local registrars, and records from an independent half-yearly survey that covers the entire sample registration system population. Records are matched followed by data reconciliation, with the reconciled list used to measure vital rates. This system has been in regular practice for four decades.

In the disease surveillance point system for measuring mortality indicators, in operation in China since 1980, the secondary source of vital records for linkage is provided by an independent sample retrospective survey conducted once every three to five years.

While using record matching, the Indian sample registration system does not apply any methods for estimating registration completeness, and therefore there is no adjustment of sample registration system vital rates. The Chinese disease surveillance point system applies the linkage method to estimate completeness and standard errors, according to the assumptions of statistical independence and absence of bias from other sources. The standard error estimation does not, however, account for sampling variance from the independent survey. The Chinese disease surveillance point vital rates are adjusted for incompleteness. It is recommended that record matching should be followed up with estimation of completeness of the registration data source and also measurement of error, accounting both for bias and for sampling variance, as applicable.

386. Box 18 shows three case studies where the health sector has a principal role in the record linkage procedures, taking advantage of the key role of the health sector as a natural source both of vital events occurring within its institutions, and of events occurring within the community, which, for a variety of reasons, are commonly brought to the attention of local health sector personnel. In addition, the health sector is a key stakeholder given its interest in routine and timely high quality vital statistics for policy, monitoring and evaluation. Accordingly, enhancing the role of health sector institutions and personnel in strengthening civil registration and vital statistics systems is essential. As noted above, the measurement of completeness should be followed up with additional analysis to measure the error in completeness estimates that arises from data biases and sampling variance, where applicable.

Box 18

Brazil, Islamic Republic of Iran and Turkey: role of the health sector in quality evaluation exercises

In some countries, multiple systems operate at the local level for recording vital events. Such systems provide readily available sources for linking records and data reconciliation to improve the completeness and accuracy of vital statistics. Three case studies exemplify such mechanisms.

- **Brazil:** Here the Ministry of Health routinely collates and merges deaths recorded in hospitals with records of deaths outside hospitals from civil registers maintained in each municipality, to generate the national mortality database maintained by the Ministry of Health mortality information system. This is supplemented by routine active data searches and the compilation of

¹¹³ India, Ministry of Home Affairs, Office of the Registrar General and Census Commissioner, Vital Statistics Division, *Sample Registration System* (New Delhi, 2007). Available at www.censusindia.gov.in/Vital_Statistics/SRS/Sample_Registration_System.aspx.

¹¹⁴ Gonghuan Yang and others, "Mortality registration and surveillance in China: History, current situation and challenges". *Population Health Metrics*, vol. 3(1), No. 3 (April 2005).

data on infant deaths from sources such as primary health care units, midwife groups, ambulance services, burial sites, and institutes of forensic medicine. These activities have strengthened the measurement of local infant mortality rates. Routine implementation of these linkage mechanisms has improved the completeness of mortality data in Brazil to over 90 per cent, with some subnational variations.

- **Islamic Republic of Iran:** Here, on a routine basis, the District Health Centre collates and merges death records from all local health sector institutions (hospitals, rural health centres, and forensic medicine bureaus) with records from the district office of the National Organization for Civil Registration. The reconciled data are entered into a customized computer programme and submitted to the Ministry of Health and the Medical Education Institute for subsequent data compilation, quality evaluation and analysis. This process was initiated in three provinces in 1997, and the coverage was gradually expanded across the country to cover all 30 provinces by 2007.
- **Turkey:** Since 2009, death records from the central population register (MERNIS) maintained by the Ministry of Internal Affairs are regularly reconciled with data from the death reporting system operated by the Turkish Statistical Institute. This has resulted in a marked improvement in completeness of data from the Statistical Institute since 2009. The record matching and data reconciliation process is conducted by the provincial health directorates, and this activity is also associated with the implementation of procedures for quality evaluation and the coding and classification of causes of death.

(ii) Probabilistic record matching

387. The record linkage methods applied above follow the deterministic approach, as outlined in paragraph 371 above. An alternative method is the probabilistic matching approach, which takes into account the likelihood of two records being matched based on agreement characteristics across a number of variables. This approach is best applied when dealing with large electronic files of records from routine sources, including civil registration systems, censuses and health information systems, which can be readily analysed, using electronic record linkage software. In addition, probabilistic linkage methods can be used where only a limited set of matching variables are available, or where there could be variations in data quality.¹¹⁵

388. The method assigns agreement weights and disagreement weights for each variable from a sample of matched records derived from a deterministic review of the data. The method compares the probability that true matches agree on a specific variable with the probability that unmatched cases randomly agree on the same variable. In instances where information on some key variables for the deterministic approach is missing, the probabilistic method offers some advantages, by using the information provided by other less important variables, along with their agreement and disagreement weights. The method also takes into account the potential for agreement or disagreement to be affected by chance. The ratio of these two probabilities is termed as the weight for each variable. It is also possible for partial agreement weights to be applied for some variables.

389. These match probabilities and weights from the sample of matched cases from deterministic review are then applied to evaluate the variable values in linked pairs from the larger universe of records being analysed. Subsequently, the weights are summed across all the potential variables to derive a total weighted agreement score for a case pair. This total weighted score is then evaluated against a threshold score above which record pairs can be adjudicated as matched pairs, and below which record pairs are declared as non-matched pairs. Different thresholds could be tested to assess their impact on the overall validity of the linkage and matching exercise. Validity can be evaluated in terms of sensitivity and positive predictive value, using the sample of pairs from the deterministic review as the reference standards for validation. A conservative threshold will

¹¹⁵ See Stacie B. Dusetzina and others, *Linking Data for Health Services Research: A Framework and Instructional Guide* (Rockland, Maryland, Agency for Healthcare Research and Quality, 2014).

restrict the total number of matches from the probabilistic linkage, while a liberal threshold will maximize the total number of matches.

390. The probabilistic approach has several significant advantages in terms of its potential for application in settings with limited or unknown data quality, the statistical precision of its results and the cost-effectiveness of its implementation. This method has been successfully used in several studies using health system databases till date as documented in a systematic review.¹¹⁶ There is, however, no available documentation on the application of this approach in linking civil registration data with other electronic data sets on vital events. There is a need for standard practical instructions and a guide for its use in record matching to assess completeness of civil registration data, particularly in regard to the procedures for deriving agreement and disagreement probabilities and the overall weighted score for matched pairs. The civil registration and vital statistics quality evaluation should explore the potential for testing probabilistic methods to assess completeness, in terms of the availability of requisite electronic data sources, as well as the availability of statistical institutions with skilled human resources to undertake such research.

(iii) Analytical (indirect) techniques and alternate methods to evaluate completeness

391. A range of alternatives can be used to estimate completeness, where secondary data sources for record linkage are not available. The estimated parameter is the expected number of events in the population, which is used as the denominator to compute the proportion of observed events as the measure of completeness. One approach commonly used to estimate the expected events is to apply a crude vital rate (birth or death rate) from an alternative source, such as a population census or survey, a demographic surveillance site or a research project, to the population.

392. In all such instances, the source of the alternate vital rate is itself potentially subject to incompleteness, or may not be actually representative of the population. For this reason, the estimated completeness from this approach could only at best be an approximation, indicative of the likely performance of the system. Where such alternative empirical vital rates that could be potentially representative of the population are not available, a modelled estimate could be used to compute the denominator of expected events. The United Nations World Population Prospects time series of estimated fertility and mortality rates for all countries may be used for this purpose.¹¹⁷

393. In addition to record linkage mechanisms, a range of analytical methods are available to evaluate the completeness of child and adult death registration. These methods essentially involve two approaches. The first comprises comparisons of specific aspects of the data under evaluation (for example the ratio of neonatal deaths to post-neonatal deaths, or the ratio of deaths below the age of 1 to deaths between the ages of 1 and 5) with such ratios from another population with high quality data and proven accuracy. Such comparison of ratios can identify potentially missed events in specific age groups in the civil registration data under evaluation.

394. The second approach involves methods based on mathematical relationships between age distributions of populations and age distributions of deaths.¹¹⁸ The methods based on mathematical relationships require information on population distributions by age from one or two censuses, along with information on distributions of deaths by age from death registration. In this family of methods, statistical models comprising mathematical relationships based on specific demographic assumptions are used to estimate an expected number of deaths by age-sex distribution in the population. This estimate of expected deaths serves as the

¹¹⁶ Daniele Pinto da Silveira and Elizabeth Artmann, "Accuracy of probabilistic record linkage applied to health databases: systematic review", *Revista de Saúde Pública*, vol. 43, No. 5 (2009).

¹¹⁷ <https://esa.un.org/unpd/wpp/>.

¹¹⁸ See Hill, "Analytical methods to evaluate the completeness and quality of death registration".

denominator in computing the fraction of deaths that were actually recorded in the population,¹¹⁹ and in turn this fraction represents the completeness of death registration in the population.

395. In general, analytical methods are far less resource-intensive, in particular since they are applied to available data from existing systems only, without any need to mount additional data collection schemes. At the same time, however, the relevance of some of the demographic assumptions for individual populations (such as constant fertility and mortality for some methods, and absence of migration), together with uncertainty in accuracy of data from death registration systems (such as misreporting of age and reference period for registration data) and in enumerated population from censuses may limit the overall usefulness of such analytical methods based on population and death distributions by age.

396. In developing countries institutional capacity for the implementation of such processes at the national or subnational level is limited. Most important, the outputs of such analysis are inconsistent across populations and over time. Added to which, there is considerable uncertainty in the resulting measures of completeness, estimated to be in a range of plus or minus 25 per cent.¹²⁰ In summary, the civil registration and vital statistics quality assessment could consider the application of such analytical methods as an exercise designed to give a rough estimate of the potential completeness more as an indicator of data quality, than as a means of deriving adjustment factors to estimate vital rates.

397. As outlined in the third revision of the *Principles and Recommendations for a Vital Statistics System*, the following techniques are available for use if a record linkage exercise is not possible: comparison of trends, comparison of rates, comparison with census results, and inclusion of questions regarding registration in surveys and censuses. Overall and disaggregated trends and rates can be compared over time for a broad assessment of the levels of registration and statistical reports from the registration authority to the statistical office. A significant variation over time or across population subgroups may indicate problems of underregistration. While such comparisons provide only a general measure, if large unexpected differences are found, this technique may be useful as a warning that further examination of the data is warranted.

398. Comparing the results of a single census with registered births provides another means of evaluating the completeness of birth registration. In this approach, the number of children under 1 year of age enumerated in the census is compared with the number of live births registered in the 12 months preceding the census, making allowance in this process for the number of deaths of children in that age group during those months. The same approach can be extended to children other than those under 1 year of age. By the process known as “reverse surviving” the number of children under 15 enumerated in a census, the number of live births for the years preceding the census can be derived through the use of a set of mortality estimates. This method makes it possible to derive an estimate of the completeness of the birth registration for a larger number of years. It is also affected, however, by the factors listed. The technique provides only a rough measure of underregistration, since the difference between the data from the census and those from civil registration may be due to a number of factors, including incomplete registration of births and infant deaths, errors in the statement of age of enumerated infants, or census underenumeration of infants. Problems of infant underenumeration and age misstatement, which are particularly widespread in developing countries, may limit the usefulness of this method.

399. A similar analysis can be performed by comparing the number of deaths (and the corresponding age and sex of the deceased) declared in a census with deaths registered in the 12 months preceding the census. This approach is commonly followed when an active search is made of maternal deaths.

¹¹⁹ Rao and Kelly, “Overview of the principles and international experiences in implementing record linkage mechanisms to assess completeness of death registration”.

¹²⁰ Christopher Murray and others, “What can we conclude from death registration? Improved methods for evaluating completeness”, *PLOS Medicine*, vol. 7, No. 4 (April 2010).

400. Lastly, censuses and sample surveys implemented in some countries have included such questions as whether children who are under 5 years of age have birth certificates, and whether they were registered with the civil registration authority; and sometimes a birth certificate is requested. Based on the answers, an estimate of birth registration completeness may be derived. These questions have been included in the multiple indicator cluster surveys supported by the United Nations Children’s Fund (UNICEF), the Demographic and Health Surveys programme, and the population census questionnaires used by a number of countries.

401. In addition to such factors as recall bias and the lack of a clear understanding by the respondent of the nature of a birth certificate, it should be noted that registration does not always translate into statistics. There are situations where vital events are registered but not all the data are compiled into statistics. Accordingly, the measure of completeness obtained from questions on sample surveys and censuses relates only to registration and not to statistics. This practice is generally not recommended because it is unlikely that reliable estimates will be obtained.

(b) Accuracy of vital statistics (data content)

402. A variety of methods and techniques to assess data content errors will be discussed in this subsection. The techniques will largely be focused on the evaluation of data on live births, deaths and fetal deaths, but additional aspects of vital statistics, such as accuracy of data on causes of death, are also considered.

403. First, data accuracy should be evaluated in terms of the recorded variables for each registered event and the extent of missing variables. The accuracy (or correctness) of the registered spelling of names, age, sex, address and other location variables, dates, and other variables for core topics, as specified in the third revision of the *Principles and Recommendations for a Vital Statistics System*, such as causes of death, are essential both for the verification of events and for the production of good quality vital statistics. Data accuracy is best ensured at the point of registration, by the local registrar paying careful attention to the task of entering complete and correct information. Data accuracy can also be enhanced, however, through secondary data evaluation and verification using alternate data sources for the same individual.

404. At the point of registration, it is possible to ensure data accuracy for several variables by asking the informant to provide any available identification documents for the verification of relevant details, in keeping with the national legal framework. Registration officials should be made aware of the critical importance of the accurate entry of details of all variables. This aspect should be emphasized during training and should also be documented in registration guidelines and reference operation manuals. The guidelines should include clear definitions of specific variables and the range of permissible options, as applicable. Where manual registration processes are in place, the need for legible writing and correct and consistent spelling of names and address variables should be noted. For electronic data capture, data entry should follow similar norms of accuracy and consistency.

405. Several countries routinely apply mechanisms to ensure data accuracy through customized database functions and software programs. These include functions for the completion of missing variables and for the verification and updating of specific variables. For example, Canada (see box 19 below) has a routine mechanism for the weekly and annual monitoring of the accuracy of variables to be verified and updated for record duplication, and also for missing, improbable and clearly erroneous data. The accuracy and validation procedures include automated corrections, such as calculating missing age from available information on dates, and the review of microfilm images of physical registration records. The findings from these corrections and updates of missing variables are used to revise vital statistics indicators and estimates. Similar reviews of the data accuracy of specific variables with corrective follow-up are essential to the maintenance of a high level of data quality from civil registration and vital statistics systems.

Box 19

Canada: internal review mechanisms for vital statistics

Coverage: Although vital event registration data are received by Statistics Canada on a daily basis, and volumes are monitored on a weekly basis, data are processed on a yearly basis. Once all the microdata for a reference year are extracted, a reconciliation of data holdings takes place. During this step, different sources of data are gathered: the electronic National Routing System messages, digitized images of event registrations, cause-of-death data automatically extracted by cause-of-death coding software, and the highest registration number reported by the jurisdiction. These are compared in order to determine whether all records have been received. If for example, there are more records on the cause-of-death coded data than there are electronic death messages for a particular jurisdiction, the jurisdiction is contacted and asked to submit the missing data.

The next step is the elimination of possible duplicates within a jurisdiction, among jurisdictions, and over two years of data. Most of the possible duplicates identified through this process, which is based on a set of key fields, can be resolved at the central office, which then cancels the duplicate record. For those that cannot be dealt with in this way, the jurisdictions for which there are duplicate records are contacted and requested to resolve them.

Missing, improbable, and erroneous data: The microdata are then run through a series of validation edits. In the past, erroneous vital statistics records were corrected or verified by manually consulting the digitized image (or microfilm) of the registration to confirm or correct the information in the field which failed the edit. This process is lengthy and labour-intensive.

Where possible, computer programmes are installed to make automated corrections or data conversions for systematic errors, based on information available from other areas of the data. For example, if the age-of-mother field is blank but the date-of-birth field contains data, the age will be derived using the date of birth and date of event. In this way such attributes as the parity of the mother can be more accurately verified during the editing stage. Another example is where the province of residence is missing and the postal code is available, the province can be derived from the first letter of the postal code. Certain edits correct errors of logic (for example, to verify that marital status is given as “single” for deaths of children under the age of 15).

The final stage of the evaluation will be to assess the value of the corrections on the basis of the precision of the estimates.

Cause-of-death editing: This is a separate process and a shared responsibility. The three larger jurisdictions maintain their own trained cause-of-death coding staff and code their own data. Statistics Canada provides cause-of-death coding for the remaining jurisdictions. Statistics Canada provides the training for all cause-of-death coders and also conducts a cause-of-death review where invalid cause, rare codes, first time used codes, age and cause correlations, and maternal deaths are reviewed. The review also ensures consistent application of the classification and addresses problems arising with the automated mortality classification system. Validity checks such as age and cause or sex and cause are conducted during the editing process.

406. Second, the validity of reported variables needs to be assessed in order to determine data accuracy. The notion of “validity” here refers to the propensity for a recorded data variable to actually be the true or correct value for that variable. Establishment of validity would require the presence of a reference standard for the specific variable in question. Data validity is statistically evaluated using a sample of vital records. The indicators used to measure validity are sensitivity, specificity, and positive or negative predictive values.

407. In addition, data validity is studied by triangulating the civil registration records with other data sources for the same event or variable, taking one source as a reference standard, which can lead through a descriptive analysis of misclassification patterns. For instance, certain variables captured in deaths from civil registration records are compared with information available from deaths in health records. Research studies can measure the validity of causes of death recorded in the process of death registration, comparing them to causes for the same death that are derived from a detailed review of available medical records for the deceased. The result of such a comparison exercise would be a table showing observed discrepancies and misclassification patterns,

and would shed light on the type of variations that arise between certified causes recorded in the process of death registration and actual causes noted in clinical records.¹²¹

408. The findings from such research studies carried out to validate causes of death can serve several purposes. The statistical measures of validity and misclassification patterns can be used to derive adjusted estimates of cause-specific mortality rates, which serve as more plausible and relevant data for health policy evaluation and planning. Moreover, the review of death certification practices and of the implementation of coding processes provides useful insight into the nature and design of interventions to strengthen these processes in the routine civil registration and vital statistics system. Lastly, implementation of these studies will be of help in the development of standard training materials and protocols and in creating a critical mass of trained human resources, with a view to scaling up best practices for these functions.

409. In its efforts to assess the quality of cause of death statistics, the Bloomberg Data for Health initiative has developed a tool known as ANACONDA, for the analysis of causes of death, and has supported its implementation in the 20 countries participating in the initiative. Further details on the ANACONDA tool are set out in box 20 below.

Box 20

ANACONDA tool: “Analysis of causes of (national) death for action”

With support from the Bloomberg Data for Health initiative, ANACONDA is a tool that performs the calculations needed for a comprehensive quality assessment of cause-of-death data. It automatically generates the figures and tables from which a data quality assessment report can be written. Countries that integrate ANACONDA into their vital statistics production system can conduct annual assessments of their data at marginal cost. The tool identifies weaknesses in cause-of-death reporting, such as the misuse of certain causes of death, thus enabling a focus on the necessary remedial action. ANACONDA also generates a summary indicator, the Vital Statistics Performance Index (VSPI(Q)), that enables progress monitoring and cross-country comparisons.

Detailed information on ANACONDA may be found at <https://crvsgateway.info/learningcentre/deaths-cause-of-death-statistics/tools-specifically-to-assess-mortality-data-quality-1>.

See also Carla AbouZahr and others, “Mortality statistics: a tool to improve understanding and quality”, Working Paper No. 13, University of Queensland School of Population Health, Health Information Systems Knowledge Hub (Brisbane, 2010).

410. Third, reliability of the recorded information is yet another dimension of data accuracy. Reliability is assessed through the collection and matching of data variables from an independent data source, and by measuring the agreement scores between the two data sources for specific variables of interest. Assessments of reliability are applied when neither of the two data sources could be considered as a true value or reference standard for the measurement of validity. In some instances, a separate data collection exercise could be undertaken to establish the independent data source. The statistical measures for reliability are measures of concordance, and also Cohen’s kappa coefficient, which estimates the chance-corrected agreement between the two data sources. Measures of reliability help to establish the consistency of data collection and compilation procedures and should be used to evaluate data quality during exercises to triangulate records from different sources for data reconciliation.

411. Data reliability can also be indirectly assessed in terms of the plausibility or consistency of observed patterns of age-sex distributions of vital events when compared to those from populations with similar

¹²¹ As an example, see the following study looking at the discrepancies and misclassification patterns observed from a review of registered causes in a sample of deaths in China: Chalapati Rao and others, “Validation of cause-of-death statistics in urban China”, *International Journal of Epidemiology*, vol. 36, No. 3 (2007), pp. 642–651.

demographic, socioeconomic or epidemiological profiles.¹²² For instance, plausibility can be assessed by comparing the proportional distributions of components of under-five mortality, such as neonatal mortality as a proportion of total infant mortality, with similar proportions in historical data from high quality civil registration and vital statistics systems. Distortions in observed proportions in local data could potentially be due to problems with data completeness or accuracy and their detection could trigger more detailed investigation and data verification exercises. Similarly, age-patterns of distributions of deaths by cause could also be reviewed for their consistency with epidemiological expectations.

(i) Relevance of vital statistics

412. In today's world, data on population characteristics and vital events are increasingly being used for government policy and planning at the local level. These small area statistics are best available from civil registration and vital statistics systems with total national coverage, high levels of data completeness and adequate data quality. Such civil registration and vital statistics yield local level estimates of key statistical indicators with a high degree of precision, as compared to statistics derived from sample surveys whose precision is affected by limited sample size, or indicators derived from routine health sector and other administrative data sources which are usually biased in their coverage.

413. The limitations of civil registration and vital statistics systems in several countries have resulted in the routine conduct of programmes by international agencies and academic institutions to generate modelled estimates of key vital rates and indicators, including life expectancy at birth, fertility and mortality rates. In general, these statistical models are based on mathematical relationships and time trends observed in historical data from developed countries, with only minimal local data from developing countries. As a result, these indicators have limited validity and political relevance, because they are so weakly anchored in local data.

414. National civil registration and vital statistics systems should strive for the accurate and complete compilation and availability of local data in order to increase the policy relevance of their outputs. This would decrease the need for modelled estimates, or at least would provide better inputs for such statistical models for small area statistics, much more strongly anchored in local data of good quality. Ultimately, the continued improvement over time in the availability and quality of the data underpinning locally produced empirical vital statistics will enable their direct use in development policy, monitoring and evaluation and, in consequence, will enhance their relevance.

(ii) Timeliness of vital statistics

415. The importance of data timeliness for policy development and evaluation cannot be over-emphasized. The timeliness of data will also have an impact on their relevance.

416. Given the extensive administrative and geographical scale of most national civil registration and vital statistics systems, a time lag in the overall compilation and publication of annual vital statistics is inevitable. A margin up to two years for the publication of vital statistics is generally acceptable. Added to which, the observance of regular production intervals in order to attain a time series of vital statistics is also a requisite to achieve timeliness.

417. National statistical agencies need time to implement specific data quality verification and update activities, in accordance with their respective internal audit and field programmes. Allowance must also be made for delayed registrations and for the incorporation of findings from additional procedures such as the forensic investigation of causes of death. Such time margins vary across different registration units and statistical offices and must be effectively monitored by the statistical agency, to minimize their impact on data compilation at the national level.

¹²² Jané Joubert and others, "Evaluating the quality of national mortality statistics from civil registration in South Africa, 1997–2007", *PLOS One*, vol. 8, No. 5 (2013).

418. Regular monitoring of the interval between the date of occurrence and the date of registration of events can provide useful information on the timeliness of civil registration and statistical reporting. The proportion of total registrations that are delayed – or late – will provide a rough but easily obtainable estimate of underregistration in previous time periods. Depending on the length of the delay and the cut-off date for the inclusion of vital statistical reports in statistical tabulations, delayed and late registrations can have a substantial impact on the completeness of vital statistics. Through continuous measurement of the delay between occurrence and registration, it is possible to infer whether the operation of the system is improving or deteriorating.

419. Similarly, delays in the transmission of vital statistical reports to the compiling agency may affect the completeness of annual statistics. Regardless of the size of the country and any difficulties in communications, delays in the transmission of statistical reports should occur rarely and every effort should be made to ensure that this process is as efficient as possible.

420. Information on late and delayed registrations or on the delayed transmission of information can provide insights into other aspects of the vital statistics system as well. For example, for systems relying on health personnel for the notification of events or for the actual registration of events, a table showing registration or transmission delays by type of place of birth or death (for example, whether a health facility or not a health facility) may provide some information on the degree of cooperation of health personnel in the registration and reporting process.

421. In developing countries, where a considerable proportion of deaths occur without medical attention, arrangements could be set in place for the performance of verbal autopsies and related investigations, including follow-back procedures to trace and link medical records from health facilities attended by the deceased. In these situations, there may be a longer time lag for the incorporation of cause-of-death findings into statistics.

422. As noted above, the computerization of individual records at the point of registration will be conducive to rapid electronic compilation, data management and analysis to meet specific statistical requirements. Generally speaking, time lags of longer than three years will decrease the relevance of the data, since revisions may be made to the civil registration and vital statistics system, or, for example, sudden changes may occur in the epidemiological profile of disease prevalence or risk factors in local communities.

(iii) Availability and accessibility of vital statistics

423. The final element in the quality evaluation of civil registration and vital statistics systems is an assessment of the availability of and accessibility to data, both from individual civil registration records and from statistical compilations and aggregated data analyses. In principle, the available data should meet the needs of various sectors, including identity and population management, government planning for housing and education, population health assessment and health services policy, among others. As noted above, the third revision of the *Principles and Recommendations for a Vital Statistics System* prescribes a comprehensive and detailed list of vital statistics tabulations that should be made available on at least an annual basis at the national and subnational levels, as determined in each country. The assessment exercise should verify the availability of these statistical tables in published annual vital statistics reports or on regularly maintained and publicly accessible websites. The availability evaluation should also look at the formats of publicly available data and assess whether they are suitable and friendly for a wide range of users, with needs ranging from the most basic to the most sophisticated. An important criterion for the evaluation of vital statistics will be the availability of a time series, in other words, data points available for successive points in time over a considerable period of time.

424. The assessment should also review policies for data accessibility and sharing between the civil registration authority, the statistics office and other government agencies. In some instances, there could be a need to provide access to individual records, including identity and demographic details. Such access is often

required for the purposes of verification of identity, to enable the accurate provision of relevant public services, including passports, employment services and other financial and social support services. In addition, there should be clear and public instructions as to how to gain access to anonymized microdata for academic research. Institutional data-sharing policies and agreements should include clauses about data confidentiality and privacy, to prevent data leakage, identity theft and other forms of misuse. Further discussion of this issue may be found in chapter VI below.

425. The assessment of availability and accessibility should also consider processes to facilitate efforts by citizens to gain access to their relevant registration documents or certificates from the civil registration authorities. Issues relating to application forms, the submission of supporting documentation and the payment of fees or penalties for obtaining original or additional copies of vital event certificates, such as those for birth, death, marriage and adoption, should be reviewed as part of the evaluation. Where possible and necessary, the field programmes could also include a set of random interviews with citizens at civil registration offices to ascertain their perceptions and feedback on the quality of civil registration services and their general opinions regarding the ease of obtaining relevant documents and advice.

426. The quality evaluation assessment should also review the availability and accessibility of anonymized microdata from civil registration and vital statistics systems, both for academic research and for policy purposes (see chapter VI, section C, for further discussion of this topic). These microdata are necessary for a wide range of research topics in the fields of demography, sociology, epidemiology and economics, among others. In several countries, such data are available only on specific request to the national statistics offices, with the request being accompanied by details of the purpose, methodology, expected outputs and potential benefit of the research. The quality assessment should check for the availability of regulations and specifications for such requests, and make recommendations to improve the dissemination and availability of microdata, as required.

427. Certain countries routinely release anonymized microdata on births, and also on deaths, including coded multiple causes of death, which are of considerable value in public health research. In general, for each individual record in the data set, the availability of geographical location (indicating at least state or province level and whether urban or rural area), along with sex, age, date of birth or death, occupation, and multiple causes of death can facilitate detailed demographic and epidemiological analysis.¹²³ The quality assessment should review the availability of such services, with the application of appropriate safeguards regarding privacy and data confidentiality.

¹²³ Such data sets, with varying levels of detail in regard to the number and type of variables, have been available in the United States of America since 1959. See United States of America, National Bureau of Economic Research, *Mortality Data – Vital Statistics NCHS' Multiple Cause of Death Data, 1959–2016*. Available at www.nber.org/data/vital-statistics-mortality-data-multiple-cause-of-death.html. Australia provides a service known as the National Death Index, which, in response to research requirements, establishes links between civil registration data and other sources of individual records (for example clinical trial registers) and returns the linked records with desired variables to the applicant. See Australian institute of Health and Welfare, *National Death Index*. Available at www.aihw.gov.au/about-our-data/our-data-collections/national-death-index.

V. Integrating civil registration, vital statistics, population registers and identity management

A. Introduction

428. As mentioned in previous chapters, vital statistics and civil registration are separate entities, but it is crucial that they be established, maintained and employed as components of a coordinated and coherent system for registering and producing vital statistics. In addition, the emergence of interconnections between civil registration and identity management systems adds yet another dimension to the structure of the civil registration and vital statistics system. A graphic representation of these relationships and functioning is presented in figure 1, in chapter I above. Civil registration is defined as the continuous, permanent, compulsory, universal recording of the occurrence and characteristics of vital events pertaining to the population, as provided through decree or regulation in accordance with the legal requirements in each country.¹²⁴ It is important to highlight the quality of universality in relation to people's rights regarding the registration of vital facts. Everyone has the right to be recognized as a person before the law, as enshrined in article 6 of the Universal Declaration of Human Rights and reaffirmed in several other global accords and international human rights instruments.¹²⁵ As civil registration establishes the existence of a person under law, it has traditionally been the fundamental means of granting legal identity. In this regard, laws, policies, rules and regulations must not be a hindrance to the realization of this right. In particular, the registration of events must be performed even if the time frame given by law has elapsed, and regardless of migratory status, citizenship and any other request that may act as an obstacle to registering the vital facts occurred in the territory. Civil registration is carried out primarily for the purpose of registering vital events and establishing the documents provided for by law. The usefulness of these records as the best source for the production of vital statistics is well established. The procedures for recording vital events are equally important for civil registration as a legal exercise and for vital statistics as a source of statistics; hence the tasks performed by civil registrars and those of statisticians are interdependent.¹²⁶

429. In a significant number of countries the full interoperability of civil registration, on one hand, and vital statistics, on the other, is not completely assured, yet both components are able to perform deliver their intended tasks in an efficient manner. This model is undergoing significant shifts with the emergence of population registers that require a much more coherent and automated structure. At the current time, in view of the heightened importance of assigning to each individual a unique identity document that would ensure the effectual delivery of services and, at the same time, enhance the identification of individuals for security purposes, and in response to the need to link civil registration, as the entry point for assigning identity documents (birth and death certificates), vital statistics and identity management, yet another model has come into existence, and this makes extensive use of information technology,. The present chapter considers the flow of information and accompanying arrangements for each of these three models:¹²⁷ civil registration and vital statistics as separate components without population registers; civil registration and vital statistics with the use of population registers; and, lastly, the holistic combination of the functions of civil registration, vital statistics and identity management.

¹²⁴ *Principles and Recommendations for a Vital Statistics System*, Statistical Papers, Series M, No. 19, Rev. 3 (United Nations publication, Sales No. E.13.XVII.10), para. 279.

¹²⁵ 1948 Universal Declaration of Human Rights, arts. 6 and 15; 1951 Convention relating to the Status of Refugees, arts. 25 and 27; 1954 Convention relating to the Status of Stateless Persons, arts. 25 and 27; 1961 Convention on the Reduction of Statelessness, arts. 1–4; 1965; 1969 International Convention on the Elimination of All Forms of Racial Discrimination, art. 5 (d) (iii); 1966 International Covenant on Civil and Political Rights, art. 24; 1979 Convention on the Elimination of All Forms of Discrimination against Women, art. 15; 1989 Convention on the Rights of the Child, arts. 7–8; 1990 International Convention on the Protection of the Rights of all Migrant Workers and Members of Their Families, art. 29; 2006 Convention on the Rights of Persons with Disabilities, art. 18.

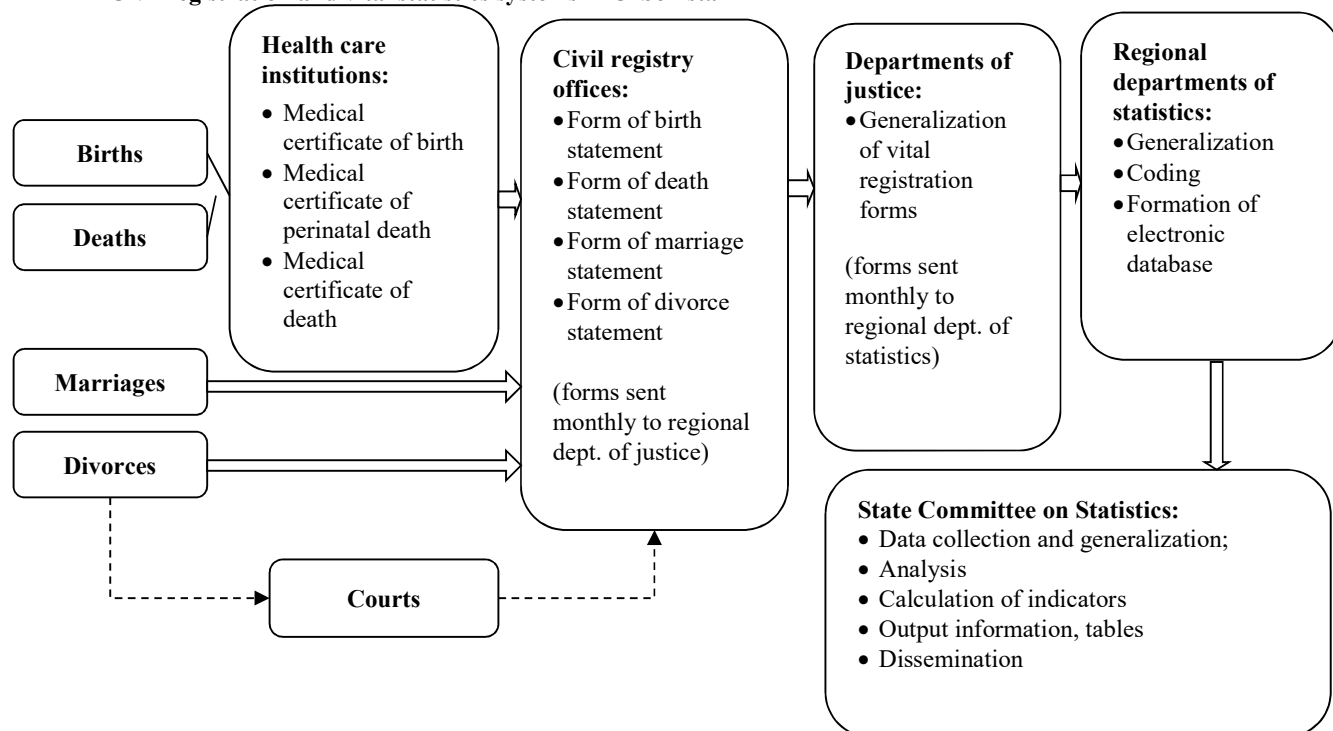
¹²⁶ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 274.

¹²⁷ These three models are presented in chapter I above.

B. Civil registration and vital statistics as separate agencies

430. In this model, the functions of civil registration, on one hand, and vital statistics, on the other, are delivered by separate agencies; this requires a careful and effective division of labour, along with coordination to ensure the efficient transmission of relevant and accurate information. A graphic example of this division of labour is provided below. This flow chart or business map is part of the output of a series of regional workshops on the application of the third revision of the *Principles and Recommendations for a Vital Statistics System*, held by the United Nations Statistics Division in partnership with relevant regional stakeholders.

Figure 9
Civil registration and vital statistics systems in Uzbekistan



Source: United Nations subregional workshop on applying *Principles and Recommendations for a Vital Statistics System* for implementing the regional action framework for CRVS in Asia, held in Istanbul, 15–18 September 2015.¹²⁸

431. In the case of birth, the third revision of the *Principles and Recommendations for a Vital Statistics System* recommends, in paragraph 66, that the following information be collected:

1. Date of occurrence of birth
2. Date of registration
3. Place of occurrence
4. Place of registration
5. Type of birth (single, twin or other)
6. Attendant at birth
7. Name of newborn
8. Sex of newborn
9. Weight of newborn
10. Name of mother
11. Date of birth of mother
12. Marital status of mother

¹²⁸ All documentation available at https://unstats.un.org/unsd/demographic/meetings/wshops/Turkey/2015/list_of_docs.htm.

13. Educational attainment of mother
14. Place of usual residence (address) of mother
15. Duration of residence at current address of mother
16. Place or country of birth of mother
17. Children born alive to mother during her entire lifetime
18. Fetal deaths to mother during her lifetime
19. Date of last previous birth by mother
20. Date of marriage of mother
21. Name of father
22. Date of birth of father
23. Marital status of father
24. Education attainment of father
25. Place of usual residence (address) of father

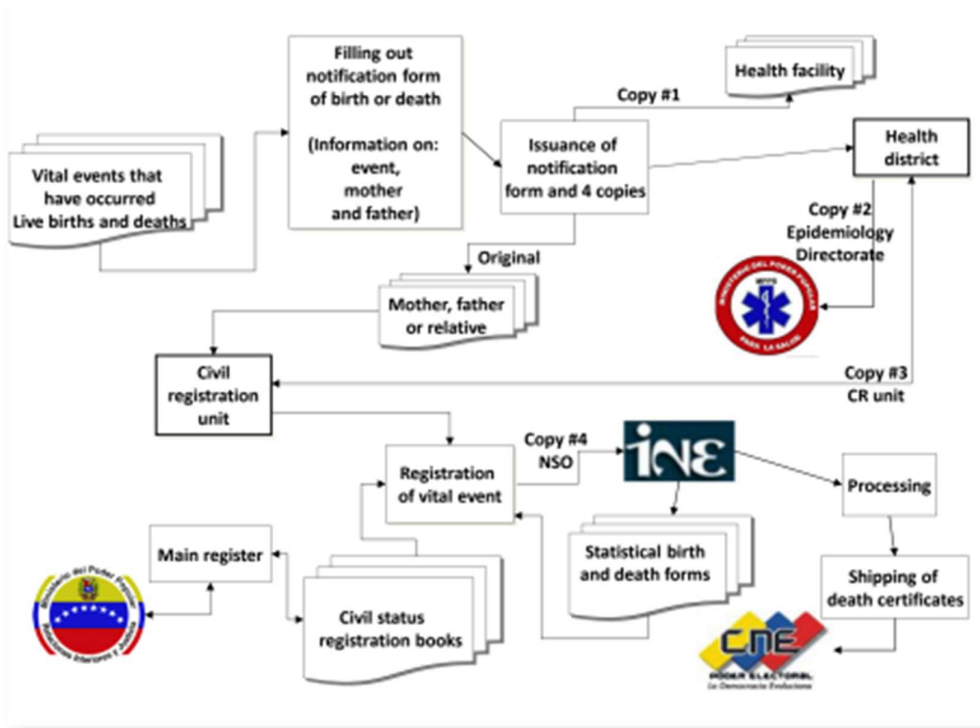
432. In addition to these characteristics – in all, 25 pieces of information, as presented – recommended as core topics in accordance with international statistical standards, other essential pieces of information would have to be collected or assigned, such as the unique identifying number of the event, which usually consists of the civil division code where the birth occurred, the code for the registration office where it was registered and a set of random numbers. In addition, in a number of countries, supplementary personal characteristics of the mother and the father may be of particular interest, such as literacy, ethnicity, employment and occupation. Public health concerns may also influence additional sets of information that have to be collected, for example, related to gestational age, number of prenatal visits by mother and the exact month of pregnancy when prenatal care began. Thus the list of information items is comprehensive and necessitates the development of procedures and routines that would ensure the complete and accurate collection of information.

433. Informants (notifiers) play a critical role in collecting the bulk of information. Consequently, a number of countries specifically designate – through the civil registration law – the health institution or its head as responsible for acting as an informant of births, fetal deaths and deaths occurring in the institution. In practice, it is the staff of the health institution that actually collects the information and fills the form. The form, in turn, may be in paper or electronic. If a paper form, once filled, this is submitted to the registrar's office, where verification of the information in the form takes place. The registrar, as an official of the State, has the authority to request identification documents from the parents, and will check whether name, date of birth and address correspond to those provided in the form. In addition, the registrar will supply any missing information in the form by acquiring it directly from the parents, thus ensuring completeness of the collected data.

434. The registrar will then make an official entry in the civil register, including all the information required by law, which usually comprises the names of parents, name of the newborn, addresses, age, marital status and, depending on the country, additional information regarding ethnicity, religion and so forth. Once the official record is entered, the registrar issues a birth certificate to the parents, which represents the seed document for the newborn's identity and ensures that individual access to various services, such as immunization, health care, education and so forth. Country examples of the birth and death registration process are presented in the form of business process maps, in figures 10 and 11 below.

Figure 10

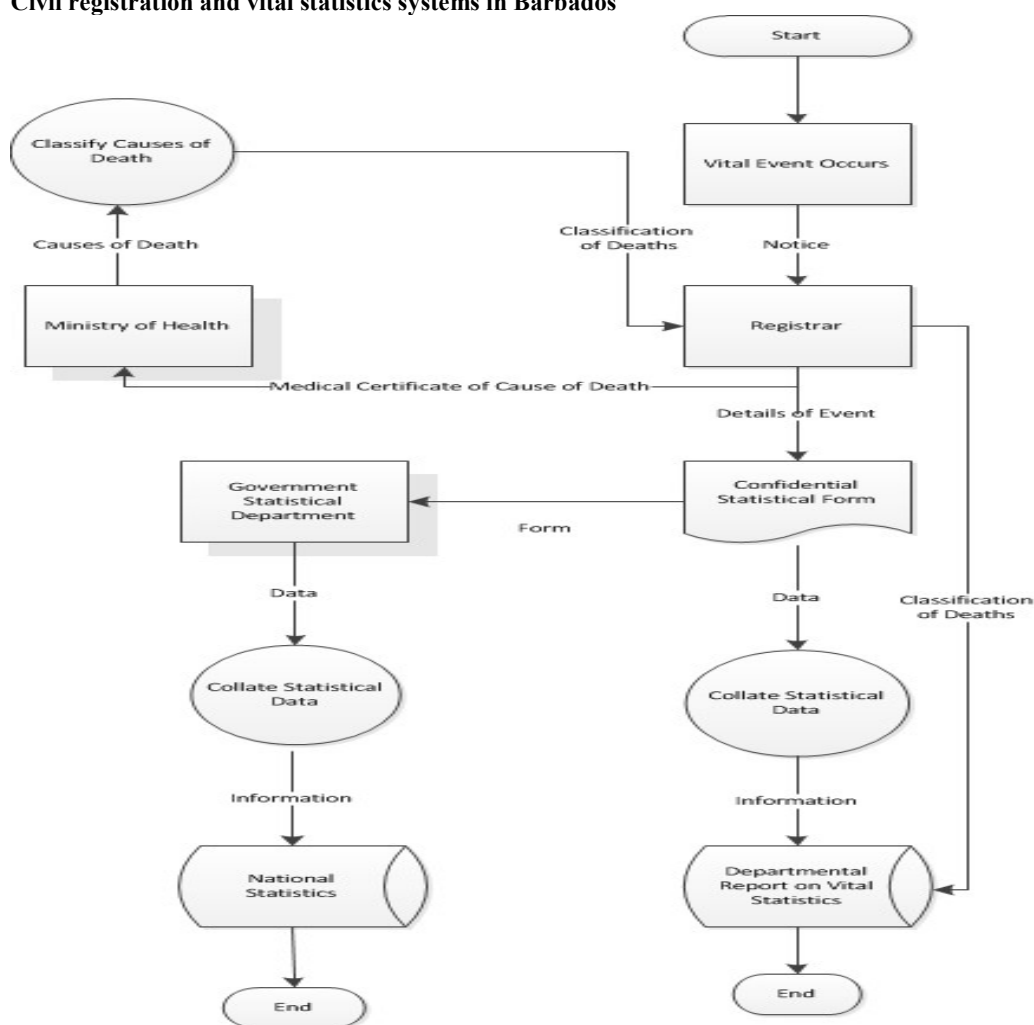
Civil registration and vital statistics systems in the Bolivarian Republic of Venezuela



Source: Workshop on the *Principles and Recommendations for a Vital Statistics System*, Revision 3, for South American countries, held in Santiago, 9–12 November 2015.¹²⁹

¹²⁹ All documentation available at https://unstats.un.org/unsd/demographic/meetings/wshops/Chile/2015/list_of_docs.htm.

Figure 11
Civil registration and vital statistics systems in Barbados



Source: Workshop on the *Principles and Recommendations for a Vital Statistics System*, Revision 3, for Caribbean countries, held in Port of Spain, 1–4 December 2015¹³⁰

435. As for the form (whether paper or electronic), the registrar is responsible for transmitting this to the statistical authorities. In practice, the registrar's office will compile all forms for a certain period of time, usually one week, and then forward them as a batch to the regional outpost of the national statistical system. The national statistical system, in most cases, has regional offices that are fully equipped to collect and process data from administrative records, surveys and censuses. In the case of forms in paper, the staff of the regional statistical office will then key the information into a computer file, proceed with the data processing and coding, run editing procedures and notify back to the registrar's office any discrepancy identified in this process. In the case of electronic forms, data entry is performed by the registrar; all the other procedures, however, such as coding, editing and others, would be administered by the statistical office. Ultimately, digital records for all events will be compiled by the central statistical office, where national totals and tabulations will be produced; this does not prevent the regional statistical offices from producing the same tabulations for their regional levels.

436. Such an arrangement requires an appropriate administrative set-up for the coordination of activities and the establishment of procedures and protocols to ensure the flow of information and performance by each of

¹³⁰ All documentation available at:
https://unstats.un.org/unsd/demographic/meetings/wshops/trinidad/2015/list_of_docs.htm

the two components of their assigned tasks: this set-up is an inter-agency coordination committee. As the two key preconditions for the reliability of records are completeness and timeliness, achieving these would be the committee's primary focus and its membership should include participants from all levels of both the civil registration and vital statistics systems, and also from the health sector. This will ensure an essential insight into the broad and comprehensive use of the information that the registration system provides. The perspective that the committee provides to the system can help focus and direct the agencies involved in obtaining complete, timely and quality data for the registration office. At the committee's sessions, the registration and statistical staff should present and discuss the potential use of the data. The committee should consider the use of data at the local level for immunization programmes, disease categories and associated illnesses, related health-care needs and services, and available resources. This type of cooperative involvement and information exchange among the various agencies and local registration offices will improve data integration. Further information on coordination mechanisms may be found in chapter II, section C, above.

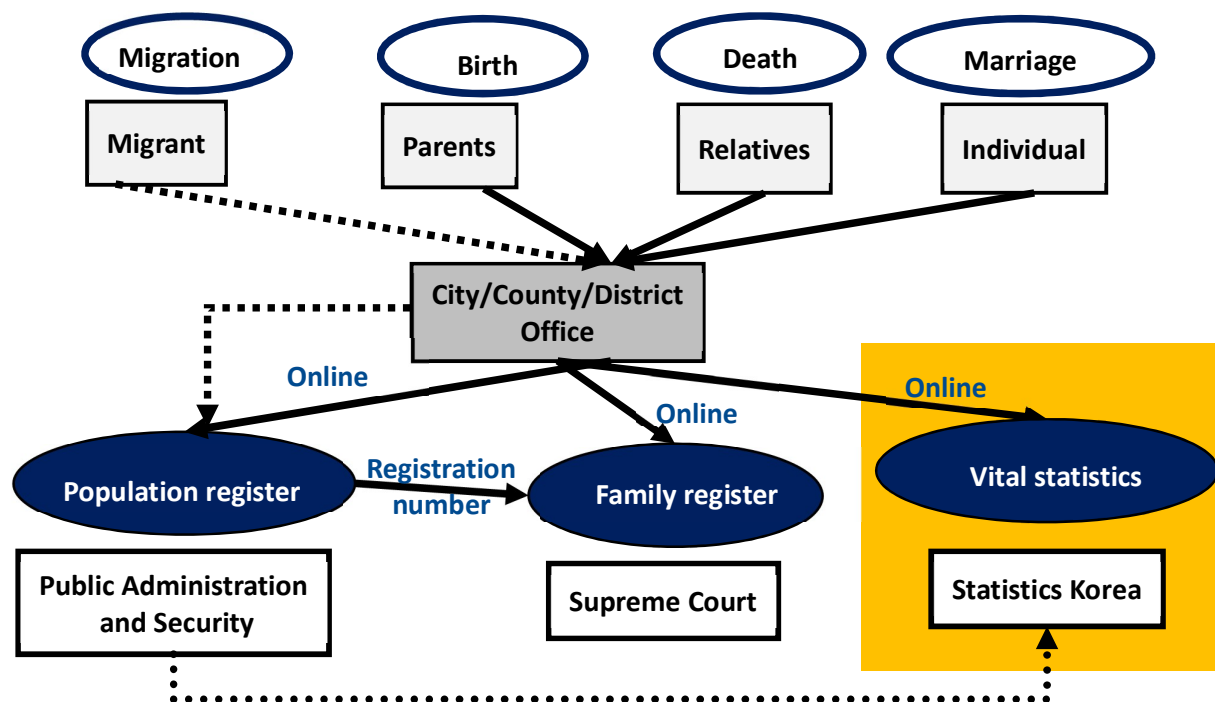
437. The inter-agency coordination committee would need to develop and maintain instructions covering such matters as definitions of vital events, coding schemes, generation of the unique identifier, content of the form, statistical definitions of characteristics of the event and the persons involved, training curricula for informants, registrars and statisticians, quality control mechanisms, field visits, procedures for reporting and recording events, content and format of certificates, transmission protocols, content and periodicity of statistical reporting and all other standardized activities as necessary. This committee is the coordinating body for data items and definitions, for the collection, monitoring, access and use of data and for the legal and administrative functions needed to manage the programmes effectively (see box 12 in chapter II for a few case examples on how this type of committee works).

438. In addition, the creation of working committees for specialized functions should be considered, with a view to maintaining the operational aspects of registration and vital statistics. Such working committees can revise the legal framework, conduct education and communication programmes and enhance the accuracy, completeness and timeliness of civil registration and vital statistics. Subcommittees may be set up to focus on operational aspects of the two programmes, looking in particular at the interaction of staff in the processing of records. Each programme requires access to the vital records in order to complete its respective functions. Delays in reporting, errors and staffing shortages within a particular unit involved in the process could influence each programme's activities. To address such issues, the working committee could establish options for conducting specific processing functions, depending on the issue under review.

C. Civil registration, vital statistics and population registers

439. With the introduction of population registers as standard government mechanisms, the functional – but not the administrative or institutional – integration of civil registration and vital statistics has been further strengthened and standardized where operational activities are concerned. Nowadays, population registers essentially take the form of computerized databases with a separate record for each individual in the country. This population register can be a centralized database or it can consist of interlinked regional or provincial databases. The agencies in charge of operating and maintaining population registers differ from one country to another. Often this function is assigned to the home affairs authorities and the police. In other countries it is under the responsibility of the tax authorities. There are cases where the function was initially performed by the national statistical office, then moved to an agency that has more direct access to the population. The figure below illustrates how this division of labour works in the Republic of Korea.

Figure 12
Civil registration and vital statistics systems in the Republic of Korea



Source: Expert group meeting on the management and evaluation of civil registration and vital statistics systems, United Nations Headquarters, New York, 20–24 February 2017¹³¹

440. The primary function of the population register is to provide reliable information for the administrative purposes of government, in particular for programme planning, budgeting and taxation. The registers are also useful in other administrative areas, such as establishing personal identification, voting, education and military service, social insurance and welfare, and for police and court reference.¹³²

441. In practice, population registers nowadays rely on a robust computer structure designed to meet the essential uses presented above. They are not specifically designed either for civil registration purposes, or for the production of vital statistics; hence they must be specially adapted for these functions, so that they are compatible with all the mechanisms involved.

442. Where the population register is concerned, the first step is to ensure that all the definitions used are identical to those used in both the civil registration and statistical components. This requirement will necessitate harmonization measures that might not always be straightforward. For example, the population register definition of a resident may require that a certain period of time – three months, for example – is spent in the country for a person to be entered in the register. In the case of a newborn infant who died after a few weeks, this requirement would not be met and this, in turn, necessitates the development of particular protocols to deal with such occurrences.

443. In this model, the process is very similar to that outlined in the previous subsection. The informant fills out the form, in either electronic or paper format, which includes all the required characteristics (see para. 431 above) and submits it to the registrar. The registrar verifies the information, assigns the PIN that will follow the newborn throughout her or his life, issues the birth certificate and makes an entry in the population

¹³¹ All documentation available at <https://unstats.un.org/unsd/demographic-social/meetings/2017/new-york--egm-on-management-and-evaluation-of-crvs-systems/>.

¹³² *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 455.

register. These entries may be made online or uploaded in batches, depending on the actual computer infrastructure designed to hold and maintain the population register.

444. The content of a specific population register varies from country to country. It will always include the names of the individuals and of their parents, their date and place of birth, their address, their PIN and the unique civil registration record identifier.

445. It is important that the population register should be organized as a set of databases linked by a unique identifier, ideally the PIN. Thus there would be a master database containing all the PINs. Then another database would contain names, addresses, places and dates of birth. Another would contain the characteristics of the event, in this case birth, including the unique civil registration record identifier, and this database would double as a civil register which could be used for amendments such as adoption and recognition. Yet another should contain other characteristics, including those relevant for the production of vital statistics. Another would contain the causes of deaths. Each database would be indexed with the use of PINs, with provision for the extraction of short-form or longer certificates, as needed.

446. In this set-up, the national statistics office would be authorized to have access to the population register for the purpose of extracting records and variables necessary for the production of regular and accurate vital statistics.¹³³ The frequency of such access and the material to be extracted should ideally be spelled out either in the law governing population registration or in the law on statistics or related regulations. In principle, the statistical component does not need access to all the information in the population register, such as names, for example. A unique identifier must, however, be made available to statisticians, so that errors and inconsistencies in the processing, editing and aggregating of records can be identified and then reported back to the institution responsible for maintaining population registers. Further details on how the population register functions in Norway may be found in box 2 in chapter I above and box 21 below.

Box 21

Norway: administrative and statistical databases and registers

The Norwegian Tax Administration has been hosting and running the country's central population register since 1991, when it was transferred from Statistics Norway (Statistics Norway established the original register in 1964, see Box 2).

The two figures below show the flows of data on individuals to and from the Central Population Register of Norway. The entity at the middle of both figures, "Population register", functions both as the central register of civil events in Norway and as the country's population register. Thus, civil registration and national identity management are fully integrated. Births to residents of Norway and new immigrants are assigned personal identification numbers. Residents who die or emigrate are not physically removed from the register, but their codes are changed from "Resident" to "Dead" or "Emigrated".

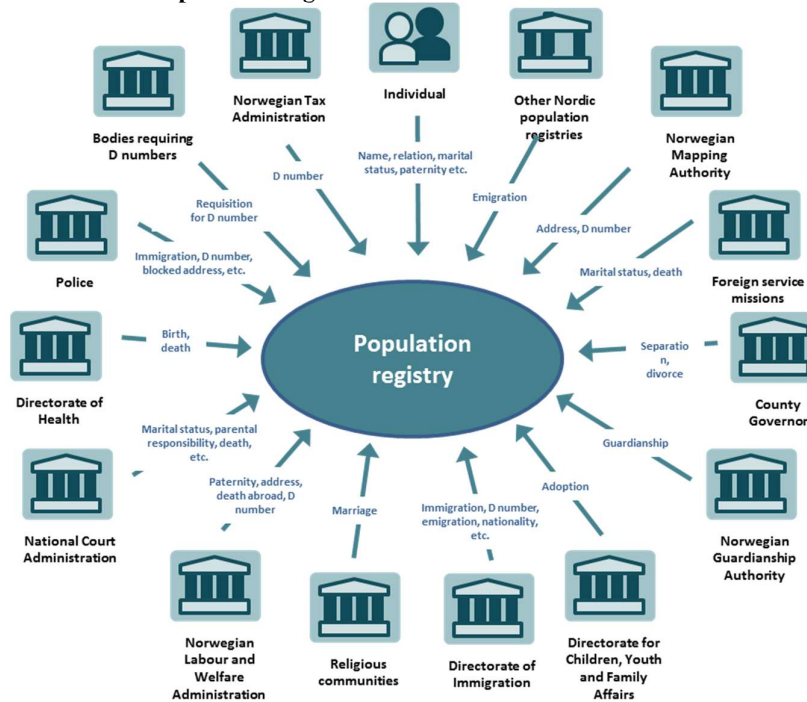
The first figure shows that the population register receives microdata from many public institutions on births, deaths, internal and external migrations, marriages and divorces, adoptions, address changes, name changes, and other events. It should be noted that the population register does not receive any microdata from Statistics Norway, in keeping with one of the fundamental principles of statistics, that the statistical agency shall not distribute data that can be used to identify individuals.

The second figure shows the public and private institutions to which the Norwegian Tax Administration distributes microdata. Statistics Norway is one of the most important recipients and users of these microdata, together with health and educational institutions, the police, the army, the electoral register, banks, and other bodies.

The task of sharing the microdata is not performed by Statistics Norway, but by the owner of the administrative register, the Norwegian Tax Administration. Statistics Norway may, however, share anonymized data on individuals if this is approved by the data inspector.

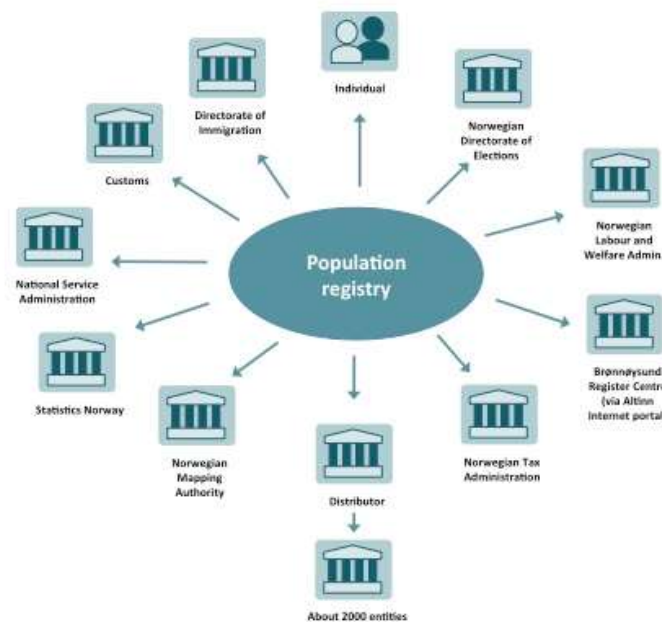
¹³³ See "Register-based statistics in the Nordic countries" (United Nations publication, Sales No. E.07.II.E.11). Available at <https://unstats.un.org/unsd/dnss/docViewer.aspx?docID=2764>.

Figure A
Data flows to the Central Population Register



Notes: A national identity number is assigned to everybody born in Norway or who settles in Norway for more than six months. It consists of 11 digits, of which the first six digits indicate the date of birth. D numbers are temporary identification numbers assigned to persons who do not live in Norway but who are working in the country for less than six months or who have other economic relations with the country, such as owning property or paying taxes.

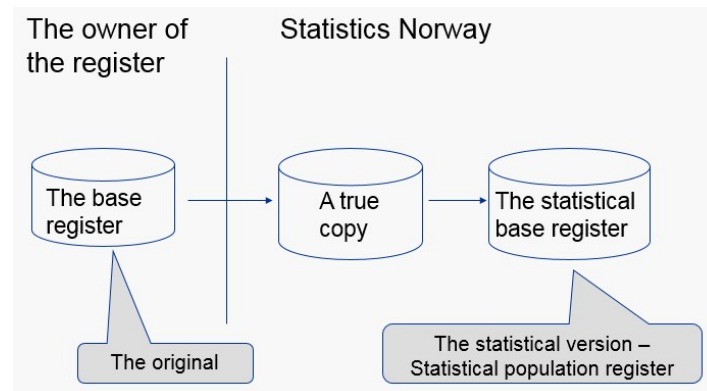
Figure B
Data flows from the Central Population Register



Statistics Norway receives updates on vital events and other changes in the register every night, five days a week, following the same routine as many other users of the population register that need daily updates for administrative purposes. Every morning, Statistics Norway staff verify the updates received.

The diagram below shows the relationship between the administrative and statistical population registers. Statistics Norway maintains two versions of the population register:

- True copy of the administrative register
- Separate statistical population register, in which internal adjustments and amendments are made and saved



The key reason for this approach is that the administrative register is incomplete and may include errors and other shortcomings, such as missing data. Statistics Norway has access to many other administrative data sources and can link them to the copy of the central population register to check for possible errors. This information cannot be shared with the Tax Administration without permission from the owners of other sources for confidentiality reasons, but it still has an impact on the quality of the statistics produced. Statistics Norway may report faulty microdata (including the PIN) back to the Tax Administration or any other register owner, as this may be considered a complaint regarding the quality of the data. The most important aspect of the statistical population register is that it has been supplemented with other relevant data from internal sources, which makes it a prime source for statistics production.

There have been few, if any, changes to the system since 1991, but the population register is now being upgraded. The upgrade will be completed in 2019, including a new Population Registration Act, where statistics is mentioned as one of the purposes of the population register. The modernised population register will be extensively based on digital and automatic routines and include additional information. The user forum, which includes a broad set of public and private stakeholders, is involved in this work and provides feedback on any changes. Statistics Norway very involved in the modernization process, which is mandated by the country's Statistics Act.

447. Integrating the processes of civil registration, the maintenance of population registers and the production of vital statistics results in a dynamic mechanism that is updated on a daily basis, with routine operations encompassing all three components, from the issuance of birth, death and marriage certificates to the processing of individual information for administrative purposes, and generating regular and timely vital statistics. The successful outcome of such integration will also significantly reduce the costs of all three functions in the long run – and savings will be reflected in the short term as well. From the point of view of service delivery, such a mechanism will afford individuals much faster and more comprehensive access to various documents necessary for daily tasks in present-day life.

448. As noted in chapter I above, the linkage of the population register with the civil registration system makes it possible to reconstruct the history of an individual's life events. Provided that the date of the events is properly recorded, this high level of detail can be used also for estimation both of the duration of a demographic state (such as the state of "married" or "parity one", and so forth) and of the related probabilities of transition, and also for longitudinal studies. In addition, it may enable the definition of specific geographical

aggregates of interest, such as population living in coastal areas, or in certain disadvantaged localities, whose boundaries do not necessarily conform to the administrative boundaries.¹³⁴

449. The confidentiality of individual information is of paramount concern and one of the basic principles underlying all three components: civil registration, the population register and vital statistics. Thus strict and unambiguous procedures and rules designed to ensure the confidentiality and protect the privacy of the information contained in the population register have to be part and parcel of the law regulating the use and maintenance of population registers. This law should also stipulate the punishments incurred by government officials who fail to protect confidentiality or unduly disclose private information.

450. In conclusion, making the civil registration system a vital component of a computerized population register would offer the most appropriate and advanced means of generating relevant, accurate, timely and comprehensive vital statistics. While building such a system would initially be resource-intensive, it would pay dividends over a prolonged period of time.¹³⁵

D. Civil registration, vital statistics and identity management

451. In principle, identity is an individual's self-awareness. As such, identity can have numerous dimensions, or layers, including cultural, ethnic and religious, and these can evolve and change over time. In modern societies, however, and the manner in which they function, it is the individual's legal identity that counts, as this is the one that provides access to services, the exercise of rights and entry in the legal framework. Thus, in this context, "identity" refers to that dimension of the term established by issuing a birth certificate, with the newborn's name, date and place of birth and parents' names, in other words, official certification of the occurrence of the event and the persons involved, and this identity is withdrawn upon the issuance of the death certificate of that person (by flagging it or changing its status from "living" to "deceased").

452. As presented in the documentation collected for the purpose of monitoring the state of the art of civil registration and vital statistics worldwide,¹³⁶ the number of individuals without a basic birth certificate is considerable because of the lack of civil registration services or the incomplete coverage of these services in their respective countries. As noted above, it is important to highlight the quality of universality in relation to people's rights regarding the registration of vital facts. As established in the 1948 Universal Declaration of Human Rights and reaffirmed in other global accords, every person has the right to be recognized as a person before the law and, as civil registration establishes the existence of a person under law, it has traditionally been the fundamental means of granting legal identity. In this regard, laws, policies, rules and regulations must not be a hindrance to the realization of this right. In particular, the registration of events must be performed even if the time frame prescribed by law has elapsed, and regardless of migratory status and any other request that may act as an obstacle to registering the vital facts that have occurred in the territory.

453. The problems experienced in attempting to govern without a comprehensive understanding of the size and structure of their populations and without assurance that services are being delivered to the people for whom they were intended forced many countries to give much more careful attention to the task of issuing identity documents to everyone in the population. In addition, the sharing of resident information makes possible the provision of joint services from multiple government agencies and will reduce the time spent reviewing and verifying identity and resident information. Information-sharing systems help governments to

¹³⁴ Other significant advantages of this model include the wealth of longitudinal information critical for researching and understanding population dynamics and structure, migration and a number of other demographic and social phenomenon processes; these are not discussed here as the focus of the present chapter is on the operational structure. See *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 479.

¹³⁵ *Ibid.*, para. 484.

¹³⁶ Further information on this matter may be found on the website of the United Nations Statistics Division, available at http://unstats.un.org/unsd/demographic/CRVS/CR_coverage.htm.

enhance their capacity to meet citizens' needs with targeted solutions.¹³⁷ Awareness of that benefit has prompted governments to establish a special agency entrusted with issuing identity documents to every individual in the country, with unique identifiers, such as photographs, fingerprints and other biometric characteristics.

454. Civil registration – in other words, the recording of vital events of individuals and ascertaining their occurrence through the issuance of certificates – forms the basis for the legal or civil identification of individuals. Thus the most pressing first steps that those identity management agencies have to take is to integrate the civil registration function in their work. In that process, the civil registration operations are not significantly changed in any substantive manner: the submission from the informant to the registrar remains as before, as do the processes of official certification and issuance of a certificate. In this model, the identity management agency becomes the custodian of the population register, described in section C above.

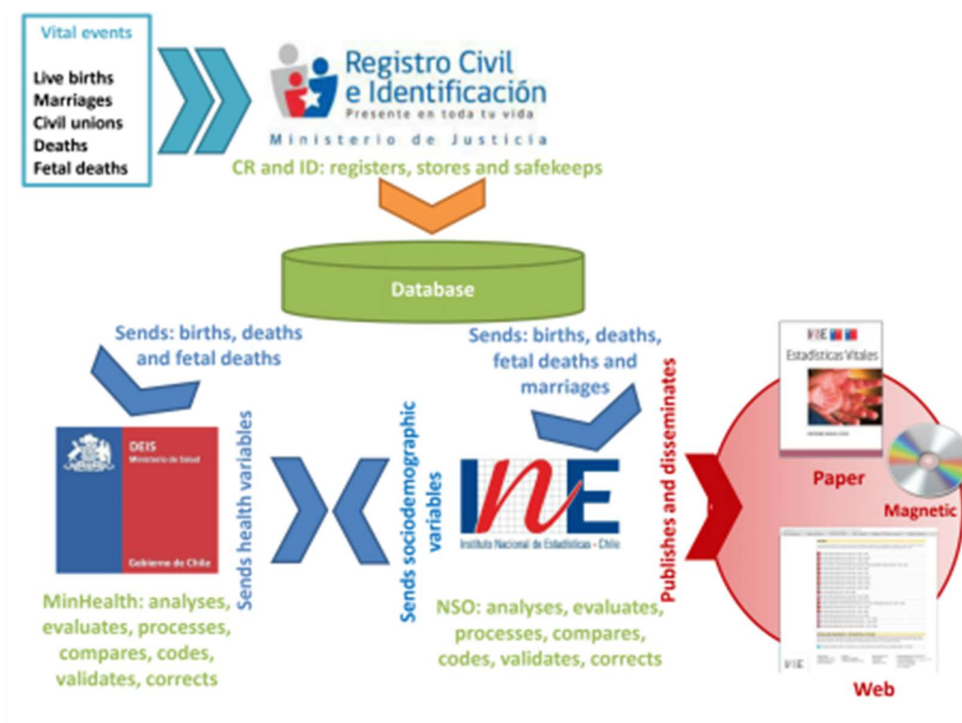
455. While the integration of civil registration and identity management functions was fairly straightforward and uncomplicated, incorporation of the vital statistics component represents a rather more difficult process. This is partly because the national statistical system, of which vital statistics forms part, is administered by the national statistical office – an institution of long standing with a specific role in the government structure. For a set of different reasons, primarily the incomplete coverage of civil registration, the national statistical office traditionally relied on other sources of data to generate vital statistics indicators. Where the identity management agency is concerned, the generation of vital statistics was not a priority – rather, every effort was made to use contemporary technology to issue biometric identity cards to every individual, with a focus on national security and law enforcement.

456. Integrating the vital statistics function in this model, in a holistic and routine manner, is an essential prerequisite for making the system efficient and comprehensive. As described above, the informants and notifiers should be trained and equipped to collect all the characteristics prescribed by international standards; the registrar must verify and certify the content of registration forms and ensure their entry in the population register databases. The central statistics office must adjust and develop routine procedures for extracting data from the identity management system and the civil registration database in order to generate complete, accurate, reliable and routine small area vital statistics. As this model is now implemented and functioning in an increasing number of countries, the benefits to the population that it serves and the easy availability of identification documents that afford access to different services and enable the government to develop with precision the types of social services needed for their respective jurisdictions clearly and unambiguously indicate the appropriateness and efficiency of this paradigm.

457. Care must be taken to maintain the equal standing of the different components of the system: in other words, civil registration is the building block that must continuously feed information on vital events on the one hand to the identity management system for it to maintain its relevance and, on the other hand, to the statistics office in order to produce tabulations, rates, ratios and other figures that guide policy formulation. These components should provide feedback to one another in a virtuous circle of improvement. The figure below depicts an example of the division of labour following this paradigm. This process map is one of the outcomes of a series of regional workshops on the application of the third revision of the *Principles and Recommendations for a Vital Statistics System*, held by the United Nations Statistics Division in partnership with relevant regional stakeholders.

¹³⁷ See Proceedings of the International Identity Management Conference, Seoul, 23–25 September 2014, available at https://publications.iadb.org/bitstream/handle/11319/7125/International_Identity_Management_Conference_Proceedings.pdf?sequence=4.

Figure 13
Civil registration and vital statistics systems in Chile



Source: Workshop on the *Principles and Recommendations for a Vital Statistics System*, Revision 3, for South American countries, held in Santiago, 9–12 November 2015.¹³⁸

458. The unified system also has the advantages of being conducive to smoother registration procedures, making the system more cost-efficient and being more accessible to the public. When looking at ways of streamlining processes, cutting red tape and improving services, countries must seek opportunities for collaboration among agencies and with all levels of government. This is the case of service bundling, often with civil registration at its core. Box 22 below presents an example of this practice in Canada, which takes advantage of a seamless integration of identity management, civil registration and vital statistics. Another example of this integration effort is presented in box 23, with the case of Uzbekistan.

Box 22

Canada: service bundling and integration

Service bundling enables various federal and provincial departments to improve services to clients by delivering programmes without developing completely separate systems for each programme. For example, when parents fill out birth registration forms, they can indicate whether or not they would like to apply for a social insurance number for the newborn and for federal benefit programmes to which they may be entitled. This information is captured by the provincial register as part of the registration process and is then automatically distributed to the appropriate federal government department through the National Routing System. This integrated service motivates early birth registration and has proved popular with parents as they only have to provide the information once in order to register their child's birth and to gain access to key federal services.

Service Canada also uses the National Routing System to validate birth certificate information submitted in support of a social insurance number application. This reduces the potential for fraud, as the information that is on the birth certificate must match the information in the provincial civil

¹³⁸ All documentation available at: https://unstats.un.org/unsd/demographic/meetings/wshops/Chile/2015/list_of_docs.htm

registers. Federal departments enjoy cost savings and are assured of the integrity of the information as it is provided directly by the provincial issuing authority.

The Canada Revenue Agency and Service Canada also receive timely death notifications through the National Routing System. Both organizations rely upon these data for the integrity of their programmes. Where the Canada Revenue Agency is concerned, these data help to reduce overpayment of benefits. Similarly, for Service Canada, the integrity of the data that are maintained in the Social Insurance Register is enhanced to reduce overpayment by programmes that rely upon this information, such as the Canada Pension Plan. Receipt of death data also serves to trigger survivor benefits.

Box 23

Uzbekistan: electronic archive of the Registry Office

Since January 2014, Uzbekistan has operated a consolidated electronic archive for its registry office system. The registry office bodies at subnational level furnish information on civil status (for example, birth, marriage, divorce, death) to the State Personalization Centre, under the central Government, which subsequently assigns a personal (ID) code.

Passports and other documents of citizens of Uzbekistan should include this ID number, in compliance with the national legal framework and conformity with the standards of the International Civil Aviation Organization (ICAO) for machine-readable documents.

In order to ensure accuracy of the entered data, the State Personalization Centre provides access to the database of biometric passports. With the use of this mechanism, the registry office bodies can instantly verify information and fill out forms with the necessary data about individuals.

In parallel, birth and death registration information is also provided to statistics bodies at the subnational level.

Lastly, death registration information is relayed to the Pension Fund under the Ministry of Finance for the purpose of removing the deceased persons from the list of pension beneficiaries.

459. Many countries¹³⁹ have integrated their civil registration, vital statistics and identity management systems. An important advantage of this model is that it makes it easier to assign a PIN at birth, rather than requiring people to attain a certain age in order to obtain an ID card (usually set the ages of 15, 16 or 18). Late assignment of PINs makes it harder to capture children who die before the threshold age and to link their deaths to other data sources, such as the population register. Introduction of a PIN at birth will increase the registration coverage of infant deaths and improve estimates of infant mortality.

¹³⁹ Examples include Bhutan, Botswana, Mongolia and the Nordic countries, among others.

VI. Application and use of civil registration and vital statistics information

A. Introduction

460. The present chapter covers such topics as the use and application of civil registration information and records, and of vital statistics and data, including total counts, tabulations, rates, ratios and microdata. In particular, a distinction is made between use within each system (registration and statistics, respectively), and use for applications outside the system. External applications of civil registration information and vital statistics include data sharing with both public and private entities; thus heightened importance must be placed on confidentiality issues.

461. As noted before in this handbook, vital statistics and civil registration are separate entities, but it is crucial that they be established, maintained and exploited as components of a coordinated and coherent system for registering and producing vital statistics. In addition, the emergence of interconnections between civil registration and contemporary identity management systems adds yet one more dimension to the structure of the civil registration and vital statistics system. A graphic representation of these relationships and functioning is presented in figure 1, in chapter I above. Civil registration is defined as the continuous, permanent, compulsory, universal recording of the occurrence and characteristics of vital events pertaining to the population, as provided through decree or regulation in accordance with the legal requirements in each country.¹⁴⁰ It is important to highlight the quality of universality in relation to people's rights regarding the registration of vital facts; in this regard, laws, policies, rules and regulations must not be a hindrance to the realization of this right. In particular, the registration of events must be performed even if the time frame given by law has expired, and regardless of migratory status, citizenship and any other request that may act as an obstacle to registering the vital facts occurred in the territory. Civil registration is carried out primarily for the purpose of establishing the documents provided for by law. The usefulness of these records as the best source of vital statistics is well established. The procedures for recording vital events are equally important for civil registration as a legal exercise and for vital statistics as a source of statistical information; hence the tasks performed by civil registrars and those of statisticians are interdependent.¹⁴¹

B. Application of civil registration information

462. The information collected through the civil registration system can be used to assess performance, support managerial decision-making and management structure development and organize the operational workflow between different programme functions. In both centralized and decentralized systems, each of these activities will yield relevant information from the programme.

1. Applications within the registration system

463. The uses of registration information in the three different areas described in the present subsection are all intra-agency applications, either within the registration programme or outside the programme, but within the agency. The information may be descriptive or qualitative, or may consist of frequency counts of vital events reported and registered. Such properties as its completeness, quality and reliability are critical to the usefulness of the information. Where any of these aspects raise concerns, steps should be taken resolve them.

(a) Assessment of civil registration performance

464. A number of activities are carried out in the registration programme to establish performance standards. These relate primarily to services provided to the public but may also include internal programmatic activities.

¹⁴⁰ *Principles and Recommendations for a Vital Statistics System*, Statistical Papers, Series M, No. 19, Rev. 3 (United Nations publication, Sales No. E.13.XVII.10), para. 279.

¹⁴¹ *Ibid.*, para. 274.

Where public services are concerned, the availability of the information for issuing certified copies of records, the process for amending records, the time period required to provide these services, the waiting time in the civil registration office, and the number of times that a user has to go back to the registration office in order to have a request fulfilled are all essential measures of performance.

465. Other public services that reflect performance include making changes to records, maintaining the proper documentation for changes that are made, and following legal standards in making the modifications. The ability to complete, document and record the legal basis for making changes to records is a measure of performance. As described in earlier chapters of the present handbook, changes necessitated by adoptions, legitimation and paternity issues and those involving such items as name, date of birth and residence all require documentation, court orders or other administrative approvals. Such documentation should be retained in case questions arise at a future date. The record itself should contain proper citations of the legal basis for the changes to the record. The civil registration programme is considered to be at a satisfactory performance level when each of these elements is in place as an integral and routine part of the registration services provided to the public, both centrally and at the local registration offices.

466. Some internal registration activities also benefit from the information contained in registration files. The completeness, accuracy and reliability of the information reflect on the performance of the programme units responsible for these components. Deficiencies in these areas can jeopardize the results for other registration activities. In the case of an adoption, the original birth record must be registered and the information regarding the biological parents must be accurate and complete. Performance here affects not only the adoptee and adopting parents but also the adoption unit in the registration programme. The performance of the unit would be rated harshly in the case of misplaced, inaccurate or incomplete information.

467. The number of double registrations must be kept to a minimum. A central database containing all registrations of vital events in the country, or the creation of a number of linked databases are effective means of preventing double registrations (both intentional and inadvertent). One of the most common uses of civil registration records for assessing performance is the matching of the death of an infant to the infant's corresponding birth registration. This has a twofold objective: first, to evaluate completeness of the birth registration and, second, to flag the birth record in order to prevent its subsequent fraudulent use.¹⁴² Other internal activities on which civil registration performance will be rated include the vital event index registers, which affect the capability to search for and retrieve records; record matching for purposes of incorporating amendments and corrections to the original records; and the verification of registered events for legal or administrative purposes. The last of these relates to services provided to other programmes or agencies that may receive requests for health, social or economic benefits. The ability to provide such services is a measure of the quality of the performance of units within the registration programme.

468. Public service functions are primary objectives. The extent to which these objectives are accomplished yields performance indicators of the registration programme. Periodic user satisfaction surveys represent a key tool for assessing registration performance and an excellent source of information on user needs and expectations.

(b) Management decision-making and structure

469. The information derived from registered vital events can support administrative decision-making and policy and planning activities within the agency responsible for the registration programme, at national, subnational and local levels. Registration data provide insights into the sources of reporting and the possible need for training or other resources. Significant increases in vital events may require a redistribution of staff resources, funding support or the establishment of additional local registration sites. Proposals for legal or procedural changes in registration functions can be initiated through the administrative process. These proposals are based on information received on changes in vital events reporting, changes to the reporting

¹⁴² Ibid., paras. 580–582.

period between the occurrence of a specific vital event and the date of registration, or changes in definitions of events or supporting documentation for modifications of records.

470. Outside the registration programme, registration information from local offices can be used for administrative policy and planning at the local level. It can be used to plan in respect of health care needs and resources for specific health facilities, geographical areas or population groups. Administrative decisions in the conduct of programmes such as those relating to maternal and child health, family planning, adolescent health and acute and chronic diseases draw on the registration information to assess the current impact of existing programmes. This information can also signal the need for the development of new programmes.

471. The requirements for managing an effective registration programme are based, in part, on the information from the programme itself. Administrative decisions determine priority service areas and functions. These priorities, in turn, require a management structure for performing the programme activities necessary to accomplish them. The internal programme structure is heavily dependent on management approaches to the performance of specific functions and activities. Each of these functions and activities is identified, along with staff, equipment, resources and relationships with other programmes. When legal changes cause delayed registration or large increases in requests for registration services, or new programmes for public service benefits are implemented that require additional registration documentation, the organizational and management structure are seriously affected. Advance information from the registration units responsible for these activities can guide the management in its work to arrange and structure necessary resources to meet these needs.

472. Relationships with other programmes within the agency, but outside the registration programme, also have significant implications for the management. In order to provide information to these programmes, the types of data and the information network required to support them are the management's responsibility. Drawing on the information from the registration programme relevant to the specific programmes and activities being addressed provides the proper structure for managing data and information requests. Such programmes would benefit from information on vital events registered by type of event, location, volume, reporting source and health-care providers. Access to this information from programmes outside the registration system requires a well-managed and well-organized internal structure that can direct the proper resources to meet these needs.

(c) Operational workflow

473. Daily registration operational activities rely on information related to record volumes, number of requests for registration services, coding, data entry, validation, record changes and updates. To assign appropriate resources for the conduct of these activities in an effective and timely manner, information from the different organizational units is essential. The number of records received by type and the processing needed before the records can be shared with other registration units set the framework for all other activities. The initial review, logging, recording and entering of the records is followed by their distribution to other units for their use. The type of record, birth, death, fetal death, marriage or divorce determines the time period required for each unit to complete its function, since the volume and number of data elements included in the records will differ and this affects the workflow. Fewer data items require less time for coding or data entry and validation. Birth records, for example, require a greater amount of processing and services than fetal death records. Each of these characteristics helps determine the workflow between the different units.

474. When a well-organized record management system among different units is in place, the information from the system defines which type of records is to be processed by which units for a specific time period. The workflow and the processing methods for birth records, for example, determine how soon these records will be available for adoption, legitimation and paternity modifications. The priority level for these areas determines the resources allocated to the initial birth record processing activities. A high priority would require more resources to ensure that birth records were available on a timely basis. A low priority would suggest that other records, such as deaths, would receive more processing resources. The major factor determining the operational structure to meet established priority needs is the information coming from the registration

programme. Without the use of this information, the capability to establish an efficient and productive programme is minimized. The impact is not limited to the registration programme: it also affects the other programmes in the agency that rely on these records for their activities and functions.

2. Inter-agency applications of civil registration information

475. The extent to which information collected through the civil registration system can serve other government agencies, professional organizations and voluntary health or social groups depends on the data items that vital record and statistical forms contain. Prior determination of the anticipated use of registration information establishes the baseline; major areas that rely on registration information include identity management and population registers, health and social services, selected health oriented registers, electoral rolls, passport, visa and citizenship services, and certain legal functions. Figures 1 and 2 in chapter I above provide a graphic illustration of inter-agency interaction. The objective of the national coordination committee is to study particular challenges, make decisions and take actions to facilitate the use of civil registration information among agencies.

(a) Identity management and population registers

476. The process of building a holistic system that encompasses civil registration, population registers, identity management and vital statistics was elaborated and presented in detail in chapter V above. The main focus of the present subsection is to consider how the civil registration systems support the building, maintenance and operation of identity management systems and population registers. The key attributes of a holistic system are described in the following paragraphs.

477. *Interoperability*: This is critical to the civil registration, population registers, identity management and vital statistics system and it must be incorporated from the very beginning. Interoperability refers to the system's capacity to develop interfaces that fully communicate among themselves in the process of its operation. Civil registration is the building block that must continuously feed information on vital events to, on the one hand, the identity management system for it to maintain its relevance and, on the other, the statistics office for it to be able to produce vital statistics that guide policy formulation. Within the identity management system, a major use of civil registration information is the issuance of passports; an example of this interaction is described in box 24 below.

Box 24

Canada: civil registration and passport issuance

Passports are issued by the federal Government through the passport office, called Passport Canada. In 2011, Passport Canada attended the annual general meeting of the Vital Statistics Council for Canada in order to consult the Council on proposed changes under consideration for passport issuance. To enhance the security and integrity of Canadian travel documents, Passport Canada suggested limiting what constitutes acceptable proof of citizenship for a general passport application to a copy of the birth certificate issued by a provincial or territorial registrar or a certificate of citizenship. The proposed changes would have a significant impact on civil registrars since a substantial number of citizens would now require a copy of their birth certificate in order to apply for a passport.

The Passport Canada presentation highlighted the changes under consideration and registrars were able to provide feedback during the meeting. Passport Canada was then able to incorporate the feedback and forward a discussion paper to the registrars for more formal input. Additional discussions were held with individual jurisdictions to accommodate differences in provincial and territorial legislation. One of the main findings was that outreach materials were needed to enable vital event registrars to explain the changes to Canadians.

Negotiations between Passport Canada and registrars ensued on the appropriate timing for implementation of the proposed changes. A communications strategy and accompanying outreach materials (press release, posters, etc.) were developed collaboratively. Ultimately, the initiative was

successful and there were no significant issues with these substantial changes across 13 individual jurisdictions.

478. Where civil registration and identity management are concerned, interoperability refers to the ability of different registers and databases to communicate with one another, on the basis of a unique identifier, definitions and classifications, subject to restrictions in terms of security and legal protection of confidentiality and privacy of information. These restrictions must be balanced with international agreements about data sharing, in particular where data sharing between agencies may be required to monitor disease outbreaks, in particular those which, pursuant to the International Health Regulations, are to be notified to WHO. For example, death notification data received by civil registration or a health agency may be critical to the detection, monitoring and containment of a disease outbreak. The inter-agency coordination committee is well placed to study particular challenges and make decisions to facilitate interoperability among agencies.

479. *Universality*: The universality of the coverage of civil registration is one of the essential principles defined in the international standards,¹⁴³ and is directly related to the ability to make use of the civil registration information. In this context, “universality” means universal coverage of the occurrence of vital events in the country, irrespective of the characteristics of the event and the persons involved, such as sex, age, nationality, ethnicity, physical ability, income, legal or migratory status and so forth. The registration and issuance of certificates must be free from any kind of discrimination and truly universal throughout the country, in line with the universality of the right of all persons to be part of the system. Consequently, the same principles must guide the establishment and development of population registers and identity management, so that identity documents are available for the lifetime of each individual in the country, thus enabling access to services in the contemporary societies.

480. *Compulsory nature*: Hand in hand with universality is the necessity to make the registration of vital events and the persons involved a compulsory requirement.¹⁴⁴ Civil registration is not just a right, but also a duty, regardless of migration status, nationality and any other characteristic. A country’s civil registration system must be compulsory in order to ensure its smooth operation and effectiveness. While it is necessary for every country to establish and maintain a law on registration, the existence of such a law is not a sufficient condition for ensuring that the general public reports the occurrence of vital events. To facilitate compliance with this requirement, issuance of the first certificate should be free of charge and, as a compulsory requirement, registration must be linked to the imposition of some form of penalty on those who fail to comply with registration law – in other words, those who fail to register the occurrence of a vital event should be punishable by law. Since penalties for failure to comply with registration laws may not always be invoked and penalties may also be a deterrent to registration, it is imperative that there be a legal basis for prosecution to ensure general compliance with the registration law. Thus a legal framework for civil registration is fundamental to its sound operation as a coherent, coordinated and technically sound system.

481. In spite of the existing provisions in a number of countries for penalties in cases of non-compliance, the level of completeness of registration remains low. This non-compliance is primarily attributable to the lack of incentives for registration. Incentives must be established not only to stimulate but also to encourage compliance with the compulsory registration law. Civil registration authorities must highlight the function that registration performs in giving people access to a range of services. Besides the privileges and rights that are to be enjoyed upon proof of registration (such as facilitated access to health, education, employment, banking, electoral participation, driving permits and so forth), national registration systems, within their own respective social and cultural environments, should offer other incentives which are of practical use, in particular at the individual level. Examples of incentives include in-kind goods for new-born care, household goods and cash stipends for health care or burial expenses, among other measures. Some countries owe the high level of completeness of their registration records to the existence of a unique identifier for individuals, or

¹⁴³ Ibid., para. 296.

¹⁴⁴ Ibid., para. 294.

PIN, which is key to the provision of a range of services, both public and private, and also helps to ensure interoperability.

482. There are no standards for the type of PIN to be used; most European countries use individual information for the first part of the PIN, together with a second part comprising random digits; other countries assign random, sequential or consecutive numbers; others use a combination of letters and digits. There are two important factors to bear in mind regarding the type of PIN to be used. The first is security and protection of data: PINs should be difficult to crack; and the second is the need for the PIN to be so designed to enable the perennial generation of new PINs for new members of the population – in other words, to ensure that the pool of available numbers is not exhausted. Details on how PINs are managed in Chile may be seen in box 25 below.

Box 25

Chile: personal identification number

Since 1942, the functions of civil registration and identity management are integrated in a single government agency. Every individual is assigned a unique identifier (PIN) at the moment of birth registration, or at the moment of immigration registration. This identifier comprises a consecutive number allocated in sequential order, plus a verifier digit (zero to nine, or the letter K) generated by an algorithm. Individuals carry this number for a lifetime in order to identify themselves in all interactions both with the State and with private entities. Consequently, birth registration plays a fundamental role because it is the gateway to inclusion in the network of subsidies, benefits and health care, in both public and private spheres. In turn, people are highly motivated to comply with birth registration requirements as soon as possible and no penalties are necessary for late and delayed birth registration. It is estimated that only 0.5 per cent of all births in the country are not registered, and that only 0.5 per cent of the population have no PIN.

Chile is a centralized State, which means that all its public agencies have nationwide authority. The civil registration system and the identity management system are integrated into a single agency; individuals' records in the corresponding databases are linked through their PIN. The implementation of the PIN system has made possible the efficient targeting and control of resources linked to social security, health, education and other social services.

Addresses and change of residence are not registered, but every time that individuals renew their identity card or passport, they are given the opportunity to provide an address for electoral purposes. Thus interoperability is established between the electoral authority and the civil registration and identification authority, which serves as the main data supplier when an election takes place.

483. The compulsory nature of registration must be maintained throughout the system of civil registration, population registers and identity management. In practice, this means that changes in the civil status or physical location of individuals have to be reported and recorded in the population register and this obligation needs to be stipulated in the relevant legislation. Changes of address, in particular, have a substantial importance for a number of reasons, for example, voting lists, and must therefore be reported to the agency that maintains the population register.

484. In the case of identity management, the compulsory requirement is manifested by making the acquisition and carrying of an identity document mandatory for all individuals in the country. Provided that the requirement is spelled out in the appropriate legislation, it can easily be enforced by denying services to individuals without the proper identity document – creating a strong and unambiguous incentive for all to comply with this requirement. It must be noted that this approach engages ethical implications that need to be carefully considered.

485. *Continuity and permanence*: These attributes of the registration method, which are among the basic principles identified in the international standards, require the existence of an agency of sufficient administrative stability whose operation is not limited by the factor of time. Permanence is contingent upon the authority given to the civil registration administration through enactment of a civil registration law.

Permanence of the system is a requirement for the continuity of registration and vital statistics data, which is necessary for a meaningful understanding of both current figures and also of trends in vital statistics measures.¹⁴⁵ This is true for the functioning both of population registers and of identity management.

486. *Confidentiality*: This is yet another major principle spelled out in the international standards.¹⁴⁶ Operation of a civil registration system means that a variety of information is collected about individuals within the population. While all the information collected may be significant, some data, when identified and linked to a specific individual, could be highly personal and sensitive. In order to promote the provision of full and honest data to the system, which directly conditions the extent to which civil registration information can be used, confidentiality must be protected – in other words, those who provide information must rest assured that it will be used only for the purposes prescribed by law or only in aggregated form so that individuals are not publicly identifiable.

487. If an agency other than the civil registration authority, such as the national statistical office, is responsible for producing vital statistics, this agency should be given access to micro data – namely, individual-level information from the civil registration system. This will greatly improve the possibility of assessing the data quality, including detection of errors, and of producing good quality vital statistics. In every case, the national statistics office must guarantee that the same or a higher level of security is maintained as at the civil registration authority and that confidentiality is strictly safeguarded. In addition, the formulation of a data protection law and the establishment of a data protection government agency may be helpful in enforcing the confidentiality and security of individual data, and in preventing their misuse.¹⁴⁷

488. In today's world, acts that compromise the confidentiality of individual data can occur through many different channels, such as breaking into online databases or selling them for profit to online retailers, for example. These facts heighten the importance of assuring the population that the confidentiality of individual information provided to civil registration, population registers and identity management is of paramount concern and that access to such information is strictly underpinned by law and regulations. It also requires the development of safeguards that are as robust as possible, to prevent intrusion into the registers; in turn, this demands continuous follow-up on technological developments in the field of digital security systems.

489. In practice, a series of routines (physical and electronic) must be established in order to protect information. For example, employees must sign, together with their work contract, that no confidential data will be shared and that they will be subject to legal prosecution if this is violated. Designating and equipping a zone for secure data storage is of paramount importance, as is designating laboratories where there is access to confidential data but no Internet or email connection. If data are moved from these laboratories to a work zone where there is email and Internet, this movement must be registered, as must the attachment of data files to email messages. This means that a log must be maintained of those persons who open, change and extract records, in order to be able to track their activity. Access to confidential data must be limited to those who need it for work purposes.

490. *Costs*: Any costs involved with the registration of vital events and issuance of certificates and identity cards must be set in such a manner that the registration and subsequent issuance of documents are encouraged. International standards¹⁴⁸ recommend that, when registration of a birth, marriage, divorce, fetal death or death is made within the time period prescribed by registration law, no fee should be charged. In addition, issuance of the first certificate should be available to the public at no cost. The fees charged should be related to the purpose of issuance, for example, of certified copies of vital records and replacement of identity cards. Fees, reasonable and proportionate to the additional work necessary, may apply in cases of the delayed registration of vital events as provided in registration law. For individuals, fees may be related to the extent of the delay or

¹⁴⁵ Ibid., para. 297.

¹⁴⁶ Ibid., paras. 298–299.

¹⁴⁷ Norway and Sweden have such data protection agencies, the Swedish Data Protection Authority (www.datainspektionen.se/in-english/) and the Norwegian Data Protection Authority (www.datatilsynet.no/English/).

¹⁴⁸ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 364.

to the nature of the information, such as name changes, legitimations, adoptions and the establishment of filiation. Minor corrections due to clerical errors discovered at the time of registration, burial or cremation should be permitted free of charge.

491. *Accountability*: Instruments for holding the system accountable must also be put in place. Accountability of the system and its operators will boost the confidence of the population that it serves their needs and augments the likelihood of, for example, the proper and prompt reporting of the occurrence of vital events and the characteristics of persons involved, the timely registration of changes of address in the population registers and the issuance of identity cards with biometric¹⁴⁹ characteristics. The administrative arrangements for ensuring accountability of the system may include the creation, for example, of the institution of an independent general inspector of the agency, whose office would have the authority to review all the procedures and actual services delivery by the agency's staff, in particular in terms of gaining access to and manipulating individual information. In a number of countries, civil servants in such agencies are required to swear an oath that they will discharge their responsibilities according to the law and regulations and will be subject to penalties and criminal investigation in case of breach.

(b) Health and social services

492. Access to health and social benefits generally requires some sort of documentation, including registration information. For example, social service programmes that provide support for families with a large number of children require, prior to the allocation of resources, birth certificates for each child to verify family size. In the case of a single parent requesting support services as a result of the death of the other parent, the agency may require a certified copy of the death record to verify that the death occurred. Services relating to food, immunization, housing, clothing and other personal needs that are provided through either government or voluntary organizations require verification of the individuals involved; hence the importance of official identity cards issued by the identity agency and seed documents, such as birth or death certificates issued by the civil registration authority.

493. Services in the medical and health area are often made available to the public free of charge provided that other eligibility criteria, such as residence and income, are met. Problems associated with pregnancy or delivery complications can lead to necessary follow-up for medical and health benefits. The birth record, in addition to hospital and or clinic records, may include relevant information to verify stated medical and health conditions and may trigger cost-free care for the patient. Selected causes of death on the death record may be used by a family to obtain certain counselling and testing procedures related to possible hereditary communicable disease categories for the surviving spouse and children, depending on the condition. Thus the content of the vital record forms becomes critical for their use in obtaining particular or targeted services.

(c) Disease registers

494. The use of notification and registration data for surveillance purposes and in the development and maintenance of disease registers has been on the rise. The International Health Regulations are a legal instrument which requires WHO member States to report diseases of global importance; the notification and registration of deaths may form an important part of the process in reporting such diseases. The long-established use of the cancer registers in many countries has drawn on death information to identify cases and to update existing cases. This has now resulted in other registers being implemented; these registers are enriched when drawing on civil registration information. Examples include registers for birth defects that obtain the initial information from the birth record. The information in these registers is also used for epidemiological investigations in which environmental or nutritional factors may have caused the defect. Other disease registers, such as those for tuberculosis, AIDS and Alzheimer's disease, use death records information to identify cases not previously reported and to update current cases. This information is critical for establishing and maintaining effective disease registers that may be used to identify individuals and

¹⁴⁹ In general, biometric identifiers are unique and measurable characteristics of each individual person, such as photographs, fingerprints, palm or foot print (used mainly for newborns), iris recognition, among others.

families in need of health or social support services. Other examples that may benefit from civil registration information are patient registers and registers of medical prescriptions.

495. To manage the critical functions linking the civil registration and vital statistics systems and the health systems, it is recommended that a national technical committee be entrusted with ensuring that data sharing and linkage arrangements are put in place. This will benefit disease notification and disease registers, and the continuous registration of vital events, such as death.

(d) Legal uses and activities

496. Throughout the present handbook, and also in the principles for civil registration and vital statistics, the importance of providing legal status and identity to each individual has been outlined as one of the most essential and crucial responsibilities of the government. This is especially related to the fact that, in many of the support service areas, there are specific requirements to be met prior to authorizing the release of the information. The identity documents based on civil registration form the legal basis for establishing some of the essential criteria and authorizations needed for access to services. Other areas, such as inheritance, insurance, citizenship, school and military enrolment, and family status, are all based on legal information from the registration and identity management system. Age, date of birth, place of residence, place of occurrence, family name, citizenship and personal identification are significant legal factors that rely heavily on the registration system for verification. These, in turn, affect a wide variety of rights to which an individual may be entitled. Normally, there is no other system that provides these basic elements.

497. The legal implications associated with registration information are a significant factor in the design, implementation, operation and management of a registration and identity management programme. These elements have been described in the chapters above and the use of the information noted in the present subsection demonstrates the need to ensure a well-developed system. Legal issues often occur many years after the date of occurrence of a vital event. There is, accordingly, a need for record preservation and record accessibility. Events involving issues of adoption, legitimation, paternity and the dissolution of legal marriages have legal implications for inheritance, government services, insurance benefits and social and health outcomes. An adopted child's health might become an issue in later years, depending on medical facts of the biological parents. Such situations can lead to legal action to gain access to the original records in order to obtain relevant information for assessing a current medical condition. Civil registration information clearly has a broad spectrum of uses for multiple purposes and under many different conditions for the population, and for administrative, government and legal actions and activities.

(e) Other inter-agency applications

498. Information from the civil registration records, population registers and identity management system has a valuable role in a number of other programmes at national and subnational levels. These include maternal and child health, family planning, population patterns, planning and development for health and medical care programmes, surveillance sites, evaluation, government resources allocation and electoral processes. In the case of the maternal and child health programme, it identifies families requiring services. Within this programme, a number of subprogrammes are funded to supply medical care, nutrition, public housing, prenatal and postnatal counselling, and infant and child health-care services. Reviews can be conducted using both the birth and death records associated with the maternal or infant death under review, combined with other data from the medical care provider and the facility where the event occurred. Based on the findings, the government may promulgate rules and regulations relating to medical practice, health-care delivery services at medical facilities or malpractice issues. The records-level information extracted from the civil registration and population registers is the primary source for initiating and implementing this type of programmes.

499. With the increasing availability of computerized records from both civil registration and censuses, several countries lacking population registers have created long-term representative samples (longitudinal panels, or virtual cohorts) of their national population by linking a systematic sample of birth records from

selected years with other civil registration records in subsequent years (such as those for marriage and deaths), together with census individual records over the following decades. Unlike cross-sectional studies, these virtual cohorts make possible the study of many individual outcomes through the course of an individual's life (such as social and economic inequalities in health, geographical and occupational mobility), without being affected by numerator-denominator bias. France,¹⁵⁰ the United Kingdom of Great Britain and Northern Ireland¹⁵¹ and the United States of America¹⁵² are among those countries which started some of these largest national cohorts several decades ago, followed in more recent years by New Zealand¹⁵³ and Switzerland,¹⁵⁴ to name a few. Selected examples of this type of endeavour are set out in box 26 below.

500. The linkage of these various sources of information, including tracking individuals from one census to the next, supplemented by civil registration (and, where applicable, other administrative data sources such as health records), provides a wealth of information on geographical, occupational and demographic changes relating to its study population. Panel data of this nature are invaluable for the conduct of methodological studies and the exploration of health pathways and complex life trajectories, including those of education, social and professional mobility, evolution of family composition and others, which are difficult if not impossible or too costly to study from a single data source.

501. The ability of the civil registration authority to share information with other governmental agencies must be regulated by the legal framework, which spells out conditions and limits, specifies partner agencies and makes other provisions. The legal framework for the civil registration system establishes a continuous source of information to serve a broad range of activities and programmes. A detailed discussion of the legal framework may be found in chapter I, section D, above.

Box 26

Longitudinal panel studies created by linking civil registration records with census individual records

France launched its “échantillon démographique permanent” (“permanent demographic sample”) with 1 per cent of its 1967 birth cohort and 1968 census. By the end of 2013, the sample had grown to 2.7 million, with individuals enumerated in the censuses of 1968, 1975, 1982, 1990 and 1999, and annually since 2004. From the beginning, each year, all vital events are tracked for all persons born on the first four days of October. The sample size has quadrupled since 2004 for civil registration and since 2008 for the census, as persons born on January 2, 3, 4 or 5 or the first four days of April or July have been added to be monitored in the panel.

The British equivalent is the Longitudinal Study, based on the censuses of 1971, 1981, 1991, 2001 and 2011. Census records are linked with life events data to create a 1 per cent sample of the population of England and Wales. More recently, sister studies have been established in Scotland and Northern

¹⁵⁰ Christine Couet, “L'échantillon démographique permanent de l'Insee”, *Courrier des statistiques*, No. 117–119 (2006), pp. 5–14; Stéphane Jugnot, (2014). “La constitution de l'échantillon démographique permanent de 1968 à 2012”, Institut National de la Statistique et des Etudes Economiques, Direction des Statistiques Démographiques et Sociales, Document de Travail No. F1406 (September 2014); www.insee.fr/fr/metadonnees/source/s1166.

¹⁵¹ Paul Boyle and others, “Cohort profile: the Scottish Longitudinal Study (SLS)”, *International Journal of Epidemiology*, vol. 38, No. 2 (2009), pp. 385–392; Dermot O'Reilly and others, (2012). “Cohort description: the Northern Ireland Longitudinal Study (NILS)”, *International Journal of Epidemiology*, vol. 41, No. 3 (2012), pp. 634–641; www.ons.gov.uk/aboutus/whatwedo/paidservices/longitudinalstudies.

¹⁵² National Longitudinal Mortality Study, available at www.census.gov/did/www/nlms/about/.

¹⁵³ Tony Blakely, Alistair Woodward and Clare Salmond, “Anonymous linkage of New Zealand mortality and census data”, *Australian and New Zealand Journal of Public Health*, vol. 24, No. 1 (2000), pp. 92–95; Sarah Hill, June Atkinson and Tony Blakely, “Anonymous record linkage of census and mortality records: 1981, 1986, 1991, 1996 census cohorts”, NZCMS Technical Report No. 3 (Wellington, Department of Public Health, Wellington School of Medicine and Health Sciences, University of Otago, 2002); www.otago.ac.nz/wellington/departments/publichealth/research/hirp/otago020541.html.

¹⁵⁴ Matthias Bopp and others, “Cohort profile: the Swiss national cohort – a longitudinal study of 6.8 million people”, *International Journal of Epidemiology*, vol. 38, No. 2 (April 2009), pp. 379–384; www.swissnationalcohort.ch.

Ireland. The Scottish Longitudinal Study started with 1991 census data and the Northern Ireland Longitudinal Study with 2001 census data.

In the United States of America, the National Longitudinal Mortality Study is based on a random sample of the non-institutionalized population and, since 1973, has been following 1 million respondents of the current population surveys, annual social and economic supplements and a subset of the 1980 census, combined with death certificate information to identify mortality status and cause of death. The study enables the investigation of social, economic, demographic and occupational differentials in mortality (total and by cause).

The New Zealand Census Mortality Study anonymously and probabilistically links all census data (1981, 1986, 1991, 1996, 2001 and 2006) with death registration records during the subsequent three years (for the cohorts of 1981, 1986, 1991 and 1996), or five years for the more recent cohorts (2001 and 2006). This linkage has made it possible to study socioeconomic and ethnic inequalities in mortality, and to address the issues of numerator-denominator bias for ethnicity reporting in censuses compared to mortality data from death registration.

In 2005, Switzerland created the Swiss National Cohort, which is a nationwide anonymized record linkage of census and death registration records that includes all residents enumerated in the national 1990 and 2000 censuses. Deterministic and probabilistic methods of record linkage were used to link anonymized census records to death or emigration records from 1991 up to 2008.

502. Continuous assessment of the impact and outcomes of national health programmes and identification of population health patterns require access to appropriate health and demographic information. The registration programme can provide this type of information for planning new programmes and for evaluation of the impact of existing programmes. Whether the issue is maternal and infant health, family planning activities or general health, fertility and mortality patterns of the population, birth and death information is available by health, demographic and geographical characteristics on an individual basis. This information can then be used to profile the impact of current programme activities, and can lead to planning and programme evaluation. The individual record information, supplemented with vital statistics summary data for relevant variables, is an effective mechanism for determining new directions for various programmes.

503. Another area in which registration information is used by different government agencies is for the allocation of funds, human resources, supplies and services. The conduct of such programmes as education, maternal and infant health care, family planning, maintenance of health and disease registers, and population health patterns and status requires well-structured decisions and resource commitments. To do this effectively, a sound, accurate and reliable information base is needed. In some cases, this base can be provided by vital statistics summary data and, in others, by record-specific individual information. The latter situation draws on the civil registration system to provide data on an individual level. When funds are to be allocated to programmes based on individual events, the decision-making process needs information at that level – and this is available from the well-designed and operated holistic system of civil registration, population registers and identity management.

C. Applications of vital statistics

504. The registration information described above is primarily for use at the individual level. In addition to these substantive applications, the registration system provides the database, containing microdata (individual level), for the preparation of vital statistics data files covering natality, fertility, mortality, marriage, divorce and selected population profiles. The statistical data have broader uses at the general descriptive or analytical levels. The database serves a multitude of purposes in quantitative terms, offering the capacity to extrapolate, estimate or project selected characteristics based on previous data. This provides for more applications, some of which may relate to conditions outside the registration programme. Several application areas within the statistical agency, in conjunction with other agencies and programmes and at the national level, are described below.

1. Intra-agency applications of vital statistics

505. Acquiring knowledge of the size and characteristics of a country's population on a timely basis is a prerequisite to social and economic planning and informed decision-making. Vital statistics and their subsequent analysis and interpretation are essential for setting targets and evaluating social and economic plans, including the monitoring of health and population intervention programmes, and the measurement of important demographic indicators of standards of living or quality of life, such as expectation of life at birth and infant mortality rate.¹⁵⁵ Vital statistics are obtained preferably through a complete civil registration system, as this is the ideal source from which to derive accurate, complete, timely and continuous information on vital events. In addition, vital statistics derived from the civil registration system and accompanying population registers can include annual flow statistics from the smallest civil divisions, which no other data-collection system can provide.

506. In the model where civil registration, population registers and identity management components are interlocked in a holistic system, vital statistics activities are usually housed in the national statistical office, since centralizing all statistical work in the country enhances the quality and efficiency of the production of official statistics. This holistic model also enables the forging of linkages with other sources. Examples of specific indicators and measures computed within the national statistical office include infant mortality rates, crude birth, death, fetal death, marriage and divorce rates, total fertility rates, age-specific rates, fertility rates, mortality and marriage rates, life-tables, life expectancy at birth and cause-specific death rates. These specific indicators and measures are available not only for the country as a whole and its main divisions but also for small geographical areas. The national statistical office would develop these raw statistics for other programmes and agencies involved in medical, health, housing, social services, education, economic planning, natural disaster risk mapping, among other issues. The demographic data would be directly used for national purposes within that agency.

507. Many of the applications described in the previous subsection related to registration information at the individual level have similar statistical applications in aggregate form. In the maternal and child health area, vital statistics are used to compute rates for maternal mortality, infant mortality, complications of pregnancy, labour and delivery, malformations and such health services as prenatal care and other related government services. These quantitative measures are then used by programmes to assess the quality of care, medical problems associated with pregnancies or delivery procedures, the use of health services and health outcomes.

508. Within an agency with responsibility for the health of the population, such as the ministry of health, vital statistics serve multiple purposes. Mortality measures based on demographic information provided on the death record are used to identify specific causes of death for specific population groups. When death rates appear significantly higher for certain groups, studies to obtain more detailed information or epidemiological investigations may be initiated to determine the factors causing the increases. Geographical data for place of residence or place of occurrence, and also for year of occurrence, can provide additional information on health conditions in specific locations and points in time, and are key elements for the evaluation and monitoring of intervention programmes.

509. To assess disease conditions elevating mortality rates in a certain area, the mortality data must be analysed by both residence of the deceased and the site where the death occurred. Individuals may be infected in one area but travel to another for medical care. This can give a false impression of where the problem exists. The rates in the area of occurrence may have no bearing on the site where the actual disease problem exists. Place of residence and occurrence are two critical variables in the conduct of such analysis.

510. Extensive use is made of mortality data in evaluating health-service facilities and for studying environmental and social factors related to the health system. Death rates for events that occur in a particular hospital, clinic or other type of facility can be compared both with other similar facilities and with national or state averages. These data can give some sense of the quality of services being provided, and may reflect both

¹⁵⁵ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 3.

on the institution and on the person providing care. For example, when reported on the death record, differences in death rates following surgical procedures for heart disease or cancer can be used to assess these outcomes for quality of care, availability of resources or severity of illness. Results of these analyses are then brought back to the health facilities and providers for review and evaluation to improve conditions, when applicable.

511. The data can also be used by government survey teams in attempting to determine the allocation of resources and funds for improving health and medical services to the population. In countries where surveys of medical records are conducted for reviews of the use and the quality of care of health providers, mortality outcomes are essential data in the survey process.

512. Generally, there are more data items included on the birth record than on the death record. This creates the potential for more extensive use. In line with international standards, the birth record would contain items relating to the mother, such as demographic characteristics, previous pregnancy history and prenatal care; in some countries, birth records also include information on services or behavioural factors, such as smoking, alcohol or drug use. In addition, the record often contains conditions associated with pregnancy, methods of delivery and birth outcome. These data form a large pool of health data for review, evaluation and research activities. Data regarding the condition of the infant at time of delivery, Apgar score,¹⁵⁶ birthweight and birth defects provide a substantial database for planning and evaluation purposes, research and the health service needs of the family.

513. The broad and comprehensive nature of the vital statistics data for use in areas of research, analysis and evaluation may be observed in most public health and medical publications of governments, professional organizations and other public and private agencies. Examples of vital statistics and research, in particular if a PIN is available to link different databases, include: distribution of women by parity (number of live births), including research into childlessness; analysis of fertility by social strata (educational attainment, labour force activity), social inequalities in life expectancy (by occupation and educational attainment), and integration of immigrants by duration of residence in the receiving country.

2. Inter-agency use and applications of vital statistics

514. Vital statistics are a critical mechanism for supporting good governance, through data-driven planning and accountability. They have a significant value and financial function as they are key inputs for planning and resource allocation at national and subnational level. Access to the vital statistics database by other agencies is important to such bodies as public social services organizations, specialized units for independent research and medical facilities, and for the preparation of population profiles and for educational purposes.

515. These programmes draw on natality, fertility and mortality statistics to address current issues, identify trends and project new directions of the events being considered. Social service programmes use natality data to identify geographical or demographic profiles of high fertility that affect benefits and services directed at women and infants. In particular, natality and fertility data are used to inform plans for building or opening new schools. In a similar manner, urban planning, in general, is highly connected to vital statistics.

516. Social and health programmes use mortality data to provide support to families in areas having major difficulties involving epidemics or other health problems where support services are needed. Through the linkage of social service records and vital statistics data, family profiles may be developed for use in the allocation of resources. Allocations can be based on such attributes as number of children, single parenthood, health problems and availability of medical care in specific geographical locations.

¹⁵⁶ The Apgar score, named after Dr. Virginia Apgar, the anaesthesiologist who developed it in 1952, was introduced in the 1950s as a simple and quick method of assessing and summarizing the health of a newborn. It evaluates the newborn on five criteria (skin colour, pulse rate, reflex irritability grimace, activity and respiratory effort) on a scale from zero to two and the resulting Apgar score ranges from zero to ten.

517. Agencies that maintain data on selected health characteristics, such as specific disease categories and health or medical conditions, or are responsible for planning and evaluation activities require access to data and information from the vital statistics system. The number of individuals dying from a particular disease or illness is valuable information for agencies or programmes targeting these conditions. The most complete and timely data come from the vital statistics database. An agency with the responsibility to build health facilities or relocate clinics or care providers based on health conditions, or to propose new resources to meet current or projected healthcare needs, must have access to vital statistics.

518. Quantitative information is fundamental to the conduct of such programmes. Rates of specific health conditions, the proportion of events occurring in particular locations or at specific facilities and the relative rates of change and trends over time offer valuable indicators for the agency to make decisions and align resources to their best use.

519. High rates of low birthweight newborns, birth defects and infant mortality from the vital statistics database may help to define where the next infant health programmes should be located. This information can indicate the conditions on which the programmes should be focused. High fertility rates for specific age groups may provide the information needed to redirect a family planning programme. High rates of mortality in specific geographical areas, for particular population groups or in health facilities provide data necessary for the health agency to conduct surveys and record reviews to determine causes.

520. Agencies often require quantitative data to sustain support for the programme or agency function. Depending on the area of responsibility of the agency or programme, vital statistics represent a vital source of information for preparing descriptive summaries and profiles of particular categories of vital events. These events can be further detailed by geographical areas, demographic profiles, health-care provider types and particular population groups, and can be linked with other data. The data provide integrated information for the programme or function under review.

521. For instance, the demographic dynamics of displaced, stateless persons and refugees may be different from that of the ordinary population. If the vital statistics on these population groups are sufficiently comprehensive, it can be useful for governments and humanitarian workers to analyse their statistical patterns, also in comparison with the overall population in the country. The Expert Group on Refugee and Internally Displaced Persons Statistics was established by the United Nations Statistical Commission in 2016 to develop guidelines on refugee statistics and a technical report on the statistics of internally displaced persons.¹⁵⁷

522. Measures and indicators for selected vital events can be constructed for use in programme operation, evaluation and impact analysis. The data items to be used depend on the programme objective. Rates, proportions, frequencies and volume of events are common indicators and measures that may be used for agency programmes and functions. For infant immunization programmes, the number of infants in a particular area can be obtained from the vital statistics files and this measure will help to define the level of service needed.

523. Programmes for the delivery of health-care services, programme initiatives, impact analysis, evaluation and programme direction, planning and development, and research activities have significant links with the vital statistics system. Responsibilities for these activities vary among agencies, programmes, and private and voluntary organizations. Vital statistics systems should be positioned to meet these needs; for their part, external users need to have this information available. Participation of these groups in the structure of the civil registration programme is essential to the attainment of this objective.

524. The use of data can be of a general nature, with a focus on the overall characteristics of vital events. Birth rates and death rates, the frequency of vital events categorized by selected demographic and

¹⁵⁷ See, for example, the report on the forty-seventh session of the Statistical Commission (E/2016/24-E/CN.3/2016/34), available at <https://unstats.un.org/unsd/statcom/47th-session/documents/Report-on-the-47th-session-of-the-statistical-commission-E.pdf>.

geographical variables, the distribution of vital events by type of service provider, and the place of occurrence of the event and residence of the individual give a general statistical overview. These data offer a profile for health outcomes of the population, for geopolitical subdivisions down to the smallest geographical areas, and for facilities used for health care. More detailed uses can also be made of the vital statistics data, using selected outcome variables, such as malformations at birth, the amount of prenatal care by age or socioeconomic group, cause-specific information for maternal and infant deaths, complications associated with pregnancies and specific cause of death for various demographic characteristics.

525. These detailed data may be used to monitor particular programme or agency objectives or to define areas for medical and health research activities. In either case, the data elements for these applications come through the vital statistics system and reach out in a wide pattern of use and application in the health field.

526. At the international level, vital statistics will be essential for reporting against development frameworks such as the Sustainable Development Goals. Of the 230 indicators, 19 use vital statistics as direct inputs, be it in the numerator or the denominator. Of these, 11 form part of Goal 3, on good health and well-being, in pursuit of which strong emphasis is placed on cause-of-death information. In addition, information on registration completeness of births and deaths is directly needed for two more indicators. Many more indicators use vital statistics as an indirect input for computing population estimates, rates, ratios and other figures. Examples of Sustainable Development Goal indicators necessitating vital statistics indirectly include indicators on access to certain services, land ownership, malnutrition, school attendance, literacy and gender violence, among other variables.

(a) Vital statistics dissemination

527. The regular dissemination of vital statistics is one of the principles of the vital statistics system in accordance with the international standards.¹⁵⁸ The compilation of vital statistics should have as its minimum goal two attainments: first, the provision of total monthly or quarterly summary counts of vital events on a time schedule prompt enough to provide information for health intervention and population estimation programmes, administrative uses or other needs; and, second, the production of detailed annual tabulations of each type of vital event cross-classified by its demographic and socioeconomic characteristics. Such tabulations must be accompanied by metadata, graphs, maps and descriptions that are conducive to their analysis and comprehension.

528. In planning the detailed tabulation programme, it is important to ensure that resources are available for completing it on a regularly established basis and in accordance with a publicly available time schedule. It is common for countries to set a cut-off date for incoming data from the previous year in producing their annual vital statistics tabulations. Depending on the country, this date ranges around 1 February and 1 March every year. An established time schedule will contribute to the effective use of the analysis of the interrelationship among demographic, economic and social factors in the planning, operation and evaluation of public programmes and policies, and for the purpose of formulating and evaluating economic and social plans.

529. There are tools that support the design and implementation of the annual dissemination programme of vital statistics compiled from civil registration data. Principal among these are the third revision of the *Principles and Recommendations for a Vital Statistics System*, which presents recommended tabulations in detail in its annex II,¹⁵⁹ and the guidelines and template for developing a vital statistics report, developed by Statistics Norway.¹⁶⁰ As far as possible, statistics should be comparable within the country, across

¹⁵⁸ *Principles and Recommendations for a Vital Statistics System*, Rev. 3, para. 38.

¹⁵⁹ *Ibid.*, annex II.

¹⁶⁰ Economic Commission for Africa, Economic Helge Brunborg and Social Commission for Asia and the Pacific and Statistics Norway, "Vibeke Oestreich Nielsen, "Guidelines and template for developing a vital statistics report" (Addis Ababa, 2018). Available forthcoming), draft available at <http://www.getinthepicture.org/resource/guidelines-and-template-developing-vital-statistics-reportsystem/files/event/documents/%5BDRAFT%5D%20Guidelines%20and%20Template%20for%20Developing%20a%20Vital%20Statistics%20Report.pdf>.

demographic data sources and across different countries, so as to permit international analysis. Where particular circumstances within a country require departures from international standards, publication of the data should be accompanied by an explanation of these departures and an indication of how the national presentation can be converted so as to meet or approximate international standards.

530. For national and subnational purposes, an annual programme for the tabulation of vital statistics should provide data classified in accordance with the need to study the incidence, patterns, time trends and geographical differentials of the most important characteristics and determinants of fertility, mortality, fetal mortality, nuptiality and divorce, together with the exploration of their interrelationships. Tabulations for small geographical areas need to be included in the dissemination plan, together with disaggregations by relevant variables. In addition, the programme should include tabulations needed for administrative purposes to evaluate the quality of vital statistics, including the completeness and timeliness of registration and the accuracy of the content of the registration records (or the reporting forms for statistical purposes, as the case may be). The tabulation programme should also seek to meet the requirements of international organizations and, wherever possible, conform to recommendations for achieving international comparability.

531. As far as basic concepts of tabulations are concerned, they refer to the following attributes:

(a) *Universality*: The legal framework stipulates that each vital event occurring within the geographical area concerned must be registered once and only once within the time period. Accordingly, statistical tabulations should encompass the entire geographical area and include events for all population groups within the area occurring during the specified time period. The tabulation of data for a country should generally only include events occurring within its boundaries. Events occurring outside the boundaries need to be included only when they relate to persons included in the population denominator for potential national rates, such as deaths to nationals on holiday or members of the armed forces occurring outside the country. For countries that wish to implement this approach, provision should be made for the international or bilateral exchange of records so that events occurring to residents of other countries can be excluded from occurrence data;

(b) *Tabulation by date of occurrence*: Although preliminary tabulations may be presented by date of registration so that they can be prepared as quickly as possible, final tabulations for the calendar period should be based on events that actually occurred during the period, regardless of their date of registration;

(c) *Tabulations by place of occurrence and place of residence*: Final annual tabulations should be prepared by place of residence. Generally speaking, for tabulations of events for the country as a whole, there is relatively little difference between place of occurrence and place of residence. Final tabulations for geographical areas smaller than the total national territory, major civil divisions, minor civil divisions and cities should, for analytical purposes, be prepared according to place of usual residence. As discussed in paragraphs 465–469 above, however, place-of-occurrence tabulations required for administrative purposes or evaluation of registration coverage need to be prepared.

532. A detailed list and specifications for an annual vital statistics tabulation programme are presented in appendix II to the third revision of the *Principles and Recommendations for a Vital Statistics System*. In addition, countries are encouraged to publish the level of completeness of registration for each of the vital events, at national and subnational levels.

533. The term “vital statistics microdata dissemination” refers to the development of mechanisms to grant users access to individual record files maintained for the production of vital statistics. In the model of civil registration, population registers and identity management, an indispensable feature of such an arrangement is reliance on individual records stored in different databases that can be linked with a unique identifier, preferably the PIN. For the purpose of vital statistics, the extraction from the population register will normally omit data items not relevant for aggregation purposes, such as the name and address, but will retain the unique identifier and location.

534. Guidelines for the dissemination of microdata by the national statistical service are presented and elaborated in the third revision of the *Principles and Recommendations for Population and Housing*

Censuses.¹⁶¹ The same principles and confidentiality protection protocols apply also to vital statistics microdata, taking into consideration the substantial value that this dissemination provides for in-depth research of demographic, health and social-related phenomena. Details on how the dissemination of vital statistics microdata is handled in Norway may be found in box 27 below.

Box 27

Norway: vital statistics microdata for research

Requests for access to the data of the Central Population Register in Norway are handled by the owner agency, the National Tax Administration. The Tax Administration distributes data directly and daily to a few large users, including Statistics Norway, the Norwegian Labour and Welfare Administration, the Directorate of Immigration and the Norwegian Mapping Authority. Other users (more than 2,200) receive the information through a private company according to an agreement with the Tax Administration. Users may only receive data after submitting an application that explains their reasons for needing the data. The users only receive the data in the Central Population Register to which they are entitled by law.

For its part, Statistics Norway handles requests for microdata for research projects, relating to persons, establishments and enterprises (www.ssb.no/en/omssb/tjenester-og-verktoy/data-til-forskning). Researchers from approved research institutions in Norway have to apply to the Data Protection Authority or one of the regional ethics committees for permission to use microdata, while paying for the costs of producing the data files. Under the Statistics Act, the transfer of personal data outside the country's borders is not allowed. There have not been any very serious cases of misuse of data from the Central Population Register, but it has been revealed that, in a handful of cases, conditions for receiving microdata were violated, such as sharing the data with other researchers or exporting data to other countries.

The microdata are anonymized before being released, which means that variables that can be used to directly identify an individual, such as name and PIN, are removed from the file. Since it may still be possible to use other variables, such as address, full date of birth, etc., to identify individuals, users need to sign a non-disclosure declaration. Furthermore, microdata are released for a specific project and must be eradicated when such a research project is finished. Microdata that may be released for research include data from administrative registers, population censuses and sample surveys, and cover such areas as the labour market, population, social security, income, wealth, educational activity and attainment, health and establishments and enterprises.

According to the new Population Register Act, which is expected to enter into force in 2017, public authorities and enterprises will be able to obtain non-confidential information from the Central Population Register through lists based on PINs. Private businesses and individuals will be able to obtain non-confidential information from the Register about named identifiable individuals. The principle of confidentiality will not apply for information elements such as name, date and place of birth, gender, PIN, citizenship, marital status and date of death. The confidential items will include address, parents, spouse, children and adoption.

535. The Fundamental Principles of Official Statistics¹⁶² provide unambiguous guidance in the administration of official statistics at national and international levels. Particular emphasis is placed by these principles on confidentiality of information collected for statistical purposes. Thus Principle 6, governing international statistical activities, states: "Individual data collected by statistical agencies for statistical compilation, whether they refer to natural or legal persons, are to be strictly confidential and used exclusively for statistical purposes." In addition to the Fundamental Principles of Official Statistics, the following four principles should be considered when ensuring the confidentiality of microdata:

¹⁶¹ *Principles and Recommendations for Population and Housing Censuses*, Rev. 3 (United Nations publication, Sales No. E.15.XVII.10), paras. 3.373–3.388.

¹⁶² Resolution 68/261. Text available at <http://unstats.un.org/unsd/dnss/gp/fundprinciples.aspx>.

(a) *Appropriate use of microdata:* It is appropriate for microdata collected for official statistical purposes to be used for statistical analysis to support research, as long as confidentiality is protected;

(b) *Microdata should only be made available for statistical purposes:* A distinction must be made between statistical or analytical uses and administrative uses. In the case of statistical or analytical use, the aim is to derive statistics that refer to a group (whether this be of persons or legal entities). In the case of administrative use, the aim is to derive information about a particular person or legal entity to make a decision that may bring benefit or harm to the individual. If the use of the microdata is incompatible with statistical or analytical purposes, then microdata access should not be provided;

(c) *Provision of microdata should be consistent with legal and other necessary arrangements that ensure that confidentiality of the released microdata is protected:* Legal arrangements to protect confidentiality should be in place before any microdata are released. The legal arrangements must, however, be complemented with administrative and technical measures to regulate the access to microdata and to ensure that individual data cannot be disclosed;

(d) *The procedures for researcher access to microdata should be transparent and publicly available, as should information about the uses and users of microdata:* This principle is important to shore up public confidence that microdata are being used appropriately and to show that decisions about microdata release are taken on an objective basis.

(b) Demographic applications

536. The use of vital statistics in the area of demographic analysis depends heavily on the quality and completeness of the data. The accuracy and timeliness of data are significant factors for demographic use in mortality, natality, fertility, nuptiality and population analysis.

537. Demographic analysis related to natality and fertility also requires specific variables, many of which are included in the vital statistics files. Characteristics that are important in the measurement and analysis of fertility for population purposes include the age and marital status of the mother, parity, birth order and residence. Other factors that may affect the levels of fertility are also essential data elements, such as race and ethnicity, age of parents, marital status, social and economic status and educational level. These data provide basic information on factors that can affect the fertility of population groups and population growth.

538. Measures for demographic analysis include age-specific fertility rates, fertility rates within marriage cohorts, probabilities of birth based on age of the mother, and various subcategories for birth and fertility rates. In many instances, use of these data from the vital statistics system will require their linkage to census data or other survey data. This makes the data effective for demographic analyses related to natural growth and change of the population. Vital statistics are often used to evaluate the quality of population censuses, by comparing the total number of births or deaths in both sources.

539. Mortality data from the vital statistics system can provide indications of variations in the characteristics of the deceased and the cause of death. These are important variables in the demographic analysis of mortality. Two of the most critical variables associated with demographic analysis related to mortality are the age and the sex of the decedent. The relationship between the risk and cause of death, on the one hand, and age and sex, on the other, makes them important factors in the demographic analysis of mortality. The fact that mortality varies by gender, geographical area, marital status, socioeconomic conditions and availability of health-care resources makes these characteristics essential in the analysis of mortality. Many of these variables are part of the vital statistics database derived from the registration programme. For those items not collected through registration, other options may be explored for obtaining the data. These may include conducting surveys that use the vital records as the framework for identifying and locating individuals for the sample. Another option is to draw on other administrative databases that contain the data.

540. Mortality data from the vital statistics system are also used in the development of life-tables for the measurement of mortality. The basic life-table provides data on mortality, life expectancy and survivorship.

Other applications include the projection of population size, natural population growth and length of life for selected subcategories. Essential to the construction of the life-table are the death data. The applications for life-tables and the mortality, natality and fertility data from the vital statistics system are described in detail in a number of publications.¹⁶³

541. Vital statistics can provide some of the essential data elements in the preparation of population estimates and projections. The basic process is to use the numbers of births and deaths and a migration measure, which may be obtained from other sources unless a population register is available. These data can be used to update a previously conducted population census. Natural increase in the population based on birth and death information combined with net migration can be used to update an earlier census count. Another approach, the vital rates method, uses birth rates and death rates for selected geographical areas, and, combined with a previous census count, produces an intercensal estimate of the total resident population.

542. Various methodologies exist for the preparation of population estimates and projections for the total country or for selected geographical areas. Many of these include vital statistics data when it is determined that the registration programme has provided adequate reporting (see box 28 for an example of how census results and vital statistics are used jointly to assist the production of population estimates at the subnational level). When the registration programme has not achieved adequate levels of completeness or accuracy and timeliness of reporting, other sources of data are used, but the methods become more complex and less reliable.

Box 28

Tunisia: allocation of births at the subnational level for the production of population estimates, implemented by the National Institute of Statistics

The Tunisian Registration Act requires that both births and deaths be registered in the municipality or civil registration centre closest to where the event occurred. Not all governorates (major civil divisions) have hospitals or clinics, however, and this forces women residing in those governorates to deliver and register their babies in a governorate that is not their usual residence. Since place of usual residence is not recorded in the registration system, this leads to a problem when producing population estimates at the governorate level. The National Institute of Statistics solves this problem by using the geographical distribution of children under one year of age observed in the population census and applies it to the total number of births from the civil registration system.

¹⁶³ Tom Moultrie and others, eds., *Tools for Demographic Estimation* (Paris, International Union for the Scientific Study of Population, 2013), available at <http://demographicestimation.iussp.org/>; *Handbook on the Collection of Fertility and Mortality Data* (United Nations publication, Sales No. E.03.XVII.11).

VII. Digitizing civil registration and vital statistics

A. Introduction

543. The rapid development and ever-widening availability of information technology have facilitated the transformation of civil registration and vital statistics processes from paper-based to electronic formats. To succeed, however, this transformation requires a careful and deliberate design and implementation process. The topics covered in the present chapter include the technical details of the digitization of civil registration and vital statistics systems and their specific components. Based on the *Civil Registration and Vital Statistics Digitisation Guidebook* (version 0.10),¹⁶⁴ the present chapter outlines the preparation, analysis, design and implementation considerations and processes for the effective digitization of a civil registration and vital statistics system.

544. As noted before in this handbook, vital statistics and civil registration are separate entities, but it is crucial that they be established, maintained and exploited as components of a coordinated and coherent system for registering and producing vital statistics. In addition, the emergence of interconnections between civil registration and contemporary identity management systems adds yet one more dimension to the structure of the civil registration and vital statistics system. A graphic representation of these relationships and functioning is presented in figure 1, in chapter I above. Civil registration is defined as the continuous, permanent, compulsory, universal recording of the occurrence and characteristics of vital events pertaining to the population, as provided through decree or regulation in accordance with the legal requirements in each country.¹⁶⁵ It is important to highlight the quality of universality in relation to people's rights regarding the registration of vital facts; in this regard, laws, policies, rules and regulations must not be a hindrance to the realization of this right. In particular, the registration of events must be performed even if the time frame given by law has expired, and regardless of migratory status, citizenship and any other request that may act as an obstacle to registering the vital facts occurred in the territory. Civil registration is carried out primarily for the purpose of establishing the documents provided for by law. The usefulness of these records as the best source of vital statistics is well established. The procedures for recording vital events are equally important for civil registration as a legal exercise and for vital statistics as a source of statistical information; hence the tasks performed by civil registrars and those of statisticians are interdependent.¹⁶⁶

B. General overview

545. Digitizing administrative processes is an indispensable element of contemporary approaches to government functions. In its essential meaning, "digitizing" refers to the generation of a series of numbers that represent a document, signal and so forth. The term is also commonly used to convey the process where a piece of information is converted into single binary code. In theory, digital information is not subject to damage or degradation over time, as it consists of strings of numbers recorded and stored in an appropriate device. As digitizing a certain process or information is not possible without the use of information technology, the meaning of the term also encompasses computerization of these processes and information – in other words, the use of automation by way of computers and software.

546. In the context of the systems of civil registration, vital statistics, population registers and identity management, digitization refers to developing an enterprise information system – that is, an information system that provides a technology platform that enables all components to integrate and coordinate business processes on a robust foundation.¹⁶⁷ A functional system needs to be in place for the information to be

¹⁶⁴ See www.crvs-dgb.org/en/; Guidebook available at www.crvs-dgb.org/wp-content/uploads/2015/11/crvs-dgb-0.10-FINAL-EN-ALL.pdf.

¹⁶⁵ *Principles and Recommendations for a Vital Statistics System*, Statistical Papers, Series M, No. 19, Rev. 3 (United Nations publication, Sales No. E.13.XVII.10), para. 279.

¹⁶⁶ *Ibid.*, para. 274.

¹⁶⁷ Chapter V of the present handbook discusses operational integration for civil registration, vital statistics and identity management.

transformed and digitized successfully. In addition, even if a system is functioning smoothly without automation, digitization needs to be conducted carefully, avoiding the over-hasty application of technological tools and guided by international standards, in particular the third revision of the *Principles and Recommendations for a Vital Statistics System*.

547. Taking into consideration that information systems tend to be fairly complex and multilayered, recent developments include the introduction of a separate discipline – governance of enterprise information technology, which is concerned primarily with organizing the resources of an enterprise or organization for the purpose of satisfying stakeholders. Governance of enterprise information technology is intended to ensure that high-level strategic objectives are aligned with operational level activities and work outcomes.¹⁶⁸ It will make it possible to develop precise blueprints enabling all stakeholders to understand the business processes, even if they lack a full understanding of information technology.

548. In this context, the notion of a “business process” is defined in the *Civil Registration and Vital Statistics Digitisation Guidebook* cited above as a self-contained, logical set of activities performed by humans or machines with the aim of accomplishing a specific business objective. Triggered by specific events, a business process has one or more outcomes that may result in the termination of the process, or their handover to another process. It is often presented in the form of a figure or map and is composed of a collection of interrelated tasks or activities that solve a particular issue. A business process comprises end-to-end work that delivers value to customers (or users) and may involve crossing functional boundaries.

549. The first step in applying these contemporary mechanisms and their operational logic is to develop a clear understanding of the current and ideal business processes and their stakeholders. Chapters II and III of the present Handbook elaborate on these issues, and the integration of civil registration, vital statistics, population register and identity management functions and components is presented in chapter V. Consequently, this chapter will focus in more technical detail on the implementation of the enterprise information system paradigm and the features of the governance of enterprise information technology adapted for civil registration and vital statistics, which then leads to the feeding of population registers and identity management systems. More and more countries are introducing identity cards and identity management systems with biometric markers. Such systems have great potential for improving vital statistics but this is often not realized. Some of these identity systems are closely linked to the civil registration system, while others have little or no connection. A database including all identity numbers with particulars about individuals can be developed into a population register if it is regularly updated with birth, death and migration details. This transition is particularly smooth if identity numbers are assigned at birth, rather than when a person reaches a required age.

550. The principal reference in this area is the *Civil Registration and Vital Statistics Digitisation Guidebook* cited above, which was developed for the purpose of supporting the Africa Programme for Accelerating Improvement of Civil Registration and Vital Statistics, a regional programme prepared in fulfilment of the political commitment and policy directives of the ministers in charge of civil registration to reform and improve civil registration and vital statistics systems on the African continent.¹⁶⁹

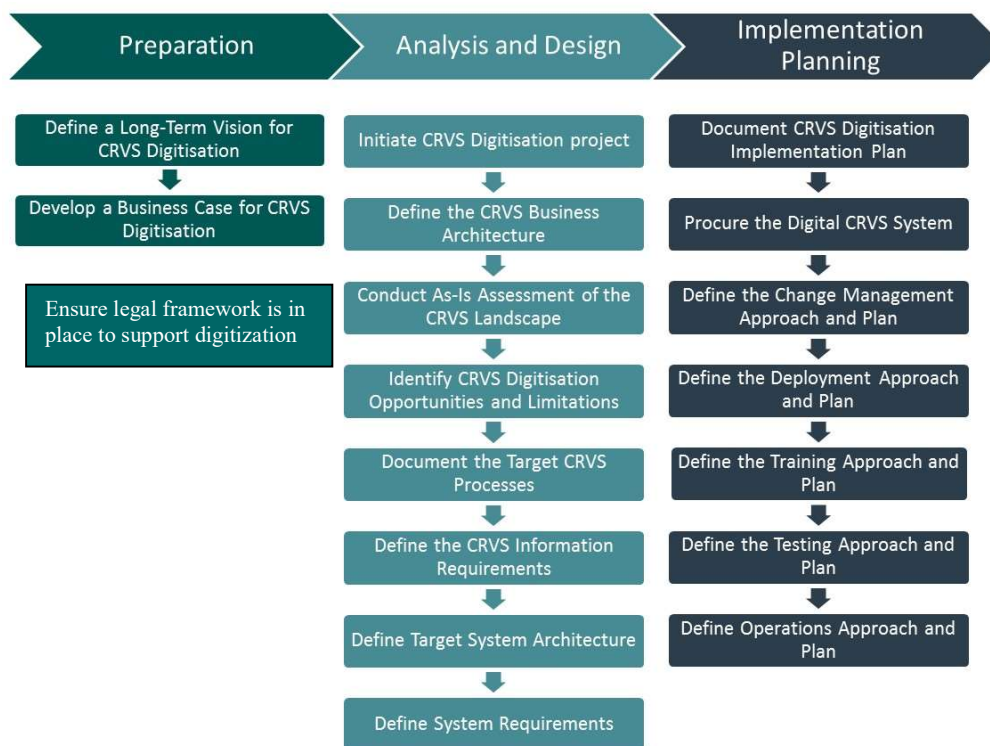
C. Developing blueprints

551. The general framework for implementing an efficient enterprise information system needs to be adapted to the process of conducting civil registration of all various vital events, collecting the necessary information, ensuring the production of comprehensive vital statistics and generating input for population registers. The figure below presents the digitization life cycle for civil registration and vital statistics.

¹⁶⁸ See ISACA, *Getting Started with Governance of Enterprise IT (GEIT)*, ISACA White Paper (ISACA, 2015). Available at www.isaca.org/Knowledge-Center/Research/Documents/Getting-Started-With-GEIT_whp_Eng_0314.pdf?regnum=353307.

¹⁶⁹ For more information, see www.apai-crvs.org/.

Figure 14
Digitization project life cycle for civil registration and vital statistics



Source: Adapted from the online *Civil Registration and Vital Statistics Digitisation Guidebook*, available at www.crvs-dgb.org/en/.

552. Each of the phases and recommended activities is presented below in a prescribed sequence that may be accomplished in its entirety or taken step by step, depending on the system, stakeholders and resources in place.

1. Preparation phase

553. The activities of the preparation phase need to be completed prior to commencing a civil registration and vital statistics digitization project. This phase includes alignment with a country's broader civil registration and vital statistics strengthening programme and lays the foundations for a business case for digitized civil registration and vital statistics. It comprises the following steps:

- (a) *Defining a long-term vision for digitization*: The long-term vision for digitization sets out a desired future state for civil registration and vital statistics that can specifically be achieved through the use of digital technologies. Aligned with a strategic plan for civil registration and vital statistics, the long-term vision will be based on high-level needs and will set the direction for the digitization project;
- (b) *Developing a business case for digitization*: The business case explores the manner in which technology can provide a cost-effective means of improving civil registration and vital statistics systems and processes. The document should be used to indicate the expected benefits of digitization, to generate support from key stakeholders, to justify the technology investment costs and to raise funds for project implementation. The business case is developed in two parts. The initial business case, developed in this activity, outlines the actual costs of the analysis and design phase and indicative costs for full implementation. This business case will be revisited and updated at the beginning of the implementation phase to give a more accurate reflection of the findings of the analysis and design phase, including an accurate representation of the defined digital civil registration and vital statistics system and the benefits and costs associated with its implementation;

(c) *Ensuring that a legal framework is in place to support digitization:* An appropriate legal framework is developed or reviewed for a national civil registration system that highlights its statistical function and takes into account the identity management system, in the context of e-government. Gaps in the current legal framework are identified and a plan devised to align it with the needs of a digitized system.

2. Analysis and design phase

554. The activities outlined in the analysis and design phase must provide step-by-step guidance on how to align information and communications technology with the civil registration and vital statistics business need. Following the activities in a sequential manner will ensure that the relevant country context is fully analysed and traceable, from the civil registration and vital statistics business requirements through to the detailed requirements for an enabling civil registration and vital statistics system. This process comprises the following stages:

(a) *Initiating the digitization project:* In order to implement a successful digitization project, it is critical that the project be initiated in a structured manner, clearly defining expectations and standards to all relevant actors and stakeholders. To do this, a project initiation document should be created, formally documenting the purpose, approach, standards and timelines of the analysis and design phase. The project initiation document should be shared with all relevant parties, so that the scope of work and their roles and responsibilities are acknowledged and accepted before formal work begins. In subsequent activities, this advanced project planning will help guide project decision-making and management and will be updated to reflect the change in focus of activities at the beginning of the implementation phase;

(b) *Defining the civil registration and vital statistics business architecture:* The purpose of defining a business architecture is to build a common understanding of the organization's purpose, functions and needs, in order to guide and manage organizational activities and change. In this context, the organization comprises the authorities responsible for civil registration and vital statistics. Subsequent steps in the digitization process must be aligned with the organizational foundations defined in the business architecture; in other words, the targeted digitized systems and processes must meet the business requirements;

(c) *Conducting an as-is assessment of the civil registration and vital statistics landscape:* In order to identify appropriate technologies to support civil registration and vital statistics, an assessment of the status quo, known as an "as-is" assessment, must be conducted to understand the strengths and weaknesses of the existing landscape, including several components documented in the business architecture, such as the civil registration and vital statistics business processes. Basing subsequent technology decisions on these findings will ensure that technology interventions directly address identified weaknesses;¹⁷⁰

(d) *Identifying digitization opportunities and limitations:* In order to identify appropriate technologies that are feasible in the current context, it is important to understand what opportunities and limitations exist in the country to support a digital civil registration and vital statistics system. These opportunities will later be used to inform the definition of the target digital civil registration and vital statistics system and processes;

(e) *Documenting the target civil registration and vital statistics processes:* Target civil registration and vital statistics processes are redefined processes that respond directly to the weaknesses identified in the as-is assessment and the opportunities identified in the previous activity. The target processes should simplify and streamline existing processes, by reducing bureaucracy, facilitating the decentralization of civil registration, remedying bottlenecks and improving service provision to citizens. The target processes will be supported by the target system architecture, which is conducive to simplification and automation;

(f) *Defining the information requirements:* Before being able to define the systems that are required to support the business needs of civil registration and vital statistics, it is necessary to understand what information requirements exist – in other words, what data are collected, stored and put to use within the existing system. At the highest level this means understanding what logical entities exist within the business

¹⁷⁰ If a rapid or comprehensive assessment has been conducted, this should be used as an input.

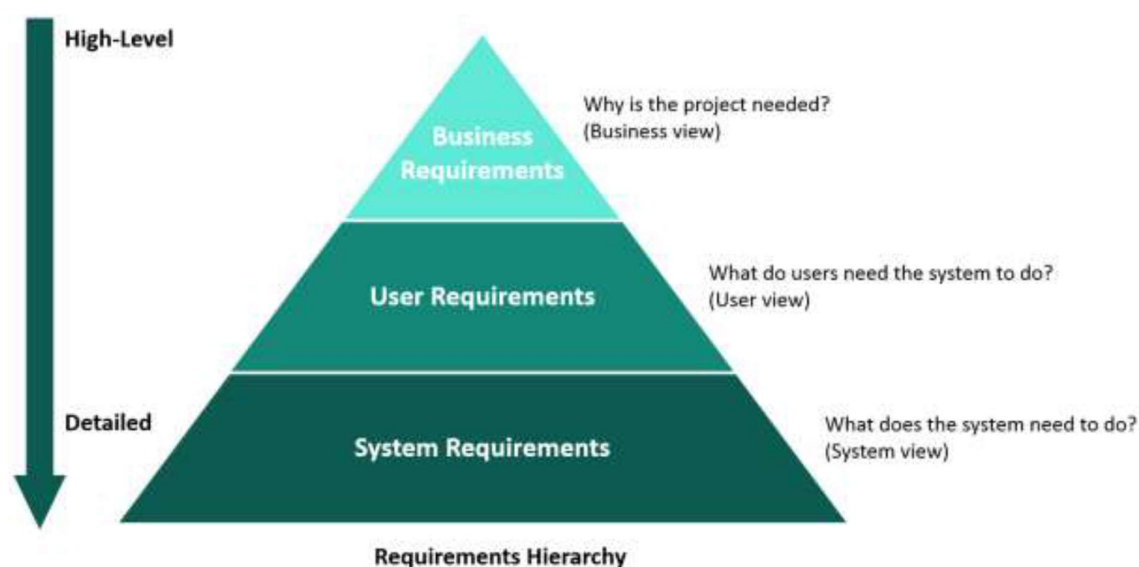
domain and the relationships between them. Together with the data dictionary,¹⁷¹ they form the basis of the data architecture, which, when detailed at the lowest level, will later define the database design for civil registration, vital statistics and population registers, and also for interactions with identity management systems;

(g) *Defining the target system architecture*: The target system architecture is a holistic, interoperable model of the applications and computer programmes required to fulfil business needs and support target processes;

(h) *Defining system requirements*: System requirements are clearly articulated statements of what a system must be able to do in order to satisfy stakeholder needs, and are derived from business requirements and user requirements, as set out in the requirements hierarchy figure below. They should be divided into two clear categories, functional and non-functional. Functional requirements describe the required behaviour and functions of the system. Non-functional requirements describe specific criteria that can be used to judge the operation of a system – in other words, its performance, security and accessibility.

Figure 15

Requirements hierarchy



Source: *Civil Registration and Vital Statistics Digitisation Guidebook*.

3. Implementation planning phase

555. The activities of the implementation phase will support the creation of a comprehensive workplan for the digitization project, ranging from the selection of software vendors to the testing and deployment of information and communication technology solutions in the field and their subsequent scaling-up. This process comprises the following components:

(a) *Documenting the digitization implementation plan*: On completion of all activities in the analysis and design phase, it is important that the next phase of activities, from system procurement to the beginning of full system deployment is carefully planned. Conducting a comprehensive planning exercise will mitigate the risk of schedule and cost overruns and a well-defined implementation plan provides a structured framework for continuous project monitoring and reporting. This should be carried out as part of the wider strategic plan, to ensure that the project is not operating in isolation and that any interdependencies are clearly acknowledged by all parties. The shift from analysis and design to implementation will necessitate returning to the project initiation document and adjusting the project team and governance to support the changing nature of activities.

¹⁷¹ As defined in the *Civil Registration and Vital Statistics Digitisation Guidebook* (available at www.crvs-dgb.org/en/glossary/), the term “data dictionary” refers to a set of information describing the content, format, and structure of a database and the relationship between its elements, used to control access to and manipulation of the database.

It will also be necessary to update the business case template, with a view to completing the costing sections related to systems development, testing and implementation;

(b) *Procuring the digital system for civil registration and vital statistics:* Conducting a rigorous procurement process will ensure a strong contractual position for the government and mitigate delivery risk in the provision of software and services. Central to this is a request for proposals that clearly defines the system, requirements, deliverables and delivery timeframes. The procurement of this system should follow the regular government-issued procurement guidelines and regulations;

(c) *Defining the change management approach and plan:* Change management refers to the management of transformative activities within an organization in such a way as to ensure that the changes that occur are fully accepted and integrated into the daily routine. An effective change management approach is crucial to facilitating the acceptance and use of the digital system and processes across the organization and should be effected in alignment with wider strengthening activities. Clear and targeted communications through a variety of different channels should be used to explain what changes are happening and when, and how they will affect each stakeholder;

(d) *Defining deployment approach and plan:* Deployment is the act of introducing a new technical solution or platform and services to an organization in a coordinated manner. The success of such deployment will depend on forward planning, the availability of adequate resources, continuous monitoring and evaluation and strong communication;

(e) *Defining the training approach and plan:* Training staff and users in the use of the digitized civil registration and vital statistics system and processes will ensure that the system is used effectively, mitigating the risk of business rejection and safeguarding against improper use;

(f) *Defining the testing approach and plan:* Rigorous testing of the newly developed digital system is essential to ensure that the system is fit for purpose when it is deployed. Testing should be carried out sequentially and traced directly back to the system requirements defined in the analysis and design phase;

(g) *Defining the operations approach and plan:* During the operations and maintenance phase, the fully tested and accepted system is released into the full-scale production environment for sustained use with operational and maintenance support. This activity focuses on planning for the transition from the implementation phase to normal operational use and handover to the operations and maintenance team. The operations and maintenance plan should define the tasks, activities and parties responsible for carrying them out, to ensure that the live system is fully functional and is performing as expected.

556. The following examples from the Philippines, Mongolia and Ghana demonstrate the varying ways in which system digitization can be designed and implemented. The Philippines embarked on the project of digitizing its civil registration and vital statistics system through a public-private partnership, details and outcomes of which are described in box 29 below.

557. Another example may be seen in Mongolia, where an electronic system for data capture has recently been introduced and has had a positive impact on the completeness of birth and death registration. Details are provided in box 30.

558. A third example, the digitization plan of the entire civil registration and vital statistics system in Ghana, is described in box 31.

Box 29

Philippines: public-private partnership for digitization of the civil registration and vital statistics system

The civil registration and vital statistics system in the Philippines follows the public-private partnership model. The Philippine Statistics Authority, which is both the national statistics office and also the civil registration authority, entered into a contractual arrangement of the kind referred to as “build-transfer-operate” with a private entity. The resulting arrangement is known as the second Civil

Registry System Information Technology Project and is the successor to a project implemented since 2000 which led to the digitization of civil registration documents and the provision of frontline civil registration services. With the original Civil Registry System Information Technology Project, service times were reduced from between 7 and 10 working days to less than a single day, and customer satisfaction increased from 18 to 82 per cent.

Under the second Civil Registry System Information Technology Project, the contractor builds the facility on a turnkey basis, assuming cost overruns, delays and specified performance risks. Supervision is exercised by the Public-Private Partnership Centre in line with the Philippine law on public-private partnerships. Once the facility has been commissioned satisfactorily, title will be transferred to the Philippine Statistics Authority. The private entity will operate and maintain the information technology system on behalf of the Authority under an agreement, while the Authority operates the Civil Registry System Service Facility. The second Civil Registry System Information Technology Project is scheduled to run for a period of 12 years under the concession agreement described above (starting in 2016), inclusive of a two-year development phase and a ten-year operations and maintenance period. Revenue sharing is based on the bid of the private partner.

The second Civil Registry System Information Technology Project will involve further computerization of the civil registration operations of the Philippine Statistics Authority and is designed to collect, access, store, maintain and manage civil registration documents and specimen signatures of all city and municipal registrars using imaging technology. It will also include faster production of vital statistics and will make available civil registration services nationwide through the civil registry system outlets and other authorized partners. It will develop a new civil registry system application based on modern architecture that will support the central and end-user computing operations for system management, system performance and security. Other access channels to civil registry system services, such as the use of the web, mobile and kiosk devices, and the integration of services with other government agencies and partners, will also be established, along with site preparation for 40 additional outlets nationwide and their establishment.

Among the objectives of the second Civil Registry System Information Technology Project is the provision of enhanced frontline civil registration services through copy issuance of birth, death, and marriage certificates, authentication, certificates of no marriage and new services such as certificates of no death. Key performance indicators have been set as follows (only basic services are shown):

Service	Former PPP (2000–2016)	New PPP (2016–2028)
Copy issuance	2 hours	1 hour
Authentication	2 hours	1 hour
Certificate of no marriage	5 days	1 day
Certificate of no death	N/A	1 day

Lastly, the second Civil Registry System Information Technology Project will establish a geographically separate disaster recovery environment in an undisclosed location within the Philippines.

Box 30

Mongolia: improved processes through digitization of the civil registration and vital statistics system

Mongolia has achieved a very high level of birth and death registration in recent years. An important factor in this achievement is the country’s introduction of an electronic system for data capture. Wherever possible, digital data which have been collected from the local registration units are transmitted through the online system to the central database. As the majority of the country’s administrative districts (soums) are not yet able to have direct access to the online system for civil registration, however, an offline program has been introduced in these offices.

The registrar at the district level enters a vital event using the offline program. This program includes checks and controls and ensures that the forms are entirely filled out and in line with nationally standardized questions. If one information item is missing, a warning is shown by the registration program and no further processing is accepted. Once the registration is complete, the local civil registrar prints the official registration form, including a quick response (QR) code where information has been saved in a machine-readable format.

The registrar and the informant sign the registration form, which is sealed by the registrar. The registration form (which contains also digital information in the QR code) is then delivered to the registration unit at the province (aimag) level, where a superior registrar verifies the information on the registration form, together with other attached documents (such as the birth notification form issued by the health facility, copies of the identity papers of parents, and acknowledgement of parentage). If everything is in order, the information will be scanned through the QR code and entered into the online registration system. If not, a correction procedure will be required and the registration form will be returned to the district registrar. At registration centres without access to the Internet, information about vital events is also computerized. The computers are used to print a QR code with all relevant information on a copy of the certificate, which is then forwarded to the higher-level civil registration centre, where the QR code is scanned and this information is entered online into the national database.

Before the offline system was introduced, inaccurate information on vital events due to unintentional mistakes was frequently encountered. Since the offline program has been in operation, the inaccuracies caused by manual errors have almost disappeared. In addition, significant time is saved as data only have to be entered once and many errors are avoided through automatic checks.

Box 31

Ghana: civil registration and vital statistics digitization strategy based on a comprehensive assessment

Ghana conducted a comprehensive assessment of its civil registration and vital statistics system and prepared a national civil registration and vital statistics strategic plan in line with regional and international requirements for the development of efficient such systems. The comprehensive assessment exercise revealed among other findings that interoperability of stakeholder databases was virtually non-existent, many parallel databases of individual identifications were being operated by various government institutions at great cost to the country, stakeholders were sharing data on an ad hoc and infrequent basis and the paper-based nature of the system was a major barrier to improving the civil registration and vital statistics system.

The current national medium term development policy framework – the Ghana Shared Growth and Development Agenda 2014–2017 – also identified underdevelopment and underuse of the civil registration information systems, lack of awareness and non-compliance with civil registration regulations as further drawbacks.

Thus the civil registration and vital statistics strategic plan proposed the digitization of the entire system to improve its efficiency and provide reliable and timely statistics to monitor and evaluate achievement of national goals and the Sustainable Development Goals at all levels of governance. In line with this undertaking, stakeholder institutions were entrusted with the design of an information and communications technology strategy for civil registration and vital statistics and with the development of a business case for its implementation. A team of consultants conducted a needs assessment of the information technology systems of stakeholder institutions, after which selected participants were trained in the use of the civil registration and vital statistics digitization guidebook (published by the Economic Commission for Africa), to cover the first phase of the civil registration and vital statistics digitization programme.

In the second phase of the programme, participants gathered in a workshop to subject the first draft of the as-is civil registration and vital statistics business process maps to a critical review, and to identify any bottlenecks in the proposed processes for registering births, deaths, marriages and divorces. System analyses were also carried out to confirm the current processes and identify missing steps. At the end of the

workshop, participants proposed the expansion of service delivery points for the registration of all the vital events considered under the programme.

A number of initiatives in the civil registration and vital statistics strategic plan encourage the automation and digitization of the system and processes, with a view to extending their registration coverage, standardizing and streamlining civil registration and vital statistics processes, integrating data from multiple systems and securely storing data at scale, all of these in a cost-effective manner. If properly employed, information and communications technology can make a significant contribution to achieving the universal registration of vital events, providing legal documentation of civil registration as necessary to claim identity, civil status and ensuing rights, and producing accurate, complete and timely vital statistics.

D. Key considerations

559. The development and deployment of digitized system for civil registration, vital statistics, population registers and identity management, using the governing enterprise information technology approach described in section B above, are also subject to several key considerations that are outlined below.

560. The system's foundation must be well established with a strong design, stakeholder engagement and a supportive legal framework, as detailed below:

(a) *Business process map*: Key stakeholders involved in the system under consideration should be gathered together to map out the current business process (status quo – the as-is situation) and proposed business process (the ideal situation). Each map should include participants, processes, time periods, outputs, and bottlenecks. This activity will elicit discussion among key stakeholders and ensure a common understanding of the current and proposed systems. The map of the proposed system should be used to guide digitization activities;¹⁷²

(b) *Legal review*: A review should be conducted to ensure that laws and regulations are in place to support the proposed digitized system. The laws should be compared with the business process map of the proposed system to ensure that the role of participants, processes and outputs are in line with the legal framework. The process of revising the laws should be initiated prior to the implementation of any system changes.

561. Digitization needs to be guided by international standards, in particular those set out in the third revision of the *Principles and Recommendations for a Vital Statistics System*.

562. The first of these relate to the selection of technology. The selection of hardware and software should be integrated to ensure compatibility, keeping in mind the need to update hardware periodically. The technology for the holistic system of civil registration, vital statistics and identity management has to be developed in the framework of contemporary solutions for computer networking and use of the Internet. In addition, the fact that collecting biometric characteristics will, at some point, be part of the system, entails the need to adapt the system to accommodate this type of information, primarily storage and retrieval. The selection of technology must be based on an objective assessment of needs and a comparative analysis of the cost-efficiency ratio of available technology options. An option for technology selection and maintenance is the implementation of public-private partnerships, with carefully spelled out terms of reference for accountability and ownership. The considerations outlined in the following paragraphs should be kept in mind in this context.

563. Where hardware is concerned, while it is well documented that hardware becomes obsolete relatively quickly, and that this creates an incentive to acquire the latest and most modern solutions – and thus the most expensive, it is also well documented that basic maintenance of the population and civil registers and related data processing does not require the most advanced technological features available. In this context, consideration should be given to hardware that meets system specifications but is compatible with the

¹⁷² In the course of strengthening civil registration and vital statistics systems in 16 countries as part of the Bloomberg Data for Health Initiative, 10 milestones have emerged from the use of business process mapping. These milestones can help support digitization planning and also facilitate quality assurance and monitoring. Further details of the Initiative may be found at <https://crvsgateway.info/learningcentre/crvs-processes>.

environment (in terms of battery power, durability and other attributes) and is user-friendly (where screen size, durability, weight and other properties are concerned).

564. Where software is concerned, consideration should be given to developed platforms rather than homegrown solutions. Technical staff supporting software solutions require less historical training if a developed platform is used. The disadvantage of using a developed platform is that it might not meet all system specifications. The pros and cons need to be carefully weighed to ensure that the software meets system needs, but can be maintained within the system architecture, regardless of the maintenance team. The software solution must also be user-friendly. With the advent of personal portable digital devices and the accompanying shift in communication behaviour, users will expect to have the necessary access to service provided by the system handy and as interactive as possible. The system architecture needs to incorporate those interfaces in a manner that meets most, if not all, expectations.

565. Second, data safety considerations mean that the process and the public must be taken into account. These considerations include the following:

(a) *Transmission and encryption*: Digitization of the civil registration and vital statistics system may result in the change to electronic from hard-copy format, for electronic transmission. To limit a data breach in which transmitted data are intercepted, encryption should be considered and applied to the necessary level of the system – file, application, database and others;

(b) *Storage*: Digitization of the civil registration and vital statistics system, including the population register and identity management, may also entail scanning old records and entering their data. This does not mean that those paper records can be abandoned: instead, they need to be carefully maintained and stored, with restricted access and regulated handling, as some of these documents might be centuries old. An example of the importance of preserving historic records is described in box 13 in chapter III;

(c) *Retention*: As with their storage, the retention of electronic records necessitates a clear policy. Server space may become an issue for long-standing programmes such as civil registration and vital statistics. Thus the information management strategy of the relevant agencies must clearly state whether, when and how digitized and electronic records may be destroyed;

(d) *Authenticity*: Civil registration systems that provide online birth and death certificates need carefully to consider methods to ensure authenticity, in order to minimize identity theft and child trafficking using stolen certificates. An example of the use of checks and safeguards in the production of certified copies, implemented by the Civil Registration and Identification Service of Chile, is provided in box 6 in chapter II.

566. The third standards-related issue is confidentiality of an individual's information: this is one of the basic principles of civil registration and vital statistics. Ensuring the safety of the individual information stored in the digitized system requires robust security setups and multilayered protection against attempts to break into the system and retrieve the records. The potential mishandling – or even abuse – of individual information does not necessarily always come from outside the system, hence the need carefully to limit access to the register to only the necessary officials. Even then, a hierarchy for allowing different levels of access to the records and their manipulation has to be established. In addition, physical security also has a role to play; for example, workstations should not be equipped with interfaces for portable memory cards, which might enable the unauthorized downloading of the records.

567. Lastly, the issue of digital identity has been the subject of debate in recent years. While there is as yet no universally adopted definition of digital identity, the notion is generally understood as unique and constant identity – a virtual identification card – assigned to individuals that authenticates them as users of all their portable digital devices, both in the digital world, such as online banking, commerce and also in the physical world whenever such identification may be required (for example to authenticate their identity at a health-care centre, or when asked by the police). It involves biometrics, such as fingerprint or iris scanning, which are increasingly available on contemporary portable digital devices. The fact that digital identity is not yet universally implemented is due to a number of issues, such as the need for such screening to be platform and

device-independent.¹⁷³ As it can be expected that the concept of digital identity will take hold more and more, and is likely to take over from the user-name-plus-password model, the digitized civil registration, vital statistics, population registers and identity management systems need to take this development into consideration and perhaps provide this additional service to their users. A discussion of the potential use of blockchain technology in this context is provided in box 32 below.

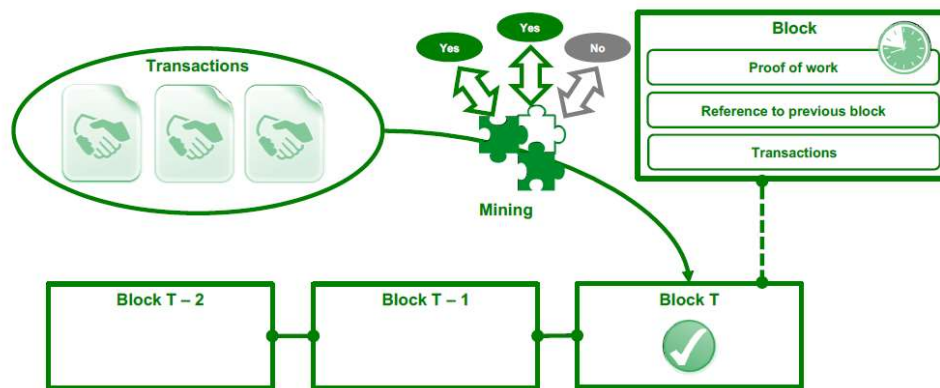
Box 32

Blockchain and civil registration and identity management

The recent surge of interest in what is known as "blockchain" (distributed ledger technology) and cryptocurrency technologies has brought the attention of many governments, United Nations agencies and civil society to their potential applications in civil registration and identity management.

As its name implies, a blockchain is a chain of blocks; each block contains records of information and is connected by hash pointers (mathematical functions) and secured using cryptography. A blockchain may be seen as a decentralized network which has the objective of maintaining synchronized copies of a digital ledger distributed among the members of the network. In the world of blockchain, each participant keeps one ledger, which registers all events occurring in the platform. Once a piece of new information pertaining to a participant is announced, it will be verified by the "miners", as those who conduct this verification are known, then it will be added and reflected in the ledger of each participant.

By design, blockchains are inherently resistant to modification of data. Once an information entry has been created and verified, it is saved permanently, as the information is verified and saved by consensus, which makes modification extremely hard. In consequence, falsification is expensive. This is the reason why blockchain technology is potentially suitable to applications related to record management, such as civil registration and identity management.

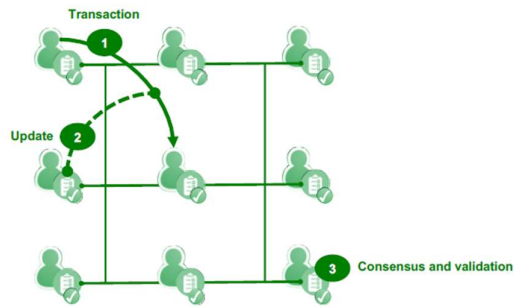


Source: Presentation of blockchain for identity management by IBM Corporation, Seoul, November 2016. Available at www.slideshare.net/eburon/blockchain-for-identity-management-ibm-part-1-of-3.

In the simplest and most practical case of implementation of blockchain in civil registration, everything in the system would appear unchanged to the public, and also to civil registrars. People would go to the civil registration office and provide requested information; local registrars would enter the required information into the system. The differences lie only in the background – in other words, the technology embedded in the system for data input, storage and update changes. No single local registrar would be able to alter any information in the system without it being verified by others and audit trails are left whenever information is edited.

¹⁷³ See Bob O'Donell, "The digital identity dilemma", *Recode*, 10 August 2016. Available at www.recode.net/2016/8/10/12413592/digital-identity-virtual-id-card-fido-web-api.

Blockchain: distributed ledger



Source: Ibid.

In addition to its usual applications, blockchain technology may also be applied to many current problems arising in civil registration and identity management. Hypothetically, the public could register all vital events from any point with an internet connection by reaching into the blockchain network. For example, to notify a birth, parents could enter the data themselves, identifying themselves using their own identity particulars, or, if this is permitted by the web application, even by uploading a link to a digitally signed video or photograph to the blockchain, stating the baby's full name, date and location of birth and other pieces of information. The miners would record the new birth and associate it irrevocably with the applicant parents and then all ledgers would be updated. To validate the process further, parents could also add their testimony or that of a third party or both, along with additional proof such as the medical birth certificate from the hospital.

Just as all data are stored digitally and cannot be erased or modified, so are personal identities, no matter if the person moves. Accordingly, loss of identity documents would no longer be a concern and the problems arising in proving identity would be eased. In fact, people may no longer need to carry and show any physical identity documents, so long as they can connect online and present information that they have at their disposal, such as a password or biometric information such as a retina scan or fingerprint to identify themselves. This would be particularly valuable for refugees and displaced persons who may not be able to carry their identity documents when fleeing their usual place of residence.

Despite the excitement about the potential revolution in civil registration and identity management brought about by blockchain technology, applications are still at the exploratory stage and only a few small pilot projects have been carried out, let alone implemented on any meaningful scale. At this stage (late 2017), it is more of a conceptual exercise as there is a need for further consideration of the use of this technology from the point of view of ensuring the proper and comprehensive input of relevant information into the statistical function as well.

Annex I

Medical certification of cause of death form recommended by the World Health Assembly

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF CAUSE OF DEATH

Cause of death		Approximate interval between onset and death
I		
Disease or condition directly leading to death*	(a)
	due to (or as a consequence of)	
Antecedent causes	(b)
Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	due to (or as a consequence of)	
	(c)
	due to (or as a consequence of)	
	(d)
<hr/>		
II		
Other significant conditions contributing to the death, but not related to the disease or condition causing it

<p><i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i></p>		

Annex II

Computer software for the selection and coding of underlying cause of death

Manual coding is a laborious process requiring understanding and skill in applying the rules and principles of the International Classification of Diseases for the correct coding and selection of the underlying cause of death. Since the 1960s, automated coding systems have been developed to streamline the coding process and improve uniformity in the application of coding rules and principles for the selection of the underlying cause of death. These automated systems do not, however, replace trained coders, who are still required to support automated coding systems for death certificates rejected by the system and to perform the quality control of automatically coded records, in particular when changes are made to the automated systems. Currently, across the world, the Mortality Medical Data System and IRIS are the two most commonly used automated coding systems. Both systems require deaths to be reported in line with WHO death certificate recommendations.

The Mortality Medical Data System is a software package developed in the 1960s by the United States National Center for Health Statistics. It includes components for the conduct of various coding data management processes: data entry, cause-of-death coding, selection of the underlying cause of death, and data translation for statistical analysis. Mortality Medical Indexing Classification and Retrieval (MICAR) is the component that codes using the rules and principles of the International Classification of Diseases for multiple cause coding. MICAR codes the causes of death entered in text format, a process that is language-dependent. It has been used in Australia, the United Kingdom of Great Britain and Northern Ireland and the United States of America. The Automated Classification of Medical Entities (ACME) is the component that determines the underlying cause of death from the codes selected in MICAR. Since the data are in numerical format, ACME is language-independent. Brazil, France and Sweden have used ACME but it does not perform as well without MICAR because of the very specific coding instructions. Currently, the United States National Center for Health Statistics maintains the Mortality Medical Data System and is its primary user.

In the 2000s, five countries collaborated on the development of a language-independent automated coding system. Initially based on MICAR and ACME, IRIS was developed as free, closed-source software with a language-independent component. Similar to the Mortality Medical Data System, IRIS conducts multiple cause coding and selects the underlying cause of death. IRIS can be used in two modes: code entry or text entry. For code entry, it selects the underlying cause of death from the codes entered directly into the system. This mode can be used once IRIS is installed and data are prepared in the required data entry format. For text entry, causes of death are entered in text format and coded in accordance with the rules and principles of the International Classification of Diseases for the selection of the underlying cause of death. The text entry mode requires the development and maintenance of a local dictionary, allowing application in any language. Dictionary development and maintenance is a substantial investment but can be facilitated with the modification of an existing dictionary, such as the French dictionary used for the development of the French-language Moroccan local dictionary.

IRIS is currently being used or in the process of implementation in many countries around the world: Australia, Brazil, Canada, Czechia, Fiji, France, Luxembourg, Mexico, Philippines, South Africa, Sweden and others. The IRIS Institute, established within the German Institute of Medical Documentation and Information and supported by partner countries, maintains IRIS through its Core Group, ensuring its conformity with the rules and principles of the International Classification of Diseases; issues software updates; and organizes annual training meetings.