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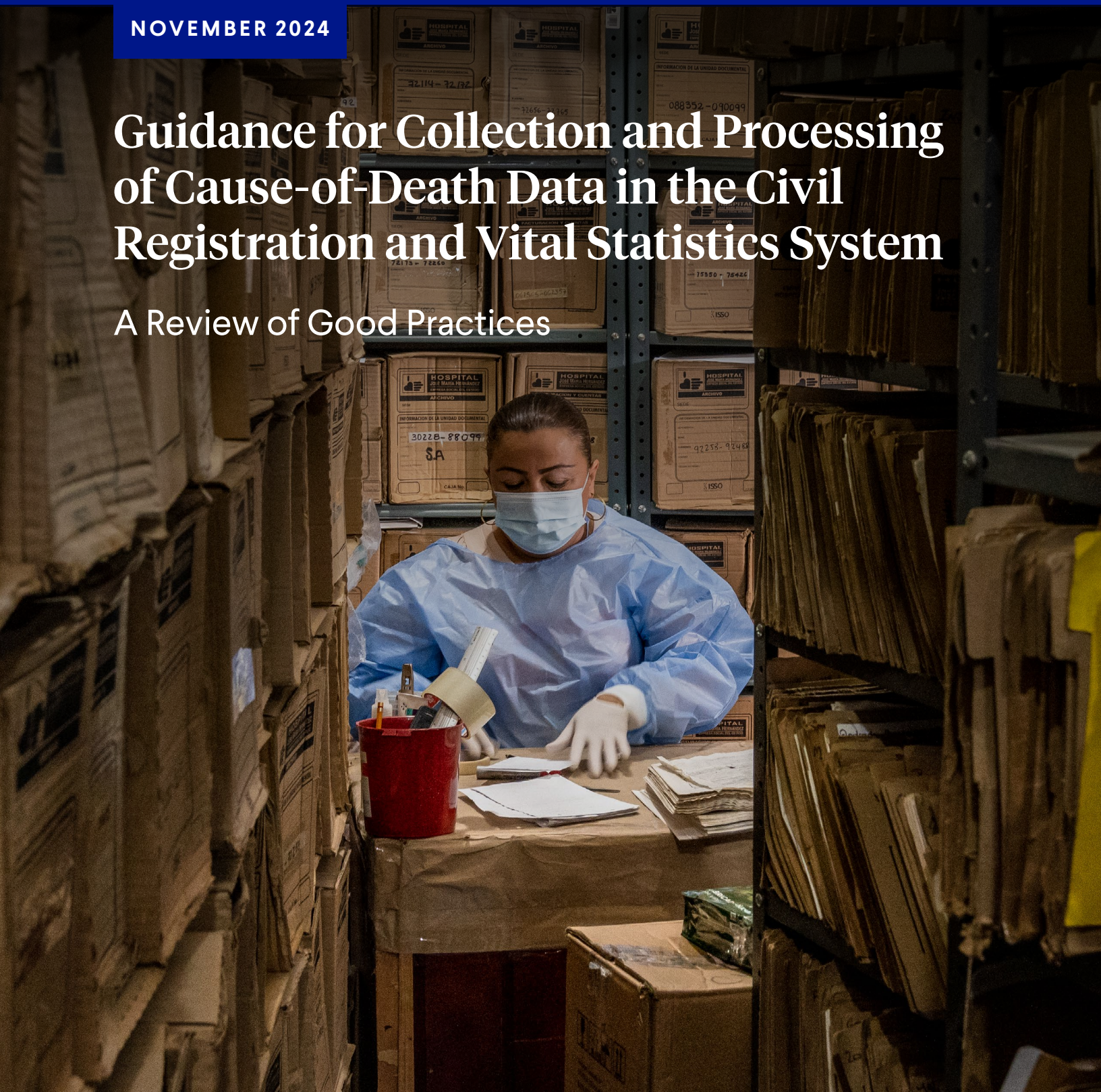
Guidance for Collection and Processing of Cause-of-Death Data in the Civil Registration and Vital Statistics System

A Review of Good Practices



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Abbreviations

CDC	U.S. Centers for Disease Control and Prevention
COD	Cause of death
CRVS	Civil registration and vital statistics
ICD	International Classification of Diseases
MCCD	Medical Certificate of Cause of Death
MLDI	Medicolegal death investigation
MOD	Manner of Death
MPDSR	Maternal and perinatal death surveillance and response
VA	Verbal autopsy
WHO	World Health Organization

Summary

This document aims to help governments achieve complete death registration, with accurate cause of death information, in order to generate timely mortality statistics for use in public health interventions and policy-making. It describes good practices for the collection, sharing and use of cause-of-death (COD) data in civil registration and vital statistics (CRVS) systems. There is no single "best practice" for how cause-of-death data should be collected, shared with other government entities, processed through the civil registration system, and used for the generation of cause-of-death statistics and other purposes. Instead, there are various "good practices" that work within a country's government, civil registration system, and health care system to create a holistic system that is efficient and effective. These good practices have one thing in common: They use processes that help achieve the goals set out in Section IV of this Guidance—namely, all deaths are registered and medically certified (whenever possible), mortality statistics disaggregated by age and sex are generated on a regular and timely basis, and cause-of-death data is shared in a timely manner for public health action and policymaking.

Sections I, II and III define the target audience for this Guidance, suggest how to use the document, and elaborate on the scope and purpose of the Guidance.

As mentioned above, Section IV identifies goals for collecting, sharing and using cause-of-death data in the CRVS system.

Section V of this Guidance focuses on the good practice procedures that help achieve these goals, detailing the sources of cause-of-death data—namely, the Medical Certificate of Cause of Death (MCCD), cause-of-death information from the medico-legal death investigation (MLDI) system, and verbal autopsy (VA). It sets out the flow of cause-of-death data for each of these three main sources, from the point of collection to the civil registration agency (where appropriate) and to the statistics agency. Section V also discusses where and when International Classification of Diseases (ICD) mortality coding may take place within the various processes and discusses procedures for amending cause-of-death data when new information surfaces.

Section VI examines maintaining confidentiality of cause-of-death data, including whether and how COD is included on a death certificate.

Finally, Section VII addresses the use of COD data for the generation of annual vital statistics and more frequent provisional statistics, and real-time sharing of COD data for public health purposes.

I. Target audience

This Guidance describes good practices that may be used in generating and using national mortality and cause-of-death data. The target audience of this Guidance therefore includes, but is not limited to, decision-makers, planners, and other managers at ministries of health, national statistics agencies, and civil registration agencies in countries aiming to improve their processes and routine standard operations to collect, process, and increase the completeness and quality of cause-of-death data and to use the data to monitor and enhance population health. These good practices are applicable to and may be used by stakeholders in countries at all levels of development of the CRVS system, regardless, for example, of whether electronic or paper processes are used.

II. How to use this Guidance

This Guidance is designed to provide policy- and decision-makers with an overview of good practices for the collection, processing, use and sharing of COD data. While it addresses COD specifically, it may be used in combination with other guidance documents to strengthen the CRVS system as a whole. For example, the Guidance can be used in conjunction with the "CRVS Systems Improvement Framework" and the "Technical Guidance for Strengthening the Vital Statistics Production Process," which encourages users to undertake CRVS business process improvement exercises, including for cause-of-death processes. This Guidance document can be used to inform such discussions about business process improvement for the collection and processing of COD in the CRVS system. In addition, the "CRVS Systems Improvement Framework" describes a methodology to assess the completeness and quality of COD data, establish key indicators for COD data performance, and monitor and evaluate whether those key performance indicators are met. A sample of complementary key performance indicators for COD data can be found in Annex 1 of this document. Likewise, the "Technical Guidance for Strengthening the Vital Statistics Production Process" provides steps that should be considered when collecting, sharing, processing, analyzing and disseminating COD data as part of vital statistics.

This Guidance document may also be used in conjunction with the "Strengthening CRVS Systems Guides" which elaborate on how to implement

systems for birth and death registration, medical certification of cause of death, International Classification of Diseases mortality coding, and verbal autopsy.

After stakeholders have decided upon desired processes and system design, they should analyze their country's CRVS legal framework to ensure that the laws underpinning the CRVS system support any new processes. It is particularly important to ensure that current laws do not conflict with or prohibit any new processes. For more information on how to design a strong CRVS legal framework, see the United Nations' "Guidelines on the Legislative Framework for Civil Registration, Vital Statistics and Identity Management Systems." For information on how to analyze a CRVS legal framework, see the "Legal and Regulatory Review Toolkit."[1]

Given the multiple stakeholders in the CRVS system, users of this guide should work collaboratively with all stakeholder agencies in their systems improvement efforts.

III. Scope and purpose of this Guidance

This Guidance focuses exclusively on processes for the collection, data processing, sharing and use of COD data. Because there is no single best practice for the collection, sharing and use of COD data, the Guidance instead presents country case studies and examples of good practice, so that stakeholders may determine for themselves which will work best in their country and adapt them to their context.

Some civil registration topics are beyond the scope of this document. Readers should be well versed in civil registration best practices before using this Guidance. Best practices for civil registration of the fact of death—including who or which entity should act as informant and notifier, the notification and declaration process, and the steps for registration and certification—are not included here.[2] Further, while physicians must be well trained on how to complete a medical certificate of cause of death in order to yield quality COD data, training on how to complete an MCCD is beyond the scope of this document. Finally, while the Guidance discusses where and when ICD mortality coding may take place within the various processes, it does not contain instructions on how to conduct

1 Regarding the "Legal and Regulatory Review Toolkit", users may find the following chapters of the toolkit particularly helpful: Chapter 3 (Birth and Death Registration), Chapter 5 (Determining and Certifying Cause of Death), Chapter 6 (Medicolegal Death Investigation), and Chapter 9 (Production of Vital Satistics).

2 For more details see: https://www.vitalstrategies.org/resources/the-health-sector-in-civil-registration-options-and-methods-to-increase-registration-of-live-births-stillbirths-and-deaths/.

ICD mortality coding, nor does it provide guidance on how to conduct mortality coding quality assurance.

For resources on best practices for registration of death, training on medical certification of cause of death, and how to conduct ICD mortality coding, see Annex 2.

IV. Goals for collecting, sharing and using cause-of-death data in the CRVS system

The collection, analysis, sharing and use of COD data in any CRVS system should adhere to and help achieve the following three goals.

Goal 1: All deaths are officially registered and have a medically certified cause of death.

Countries should strive to register 100% of deaths that occur in the country and to have a medically certified COD assigned to each death. However, in some contexts—particularly in countries where many people die at home and without medical care—it may not be possible to obtain a medically certified COD for all deaths. In these circumstances, a lack of a medically certified COD should not prevent the civil registration of a death; instead, the death should be registered without a COD. The family, or any other lay person, should not be asked to provide a COD on a death registration application, because they are not qualified to determine the COD. However, in these circumstances, verbal autopsy may be used as an interim measure to ascertain a cause of death for statistical purposes with the the long-term aim to have a MCCD for every death.

Goal 2: A national-level entity generates vital statistics on all-cause and cause-specific mortality by age, sex and location.

A national-level government entity—usually the national statistics office or other entity, such as the ministry of health—should be provided with anonymized death registration data and COD information on a regular basis for the purpose of generating related vital statistics. When a death is registered, in addition to recording the COD (if available), the United Nations recommends collecting data on the sex, age and usual place of residence of the decedent and the date and location of death. This permits statistical analysis and interpretation of all-cause and cause-specific mortality by age, sex and location. In addition to disseminating final

cause-specific mortality statistics on an annual basis, the statistics entity should also provide provisional[3] all-cause (or provisional cause-specific, if available) mortality statistics on a more frequent basis, such as quarterly, monthly or weekly. Such timely mortality analysis is particularly relevant in times of disruption to mortality patterns, such as during the recent COVID-19 pandemic.[4] Generation of provisional statistics is discussed below in Part VII, Section 1, and Box 2.

Goal 3: Cause-of-death data is shared in real time for public health purposes. Because final annual vital statistics may take more than a year to produce, provisional COD data should be shared in real time, or near real time, with health officials for purposes of public health surveillance and other public health uses. Timely sharing of cause-of-death data is discussed below in Part VII, Section 2.

V. Processes for achieving the goals of cause-of-death data collection in the CRVS System

This section describes different sources and methods for collecting cause-of-death data and the processes by which cause-of-death data is transmitted to the civil registration agency (as applicable), statistics agency and other government entities with a need for the data. These processes aim to achieve the goals set out above. Country examples are provided to illustrate various good practices.

1. Sources of cause-of-death data

There are three main sources and methods of collecting cause-of-death data.

1. A medical certificate of cause of death (MCCD) from the health sector for natural deaths (such as infections and noncommunicable diseases)
2. An MCCD and other cause-of-death information from the medicolegal death investigation system for unnatural and suspicious deaths (for example, accidents, interpersonal violence, poisoning, suicide)
3. Verbal autopsy

3 Provisional data are based on the current flow of records, and may change when the recors are complete.
4 Vital Strategies,"Revealing the Toll of COVID-19: A Technical Package for Rapid Mortality Surveillance and Epidemic Response," available at: https://www.vitalstrategies.org/resources/revealing-the-toll-of-covid-19-a-technical-package-for-rapid-mortality-surveillance-and-epidemic-response/.

Lay reporting is used in some countries, which is not recommended as explained in section 1.4.

The following sections discuss each of these three sources for the collection of cause-of-death data.

See Annex 7 for a table that summarizes the various sources of cause-of-death data, their methods of collection and their statistical reliability.

As noted above, while the goal is to have all deaths registered with a cause of death, in some countries and contexts it may not be possible to obtain a determination of cause of death by any of the three methods. For example, in some countries, a large percentage of people die at home without medical care and therefore a physician may not be able to medically certify cause of death. It would not be financially or operationally possible to refer all medically unattende deaths to the MLDI system. Nor would it be realistic to refer all these deaths to VA because it is a time-consuming and expensive process. Instead, VA can be used to generate population-level data from a sample of deaths to provide the necessary insights for public health decision-making. If it is not possible to ascertain a cause of death through MCCD, MLDI or VA, the death must be registered regardless. The lack of a cause of death should not prevent civil registration of the fact of death. Having said that, in the long run, the aim should be for all deaths to be seen by a medical professional to determine the manner of death and the cause of death; i.e. doing VA and / or having deaths without a cause of death should be a temporary state in the development of the COD system with the long term aim of having an MCCD for every death. With increasing coverage of health services and the use of those services by the population, this transition can occur.

1.1 Medical Certificate of Cause of Death (MCCD)

1.1.1 Form

Definitions: The World Health Organization's International Standard Form of the Medical Certificate of Cause of Death (WHO MCCD) is the recommended form for recording cause and manner of death information for medical certification of cause of death. It should be used for all deaths, including fetal deaths (stillbirths) and deaths referred to the MLDI system (as discussed further in Sections 1.2, 2.4 and 3). The WHO MCCD is designed to facilitate structured reporting of the sequence of diseases or conditions leading to death, as well as the manner of death. As such the WHO MCCD is required to enable ICD

mortality coding. This standardization of COD data collection allows for comparability of mortality statistics across countries and over time.

"Causes of death" refers to all diseases, morbid conditions or injuries that either resulted in or contributed to death, and the circumstances of the accident or interpersonal violence that produced any such injuries.[5] Underlying cause of death is defined as "the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury."[6] Manner of death (MOD) explains the circumstances in which a death occurred. On the WHO MCCD, the options for manner of death include: disease, accident, intentional self-harm, assault, legal intervention, war, pending investigation, unknown or manner undetermined. The WHO MCCD is attached as Annex 3.

Operational aspects: The WHO MCCD is split into three sections: "Administrative Data," "Frame A: Medical Data" and "Frame B: Other Medical Data." Frame A of the WHO MCCD contains data fields for the sequence of causes of death in Part 1, as well as for other significant conditions contributing to death in Part 2. Frame B includes information on recent surgery, whether an autopsy was performed, the manner of death, place of external cause, questions regarding fetal and infant death, and whether the deceased was pregnant at the time or within one year of the death. All sections of the MCCD should be completed. It is particularly important that manner of death be completed by medical personnel because manner of death helps ICD mortality coders verify an accurate cause of death.[7] In addition, completing manner of death enables statistical studies on injuries and other deaths, which allow for the development of public health policy interventions.[8]

In some countries the form used to report or notify the death for civil registration purposes is separate from the MCCD. However, WHO guidance states that countries may modify the "Administrative Data" section of the MCCD.[9]

5 United Nations, "Principles and Recommendations for a Vital Statistics System," Revision 3, 2014, https://unstats.un.org/unsd/demographic/standmeth/principles/m19rev3en.pdf, p. 201.

6 World Health Organization, https://www.who.int/standards/classifications/classification-of-diseases/cause-of-death.

7 "WHO Recommendations for conducting an external inspection of a body and filling in the Medical Certificate of Cause of Death (MCCD)," 2023, https://www.who.int/publications/m/item/who-recommendations-for-conducting-an-external-inspection-of-a-body-and-filling-in-the-medical-certificate-of-cause-of-death, p. 17.

8 U. S. Standard Certificate of Death, Instruction for Item Number 37 Manner of Death, https://www.cdc.gov/nchs/data/dvs/death11-03final-acc.pdf and
National Association of Medical Examiners, "A Guide for Manner of Death Classification," https://name.memberclicks.net/assets/docs/4bd6187f-d329-4948-84dd-3d6fe6b48f4d.pdf.

9 See Annex 3 for the WHO MCCD (2016), instructions in the "Administrative Data" section.

Many countries have done so and have developed a form that combines a notice of death, which serves as proof of the death for civil registration purposes, with the medical certification of cause of death. We will refer to this as a combined notice-of-death/MCCD form. The U.S. Standard Certificate of Death (attached as Annex 4) and the MCCD Form of the Special Capital Region of Jakarta (attached as Annex 5) are examples of a combined notice-of-death/MCCD form.

Some countries have developed a bifurcated form. This type of form allows the document to be torn at the line of bifurcation so that one portion of the form - containing biographical information - may be used for civil registration purposes and the other portion - containing cause of death and other information - may be used for statistical purposes. Separating biographical information from statistical information helps maintain confidentiality of cause of death in countries where cause of death is used only for statistical purposes. Morocco's Certificate of Death (Certificat de Décès) (attached as Annex 6) is an example of a bifurcated form. Similarly, the MCCD form of the Special Capital Region of Jakarta in Indonesia is a multipage form with partial carbon copy (attached as Annex 5).

1.1.2 Certifier

Definitions: The person who completes the cause and manner of death sections of the MCCD is referred to as the certifier. A certifier should be a medical professional trained in the proper way to complete the MCCD. For deaths due to natural causes that occurred in a health facility (whether public or private) or at home under medical care, the certifier should be the attending physician or other physician with knowledge of the case.

Operational aspects: Some countries lack a sufficient number of physicians to medically certify all deaths that occur under the care of a health professional. Therefore, under these circumstances, some countries (for example, Uganda and Malawi) train other medical professionals, such as nurses and physician assistants, on medical certification of cause of death to implement a model of task sharing.

In circumstances where there is no attending physician or other medical professional with knowledge of the case, the death may be referred to the MLDI system, or for natural deaths and as locally applicable to verbal autopsy (whichever is appropriate), or simply registered without a cause of death.

1.2 MCCD and other COD information from the medicolegal death investigation system

1.2.1 Form

Definition: The medicolegal death investigation system is responsible for investigating deaths due to suspicious or unnatural causes, such as accidents, assaults and suicides. Many countries also refer other types of deaths to the MLDI system when there is a public interest in developing interventions to prevent such deaths—for example, maternal deaths and deaths due to specified infectious diseases. Also, unattended deaths and deaths of public health importance may be referred to the MLDI system. The types of deaths referred to the MLDI system might be defined in a country's civil registration law, but more often are defined in a country's criminal procedure code, criminal code and/or public health laws.

Operational aspects: Cases referred to the MLDI system should be medically certified using the WHO MCCD (just as with natural deaths) in order to enable compilation of mortality statistics that includes natural and unnatural deaths. In some countries where a different form is used, or there is no clear mandate on which form to use, the statistics offices struggle to align the data from MLDI with data from the health sector. Therefore, use of different forms should be avoided.

1.2.2 Certifier

There are three main types of MLDI systems: led by medical examiner, led by coroner, and led by law enforcement. In a medical examiner system, the medical examiner is usually a forensic pathologist or, at minimum, a pathologist or physician trained in postmortem examinations; the medical examiner will therefore complete the MCCD. In contrast, coroners and law enforcement officials are usually not pathologists or physicians. In systems led by a coroner or law enforcement, the death should be referred to a pathologist or other physician working with the coroner or law enforcement for a postmortem examination. This pathologist or physician will complete the MCCD.

In addition, the coroner or police/prosecutor (depending on the system) may complete an additional form containing information about the deceased and the cause of death. The cause of death in the coroner's or police/prosecutor's form should be based upon the postmortem examination and MCCD completed by the pathologist or physician.

1.3 Verbal autopsy

Definition: Verbal autopsy is a method used to ascertain cause of a death based on an interview with next of kin or other caregivers. Verbal autopsy may be used when the deceased dies outside a health facility or was not under the care of a medical professional, and the case does not fall within the jurisdiction of MLDI authorities. The purpose of VA is to describe the causes of death at the community level or population level in instances where no better alternative sources of mortality data exist.[10]

Operational aspects: Because VA is time-consuming, expensive and the data is only valid at the population level, most countries do not conduct VA for all natural deaths that occur outside of health facilities, especially if this number is large. Countries generally select a sample of deaths for VA in order to generate probable COD that is valid at the population level.[11]

VA may be conducted by a wide range of individuals, including lay community members, health care workers and research field workers.[12] The interviewer should be trained in the use of the WHO VA standardized interview questionnaire, which elicits information on signs, symptoms, medical history and circumstances preceding death.

The cause of death, or the sequence of events that led to death, are based on the data collected using the VA questionnaire and any other available information.[13] The cause of death may be assigned by using a computer algorithm (automated VA) or by a physician who reviews the VA questionnaire results and assigns a COD (physician-certified VA).[14] Automated VA uses a limited COD list and results in a cause-of death distribution for the 10 to 20 leading causes of death in the population under consideration (e.g., a nationally representative sample).

10 World Health Organization, "Verbal autopsy standards: 2022 WHO verbal autopsy instrument," https://www.who.int/standards/classifications/other-classifications/verbal-autopsy-standards-ascertaining-and-attributing-causes-of-death-tool, p. 21.

11 U.N. Economic and Social Commission for Asia and the Pacific (ESCAP), 2021. "Verbal autopsy and the Regional Action Framework on Civil Registration and Vital Statistics in Asia and the Pacific: operational procedures, practices and innovations," https://www.unescap.org/sites/default/d8files/event-documents/ESCAP_MCCRVS_2021_INF_2_Verbal_autopsy_and_RAF_on_CRVS.pdf.

12 Gouda HN, Flaxman AD, Brolan CE, Joshi R, Riley ID, AbouZahr C, et al., New challenges for verbal autopsy: Considering the ethical and social implications of verbal autopsy methods in routine health information systems. *Soc Sci Med.* 2017;184:65–74.

13 World Health Organization, "Verbal autopsy standards: 2022 WHO verbal autopsy instrument," https://www.who.int/standards/classifications/other-classifications/verbal-autopsy-standards-ascertaining-and-attributing-causes-of-death-tool#:~:text=Verbal%20autopsy%20instrument%202022,also%20deaths%20caused%20by%20injuries.

14 United Nations, "Principles and Recommendations for a Vital Statistics System," Revision 3, 2014, https://unstats.un.org/unsd/demographic/standmeth/principles/m19rev3en.pdf, paragraphs 499-501.

There are two good practices of data collection with physician-certified VA. In the first, the physician reviews only the VA interview and assigns a cause of death based on a limited or the full list of ICD mortality codes. Ideally, two physicians will review the outcome of the interview and formulate a cause of death independently. If there is a discrepancy, a third physician should arbitrate the result.[15] This method is statistically reliable at the population level but not at the individual level, and no MCCD is completed.

In the second good practice, a physician reviews the VA interview and recent medical records and assigns a cause of death based on the full list of ICD mortality codes. This is only possible if the person who died in the community was either recently discharged from the health facility or had sought medical care in the health facilities at the time of sickness in the period leading to death. This latter method is statistically reliable at the individual level, and in some countries the physician may complete an MCCD based on the results of VA and a review of medical records. If such an approach is used, the fact that the MCCD form was completed based on a VA should be captured on the MCCD.

1.4 Lay reporting

Definition: Some countries allow the use of lay reporting of cause of death by the informant as part of the civil registration process. For example, the next of kin may complete an application for death registration and fill in a data field for cause of death. Or a civil registrar or other official may conduct an unstructured interview with the next of kin or other informant and fill in a cause of death in the death register.

Operational aspects: Lay reporting has neither legal nor statistical value because the providers of the information cannot be assumed to have the necessary medical knowledge to determine the cause of death. Therefore, lay reporting should never be used as a method of collecting cause-of-death data.

2. Flow of cause-of-death data from MCCD

2.1 Completion of MCCD: paper-based and digital systems

An MCCD may be completed in paper format or digitally. Whether paper-based or digital, the MCCD should be completed by the certifier as soon as possible after the cause of death is determined. In cases of natural death, this is usually just after

15 World Health Organization, "Verbal autopsy standards: 2022 WHO verbal autopsy instrument," p. 20.

death or the next day.[16] In cases referred to the MLDI system, certification of cause of death may take longer, as discussed in Section 5 (Process for amending COD if new information is discovered) below.

MCCD data entry should occur close to the source of the cause-of-death data—i.e., at the hospital level. Preferably, physicians completing an electronic MCCD should be equipped to enter the causes of death (the data in Frame A of the WHO MCCD paper form) and manner of death (the data in Frame B of the WHO MCCD paper form) directly into the electronic system. Other medical or administrative staff may enter the biographical and other medical information (the remaining data in Frame B of the WHO MCCD paper form) directly into the system. Other medical or administrative staff should have authorization only for data entry and not be given access to the full database of all the MCCD forms for the facility.

The flow of cause-of-death data is as described below, whether paper-based or digital. However, if paper forms are used, formal channels for submitting paper forms—such as designated staff or courier services—should be used, and the point of data entry defined in the process.

2.2 ICD mortality coding

After an MCCD is completed, the underlying cause of death must be derived by applying International Classification of Diseases mortality coding rules.

Definition: ICD mortality coding is the correct assignment of ICD alphanumerical codes to the conditions reported on the MCCD form followed by the correct application of mortality coding instructions to select the underlying cause of death according to established criteria. ICD mortality coding generates data that is relevant for a public health action.[17] It also allows for comparison of mortality statistics over time, nationally and internationally.

Operational aspects: ICD mortality coding is a separate activity from medical certification of cause of death and should be carried out by trained mortality coding staff (also referred to as nosologists), not the physician who completed the MCCD form.[18] Because mortality coding requires highly trained skill, it is

16 NHS Inform, Practical advice after a death, https://www.nhsinform.scot/care-support-and-rights/death-and-bereavement/practical-advice-after-a-death/.

17 World Health Organization, https://icdcdn.who.int/icd11referenceguide/en/html/index.html#coding-instructions-for-mortality.

18 United Nations, "Handbook on Civil Registration and Vital Statistics Systems: Management, Operation and Maintenance," Revision 1, 2021, https://unstats.un.org/unsd/demographic-social/Standards-and-Methods/files/Handbooks/crvs/crvs-mgt-E.pdf, paragraph 120.

preferable to have mortality coding staff located at the central (national) level, which helps ensure consistency of mortality coding throughout the country. The entity responsible for mortality coding varies among countries. Mortality coding often takes place within the statistics agency, but in some countries mortality coding may take place within the ministry of health or within the national civil registration agency. In regions with many small countries, such as the Pacific, coding may take place regionally to leverage combined resources.[19]

Ideally, ICD mortality coding will be automated using a program such as DORIS[20] or Iris.[21] However, even when an automated program is used, trained mortality coders are needed to:

1. Resolve issues with incomplete, inaccurate or noncompliant MCCDs
2. Follow up with certifiers
3. Manually code rejected or otherwise problematic MCCDs

After quality checks and ICD coding, the coding agency determines the underlying COD. It is the work of the coder to ensure the quality of the underlying COD. If the coder finds a sequence of events that does not support the cause of death assigned by the certifier, incomplete information, or other information that raises questions, it is the responsibility of the coder to take the applicable steps to address the issues. Consequently, the underlying COD assigned by the coding agency may be different from the original underlying COD assigned by the physician (i.e., the cause of death listed on the lowest used line of Part 1 of the particular MCCD). The underlying COD is used for generating cause-of-death statistics.

When ICD coding takes place in an agency other than the entity responsible for statistics, it is necessary for the coding agency to share the ICD-coded COD data with the statistics entity, as is discussed further in Sections 2.3.1 and 2.3.2, in order to allow the statistics entity to generate vital statistics.

2.3 Submission of cause-of-death data to the civil registration and/or statistics agency

As stated in Goals 1 and 2, countries should aim to ensure that all deaths are officially registered with the civil registration agency and have a medically

19 Pacific Community, Pacific Island countries get boost in health data with ICD-11 center, 17 March 2023, https://www.spc.int/updates/blog/blog/2023/03/pacific-island-countries-get-boost-in-health-data-with-icd-11-centre.
20 World Health Organization, https://icd.who.int/doris/.
21 https://www.bfarm.de/EN/Code-systems/Collaboration-and-projects/Iris-Institute/Iris-software/_node.html.

certified cause of death, so that the COD data may be used for the generation of cause-of-death statistics. In general, there are two ways to achieve these goals:

1. The MCCD/underlying cause of death and the notice of death are submitted from the health sector to the civil registrar, who officially registers the death and then submits all of the information, anonymized, to the national statistics agency for further analysis and production of vital statistics reports. Or
2. The anonymized MCCD/underlying cause of death is submitted directly from the health sector to the statistics agency. With this approach, only the notice of death is submitted from the health sector to the civil registrar, who then registers the death and submits this information, anonymized, to the national statistics agency. In this process, the anonymized notice-of-death information and anonymized cause-of death information must be matched at the statistics agency in order to have a complete dataset. Such linking would need to be facilitated by assigning a unique number to the event or the individual concerned.

Each of these processes is discussed in more detail below, including when and where coding is incorporated. Annex 7 provides a decision tree that presents all the possible processes.

2.3.1 Options for the processes for COD data submission to the civil registration and then the statistics agencies

2.3.1.1 Submission of MCCD to the civil registration agency

The health facility or certifier submits the MCCD to the civil registration agency (together with other required information), either directly or through the coding agency, which validates and codes the causes of death..[22] In some countries, privacy and health information laws prevent transmission of the MCCD to the registrar, and therefore the MCCD is given to the family. This presents two problems. First, giving the MCCD to the family may also induce the physician to avoid mentioning causes of death on the MCCD that are stigmatizing or likely to be perceived as problematic by family members—for example, deaths due to HIV/AIDS, suicide or drug overdose. Second, if the family fails to declare the death to

22 United Nations, Guidelines for the Legislative Framework for Civil Registration, Vital Statistics and Identity Management Systems, New York, 2019, paragraph 328.

the registrar, or declares the death but fails (unintentionally or otherwise) to provide the MCCD to the registrar, the cause of death data will be lost to the CRVS system. Therefore, if a country's privacy laws prevent transmission of the MCCD to the registrar, the MCCD should be transmitted directly to the entity responsible for cause of death statistics, as presented in Section 2.3.2.

2.3.1.2 Recording COD in the death register

Country practices vary regarding whether the cause of death is entered into the death register of the civil registrar. In some countries, cause of death is used for legal purposes and is therefore part of the official death registration record. Other countries use COD data for statistical purposes only. Where this is the case, the civil registrar is merely an intermediary for forwarding this information to the statistics agency together with the information from the notice-of-death form; COD is not entered into the death register.

Most countries that record COD in the death register include only the underlying COD. However, some jurisdictions—including U.S. states—record the immediate, antecedent and underlying COD in the death register. Other jurisdictions—for example, the United Kingdom—record the immediate and underlying COD but not the antecedent COD[23]. Regardless of which COD data fields are recorded, the primary reason for storing COD information in the death register is that this information may be needed for legal purposes in the future. For example, the next of kin may need to prove COD in order to claim benefits from life insurance, pensions or social services. If the civil registrar records COD information, the next of kin will be able to obtain a (long-form) death certificate stating the COD for their legal purposes. However, many countries—such as France and most French-speaking countries—do not record COD in the death register because COD information is treated as confidential. In these countries, in case of need (for example, for insurance purposes) the certifying physician can prepare a report stating that the COD was natural (if in fact that is true).

If cause of death is recorded in the death register, processes must be put into place to ensure that the information is kept confidential. See Section VI for more on confidentiality.

23 The "immediate cause of death" is the final condition that directly results in death. The "antecedent cause of death" is the condition(s) that led to or precepitated the immediate cause of death.

2.3.1.3 Civil registration agency submission to statistics agency

After receiving the MCCD (and notice of death), registering the event and entering all relevant information into the death register, the civil registrar is responsible for sending the registration record, including the MCCD, to the statistics agency. The record and MCCD should be anonymized, removing the name and other potentially identifying data before submission to the statistics agency. For more information on anonymization of data, see the United Nations' Guidelines on the Legislative Framework for Civil Registration, Vital Statistics and Identity Management Systems.[24]

In the process set out above, where the MCCD is sent to the civil registrar and then to the statistics agency (see Diagram 1), ICD mortality coding is done at the statistics agency. However, it is also possible that coding is conducted at the ministry of health (see 2.3.1.4) or the civil registration agency (for example in Zambia ICD mortality coding is done at the headquarters of the Department of National Registration, Passport and Citizenship), depending upon where a country has established its coding unit.

DIAGRAM 1

24 United Nations, "Guidelines on the Legislative Framework for Civil Registration, Vital Statistics and Identity Management Systems," 2019, https://desapublications.un.org/publications/guidelines-legislative-framework-civil-registration-vital-statistics-and-identity, paragraphs 488 and 506.

2.3.1.4 Submitting only underlying cause of death to the civil registrar

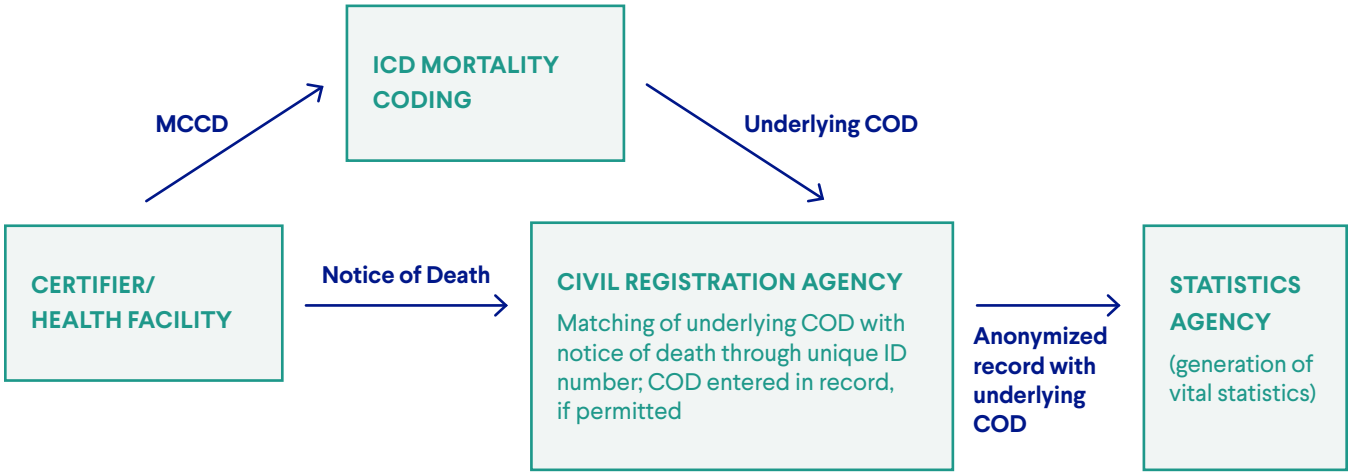
In some countries, only the underlying COD is submitted to the civil registrar, not the entire MCCD. The rationale for doing so is that the MCCD contains confidential medical information beyond just the underlying COD, and usually only the underlying COD is needed for legal purposes.

In countries that follow this practice, the health facility or physician will submit the MCCD to the agency responsible for ICD mortality coding, often the national statistics agency or the ministry of health. After quality checks and ICD mortality coding, the ICD mortality coding agency extracts the underlying COD and submits it the civil registration agency so that the civil registrar can include the underlying COD in the death registration record (this matching of records at the civil registrar can happen before or after the death is registered). Note that when this process is followed, the MCCD and notice of death should both contain a unique identification number (either for the event or for the individual concerned). When the ICD mortality coding agency sends the underlying COD to the civil registration agency, it should include the unique tracking number so that the underlying COD can be matched to the correct death registration record at the civil registration agency. Such a unique tracking number can also be used to monitor the civil registration of all deaths that have an MCCD and to ensure that all applicable deaths are matched with a COD (see also 2.3.2 below). The civil registration agency will send the anonymized death registration record with the underlying COD to the statistics agency. See Diagram 2.

Note that some countries extract both the immediate and underlying causes of death for submission to the civil registration agency. For example, in the United Kingdom, the Office for National Statistics, which carries out ICD mortality coding, extracts the immediate and underlying causes of death and sends them to the registration agency.[25]

25 United Kingdom, Office for National Statistics, User Guide to Mortality Statistics, https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/methodologies/userguidetomortalitystatisticsjuly2017.

DIAGRAM 2



2.3.2 Options for the processes for COD data submitted only to the statistics agency

Because COD is confidential medical information - often designated as such- by law - some countries choose to use COD data only for statistical purposes. These countries therefore submit COD data only to the statistics agency and not to the civil registration agency. While this protects the privacy of the deceased, there will be no legal record of the COD at the civil registrar's office, and therefore next of kin will be unable to obtain a death certificate with COD if needed for legal purposes.

In countries that submit COD data only to the statistics agency, various good practices are followed. In these processes, ICD mortality coding may occur in the health sector or at the statistics agency.

Some countries, such as Morocco, use a bifurcated notice-of-death and MCCD form. The health facility forwards the entire form to the Communal Health Bureau. The Communal Health Bureau then forwards the MCCD portion to the ministry of health and provides the notice-of-death portion to the family to use in registering the death. The ministry of health assigns ICD mortality codes in the MCCD portion of the form and generates mortality statistics.

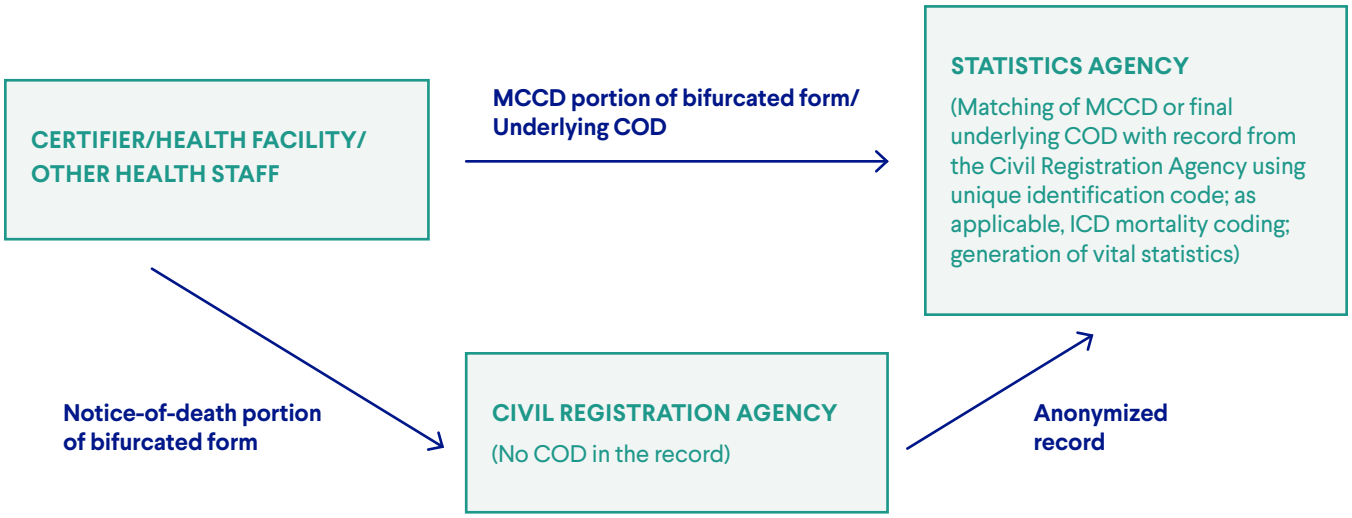
Germany similarly uses a bifurcated notice-of-death and MCCD form. In Germany, one portion of the form (the nonconfidential portion) is handed

to the next of kin for submission to the civil registration office. The MCCD portion (the confidential portion), which does not contain a name or any information that can identify the deceased, is submitted to the regional statistics office. The causes of death of all deceased are recorded by the regional statistics offices; they are then included in the mortality statistics of the federal government and the federal states.[26]

If a country submits the COD data only to the statistics agency (without the information flowing through the civil registration agency), there must be a way to ensure that the statistics agency has all the needed biographical information about the deceased—such as date of birth, sex, place of residence, and date and place of death—in order to generate COD tabulations. If paper forms are used, this could be done by including all needed biographical and statistical information in the portion of the form that is submitted to the statistics agency. This in turn would mean that some data fields—such as date of birth and date and place of death—would be included in both portions of the form, because they are used for legal purposes in the notice-of-death portion of the form and for statistical purposes in the MCCD portion of the form. However, physicians often object to providing the same information twice, with the result that often some information is missing from the MCCD portion of the form. Therefore, a better practice is to include legal/biographical data fields only in the notice-of-death portion of the form, and causes of death and other medical data in the MCCD portion. The two portions of the form will carry a unique identification code that is used by the statistics agency to match the anonymized COD data with the anonymized registration information submitted to the statistics agency by the health sector and civil registrar, respectively. Such a unique identification code is necessary for both physical and electronic data transmission along the two pathways. See Diagram 3. The unique identification code will usually be preprinted on paper forms or pre-generated on e-forms in order to avoid duplication.

26 Germany, Federal Institute for Drugs and Medical Devices, Causes of death statistics, https://www.bfarm.de/EN/Code-systems/Classifications/ICD/ICD-10-WHO/Causes-of-death-statistics/_node.html.

DIAGRAM 3



2.4 Stillbirths tracked through ministry of health

As with death, a stillbirth (which is a late-term fetal death)[27] should have a medically certified cause of death. The majority of countries require stillbirths to be registered through the civil registration agency with the stillbirth recorded in a register that is distinct from the birth and death register. Apart from having a distinct register, the flow of cause-of-death data for a stillbirth will generally be the same as for a death.

However, some countries—including France, Colombia and Cambodia—do not register stillbirths at the civil registration agency. Instead, stillbirths are reported and tracked through the health sector. In such countries, the health facility where the stillbirth occurred will complete the MCCD and submit it to the ministry of health. In some countries, the ministry of health is responsible for sending anonymized stillbirth MCCD information to the national statistics agency, which then compiles statistics on stillbirths. In other countries, the ministry of health itself is responsible for compiling statistics on stillbirths. Either is good practice. The ministry of health or the statistics agency may be responsible for ICD mortality coding of the stillbirth MCCD.

27 A fetal death is defined by WHO as a death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the 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 muscle. Stillbirths are a subset of fetal deaths. WHO recommends the following threshold criteria for stillbirths: gestational age greater than or equal to 22 completed weeks, or weight greater than or equal to 500 grams. ICD-11 Reference Guide, World Health Organization, https://icdcdn.who.int/icd11referenceguide/en/html/index.html, section 2.25.4.3 and 2.25.4.5.

3. Flow of MCCD and other COD data in cases referred to the MLDI system

The type of MLDI system—whether led by a medical examiner, a coroner or law enforcement—establishes by law the flow of COD data within the system and to the civil registration agency and/or statistics agency, as discussed below.

3.1 Medical examiner system

In a medical examiner system, the medical examiner is responsible for submission of the MCCD. Specifically, in countries that submit the MCCD to the civil registration agency, it will be the responsibility of the medical examiner to submit the MCCD to the civil registration agency, either directly or through the Ministry of Health or the coding agency. In countries where the MCCD is submitted only to the statistics agency, the medical examiner will submit the MCCD to the statistics agency. If the underlying COD is submitted only to the civil registration agency, the medical examiner will send the MCCD to the coding agency, which will then extract the underlying COD and send it to the civil registration agency.

3.2 Coroner- or law enforcement–led systems

In systems led by a coroner or law enforcement, the forensic pathologist working with the coroner or law enforcement completes the MCCD and sends a separate pathology report about cause of death to the coroner or law enforcement. The coroner or law enforcement (as applicable) then completes a report and submits it to the civil registration agency, thereby declaring the death for civil registration purposes. In countries where COD is recorded in the death register, the report will include a COD section similar to Frame A of the WHO MCCD. This information should be based on the pathology report and MCCD. Depending on the practices followed in individual countries (as discussed in Section 2.3), the MCCD itself may be submitted to the civil registration agency, go directly to the statistics agency, or be submitted to the ICD mortality coding agency for extraction of the underlying COD.

Some countries have an MLDI system that employs both coroners and medical examiners. In these systems, the law should explicitly state which of the two officials—coroner or medical examiner—is responsible for submission of COD data.

4. Flow of COD data from verbal autopsy

If automated VA or physician-certified VA based on interviews alone is used, the results should be used for statistical purposes only. That is because the results are statistically valid at the population level and not the individual level. Therefore, the VA results should be sent directly to the statistics agency. Alternatively, if the VA results are routed through the civil registration agency, the VA-determined COD should not be entered into the death register, and the civil registration agency should forward the COD information to the statistics agency.

Physician-certified VA with a review of medical records is more reliable at the individual level. If the physician reviews both the VA results and recent medical records, the physician may complete an MCCD. In some countries this resultant MCCD is treated like any other MCCD completed by a physician and may be used for legal purposes.[28] In that case, the physician will submit the MCCD to the civil registration agency, or to the statistics agency, or to the ICD mortality coding agency, depending on the usual MCCD processes followed in the country, as discussed in Section 2.3.

5. Process for amending COD if new information is discovered

A definitive cause of death may not always be available within the time period prescribed for reporting the death to the civil registrar, which is usually three to 15 days. This can be the case for deaths referred to the MLDI system. While many cases may be resolved quickly, it can take weeks or months to recieve the results of lab tests, and if an inquest is held, this can take months or years. If the MCCD and notice of death take separate pathways, this is not a problem. The notice of death will be sent to the civil registrar within the prescribed time period, while the MCCD will not be filed until the investigation is complete.

However, if a country uses a combined notice-of-death/MCCD form, the death must be reported on this form within the prescribed period. Therefore, when the results of a postmortem examination are not complete before the expiration of the prescribed registration time period, the combined notice-of- death/MCCD form will be submitted to the civil registrar and/or statistics agency with the

28 World Health Organization and Bloomberg Philanthropies Data for Health Initiative, "Sampling Strategies for Representative National CRVS Verbal Autopsy Planning: A Guidance Document and Sample Size Calculator Tool, Part A—Principles and Strategy," https://cdn.who.int/media/docs/default-source/classification/other-classifications/autopsy/crvs-va-national-sampling-strategies-for-representative-va-implementation.-v2.4.pdf?sfvrsn=2f67c8c6_3.

"pending investigation" box checked in the "manner of death" section of the WHO MCCD. Once the results of the postmortem examination are available, an amended MCCD should be submitted[29] to the civil registrar and/or statistics agency, following the processes ordinarily used for MCCDs, as discussed in Section 2.3.

For an example of how causes of death can be amended in England and Wales, see Box 1.

BOX 1:
Amending Cause of Death in England and Wales

In England and Wales, deaths certified by doctors may have their cause of death amended as a result of a postmortem or of tests initiated before death. The certifier sends this additional information directly to the ICD coding team at the Office for National Statistics (ONS), where it is only used for statistical purposes and does not appear in the public record. In addition, the ONS coders may contact the certifier for more information if the certificate is unclear or they cannot code the underlying cause.

When a death has been certified by a coroner after a postmortem with no inquest, further information may be available once the coroner receives results of bacteriology or histopathology. The cause of death may be amended in these circumstances, although this occurs rarely. For example, following an inquest, coroners may submit to the ONS details of how a fatal accident occurred. Coroners normally only certify the cause of death after their investigations are complete. Usually, the first and only information the ONS receives about deaths is ultimately regarded as the underlying cause.

Coroners may also provide an underlying cause of death much later in circumstances where a death is registered before waiting for the conclusion of a criminal proceeding. For example, a death that is determined to be due to assault after a criminal investigation might initially have been coded as "undetermined."

Source: United Kingdom, Office for National Statistics, User guide to mortality statistics, p. 20, available at: https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/deaths/methodologies/userguidetomortalitystatisticsjuly2017

29 "WHO Recommendations for conducting an external inspection of a body and filling in the Medical Certificate of Cause of Death (MCCD)," 2023, p. 15.

VI. Confidentiality of cause-of-death information

1. Access by authorized officials

If cause-of-death information is stored in the civil register, the civil registration agency must put in place protocols to ensure that the information is secure and may be accessed only by authorized persons for official purposes.[30] The legal framework should ensure that any violation of personal privacy and confidentiality will be penalized. Similarly, health facilities and medical personnel must maintain confidentiality of the MCCD, including when transferring the medical files of decedents to storage.[31]

Maintaining data confidentiality is also important when it comes to VA data. It is particularly important when transmitting data online or using mobile devices to transmit VA data. The data should be end-to-end encrypted during transmission, which ensures that no third party, including internet service providers or malicious actors, can access the data while it is in transit.

2. Inclusion of COD on death certificate issued by the civil registrar

Information on cause of death can be important to close family members of the decedent for insurance, pensions and other matters. Therefore, United Nations guidance provides that close family members should have the right to request COD information.[32] However, due to the sensitive nature of COD information, countries should carefully consider whether, when and how cause of death is included in the death certificate issued by the civil registrar.

Country practices vary with regard to inclusion of COD on the death certificate. Some countries (e.g., Cambodia and Malawi) do not include COD information on death certificates issued by the civil registrar, while others do (e.g. Uganda). If COD is included, only parties with a legitimate interest—such as immediate family or next of kin or their legal representatives—should be able to request a death certificate.[33]

30 United Nations, "Principles and Recommendations for a Vital Statistics System," Revision 3, 2014, paragraph 498.
31 "WHO Recommendations for conducting an external inspection of a body and filling in the Medical Certificate of Cause of Death (MCCD)," 2023, p. 16.
32 United Nations, "Principles and Recommendations for a Vital Statistics System," Revision 3, 2014, paragraph 498.
33 United Nations, "Guidelines on the Legislative Framework for Civil Registration, Vital Statistics and Identity Management Systems," 2019, paragraph 363.

In an effort to balance the needs of the family with the obligation to keep COD information confidential, some countries—such as the U.S.—have developed a short-form and long-form death certificate.[34] The short-form death certificate is the default certificate, issued without cause-of-death information. The long-form death certificate, with cause-of-death information, is issued only when specifically requested and only to close relatives or persons who can prove a legitimate need for the cause-of-death information.

If a country decides to include cause of death on its standard-form death certificate or on a long-form death certificate, a decision must be made as to which causes of death to include. Some countries include only the underlying cause of death. Others include the immediate, antecedent and underlying causes of death. The underlying COD is likely most relevant for legitimate use by family members.

As noted above, some countries—such as France—do not record cause of death in the death register and therefore cannot and do not include cause of death on a death certificate. In France, the actual causes of death can only be released to a judge responsible for investigating a legal matter.

VII. Use of cause-of-death data

Prompt and accurate certification of cause of death serves a number of critical functions. In addition to the well-established legal and administrative functions, information on cause of death is used by governments to monitor the health of the population and to plan and evaluate public health interventions and services. Furthermore, cause-of-death data is extensively used to support epidemiological research.[35]

1. Generation of vital statistics from COD data

1.1 Annual generation of vital statistics including cause-of-death statistics

Vital statistics are statistics about vital events generated from data collected through the civil registration system. The United Nations "Principles and Recommendations for a Vital Statistics System" contains recommended

34 United Nations, "Guidelines on the Legislative Framework for Civil Registration, Vital Statistics and Identity Management Systems," 2019, paragraph 360.

35 "WHO Recommendations for conducting an external inspection of a body and filling in the Medical Certificate of Cause of Death (MCCD)," 2023, p. 11.

tabulations for birth, death, cause of death, infant death, fetal death (stillbirth), marriage and divorce. These tabulations—including COD tabulations—should be published at least annually.[36]

Annual COD tabulations (also called mortality statistics) should be based on all deaths that occurred and were registered with a cause of death during the relevant calendar year and include ICD cause-specific data. Countries should aim to publish final mortality data within 12 months of the close of the calendar year. However, the reality for many countries is that mortality data and other vital statistics are often published two or more years after the close of a calendar year.

Vital statistics can be presented in many forms, including public health bulletins, data reports, and data portals.[37]

1.2 Weekly/monthly/quarterly provisional statistics

Because final cause-specific mortality data can take years to produce, countries should aim to produce and disseminate provisional mortality data at least quarterly, and more frequently if possible. Such dissemination of data to relevant stakeholders (e.g., the ministry of health) will enable the timely use of cause-of-death data.

In some countries, like the United Kingdom, provisional mortality data is based on the notice of death alone (not the MCCD) and therefore does not contain cause-specific data. This is referred to as "all-cause" mortality data. All-cause mortality data provides the incidence of deaths by age, sex and location. While this provisional data does not assist with cause-specific public health interventions, it can help public health officials and other decision-makers to spot mortality trends, such as excess mortality associated with infectious disease outbreaks or extreme weather events (e.g., heat waves, extreme cold).[38] In addition, the use of dashboards—with real-time provisional mortality data—helps nontechnical users understand variation in mortality levels. In pandemic times, government officials can issue short policy bulletins to explain discrepancies in various data sources and educate the public on how to interpret results with caveats. For an example of weekly all-cause mortality data, see the United Kingdom's Office for National Statistics website.

36 United Nations, "Principles and Recommendations for a Vital Statistics System," Revision 3, 2014, paragraphs 258-264.
37 For guidance and examples on how to generate and enhance utilisation of mortality data, see the products and resources available from the Data for Health Data Impact Program: https://www.d4hdataimpact.org/.
38 Vital Strategies, "Revealing the Toll of COVID-19: A Technical Package for Rapid Mortality Surveillance and Epidemic Response," available at: https://www.vitalstrategies.org/resources/revealing-the-toll-of-covid-19-a-technical-package-for-rapid-mortality-surveillance-and-epidemic-response/.

In other countries, like the United States, provisional data is based on the MCCD and therefore contains cause-specific information. However, the data may not be complete and may change when the final data is released. See Box 2 for more information about provisional data in the United States.

BOX 2:
The Centers for Disease Control and Prevention (CDC) Explains Its Provisional Data vs. Final Data Releases for the United States

What are provisional data?
To use our mortality data accurately and effectively, it's important to understand the differences between the two main types of data we release: provisional data and final data.

Provisional data are preliminary data that may not yet be complete. Provisional data reports are based on a current flow of new and updated records received from states. These data may be released monthly or quarterly and are subject to change as information continues to be collected and analyzed—as such, they are estimates that may differ from the final count.

Provisional data are not final and must always be used with the understanding that numbers and information may change as the data becomes more complete.

What are final data?
Final (annual) data are released only after we have received all death records from the states and have fully reviewed the data for completeness and quality.

Final data contain the most accurate and complete information we provide. These official records are used in publications and data visualizations, and for investigation and research, among other uses.

Why does CDC release provisional data?
The benefit of releasing provisional data is timeliness. Final data takes time to ensure accuracy and completeness. Faster and more frequent data releases may signal changes in trends and offer investigators clues about emerging public health events. Preliminary data allows us to track and monitor the ongoing impact of a crisis and take smarter action to save lives.

Timing is everything
The timing of data releases can be complex. Different sets of vital statistics data are released at different intervals—usually monthly, quarterly, or annually. Additionally, it can take varying lengths of time (often between six months and a year, or sometimes longer) for CDC to collect and review different sets of data.

For example, certain types of data (like some causes of death) may require added investigative work and take more time to confirm. Final data always takes longer to release than provisional data.

These differences in timing, as well as some differences in the ways the data are tabulated, can result in variation between the numbers found in the final and provisional data. Understanding the types of data we release and their purposes can help when deciding which data to use.

Source: CDC website, https://archive.cdc.gov/#/details?url=https://www.cdc.gov/surveillance/blogs-stories/understanding-death-data.html.

1.3 Use of verbal autopsy data in vital statistics

Cause-of-death derived from VA can generate plausible cause-specific mortality distributions at the aggregate population level. Therefore, VA-derived cause-of-death mortality statistics should be reported in the national vital statistics report on mortality alongside aggregated cause-of-death data from individual MCCD records. The Rwanda Vital Statistics Report 2023 provides an example of how VA data can be presented alongside other mortality data.[39]

While it is important to report VA-derived mortality statistics, the prevailing opinion has been that vital statistics derived from VA should not be merged with vital statistics from MCCDs. The context and method of information gathering to assign cause of death from VA is different from the medical certification of cause of death by a physician. The certainty of the cause of death is lower in VA and therefore causes-of-death data obtained from VA and from MCCDs have not been merged, on the assumption that doing so would conceal differences that may result from these methods and lead to misinterpretation of the results.[40]

However, the trend on this may be changing. Some countries use physician review of the VA interview results plus a review of medical records to enable the physician to complete an MCCD for the deceased.

Also, whether or not a methodology can be developed to reliably combine MCCD and VA data for an overall understanding of COD is a complex question, and guidance on this is under development.

If countries do aim to merge these datasets, they should pay careful attention to the differences in the nature and quality of data from each source. Aggregating data from different sources and of different levels of completeness and quality requires a thorough understanding of the data sources, the context in which

39 https://statistics.gov.rw/publication/2131
40 World Health Organization, "Verbal autopsy standards: 2022 WHO verbal autopsy instrument," p. 21.

the data was collected, and the corresponding limitations and uncertainties associated with the use of the data.[41] It is essential to understand the differences in the way that deaths and causes of death are captured by the various systems. For example:

- Which health facilities submit MCCD records (e.g., all facilities, district-level facilities, public facilities, university facilities, etc.)?
- Which types of deaths may be missing from the MCCD dataset (e.g., deaths referred for medical examination and/or police investigation or deaths occurring in the community)?
- Which deaths receive a verbal autopsy (e.g., brought in dead, rural/community deaths, ill-defined deaths from the MCCD dataset)?
- Is verbal autopsy applied to all target deaths or to a sample?
- Is there potential overlap in the deaths receiving an MCCD and those that have a verbal autopsy?

To ensure that data from MCCDs and VA can be brought together and interpreted, the general quality of the available data from each source should be evaluated separately to ensure that certain minimum standards are met before further analysis and aggregation are conducted. Issues to be taken into consideration include: size of the datasets from each source; consistency in data collection and cause-of death assignment methods; quality of the data from each source (i.e., coverage, completeness and representativeness, and accuracy of information [measurement error]).

If, based on the criteria above, the available datasets are considered to be of sufficient quality, the data can be prepared and aggregated. This involves a number of key steps, including:

- Standardizing certain variables across the two datasets, such as unique identifier, age, sex, ICD code and source of data (e.g., VA or MCCD)
- Deduplicating the verbal autopsy and MCCD populations, ensuring that each decedent is represented in only one dataset (the MCCD record would usually supersede the VA data)
- Selecting a common cause-of death list

41 Centers for Disease Control and Prevention, National Center for Health Statistics (2020), "Guidance on the Analysis of Verbal Autopsy (VA) and Medical Certificate of Cause of Death (MCCD) Data," Version 0.2 (forthcoming).

- Weighting the VA and MCCD data to adjust for the non-representativeness or incompleteness of the datasets. Inverse probability weighting can be used to adjust for missing data by place of death (i.e., community vs. hospital/facility) and the age-sex structure of the population.

If a country does aggregate these datasets, the results should always be able to be disaggregated; to achieve this, the MCCD form should indicate whether the COD is derived from VA or not, as is the case in the Philippines.

2. Timely sharing/use of COD data

2.1 Mortality surveillance and disease surveillance

While the generation of vital statistics provides important and rich data for governmental decision-making and public health interventions, even in the best of systems, final vital statistics are usually generated up to 12 months after the close of the calendar year. In many countries, vital statistics are only available years after the relevant calendar year. Yet it can be very important for public health officials to see cause-of-death data as the data is collected, particularly for purposes of surveillance and response to communicable and infectious disease. Access to near real-time data can alert public health officials to outbreaks in specific parts of the country and prevent the spread of disease before it becomes an epidemic or pandemic. This data can also help to identify trends - such as new methods or sites for suicides - allowing for early preventive action.

Therefore, collaboration among government institutions is very important. Some countries routinely share MCCDs with public health departments through mortality surveillance and disease surveillance programs that are independent of the civil registration process. These public health departments must guard the confidentiality of this information. However, some countries make an exception to the general rule of confidentiality of cause-of-death information when a death is due to a disease or condition that is notifiable under the International Health Regulations or national law (for example COVID-19, polio or Ebola). When the public health department receives notice of such a disease, officials can use the information to reach out to close contacts of the diseased to help protect them and the broader public (for an example, see Box 3).[42] In addition, the International

42 Centers for Disease Control and Prevention, 2010 Standards to Facilitate Data Sharing and Use of Surveillance Data for Public Health Action, webpage last reviewed 2014, available at: http://www.cdc.gov/nchhstp/program-integration/SC-Standards.htm#DATA-SHARINGfor Public Health Action. See also http://www.cdc.gov/nchhstp/programintegration/Data-Security-FAQ.htm.

Health Regulations obligate WHO member states to report certain disease events to WHO for global health monitoring and epidemic response.

The benefits of data sharing are immense and, therefore, stekholder collaboration is essential. However, there is the potential risk that an individual may be identified through geographic or other information. These risks can be mitigated by developing privacy rules and standards that ensure such data is used appropriately and only for authorized activities. Australia's recently enacted Data Availability and Transparency Act 2022 establishes specific rules limiting the circumstances where identified data may be used, as well as privacy requirements for data sharing agreements.

BOX 3:
South Africa

In South Africa, prior to 2014, registrars in the Western Cape province shared MCCDs with local departments of health. This allowed the departments to use the MCCD for disease surveillance purposes.* For example, if a child died of diarrhea, the departments would make a wellness visit to the family to instruct about sanitary practices, which would help ensure that other children in the family would not die of diarrhea.

In 2014, new rules required the sealing of the MCCD page of the combined notice of death/MCCD.** The form is currently given to the family, with the MCCD portion of the form sealed. The family brings this form to the local civil registrar, who enters the available details regarding the death in the death register and then submits the form to the central civil registration agency within the Department of Home Affairs, while still keeping the COD information sealed. The Department of Home Affairs enters certain legal information into the population register and sends the entire form to Stats SA (the national statistics agency). Only Stats SA is authorized to unseal the MCCD portion of the form. While this process preserves the confidentiality of medical information, it is problematic because it prevents public health officials from receiving and acting on cause-of-death information in real time. Due to the 2014 rule, local departments of health no longer have access to MCCDs and now cannot conduct real-time surveillance, which has compromised public health efforts. There are ongoing efforts to address this problem.

* Groenewald, et al., The importance of identified cause-of-death information being available for public health surveillance, actions and research, South Africa Medical Journal, July 2015, Vol. 105, No. 7.

** Regulations on the Registration of Births and Deaths, 2014, Annexure 14, Form DHA-1663, p. 4.

2.2 Maternal and perinatal death surveillance and response

Understanding the numbers and causes of maternal, perinatal and neonatal deaths is a necessary step toward improving maternal, perinatal and neonatal survival rates. Establishing a maternal and perinatal death surveillance and response (MPDSR) system is crucial to that understanding. WHO defines MPDSR as "an essential quality improvement intervention which permits the identification, notification, quantification and determination of causes and avoidability of maternal and neonatal deaths and stillbirth with the goal of orienting the measures necessary for their prevention. This definition also includes confidential enquiries, maternal death reviews, perinatal death reviews, maternal and perinatal death reviews, and maternal death surveillance and response."[43]

In many countries, MPDSR encompasses a host of activities, ranging from small research-driven projects to more formal countrywide projects. Often these activities are carried out by or in coordination with the ministry of health and gather information from health facilities and community health workers. However, occasionally some small private research projects may be conducted without coordination with the ministry of health. Regardless of the size of the project, MPDSR information gathering is frequently disconnected from the CRVS system.

In order to bring MPDSR into the broader CRVS system and coordinate within the full local mortality surveillance ecosystem, countries should consider setting up an information-sharing group—such as a National Mortality Technical Working Group—where data gathered through MPDSR, VA and MCCD can be shared, triangulated and adjusted for national use. This will help improve the robustness of the data across all systems.

2.3 Disease-specific registries and other research

Many countries keep disease-specific registries—such as a cancer registry or a tuberculosis registry—with data on the population that has contracted the specific disease, to aid in the control of the disease and for public health interventions. For example, monitoring the incidence of new cancer diagnoses, the stage of cancer at diagnosis, and survival rates provides critical information on priorities for attention and on the performance of the health care system.

In countries (or jurisdictions) with a disease-specific registry, medical facilities such as hospitals, doctors' offices and pathology laboratories send information

43 World Health Organization, Maternal and Perinatal Death Surveillance and Response, available at: https://www.who.int/teams/maternal-newborn-child-adolescent-health-and-ageing/maternal-health/maternal-and-perinatal-death-surveillance-and-response.

about cases of that disease to the registry. Most of the information comes from hospitals, where highly trained staff members transfer information from the patient's medical record to the registry's computer software using standardized codes. The data is then sent to the central disease registry. None of this information identifies individual patients.[44]

In order to get a complete picture of disease cases and deaths, mortality data from the civil registration or national statistics agency should be shared with the disease registry. Death registration records may also be shared with researchers so they can obtain mortality follow-up information about their study participants. The National Death Index in the United States serves this purpose. As discussed in Box 4, a process is used that maintains the confidentiality of the study participant, while still providing the needed information to the researchers.

BOX 4: U.S. National Death Index

The National Death Index is a database of all deaths in the United States. Containing more than 100 million death records, the National Death Index assists investigators in determining whether people in their studies have died and, if so, provides:

- Names of the states in which those deaths occurred
- Dates of death
- Corresponding death certificate numbers
- Cause(s) of death, if using the National Death Index Plus service

The National Death Index has been used to determine the mortality status of participants in thousands of studies, including:

- Survival time among people with health conditions (e.g., cancer and heart disease)
- Mortality risk in certain occupations (e.g., radiologists, pesticide applicators and auto workers)
- Effectiveness of surgeries (e.g., gastric bypass and bone marrow transplants)
- Impact of dietary factors (e.g., sodium, vitamins, coffee and antioxidants) on risks of death
- Intersection of health care and mortality, such as the costs associated with end-of-life care
- Mortality risks among vulnerable populations, such as children and adolescents with developmental disabilities, people released from prison, and psychiatric patients

Source: CDC website, available at: https://www.cdc.gov/nchs/ndi/about.htm.

44 Centers for Disease Control and Prevention, National Program of Cancer Registries, available at: https://www.cdc.gov/cancer/npcr/about.htm.

2.4 Confidentiality considerations with real-time data sharing

When sharing cause-of-death data in real time, there are two issues to consider:

1. Is it necessary to share all MCCD data, or is it sufficient to share only the underlying causes of death?
2. Should the information be anonymized, or is identified data necessary?

MCCDs contain an array of medical data. In addition to the causes of death, an MCCD also contains information on manner of death, whether surgery had recently been performed, whether an autopsy was required, and whether a person was pregnant at the time or recently before death, among other things. This information may be needed for disease surveillance purposes. However, if only the cause of death is needed, that is what should be shared, and the rest of the information should remain confidential.

For some purposes, anonymized information is sufficient. However, if, for example, contact tracing is required for infectious disease control or if a family visit is required to address the root cause of the death, then identified COD information may be shared. Identified mortality data may also be needed to understand which participants in a study have died (see also Box 4 above).

VIII. Conclusion

While there is no single "best practice" for how cause-of-death data is collected, shared and used for the generation of cause-of-death statistics and other purposes in CRVS systems, there are many examples of "good practices" that countries can employ in order to achieve the three key goals:

1. All deaths are officially registered with a medically certified cause of death (whenever possible).
2. A national-level entity generates vital statistics on all-cause and cause-specific mortality on a regular basis.
3. Cause-of-death data is shared in real time for public health purposes.

This Guidance identifies those good practices, along with their advantages and disadvantages, in order for users to determine which practices and processes will work best in the context of their own country. After determining which processes they wish to adopt, users are encouraged to undertake business process mapping to help redesign their processes to better achieve their goals. Users are also encouraged to review their country's legal framework to ensure that laws support and foster the implementation of the new business processes.

Acknowledgments

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Annex 1: Cause-of-Death Data Key Performance Indicators and Milestones

Key performance indicators and milestones	Possible baseline values	Possible source(s)	Possible root causes of performance issues	Possible redesigns to address the performance issues
Is the cause of death for all deaths occurring in all health facilities (public and private), determined by a qualified medical professional using the WHO international standard form for medical certification of cause of death? or Percentage of deaths occurring in health facilities and the MLDI system with medically certified cause of death	Yes, in all health facilities Yes, but in X out of Y health facilities No, not in any health facility % of death occurring in health facilities and in the MLDI system with medically certified cause of death	Health records	No systematic process has been implemented for collecting data on causes of death from health facilities Not all health facilities are included within the purview of collection of cause-of-death data Insufficient quantity of trained medical professionals to complete MCCD in health facilities Lack of standardized form or standardized form is not aligned with WHO MCCD No systematic process for MLDI using the WHO international standard form for medical certification of cause of death	Include all health facilities in the country, if required, in a phased manner Harmonize practices for medical certification of cause of death so that the WHO international standard form for medical certification of cause of death is consistently used Implement a regular orientation and training program for doctors on the importance of cause of death and the actual process for certifying it Implement a quality assurance mechanism for medical certification of cause of death
Are MCCDs coded using ICD mortality coding rules? or Percentage of MCCDs that are ICD mortality coded	Yes, MCCD forms are coded using ICD mortality coding rules No, ICD mortality coding rules are not used % of MCCDs that are ICD mortality coded	Records from ICD mortality coding activities	The International Classification of Diseases (ICD-10 or ICD-11) is not used for mortality coding of causes of death Insufficient number of trained ICD mortality coders	Introduce ICD-11 in mortality coding of causes of death Implement a regular training program for coding staff on using ICD mortality coding and quality control procedures
Out of all MCCDs completed, percentage of which that are submitted to the coding unit/civil registration agency (depending on the chosen process)	Yes/No %	Civil registration/ coding unit records	MCCDs are not directly submitted to the coding unit/civil registration agency (depending on the chosen process); MCCDs are given to family members of the deceased who may fail to submit the MCCD to the civil registrar	Require health facilities to directly submit MCCD to the coding unit/civil registration agency (depending on the chosen process)

MCCDs are submitted (anonymized) to the national statistics agency or Percentage of MCCDs that are submitted to the national statistics agency	Yes/No %	Health records Civil registration records Statistics agency records	Lack of connection between civil registration agency and statistics agency; or lack of connection between ICD mortality coding unit and statistics agency	Require submission of anonymized MCCD to statistics agency by health facility/civil registration agency/coding unit (depending on the chosen process)
Percentage of deaths referred to the MLDI system that receive an MCCD	%	MCCD data from owner in the MLDI system, health and civil registration records	Not all deaths referred to the MLDI system are referred to a physician for postmortem and MCCD	Advocate for requiring that all deaths referred to the MLDI system receive an MCCD from a qualified physician
Percentage of deaths referred to the MLDI system that are registered with a cause of death	%	MCCD data from owner in the MLDI system, health and civil registration records	Disconnect between MLDI system and CRVS system; MCCDs, if completed, are sent to law enforcement but not to the civil registration agency or statistics agency or other coding unit (depending on the chosen process)	Review and amend laws to require MLDI authorities to report deaths for civil registration, and submit a medically certified cause of death, depending on the chosen process, to the civil registration agency/statistics agency/coding unit
Does the country have a system for collecting and compiling cause of death for deaths occurring at home?	Yes Yes, but not routinely No	Cause-of-death report	There is no established routine VA system for collecting cause of death At-home deaths are not reported to the MLDI system	Advocate for reporting at-home deaths to the MLDI system and/or advocate for a routine VA system to collect data on cause of death for a sample of deaths occurring outside of medical care
Do the cause-of-death statistics meet the quality standard (for example, as defined by the use of ANACOD 3) and are they produced in a timely way as defined by the country? and/or Percentage of deaths with unusable COD (for example, as defined by the use of ANACOD 3)	Yes Yes, partially No	Cause-of-death report	Cause-of-death statistics are not generated Lack of quality control procedures using ANACoD3 or other standardized routine to identify unusable or ill-defined causes	Advocate for the regular generation of cause-of-death statistics Implement regular quality control procedures for cause-of-death data to determine the percentage of unusable COD

Annex 2: Resources

Resources for CRVS best practices, including best practices for death registration:

United Nations, "Principles and Recommendations for the Vital Statistics System," Revision 3, 2014.

United Nations, "Guidelines on the Legislative Framework for Civil Registration, Vital Statistics, and Identity Management Systems," 2019.

United Nations, "Handbook on Civil Registration and Vital Statistics Systems: Management, Operation and Maintenance," Revision 1, 2021.

World Health Organization and United Nations Children's Fund (UNICEF), "Health sector contributions towards improving the civil registration of births and deaths in low-income countries: guidance for health sector managers, civil registrars and development partners," 2021.

Vital Strategies, "The health sector in civil registration: options and methods to increase registration of live births, stillbirths and deaths," (intended to be used as an addendum to the aforementioned WHO/UNICEF resource).

United Nations Economic Commission for Africa, "CRVS Improvement Framework"

Vital Strategies, "Technical Guidance for Strengthening the Vital Statistics Production Process"

Resources for MCCD training for physicians:

Vital Strategies' Medical Certification of Cause of Death Course.

Pacific Community, "Curriculum on Medical Certification of Cause of Death for Pacific Island Countries and Territories," 2021

"Guidance for doctors completing medical certificates of cause of death in England and Wales," 2022.

"WHO Recommendations for conducting an external inspection of a body and filling in the Medical Certificate of Cause of Death (MCCD)," 2023.

Resources for conducting ICD mortality coding:

WHO webpage on ICD-11.

WHO ICD-10 Interactive Self-Learning Tool.

WHO Analysing Mortality and Causes of Death 3 (ANACoD3).

Vital Strategies' "Quality Assurance and Improvement Framework for Medical Certification of Cause of Death and International Classification of Diseases Mortality Coding," (forthcoming).

Pacific Community, "Curriculum for Coding of Cause of Death for Pacific Island Countries and Territories," 2021

Resources for verbal autopsy:

WHO Verbal Autopsy Standards

WHO Verbal Autopsy Reference Group

Resources for production of vital Statistics:

Vital Strategies, "Production of a Vital Statistics Report"

Annex 3: International Form of Medical Certificate of Cause of Death (WHO MCCD, 2016)

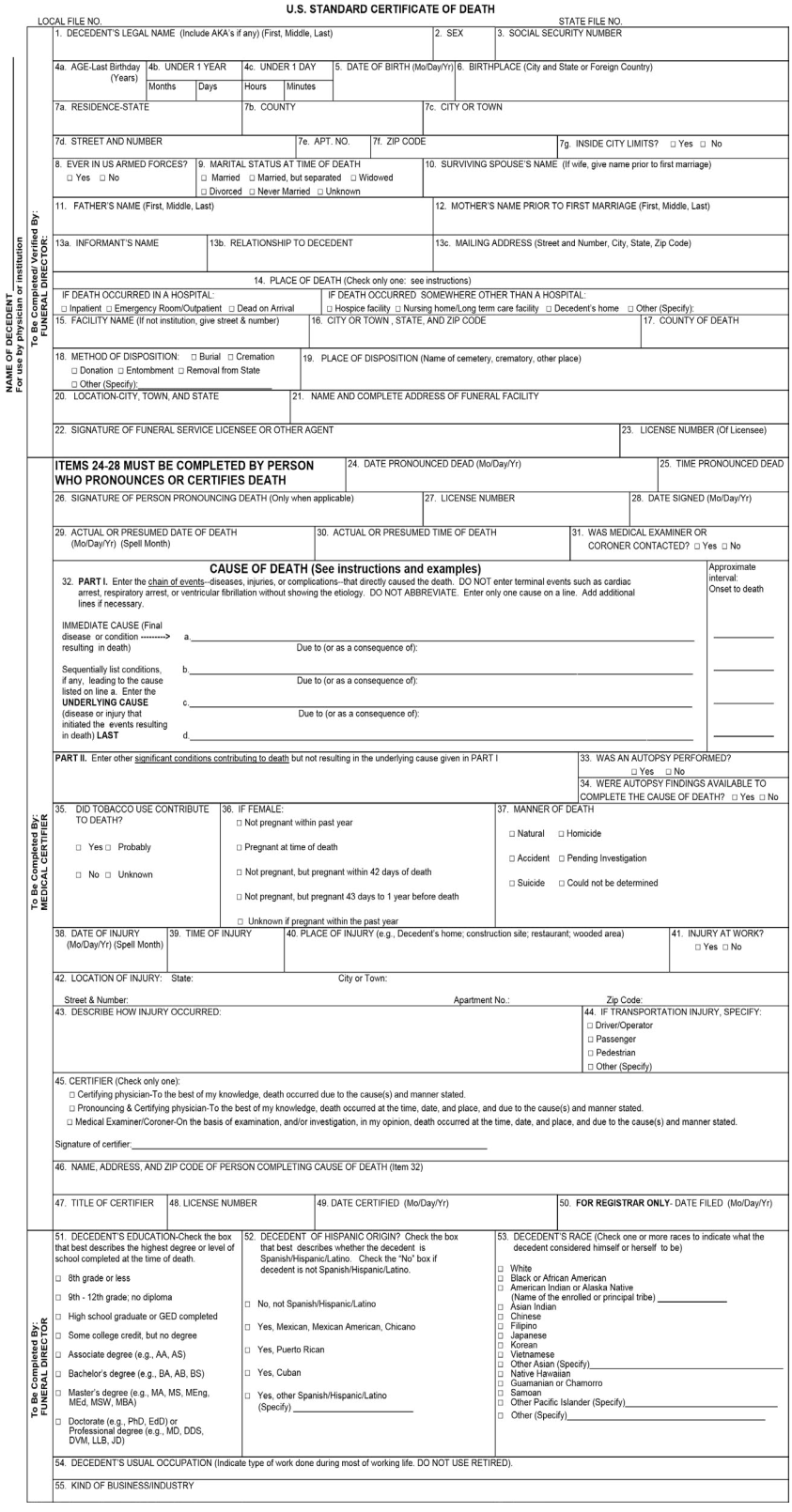
Administrative Data (can be further specified by country)																
Sex	☐ Female				☐ Male				☐ Unknown							
Date of birth	D	D	M	M	Y	Y	Y	Y	Date of death	D	D	M	M	Y	Y	Y	Y

Frame A: Medical data: Part 1 and 2				
1. Report disease or condition directly leading to death on line A; Report chain of events in due to order (if applicable); State the underlying cause on the lowest used line		Cause of death		Time interval from onset to death
		A		
		B	Due to:	
		C	Due to:	
		D	Due to:	
2. Other significant conditions contributing to death (time intervals can be included in brackets after the condition)				

Frame B: Other medical data											
Was surgery performed within the last 4 weeks?	☐ Yes	☐ No	☐ Unknown								
If yes please specify date of surgery	D	D	M	M	Y	Y	Y	Y			
If yes please specify reason for surgery (disease or condition)											
Was an autopsy requested?	☐ Yes	☐ No	☐ Unknown								
If yes were the findings used in the certification?	☐ Yes	☐ No	☐ Unknown								
Manner of death:											
☐ Disease	☐ Assault	☐ Could not be determined									
☐ Accident	☐ Legal intervention	☐ Pending investigation									
☐ Intentional self harm	☐ War	☐ Unknown									
If external cause or poisoning:	Date of injury	D	D	M	M	Y	Y	Y	Y		
Please describe how external cause occurred (If poisoning please specify poisoning agent)											

Frame B: Other medical data											
Was surgery performed within the last 4 weeks?			☐ Yes	☐ No	☐ Unknown						
If yes please specify date of surgery			D	D	M	M	Y	Y	Y	Y	
If yes please specify reason for surgery (disease or condition)											
Was an autopsy requested?			☐ Yes	☐ No	☐ Unknown						
If yes were the findings used in the certification?			☐ Yes	☐ No	☐ Unknown						
Manner of death:											
☐ Disease	☐ Assault		☐ Could not be determined								
☐ Accident	☐ Legal intervention		☐ Pending investigation								
☐ Intentional self harm	☐ War		☐ Unknown								
If external cause or poisoning:		Date of injury	D	D	M	M	Y	Y	Y	Y	
Please describe how external cause occurred (If poisoning please specify poisoning agent)											
Place of occurrence of the external cause:											
☐ At home	☐ Residential institution	☐ School, other institution, public administrative area	☐ Sports and athletics area								
☐ Street and highway	☐ Trade and service area	☐ Industrial and construction area	☐ Farm								
☐ Other place (please specify):		☐ Unknown									
Fetal or infant Death											
Multiple pregnancy			☐ Yes	☐ No	☐ Unknown						
Stillborn?			☐ Yes	☐ No	☐ Unknown						
If death within 24h specify number of hours survived				Birth weight (in grams)							
Number of completed weeks of pregnancy				Age of mother (years)							
If death was perinatal, please state conditions of mother that affected the fetus and newborn											
For women, was the deceased pregnant?			☐ Yes	☐ No	☐ Unknown						
☐ At time of death	☐ Within 42 days before the death										
☐ Between 43 days up to 1 year before death	☐ Unknown										
Did the pregnancy contribute to the death?			☐ Yes	☐ No	☐ Unknown						

Annex 4: U.S. Standard Certificate of Death



U.S. STANDARD CERTIFICATE OF DEATH

LOCAL FILE NO. STATE FILE NO.

NAME OF DECEDENT
For use by physician or institution
To Be Completed/ Verified By:
FUNERAL DIRECTOR:

1. DECEDENT'S LEGAL NAME (Include AKA's if any) (First, Middle, Last) | 2. SEX | 3. SOCIAL SECURITY NUMBER

4a. AGE-Last Birthday (Years) | 4b. UNDER 1 YEAR: Months, Days | 4c. UNDER 1 DAY: Hours, Minutes | 5. DATE OF BIRTH (Mo/Day/Yr) | 6. BIRTHPLACE (City and State or Foreign Country)

7a. RESIDENCE-STATE | 7b. COUNTY | 7c. CITY OR TOWN

7d. STREET AND NUMBER | 7e. APT. NO. | 7f. ZIP CODE | 7g. INSIDE CITY LIMITS? ☐ Yes ☐ No

8. EVER IN US ARMED FORCES? ☐ Yes ☐ No | 9. MARITAL STATUS AT TIME OF DEATH ☐ Married ☐ Married, but separated ☐ Widowed ☐ Divorced ☐ Never Married ☐ Unknown | 10. SURVIVING SPOUSE'S NAME (If wife, give name prior to first marriage)

11. FATHER'S NAME (First, Middle, Last) | 12. MOTHER'S NAME PRIOR TO FIRST MARRIAGE (First, Middle, Last)

13a. INFORMANT'S NAME | 13b. RELATIONSHIP TO DECEDENT | 13c. MAILING ADDRESS (Street and Number, City, State, Zip Code)

14. PLACE OF DEATH (Check only one: see instructions)

IF DEATH OCCURRED IN A HOSPITAL: ☐ Inpatient ☐ Emergency Room/Outpatient ☐ Dead on Arrival
IF DEATH OCCURRED SOMEWHERE OTHER THAN A HOSPITAL: ☐ Hospice facility ☐ Nursing home/Long term care facility ☐ Decedent's home ☐ Other (Specify):

15. FACILITY NAME (If not institution, give street & number) | 16. CITY OR TOWN , STATE, AND ZIP CODE | 17. COUNTY OF DEATH

18. METHOD OF DISPOSITION: ☐ Burial ☐ Cremation ☐ Donation ☐ Entombment ☐ Removal from State ☐ Other (Specify):_____ | 19. PLACE OF DISPOSITION (Name of cemetery, crematory, other place)

20. LOCATION-CITY, TOWN, AND STATE | 21. NAME AND COMPLETE ADDRESS OF FUNERAL FACILITY

22. SIGNATURE OF FUNERAL SERVICE LICENSEE OR OTHER AGENT | 23. LICENSE NUMBER (Of Licensee)

To Be Completed By:
MEDICAL CERTIFIER

ITEMS 24-28 MUST BE COMPLETED BY PERSON WHO PRONOUNCES OR CERTIFIES DEATH

24. DATE PRONOUNCED DEAD (Mo/Day/Yr) | 25. TIME PRONOUNCED DEAD

26. SIGNATURE OF PERSON PRONOUNCING DEATH (Only when applicable) | 27. LICENSE NUMBER | 28. DATE SIGNED (Mo/Day/Yr)

29. ACTUAL OR PRESUMED DATE OF DEATH (Mo/Day/Yr) (Spell Month) | 30. ACTUAL OR PRESUMED TIME OF DEATH | 31. WAS MEDICAL EXAMINER OR CORONER CONTACTED? ☐ Yes ☐ No

CAUSE OF DEATH (See instructions and examples)

32. **PART I.** Enter the chain of events--diseases, injuries, or complications--that directly caused the death. DO NOT enter terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.

Approximate interval: Onset to death

IMMEDIATE CAUSE (Final disease or condition ----------> resulting in death) a._____ Due to (or as a consequence of):

Sequentially list conditions, if any, leading to the cause listed on line a. Enter the **UNDERLYING CAUSE** (disease or injury that initiated the events resulting in death) **LAST**
b._____ Due to (or as a consequence of):
c._____ Due to (or as a consequence of):
d._____

PART II. Enter other significant conditions contributing to death but not resulting in the underlying cause given in PART I

33. WAS AN AUTOPSY PERFORMED? ☐ Yes ☐ No
34. WERE AUTOPSY FINDINGS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? ☐ Yes ☐ No

35. DID TOBACCO USE CONTRIBUTE TO DEATH? ☐ Yes ☐ Probably ☐ No ☐ Unknown

36. IF FEMALE: ☐ Not pregnant within past year ☐ Pregnant at time of death ☐ Not pregnant, but pregnant within 42 days of death ☐ Not pregnant, but pregnant 43 days to 1 year before death ☐ Unknown if pregnant within the past year

37. MANNER OF DEATH ☐ Natural ☐ Homicide ☐ Accident ☐ Pending Investigation ☐ Suicide ☐ Could not be determined

38. DATE OF INJURY (Mo/Day/Yr) (Spell Month) | 39. TIME OF INJURY | 40. PLACE OF INJURY (e.g., Decedent's home; construction site; restaurant; wooded area) | 41. INJURY AT WORK? ☐ Yes ☐ No

42. LOCATION OF INJURY: State: City or Town: Street & Number: Apartment No.: Zip Code:

43. DESCRIBE HOW INJURY OCCURRED: | 44. IF TRANSPORTATION INJURY, SPECIFY: ☐ Driver/Operator ☐ Passenger ☐ Pedestrian ☐ Other (Specify)

45. CERTIFIER (Check only one):
☐ Certifying physician-To the best of my knowledge, death occurred due to the cause(s) and manner stated.
☐ Pronouncing & Certifying physician-To the best of my knowledge, death occurred at the time, date, and place, and due to the cause(s) and manner stated.
☐ Medical Examiner/Coroner-On the basis of examination, and/or investigation, in my opinion, death occurred at the time, date, and place, and due to the cause(s) and manner stated.

Signature of certifier:_____

46. NAME, ADDRESS, AND ZIP CODE OF PERSON COMPLETING CAUSE OF DEATH (Item 32)

47. TITLE OF CERTIFIER | 48. LICENSE NUMBER | 49. DATE CERTIFIED (Mo/Day/Yr) | 50. **FOR REGISTRAR ONLY**- DATE FILED (Mo/Day/Yr)

To Be Completed By:
FUNERAL DIRECTOR

51. DECEDENT'S EDUCATION-Check the box that best describes the highest degree or level of school completed at the time of death.
☐ 8th grade or less
☐ 9th - 12th grade; no diploma
☐ High school graduate or GED completed
☐ Some college credit, but no degree
☐ Associate degree (e.g., AA, AS)
☐ Bachelor's degree (e.g., BA, AB, BS)
☐ Master's degree (e.g., MA, MS, MEng, MEd, MSW, MBA)
☐ Doctorate (e.g., PhD, EdD) or Professional degree (e.g., MD, DDS, DVM, LLB, JD)

52. DECEDENT OF HISPANIC ORIGIN? Check the box that best describes whether the decedent is Spanish/Hispanic/Latino. Check the "No" box if decedent is not Spanish/Hispanic/Latino.
☐ No, not Spanish/Hispanic/Latino
☐ Yes, Mexican, Mexican American, Chicano
☐ Yes, Puerto Rican
☐ Yes, Cuban
☐ Yes, other Spanish/Hispanic/Latino (Specify) _____

53. DECEDENT'S RACE (Check one or more races to indicate what the decedent considered himself or herself to be)
☐ White
☐ Black or African American
☐ American Indian or Alaska Native (Name of the enrolled or principal tribe) _____
☐ Asian Indian
☐ Chinese
☐ Filipino
☐ Japanese
☐ Korean
☐ Vietnamese
☐ Other Asian (Specify)_____
☐ Native Hawaiian
☐ Guamanian or Chamorro
☐ Samoan
☐ Other Pacific Islander (Specify)_____
☐ Other (Specify)_____

54. DECEDENT'S USUAL OCCUPATION (Indicate type of work done during most of working life. DO NOT USE RETIRED).

55. KIND OF BUSINESS/INDUSTRY

Annex 5: MCCD Form of the Special Capital Region of Jakarta

Form-A (Revisi)

PEMERINTAH PROVINSI DAERAH KHUSUS IBUKOTA JAKARTA
DINAS KESEHATAN

RAHASIA

SURAT KETERANGAN PENYEBAB KEMATIAN

Bulan/Tahun : ☐☐/☐☐ Nama RS/Puskesmas : ..... Kode RS/Puskesmas : ☐☐☐☐☐☐☐

No Urut Pencatatan Kematian : ☐☐☐ No Rekam Medis : ☐☐☐☐☐☐☐☐☐☐

I. Identitas Jenazah

1. Nama Lengkap : ..... Alias : ..... (HURUF CETAK)
2. No Induk Kependudukan (NIK) : ..... No. Kartu Keluarga : .....
3. Jenis Kelamin : 1. Laki-laki 2. Perempuan\
4. Tempat/ Tanggal Lahir : ..... Tanggal ..... Bulan ..... Tahun .....
5. Agama : .....
6. Alamat Tempat Tinggal : Jalan /Gang ..... No. ..... RT/RW .....
   Kelurahan/ Desa ..... Kecamatan .....
   Kota/Kab ..... Kode Pos ..... Telp. .....
7. Status Kependudukan : 1. Penduduk 2. Bukan Penduduk
8. Hubungan dengan Kepala Rumah Tangga : 1. Kepala Rumah Tangga 2. Suami/ Isteri 3. Anak 4. Menantu 5. Cucu 6. Orang Tua/ Mertua 7. Famili lain 8. Pembantu Rumah Tangga 9. Lainnya
9a. Waktu Meninggal : Tanggal .....Bulan.....Tahun.....Pukul..... 9b. Lainnya saat meninggal .....
10. Tempat Meninggal : 1. Rumah Sakit 2. Puskesmas ***3. Rumah Bersalin*** 4. Rumah Tempat Tinggal 5. Lainnya ***(Termasuk meninggal di perjalanan/DoA)***

II. Keterangan Khusus Kasus Kematian di Rumah atau Lainnya *(Termasuk DoA)*

1. Status Jenazah : 1. Belum dimakamkan/Belum dikremasi 2. Telah dimakamkan/ Telah dikremasi; Tanggal ..... Bulan..... Tahun .....
2. Nama Pemeriksa Jenazah : .....; Kualifikasi Pemeriksa : 1. Medis 2. Paramedis
3. Waktu Pemeriksaan Jenazah : Tanggal ..... Bulan.....Tahun..... Pukul .....

III. Penyebab Kematian

1. Dasar Diagnosis ***(Dapat lebih dari satu)*** : 1. Rekam Medis 2. Pemeriksaan Luar Jenazah 3. Autopsi Forensik 4. Autopsi Medis 5. Autopsi Verbal 6. Surat Keterangan Lainnya .....
2. Kelompok Penyebab Kematian ***(Lingkari Salah Satu):***

PENYAKIT/GANGGUAN		CEDERA**)
1. Penyakit Khusus)*	*4. Gangguan Maternal (kehamilan/persalinan/nifas)*	*7. Cedera Kecelakaan Lalu Lintas*
2. Penyakit Menular	*5. Gangguan Perinatal (0-6 hari)*	*8. Cedera Kecelakaan Kerja*
3. Penyakit Tidak Menular	*6. Gejala, Tanda dan Kondisi Lainya*	*9. Cedera Lainnya*

Pihak Yang Menerima

Nama Jelas
Hub.dg Almarhum/ah

Jakarta, .../...../ 20 .....
Dokter Yang Menerangkan,

Nama Jelas :
Jabatan & Cap Instansi

**)Jenazah memerlukan perlakuan khusus*
***)Jika Penyebab Kematian Karena Cedera Form SMPK Diisi Setelah Prosedur Baku Selesai*

Form-A (Revisi)

PEMERINTAH PROVINSI DAERAH KHUSUS IBUKOTA JAKARTA
DINAS KESEHATAN

RAHASIA

SURAT KETERANGAN PENYEBAB KEMATIAN

Bulan/Tahun : ☐☐/☐☐ Nama RS/Puskesmas : ..... Kode RS/Puskesmas : ☐☐☐☐☐☐☐☐

No Urut Pencatatan Kematian : ☐☐☐ No Rekam Medis : ☐☐☐☐☐☐☐☐☐☐

I. Identitas Jenazah

1. Nama Lengkap : [redacted] (HURUF CETAK)
2. No Induk Kependudukan (NIK) : ..... No. Kartu Keluarga : .....
3. Jenis Kelamin : 1. Laki-laki 2. Perempuan\
4. Tempat/ Tanggal Lahir : ..... Tanggal ..... Bulan ..... Tahun .....
5. Agama : .....
6. Alamat Tempat Tinggal : Jalan /Gang ..... No. ..... RT/RW .....
   Kelurahan/ Desa ..... Kecamatan .....
   Kota/Kab ..... Kode Pos ..... Telp. .....
7. Status Kependudukan : 1. Penduduk 2. Bukan Penduduk
8. Hubungan dengan Kepala Rumah Tangga : 1. Kepala Rumah Tangga 2. Suami/ Isteri 3. Anak 4. Menantu 5. Cucu 6. Orang Tua/ Mertua 7. Famili lain 8. Pembantu Rumah Tangga 9. Lainnya
9a. Waktu Meninggal : Tanggal .....Bulan.....Tahun.....Pukul..... 9b. Lainnya saat meninggal .....
10. Tempat Meninggal : 1. Rumah Sakit 4. Rumah Tempat Tinggal
    2. Puskesmas 5. Lainnya ***(Termasuk meninggal di perjalanan/DoA)***
    3. Rumah Bersalin

II. Keterangan Khusus Kasus Kematian di Rumah atau Lainnya *(Termasuk DoA)*

1. Status Jenazah : 1. Belum dimakamkan/Belum dikremasi
   2. Telah dimakamkan/ Telah dikremasi; Tanggal ..... Bulan..... Tahun .....
2. Nama Pemeriksa Jenazah : .....; Kualifikasi Pemeriksa : 1. Medis 2. Paramedis
3. Waktu Pemeriksaan Jenazah : Tanggal ..... Bulan.....Tahun..... Pukul .....

III. Penyebab Kematian

1. Dasar Diagnosis ***(Dapat lebih dari satu)*** : 1. Rekam Medis 2. Pemeriksaan Luar Jenazah 3. Autopsi Forensik 4. Autopsi Medis 5. Autopsi Verbal 6. Surat Keterangan Lainnya .....
2. Kelompok Penyebab Kematian ***(Lingkari Salah Satu):***

PENYAKIT/GANGGUAN		CEDERA**)
1. Penyakit Khusus)*	*4. Gangguan Maternal (kehamilan/persalinan/nifas)*	*7. Cedera Kecelakaan Lalu Lintas*
2. Penyakit Menular	*5. Gangguan Perinatal (0-6 hari)*	*8. Cedera Kecelakaan Kerja*
3. Penyakit Tidak Menular	*6. Gejala, Tanda dan Kondisi Lainya*	*9. Cedera Lainnya*

Pihak Yang Menerima

Nama Jelas
Hub.dg Almarhum/ah

Jakarta, .../...../ 20 .....
Dokter Yang Menerangkan,

Nama Jelas :
Jabatan & Cap Instansi

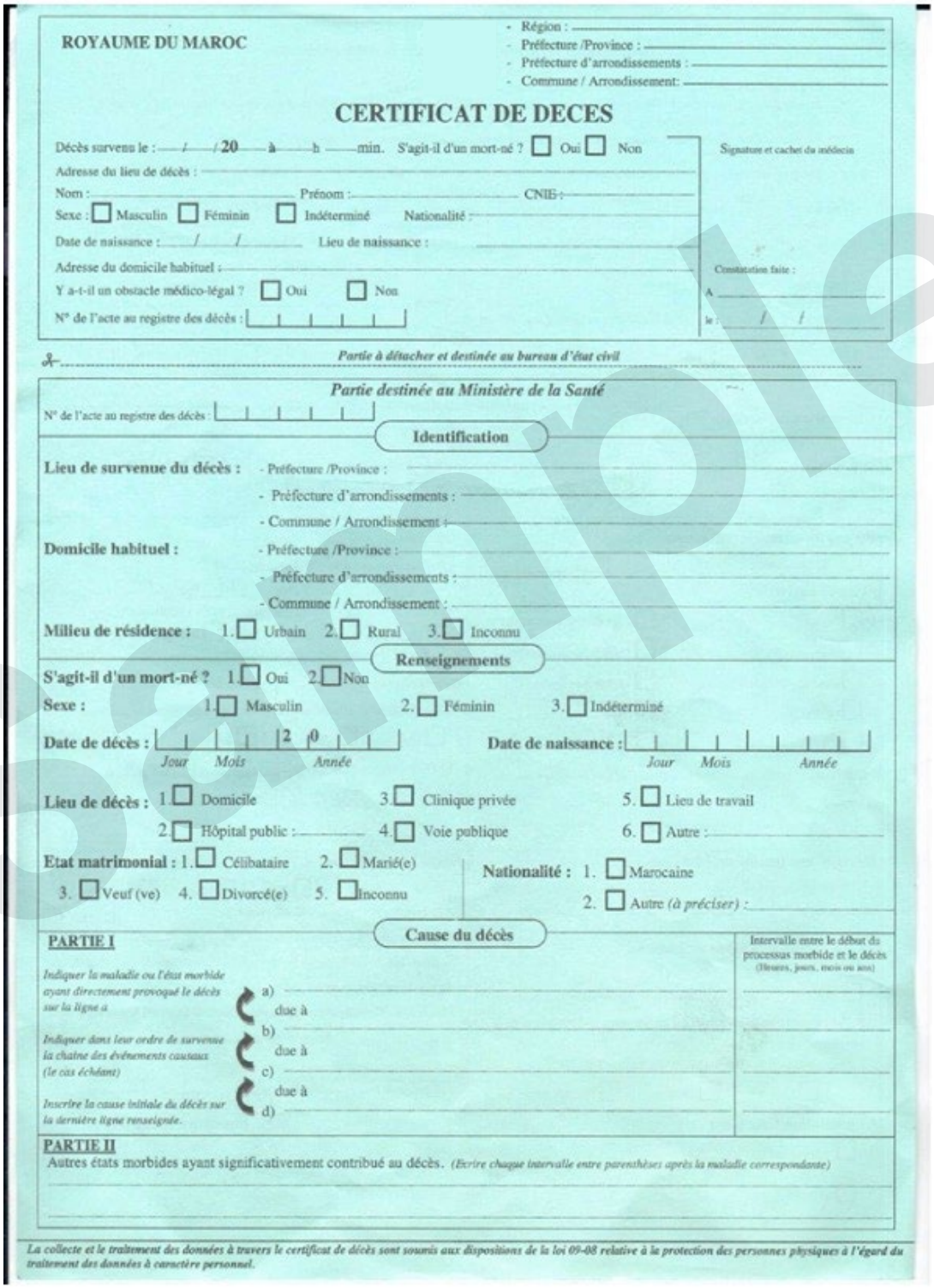
3. Penyebab Kematian Berdasarkan ICD-10	Selang waktu mulai terjadinya penyakit sampai meninggal: Tahun	Bulan	Hari	Jam	ICD-10 (Diisi oleh petugas kode)
a. Kematian Umur 7 Hari Ke Atas					
1. *Penyebab Langsung* a)					
sebagai akibat dari					
Penyebab Antara b)					
sebagai akibat dari					
c)					
sebagai akibat dari					
Penyebab Dasar d)					
2. *Kondisi lain yang berkontribusi tapi tdk terkait dgn 1a-d* :					
b. Kematian Umur 0 - 6 Hari Termasuk lahir Mati					
1. *Penyebab Utama Bayi* :					
Penyebab Lain bayi :					
2. *Penyebab Utama Ibu* :					
Penyebab Lain Ibu :					

Jakarta, .../...../ 20 .....
Dokter Yang Mendiagnosis

Nama Jelas :
Jabatan & Cap Instansi

**)Jenazah memerlukan perlakuan khusus*
***)Jika Penyebab Kematian Karena Cedera Form SMPK Diisi Setelah Prosedur Baku Selesai*

Annex 6: Morocco's Certificate of Death (Certificat de Décès)



ROYAUME DU MAROC

- Région :
- Préfecture /Province :
- Préfecture d'arrondissements :
- Commune / Arrondissement:

CERTIFICAT DE DECES

Décès survenu le : / / 20 à h min. S'agit-il d'un mort-né ? ☐ Oui ☐ Non

Signature et cachet du médecin

Adresse du lieu de décès :

Nom : Prénom : CNIE :

Sexe : ☐ Masculin ☐ Féminin ☐ Indéterminé Nationalité :

Date de naissance : / / Lieu de naissance :

Adresse du domicile habituel :

Y a-t-il un obstacle médico-légal ? ☐ Oui ☐ Non

Constitution faite :

A

le : / /

N° de l'acte au registre des décès :

Partie à détacher et destinée au bureau d'état civil

Partie destinée au Ministère de la Santé

N° de l'acte au registre des décès :

Identification

Lieu de survenue du décès :
- Préfecture /Province :
- Préfecture d'arrondissements :
- Commune / Arrondissement :

Domicile habituel :
- Préfecture /Province :
- Préfecture d'arrondissements :
- Commune / Arrondissement :

Milieu de résidence : 1. ☐ Urbain 2. ☐ Rural 3. ☐ Inconnu

Renseignements

S'agit-il d'un mort-né ? 1. ☐ Oui 2. ☐ Non

Sexe : 1. ☐ Masculin 2. ☐ Féminin 3. ☐ Indéterminé

Date de décès : | | | 2 | 0 | | | (Jour Mois Année)

Date de naissance : | | | | | | | (Jour Mois Année)

Lieu de décès : 1. ☐ Domicile 3. ☐ Clinique privée 5. ☐ Lieu de travail
2. ☐ Hôpital public : 4. ☐ Voie publique 6. ☐ Autre :

Etat matrimonial : 1. ☐ Célibataire 2. ☐ Marié(e) 3. ☐ Veuf (ve) 4. ☐ Divorcé(e) 5. ☐ Inconnu

Nationalité : 1. ☐ Marocaine 2. ☐ Autre *(à préciser)* :

Cause du décès

PARTIE I

		Intervalle entre le début du processus morbide et le décès (Heures, jours, mois ou ans)
Indiquer la maladie ou l'état morbide ayant directement provoqué le décès sur la ligne a	a)	
	due à	
Indiquer dans leur ordre de survenue la chaîne des événements causaux (le cas échéant)	b)	
	due à	
	c)	
Inscrire la cause initiale du décès sur la dernière ligne renseignée.	due à	
	d)	

PARTIE II

Autres états morbides ayant significativement contribué au décès. *(Ecrire chaque intervalle entre parenthèses après la maladie correspondante)*

La collecte et le traitement des données à travers le certificat de décès sont soumis aux dispositions de la loi 09-08 relative à la protection des personnes physiques à l'égard du traitement des données à caractère personnel.

Instructions à suivre pour remplir le volet médical

- ✓ *Les causes du décès seront indiquées de façon aussi précise que possible.*
- ✓ *Le seuil de déclaration à l'état civil des mort-nés en se référant à la définition de la viabilité donnée par l'OMS est de 22 semaines d'aménorrhée ou un poids du fœtus de plus de 500 grammes.*
- ✓ *Ne pas utiliser d'abréviation ambiguë (exemple : IR Insuffisance Respiratoire ? Rénale ?).*
- ✓ *Ecrire lisiblement.*
- ✓ *Pour plus d'informations, veuillez consulter le site web du Ministère de la Santé : www.sante.gov.ma*

Exemples

Partie I	Intervalle	Partie I	Intervalle	Partie I	Intervalle	Partie I	Intervalle
a) Septicémie	3 h	a) Coma	12 h	a) Choc hémorragique	1 h	a) Détresse respiratoire	5 mn
b) Péritonite	18 h	b) Œdème cérébral	18 h	b) Fracture multiples	6 h	b) Embolie pulmonaire	5 mn
c) Perforation d'ulcère	3 j	c) Traumatisme crânien	2 j	c) Suicide par chute du 5ème étage	6 h	c) Phlébite	?
d) Ulcère duodénal	6 mois	d) Accident de la route	2 j	d)		d) Accouchement	16 j
Partie II		**Partie II**		**Partie II**		**Partie II**	
Alcoolisme (20 ans)				Toxicomanie		Varices (4 ans)	

Remarques : • *Les cases |___| doivent être remplies par des chiffres.*
• *Pour les pointillés ..... préciser la mention.*
• *Les cases ☐ doivent être cochées selon le cas.*

Informations complémentaires

Circonstances du décès :

1. ☐ Maladie

Cause externe

2. ☐ Accident
3. ☐ Suicide
4. ☐ Homicide
5. ☐ Intention indéterminée

6. ☐ Inconnues

En cas de cause externe (*dont intoxication*) **:**

- Date de survenue : |_|_|_|_|_|_|_|_|
- Lieu de survenue :

0. ☐ Domicile
1. ☐ Etablissement collectif
2. ☐ Ecole/administration publique
3. ☐ Lieu de sport
4. ☐ Voie publique
5. ☐ Zone de commerce/service
6. ☐ Local industriel/chantier
7. ☐ Exploitation agricole
8. ☐ Autre : .....
9. ☐ Inconnu

- Circonstances de survenue : *Ex :(Piéton blessé dans une collision avec une automobile)* .....

Autopsie :

- Une autopsie a-t-elle été demandée (*) ?
  1. ☐ Oui 2. ☐ Non 3. ☐ Inconnu
- Si **Oui** les résultats ont-ils été utilisés dans la certification ?
  1. ☐ Oui 2. ☐ Non 3. ☐ Inconnu

(*) ou sera-t-elle vraisemblablement demandée ?

Intervention chirurgicale récente :

- Une opération a-t-elle été effectuée lors des **4 dernières semaines** ?
  1. ☐ Oui 2. ☐ Non 3. ☐ Inconnu
- Si **Oui**, date de l'opération : |_|_|_|2|0|_|_|
- Motif de l'opération : .....

Décès d'une femme de 12-54 ans :

- Le décès est-il survenu pendant une grossesse **ou** moins d'un an après sa terminaison ? 1 ☐ Oui 2 ☐ Non 3 ☐ Inconnu
- Si **Oui**, le décès de la femme est-il survenu :
  1. ☐ Au cours de la grossesse
  2. ☐ Dans un délai de 42 jours après la terminaison de la grossesse
  3. ☐ Plus de 42 jours mais moins d'un an, après la terminaison de la grossesse
- La grossesse a-t-elle contribué au décès ? :
  1. ☐ Oui 2. ☐ Non 3. ☐ Ne sait pas

Décès périnatal (*Mort-nés (*), décès âgés de moins de 7 jours*) **:**

- Grossesse multiple : 1. ☐ Oui 2. ☐ Non 3. ☐ Inconnue
- Age gestationnel (*en semaines d'aménorrhée*): |_|_|
- Poids à la naissance (*en grammes*) : |_|_|_|_|
- Si décès âgé de moins de 24 heures préciser le nombre d'heures |_|_|
- Age de la mère en années : |_|_|
- Maladie ou affection maternelle ayant affecté le fœtus ou le nouveau-né : .....

(*)Le seuil de déclaration à l'état civil des mort-nés en se référant à la définition de la viabilité donnée par l'OMS est de 22 semaines d'aménorrhée ou un poids du fœtus de plus de 500 grammes.

Constatation faite par :

1. ☐ Médecin
2. ☐ Autre : .....

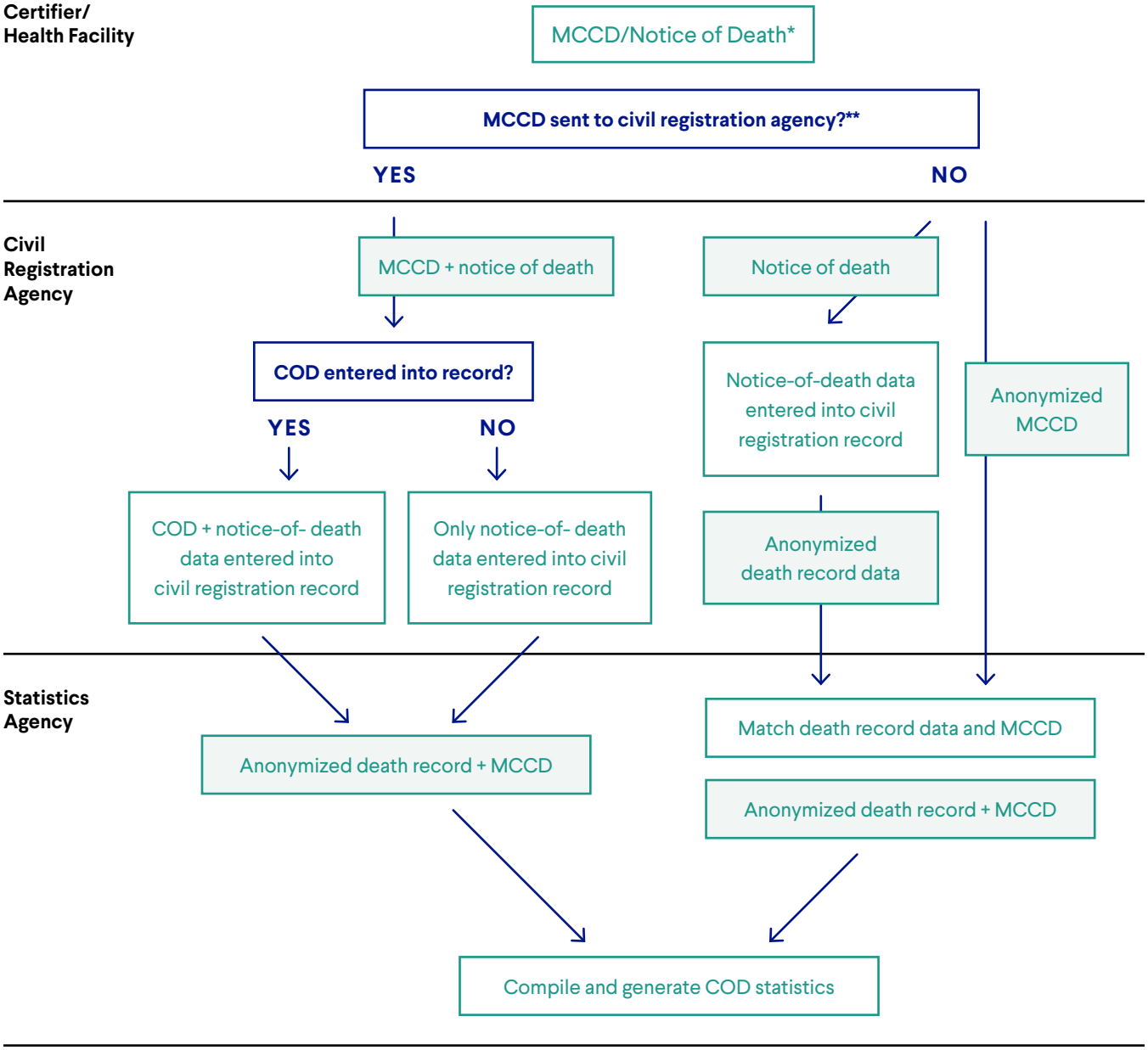
Signature et cachet

Nom de l'établissement : .....
Service : .....
Numéro de téléphone : .....

Annex 7: Reliability and Granularity of Methods for Determining Causes of Death

	Lay reporting	Verbal autopsy			Medical certification
Method of mortality data collection	Unstructured interview with respondents, e.g. next of kin	VA interview with automated COD determination	VA interview with physician review	VA interview with physician review of medical records	Completion of MCCD form by doctor; MLDI where required.
Method of assigning cause of death	Unstructured COD assignment	Automated VA algorithms	Physician assigned COD to limited or full ICD list	Physician assigned COD to full ICD list	Mortality coding to full ICD list
Accuracy & resolution of COD	Low medical validity; limited or undefined list of CODs	Limited COD list. Variability in COD distributions according to algorithm. Plausible COD distributions for 10-20 leading causes of death	Limited list of CODs. Results vary across physicians. Review dependent on ongoing availability of physicians	Full list of ICD CODs. COD may be accurate at individual level but this is dependent on the quality (recency, completeness) of available medical records	Complete list of ICD codes. High granularity and accuracy of COD at individual level. Key element in medicolegal investigations
Statistical reliability	None	Results invalid at individual level; valid at population level for statistical purposes only	Results invalid at individual level; Statistics reliable for selected (limited or full) list of CODs.	Results valid at individual level (subject to availability and quality of medical records); list of CODs comparable across populations, locations and times	CODs are statistically accurate, reliable and comparable across populations and over time and place

Annex 8: MCCD Flowchart



*A "notice of death" is a form from the health facility that contains the essential facts about the death (date and place of occurrence) and the deceased (name, sex, date of birth). It does not contain the cause of death.

**Note: The location of ICD coding is not shown because it varies by country, often being at the statistics agency, ministry of health, or civil registration agency.

Vital Strategies

vitalstrategies.org