VERBAL AUTOPSY CERTIFIER AND CODER'S MANUAL

SAVVY

Sample Vital Registration with Verbal Autopsy

MEASURE Evaluation

U.S. Census Bureau

Verbal Autopsy
Certifier and Coder's Manual

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Sample Vital Registration with Verbal Autopsy

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Cover

The cover shows a wood carving by Colombian artist Juan de la Cruz Saavedra from a photograph by Alex Treml of Durham, NC, USA, and is reproduced with permission from Family Health International of Research.

Table of Contents

LIST OF ACRONYMS

AA	assignment area
AIDS	acquired immunodeficiency syndrome
ANC	antenatal care
CSC	census supervisor coordinator
CSPro	Census and Survey Processing System (software)
DSS	demographic surveillance system
HIV	human immunodeficiency virus
ICD, ICD-10	*International Statistical Classification of Diseases and Related Health Problems*, second edition, 10th revision
ID	identification
KI	key informant
MCH	maternal-child health
MSS	mortality surveillance system
OJT	on-the-job training
QA	quality assurance
SA	supervisory area
SAVVY	Sample Vital Registration with Verbal Autopsy
SBS	SAVVY budget spreadsheet
TB	tuberculosis
TBA	traditional birth attendant
TT	tetanus toxoid
USAID	U.S. Agency for International Development
VA	verbal autopsy
VAI	verbal autopsy interviewer
WHO	World Health Organization

SAVVY MANUAL SERIES

This series of SAVVY mortality surveillance system manuals, guides, and other documents is available at the MEASURE Evaluation Web site at:

http://www.cpc.unc.edu/measure/leadership/savvy.html

Sample Vital Registration with Verbal Autopsy (SAVVY): An Overview

Central office manuals:

Data Processing Manager's Manual, including SAVVY Data System software
SAVVY Budget Manual, including SAVVY Budget Template software
Verbal Autopsy Certifier and Coder's Manual

Field office manuals:

Field Office Manager's Manual
Census Interviewer's Manual
Census Supervisor Coordinator's Manual
Census Supervisor's Manual
Census Update Interviewer's Manual
Key Informant's Manual
Verbal Autopsy Interviewer's Manual
Verbal Autopsy Supervisor's Manual

Training guides and materials:

Census Interviewer Training Guide
Census Interviewer's Workbook
Census Supervisor Training Guide
Census Update Interviewer Training Guide
Census Update Interviewer's Workbook
Key Informant Training Guide
Verbal Autopsy Interviewer Training Guide
Verbal Autopsy Supervisor Training Guide

SAVVY methods for verbal autopsy (including forms, certification, and cause of death assignment and coding) have been developed in collaboration with the World Health Organization (WHO). The WHO publication *Verbal Autopsy Standards: Ascertaining and Attributing Cause of Death* is an essential resource for the application of SAVVY methods.

What is SAVVY?

1

SAVVY stands for "**SA**mple **V**ital registration with **V**erbal autops**Y**." SAVVY is a library of best practice methods for improving the quality of vital statistics where high coverage of civil registration and/or good cause of death data are not available. SAVVY is not a substitute for universal civil registration. Its components can, however, fill short- to medium-term needs for critical information on births, deaths, and cause of death at the population level.

SAVVY can be implemented in many ways. It is not always necessary to implement SAVVY as a complete system. There are many circumstances in which various SAVVY methods might be effectively implemented. One option is to adapt specific modules and manuals in order to attain rapid cause-specific mortality estimates as part of a stand-alone data collection exercise, such as a survey. Another potential use of SAVVY methodologies is to augment existing facility-based or administrative data sources. SAVVY methods are integrated into the Health Metrics Network's vision of "stepping stones" to better vital events monitoring, and are entirely harmonized to the World Health Organization (WHO) International Classification of Diseases (ICD).

The remainder of this chapter will describe the structure of a complete SAVVY system, as part of a long-term strategy to attain universal vital registration and the proper medical certification of deaths. When implemented as a complete system, SAVVY can serve to provide nationally representative information about levels and causes of death, as well as generate many other socio-demographic indicators.

SAVVY includes resources to implement the following:

- **Demographic surveillance system (DSS) —** DSS is a complete and continuous enumeration of births, deaths, and migration in a geographically defined population.
- **Mortality surveillance system (MSS) —** MSS consists of the active reporting of deaths in a geographically defined population. Verbal autopsy (VA) interviews are used to determine

the probable causes of death.

- **Death certification and ICD coding —** Death certification and ICD coding involves application of the tenth revision of ICD and WHO-approved procedures to certify deaths from verbal autopsy interviews and assign a probable cause of death

- **Nested surveys —** Nested surveys consist of focused sets of questions and are included in the census update rounds. Examples include surveys on poverty monitoring, reproductive health, health service coverage, and environmental and behavioral risk factors.

In establishing a full SAVVY system, the first step is to select and define representative sample areas. Then a complete baseline census is conducted of all households and residents in those areas. The census information on the residents of each sample area is updated annually.

Following the baseline census and continuously thereafter, a local key informant (KI) notifies a verbal autopsy interviewer (VAI) of all deaths occurring in the KI's assigned area. The VAI then conducts a verbal autopsy interview at the household where that death occurred. This information is used later to determine the most likely cause of death.

The SAVVY system field operational structure will depend on the sample selection, as well as the availability of local resources and logistical support. The diagram on page 5 provides a general outline of the field operations in a prototypical SAVVY system.

Most of the people who work to implement SAVVY are selected with community input and participation. Ensuring the success and sustainability of SAVVY, and the use of the information it generates, depends upon fostering participation and ownership from the community to the national levels.

DEMOGRAPHIC SURVEILLANCE

Demographic surveillance is designed to collect accurate demographic data for the SAVVY system. The initial step is to conduct a baseline census for the areas within the SAVVY system. During the census, information is collected on age, sex, marital status, and educational attainment for people living within the SAVVY area. Information is also collected about family structures and other socioeconomic characteristics. Typically, interviewers who live within

the community collect the census data and the data are updated annually.

The data collected in the SAVVY censuses are used to calculate many indicators. The census data provide accurate population denominators for calculating rates (e.g., mortality rates). The census data also provide a sampling frame for supplementary surveys that are nested within the system.

MORTALITY SURVEILLANCE WITH VERBAL AUTOPSY

Mortality surveillance is designed to produce accurate community-based information on the levels and causes of death. Mortality surveillance involves continuously and actively identifying all deaths that take place in sample areas soon after they happen. Verbal autopsy interviewers visit households where deaths have occurred and interview relatives or caregivers using the SAVVY VA forms. Once completed, these forms are used to determine probable causes of death.

The data collected by SAVVY mortality surveillance techniques are used to calculate many indicators. Among the most important are mortality by age, sex, and specific causes of death. This information can be used at many levels of the health system for planning, reporting, monitoring, evaluating, and priority setting.

The information collected through SAVVY is generally not available from any other source or on an annual basis. Complete coverage and participation by all communities and the individuals residing in sample areas is extremely important.

WHAT IS VERBAL AUTOPSY?

Verbal autopsy, or VA, is a questionnaire administered to caregivers or family members of deceased persons to elicit signs and symptoms and their durations, and other pertinent information about the decedent in the period before death. SAVVY uses international standards for verbal autopsy forms, death certification and ICD coding procedures developed in collaboration with WHO, the Health Metrics Network, and other stakeholders. Separate verbal autopsy forms are used for the following age groups:

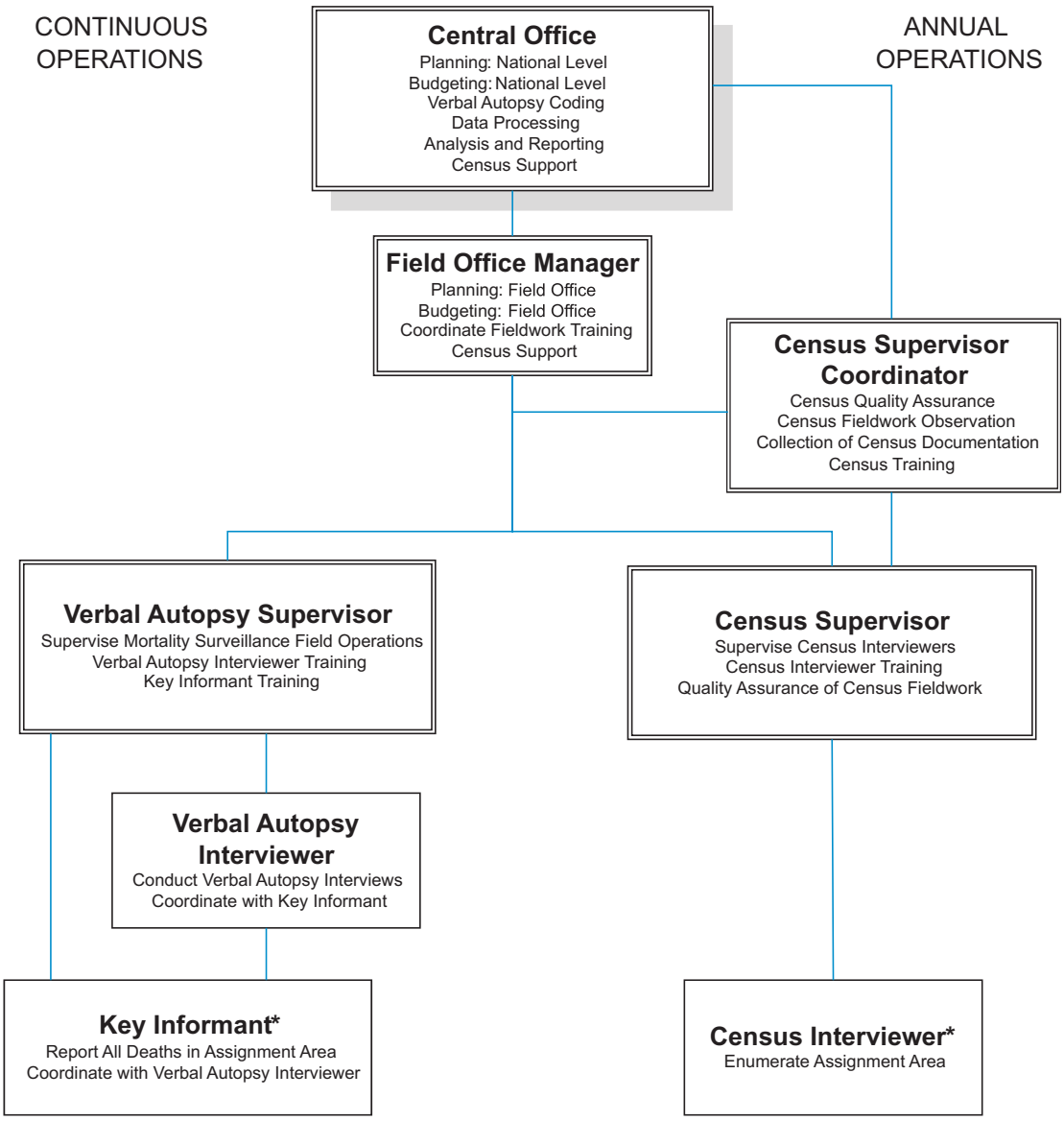
- perinatal and neonatal mortality (death of a child under 4 weeks)
- post-neonatal child mortality (age 4 weeks to 14 years)
- adult mortality (age 15 years and over).

All forms used to conduct these interviews include an open narrative section and a structured symptom duration checklist. There are also questions about the health and status of mothers (in the case of perinatal, neonatal, and child deaths), and questions that specifically relate to all women (15 years of age or older). Additional information is collected about previously diagnosed conditions, medications used, health services used, place of death, and behavioral and environmental risk factors. After the administration of the VA interview, a panel of physicians reviews the forms and assigns a probable cause of death using a method that conforms to international convention.

The purpose of VA is to describe the cause structure of mortality at the community or population level where no better alternative sources exist. VA is not intended to diagnose cause of death at the individual level. While VA has some serious limitations, the shortcomings of the tool are known and quantifiable. These deficiencies, however, should not prevent countries requiring information on causes of death from benefiting from the use of VA when no practical alternative for obtaining these data exist.

The SAVVY Resource Kit has been completely harmonized with WHO recommended tools and procedures. It is understood that there will be a need to carry out a small degree of local adaptation to these materials in each country setting in which they are applied.

Certain applications of verbal autopsy may benefit from a shortened or condensed version of the standard WHO VA forms, for example to reduce the amount of paper required. An alternative layout, containing the same questions and content as the standard WHO VA forms, has been designed. Each of these forms fits onto 4 sides of A4 paper. These forms are available upon request.



*If possible, these roles should be filled by a single individual.

ABOUT THIS MANUAL

This manual provides an overview of cause-of-death certification and an outline of the step-by-step process involved in coding information collected from verbal autopsy procedures. Guidelines for diagnostic criteria for symptoms and signs for common conditions that are encountered in verbal autopsy procedures are included. This manual also serves as a basic training and reference guide for verbal autopsy cause-of-death certification and WHO International Classification of Disease (ICD) coding. The coding process follows the guidelines provided in three volumes of ICD-10.[1]

[1]World Health Organization. International Statistical Classification of Diseases and Related Health Problems. Second ed., 10th revision (ICD-10). Geneva, World Health Organization; 1994, as updated 2005. Accessible online at http://www.who.int/classifications/icd/en/.

Roles and Responsibilities of the Verbal Autopsy Certifier and Coder

2

ROLES

The role of the death certifier is to read verbal autopsies and complete a Sample Vital registration with Verbal autopsy (SAVVY) death certificate for each verbal autopsy (VA) form. The role of the coder is to use the principles and rules of the International Classification of Disease (ICD) to code the SAVVY death certificate. In some situations, the certifier and the coder may be the same person.

RESPONSIBILITES

The responsibilities of the certifiers and coders are listed below.

Death certifier — It is important for a cause of death certifier to review all the information that is recorded in the verbal autopsy form. This information includes the identifying information about the deceased (such as age, sex, and place of death), the narrative of the illness as told by the respondent, the structured questions on specific symptoms, with their duration, details of past medical illness, and summary of medical evidence available at the household. Other information includes evidence from laboratory test reports, prescriptions, and other medical documents, and health services used by the deceased during illness in a period before death.

In children that died before reaching the age of 4 weeks, special attention should be paid to the condition of the deceased child's mother during pregnancy and events during birth. For women in the reproductive age, a checklist of symptoms and their duration should be reviewed carefully so that a pregnancy event is not missed as this information is crucial in counting and assigning maternal causes of death.

It is crucial to be aware of and take into account the absence of a symptom or sign as this helps in ruling out certain causes of death.

When a number of conditions have been identified as having occurred in the deceased, it is necessary to construct a chain of events that places the various conditions in sequence.

In the process of certifying the cause of death, the certifier

will need to read sections of the completed verbal autopsy forms carefully. Write down the relevant key pieces of information. Select the key words in the history. Look for cardinal symptoms and signs. Consider any significant negative evidence, i.e. absence of a particular symptom/sign or past history, similar to the classical teaching of clinical history taking and diagnosis.

Put the key words in chronological and patho-physiological sequence. You should not imagine the sequence ofevents, which are not documented in VA forms. It is important to stick to the words/sentences/facts provided in the VA forms only.

Lastly, come up with a tentative diagnosis.

The following is a list of tasks for death certifiers. A certifier:

- receives VA forms from the central office;
- treats the VA forms as medical records in terms of confidentiality;
- reads the VA form completely, including the history and each of the checklist questions;
- assigns an underlying cause of death and fills out a death certificate;
- ensures that the correct identification number is written on the death certificate; and
- returns the completeed forms and death certificates to the central office within the time specified.

Coders — Coders are responsible for translating the sequence of events recorded by the death certifiers into a series of codes that conform to ICD coding rules. The following is a list of tasks for coders of SAVVY death certificates. A coder should:

- receive sheets of death certificates from the central office (or possibly directly from a certifier);
- apply the ICD principles and rules to select the appropriate codes for each line of the death certificate; and
- return the coded death certificates to the central office within the time specified.

In summary, the key tasks for certifiers and coders are as follows:

- Review the VA report.
- Write the key features from the medical history in VA.
- Assign the underlying cause of death.
- Assign a three-character ICD code or four-character subcategory ICD code for cause of death.
- Record the date of assignment.
- Write down your full name, code, and sign the form.
- Return the completed forms to your SAVVY ICD coordinator.

CONFIDENTIALITY

It is ESSENTIAL that the information you obtain remains strictly CONFIDENTIAL. You are not permitted to discuss, gossip about, or show your records or completed forms to anyone who is not an authorized officer in the Sample Vital Registration with Verbal Autopsy (SAVVY) system. On no account should any unauthorized persons be permitted to fill in any section of a form. Do not leave your forms in an unsecured location where unauthorized persons may have access to them.

HONESTY

Your job will not always be easy. There may be times when your progress is not going well, even though you want to do a good job and keep on schedule. However, you must not take any "shortcuts" in reviewing or completing VA forms, or under any circumstances submit falsified work to the central office. Fake data are of no value. Worse still, if you falsify data you also weaken accurate data collected by others.

MATERIALS

- Certifiers require sheets of international death certificates.
- Coders require a set of the three volumes of the ICD-10.
- Both certifiers and coders require basic stationery, such as pens and pencils.

- ICD Certifier's and Coder's Manual (this manual) for reference.

Overview of the Data Collection Process

3

This section is intended to provide those who certify verbal autopsy (VA) deaths and code the certificates with a short overview of the broad steps taken from the time a death occurs in Sample Vital Registration with Verbal Autopsy (SAVVY) areas to tabulation and use of data. These steps include the following:

The **event of death is registered** in an active reporting system using community reporters, called key informants (KIs).

VA data are obtained by trained verbal autopsy interviewers (VAIs) who visit the households of the deceased within a specified time period after the death. They conduct structured VA interviews with family members and carers of the deceased, using the relevant VA form for the deceased person's age group.

Causes of death are assigned by a panel of physicians who use all of the information contained in the completed VA forms to discern the underlying cause and chain of events that led to death, in order to assign a specific cause or causes of death.

Rules are applied to death certificates by coders who are trained in the ICD coding protocol to translate the medical information in the verbal autopsy death certificate and apply appropriate International Classification of Disease (ICD) selection and modification rules to validate the sequence of events.

ICD codes are given by coders to each line of the death certificate.

Data processing for VA questionnaires includes the following tasks:

- check-in and control each VA form
- enter and verify data from each VA form
- assign and check-out forms for coding and assignment of cause-of-death codes
- verify coding of VA forms
- check-in forms from coding/verification
- key information from VA forms to create/update

- verify data keyed from VA forms to create final VA data file

The check-in and control of VA forms is needed ensure that forms are returned from each of the census assignment areas (AAs) and that the geographic and administrative codes applied to the VA forms are valid. Registering the forms in the control system will also ensure that the forms are made available to subsequent data processing tasks, and will reduce the likelihood that they will be lost or misplaced.

Check-in and control of VA questionnaires must be done for each form individually. A control system will be needed to monitor the processing of each VA questionnaire from check-in through data entry, matching, check-out to coders, check-in from coders, and adding codes to the VA data file.

Each VA form must be entered using a data entry program. The program performs range checks on input values and issues warning messages when certain types of inconsistencies are encountered in the data.

Each VA questionnaire should be assigned to two coders for independent coding. The coders should be randomly assigned in order to minimize any biases in coding. It is important that the control system keep track of who has the questionnaires and that the coding assignments be completed within a reasonable time.

If the codes assigned independently by the coders disagree, the questionnaires should be should be reviewed by the two coders for adjudication. For each item, the code that is assigned by the consensus of the two coders is assumed to be the correct code, so that each item in the VA form requiring a code will have only one code to be entered in the database.

Cause-specific mortality data are tabulated on a suitable periodic basis (e.g. annually) by age, sex, cause group, and geographic or socioeconomic strata. These data are fed into routine reporting, planning, and monitoring documents and, over time, allow not only assessment of current cause structure of mortality, but also an analysis of trends. Where reliable population denominators can be obtained for the reference population, mortality rates are also calculated.

The International Classification of Diseases (ICD)

4

See the WHO manual *Verbal Autopsy Standards* for material relevant to this chapter. Parts of this chapter have been taken from the WHO manual.

HISTORY

The *International Statistical Classification of Disease and Related Health Problems* (ICD) first originated in 1893. The current tenth revision of the second edition (ICD-10) was adopted in 1994 by the World Health Assembly. Its main use was to classify causes of mortality as recorded at the registration of death. Later, its scope was expanded to classify diseases and other related problems recorded on many types of health and vital records.

The current version includes a wide variety of signs, symptoms, abnormal findings, complaints, and social circumstances that may appear in place of a diagnosis on health related records, and may be important for analysis.

PURPOSE OF ICD

The purpose of the ICD is to allow systematic recording, analysis, interpretation, and comparison of mortality and morbidity data collected in different countries or areas at different times. The ICD has become the international standard diagnostic classification for all general and epidemiology purposes, and for many health management purposes. These include the analysis of the general health situation of population groups, and the monitoring and analysis of mortality and morbidity (incidence/prevalence) due to diseases in relation to other variables such as the characteristics and circumstances of the individuals affected.

The ICD also covers a conceptual framework of definitions, standards, and methods that have been closely linked and developed along with the classifications themselves. These include practical instructions and rules for reporting causes of death, coding of mortality and morbidity data, and guidelines for presentation and interpretation of data. Adherence to these guidelines enables standardized collection, analysis and presentation of data, which allows for the effective comparison of observations between populations, and across time. Some of the guidelines for cause of death certification and coding of underlying cause of death have been covered in the previous

section, and will be elucidated further in this section on examples of verbal autopsy data with solutions.

ICD-10 is a statistical classification, which contains a limited number of mutually exclusive code categories, which describe all disease concepts. The classification is hierarchical in structure with subdivisions to identify broad groups and specific entities.

The classification of diseases in the ICD is based on the practical needs of users, for epidemiological purposes and statistical data on diseases. The classification has been made in such a way that it provides a hierarchical structure and subdivisions. To accommodate these varied needs, the ICD is grouped in the following way:

- epidemic disease
- constitutional or general diseases
- local diseases arranged by system
- developmental diseases
- injuries

The ICD-10 consists of three volumes. Descriptions of the basic structure and principles of classification are found in Volume 1.

VOLUME 1 — TABULAR LIST

Volume 1 is the tabular list, which is an alphanumeric listing of diseases and disease groups, along with inclusion and exclusion notes and some coding rules. This volume is the primary coding tool and contains general principles that underlie nomenclature of diseases and classifications. Clinical coding is the translation of diseases, health problems, and procedural concepts from text to alphabetic/numeric codes for storage, retrieval, and analysis.

The main purpose of volume 1 is to verify the tentative code derived from volume 3. Volume 1 contains additional instruction notes, clarifies principles of classification and abbreviations, displays the code, the title of the code, and lists example of terms or disorders that are assigned to that code so that verification is possible.

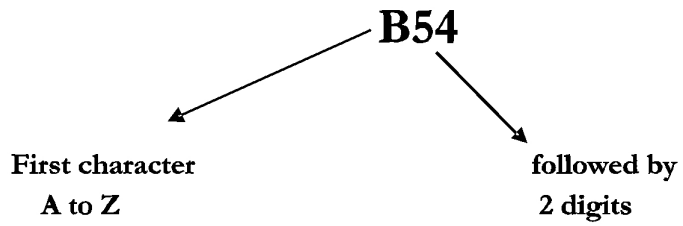
Volume 1 of ICD-10 has 22 chapters, one chapter for each main body system. Each chapter is subdivided into blocks that represent groups of closely related conditions. The blocks are further subdivided into three-character categories and finally into four-character subcategories.

This four-place alphanumeric coding scheme begins with an alphabetical character in the first position and numbers in the second,

third, and fourth position. The fourth position, following a decimal point, is not always used. (The fourth-position characters are used for different subcategory purposes, but .8 typically is used for "other" within a four-place subcategory set, and .9 often has the same interpretation as the first three character code alone with "no further specification.") The code numbers range from A00.0 to Z99.9, with the letter U reserved for additions and changes.

For example, the three-character code B54 represents unspecified malaria/clinically diagnosed malaria without parasitological confirmation. It is found in Chapter I — Certain Infectious and Parasitic Diseases (A00-B99), within the block of codes B50-B64 for "protozoal diseases."

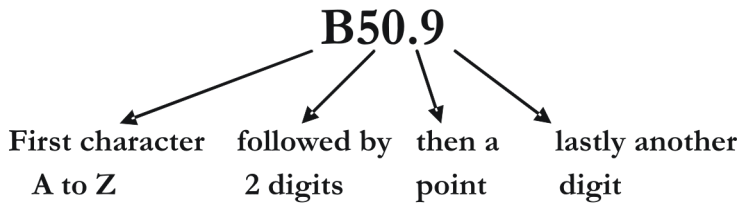
The structure of the core 3 character code is:



Each three-character category could be subdivided into four-character subcategories. Plasmodium falciparum malaria, unspecified, is represented by the code B50.9, where the final number used to designate "unspecified."

This type of grouping of infectious diseases, neoplasm, injuries etc. brings together conditions that are epidemiologically related and would be inconvenient for analysis if they were scattered in a classification arranged primarily by body site. The distinction between these special group chapters and body system chapters has practical implications for understanding the structure of the classification, for coding, and interpreting statistics that are based on it.

The structure of the 4 character sub-categories is:



In summary, the "core" classification of ICD-10 is a three-character code, which is mandatory for international reporting and international comparisons. A fourth character is not mandatory but recommended for many purposes.

The tabular list in volume 1 contains additional instructional notes that clarify principles of classification and abbreviations, displays the code, the title of the code and lists examples of terms or disorders which are assigned to that code so that verification is possible.

The use of volume 1 requires that certain conventions, notes, and abbreviations must be clearly understood. These are described in a later section of this manual.

VOLUME 2 — INSTRUCTION MANUAL

The instruction manual (volume 2) provides a basic description of the ICD, together with practical instructions for mortality coders and guidelines for the presentation and interpretation of data. Volume 2 provides:

- an introduction to and instructions on how to use volumes 1 and 3;
- guidelines for certification and rules in mortality coding; and
- guidelines for recording and coding mortality and morbidity.

VOLUME 3 — ALPHABETICAL INDEX

Volume 3 is the alphabetical index, which should be used as an accessory to the tabular list and, according to the guidelines in volume 2, in assigning a code. The index contains many more other comprehensive diagnostic terms and its use should neither be omitted nor should it be used alone. The index contains exhaustive terms that are used by physicians and appear in the records even though they may be imprecise or undesirable.

Although the index includes most of the diagnostic terms used, reference should always be made to volume 1 and the guidelines in volume 2 to ensure that a correct code is applied. The codes shown in the index are those for the three-character category to which the condition is classified. If the category is subdivided at the four-character level, that number is usually displayed.

This volume is divided into three sections entitled Alphabetical index to Diseases and Injury, Alphabetical Index to External Causes of Injury, and the Table of Drugs and Chemicals.

Inclusion terms — Inclusion terms refer to other important diagnostic terms or synonyms that are given in addition to the term provided. The diagnostic terms appears in notes ("Includes") at chapter, block, and category levels. In medical literature and diagnostic terms used by physicians, any single condition can have a wide range of medical terms. This may lead to confusion when summary mortality statistics are made. To solve this predicament, the International Nomenclature of Diseases (IND) has defined morbid diagnoses in such a way that a single name is used for each morbid condition. This means each name is applicable to only disease that is self descriptive and based on the cause.

As much as possible, eponymous (giving a name to something else) names are avoided, since they are not self-descriptive even though they have widespread use. A list of synonyms (a word that means the same, or almost the same, as another word in the same language, either in all its uses or in particular context) appears after each description with explanations why they have been discarded or why the supposed synonym it is not a true synonym.

Therefore, the IND has defined and recommended morbid diagnoses in such a way that a single name is used for each morbid condition.

Within the ICD rubric, the coder will come across a number of other diagnostic terms that are listed with the title. These other terms are synonyms for the title term.

Exclusion terms — In certain rubrics in the tabulation list, coders will find a list of conditions that are preceded with the word "excludes." After each excluded term, the coder will see a category or subcategory in parentheses to which the excluded term should be allocated.

Once the appropriate lead term has been located, several conventions and principles used in the alphabetical index and tabular list must be understood before a tentative code assignment can be made. The definition and use of the lead terms and modifiers has been described above.

Lead Terms, Modifiers and ICD Conventions

5

See the WHO manual *Verbal Autopsy Standards* for material relevant to this chapter. Parts of this chapter have been taken from the WHO manual.

The use of the alphabetical index and the tabular list requires knowledge of the definitions, principles and conventions used in the International Classification of Diseases (ICD). This section provides the coder with an outline of the terms used, with examples that must be understood for ensuring accuracy and uniformity of the codes.

LEAD TERMS AND MODIFIERS

The diagnostic statement written on the death certificate usually has two components — the **lead term** and one or more **modifiers**.

Lead terms describe the patient's actual condition or what was wrong with the patient. The lead term describes either the patient's actual pathological condition or the reason for seeking medical attention.

Modifiers usually refer to varieties of the condition, or the anatomical sites affected. Modifiers might identify the site of the condition (e.g. leg), the stage of the condition (e.g. acute, chronic) or the type of the consultation, problem, or encounter. Modifiers usually refer to varieties of the condition, or the anatomical sites affected. Modifiers need not be present in every statement and the terminology "not otherwise specified" or "NOS" is used (see below for explanation).

Examples of lead terms and modifiers:

Lead Term	**Modifiers**
Malaria	blackwater fever (type of condition)
Malaria	congenital (type of condition)
Fracture	spine (site of the condition)
Gonorrhea	acute, cervix (site of the condition)
Embolism	septic (nature of condition)
Infection	upper (site) respiratory (system involved)
Otitis	acute (stage of condition) media (location)

Essential modifiers appear in the alphabetical index as subterms and are indented below lead terms. The words in parentheses are non-essential modifiers and do not change the code number. The terminology "not otherwise specified" or "NOS" is sometimes used.

ICD CONVENTIONS

Coders need to understand the use of tabular list of inclusions and the four character subcategories before they learn the convention and definitions used in the ICD. In some of the four-character rubrics, the coder will find a number of other diagnostic terms.

THE USE OF "NOS" (NOT OTHERWISE SPECIFIED/UNSPECIFIED)

When the provider states a diagnosis, problem, or reason for an encounter as a single term that has no modifiers, it is said to be unspecified or not otherwise specified (NOS). The code assigned is that which follows the lead term.

For example, if the clinician states "anemia," the lead term for the condition is matched to the lead term "anemia" in the alphabetical index and code D64.9 is assigned for this condition. The same is true for a statement of "hepatitis" and the code assignment is K75.9

When the lead term has only one essential modifier, the modifier will appear on the same line as the lead term, separated from it by a comma.

THE USE OF "NEC" (NOT ELSEWHERE CLASSIFIED)

The phrase "not elsewhere classified" (NEC) is used with ill-defined terms as a warning that the specified forms of the condition are classified differently. The codes given for such terms should be used only if more precise information is not available.

THE DAGGER (†) AND ASTERISK (*) SYMBOLS

Sometimes a two-code system is used in ICD-10. Some generalized pathological condition may present as the primary or underlying condition, but also manifest itself with a different pathological condition in a particular site or organ. ICD uses the dagger to represent the primary code or underlying disease and is marked (†), and uses the asterisk (*) to represent the manifestation of the disease that is as an optional code for the manifestation. In mortality coding, the asterisk convention and code are not used at all. However, even though the dagger code is used, the code should be reported without the dagger.

This convention was adopted because the underlying cause is not always sufficient to describe the condition and an optional code has to be used to describe the basis for medical attention and care.

Example — A patient with tuberculosis may also present as an abscess in the spine.

In this case, tuberculosis (lead term), abscess (essential modifier), and spine (essential modifier) are shown as:

Tuberculosis A16.9
- abscess
- - spine A18.0† M49.0*

In this case, tuberculosis is the underlying cause of death and abscess of the spine is the manifestation of tuberculosis.

If it is necessary that the alternative code is required, then it should also be presented but the asterisk code should by no means be used alone. The asterisk and the dagger signs are not used in mortality coding. There are 83 special asterisk categories in the classification, which are listed in the beginning of each relevant chapter. Volume 2 provides a list of asterisks that should never be used alone.

CROSS-REFERENCES ("SEE" AND "SEE ALSO")

Cross-references ("see" and "see also") are found in the index. Cross-references are used to avoid needless repetition of terms and should be followed carefully.

Example — In the index, we find the words "see" and "see also," which should be interpreted as follows:

For the entry "Atheromatosis — see Arteriosclerosis," the word "see" is used here to refer the coder to the term "arteriosclerosis."

In the case of "Atheroma, atheromatous (see also Arteriosclerosis) I70.9," the phrase "see also" calls for the coder to refer to arteriosclerosis because the statement being coded contains other information that is not found indented under the term to which "see also" is attached.

PARENTHESES "( )"

Parentheses "( )" are used in volume 1 to include additional words that may follow the diagnostic term without affecting the code number. Examples include the following:

Gonorrhea (acute) (chronic) A54.9
Hypertension (primary) (Essential) I10

The words in parentheses do not affect the code.

SQUARE BRACKETS "[ ]"

Square brackets "[ ]" are used to enclose synonyms, alternative words, or explanatory phrases. Examples include the following:

A77 Spotted Fever [tick-borne rickettsioses]
B02 Zoster [herpes zoster]

Square brackets are also used to refer to previous notes or stated set of fourth character subdivisions.

COLON ":"

A colon is used when words used that precede a listing in inclusion and exclusion terms are incomplete terms for the assignment of the rubric. Here is an example of the tabular list:

A08.4 Viral intestinal Infection, unspecified

Viral:
- enteritis NOS
- gastroenteritis NOS
- gastroenteropathy NOS

In this example, enteritis by itself is incomplete, unless used by the term "viral."

BRACE "}"

A brace is used in listings of inclusion and exclusion terms to indicate that neither the words that precede those terms nor the words after them are complete terms. Here are examples from the tabular list:

A15.0 Tuberculosis of lung, confirmed by sputum microscopy with or without culture

Tuberculous:

bronciectasis fibrosis of lung pneumonia pneumothorax	Confirmed by sputum microscopy with or Fibrosis of lung without culture

K31.5 Obstruction of duodenum

Constriction Stenosis of duodenum Stricture Duodenal ileus (chronic)	of duodenum

THE USE OF "AND"

In ICD, "and" is used for situation to denote that both conditions mentioned can be classified in the same way; or can be classified in another way as mentioned after the word "or."

Here is an example from volume 1:

A18.4 Tuberculosis of skin and subcutaneous tissue

In this case, “tuberculosis of skin” ***and*** “tuberculosis of subcutaneous tissue” can be classified either as a case of tuberculosis of skin or tuberculosis of subcutaneous tissue.

THE POINT DASH “.-”

The convention of a point dash “.-” is used both in the tabular list and the index. This denotes that the fourth character is replaced by a dash. This is to show that a range of fourth characters are available and should be used. These fourth characters may be identified either in a note in the index or in the relevant category in the tabular list.

On the next page, a table summarizies the above symbols and terms.

Convention	Application in Volume 3	Application in Volume 1.
NOS Not otherwise specified/unspecified		Appears mostly in volume 1, falls under the terms that have no modifiers; e.g. page 414 vol. 1-H30.3 Chorioretinal inflammation, unspecified
NEC Not elsewhere classified	Found in alphabetical index to describe the terms that may be classified in other parts.	
[ ] Square brackets		Found in Vol. 1 to enclose synonyms, alternative words or for referring to previous notes. E.g. B65 Schistosomiasis [bilharziasis]
} Brace		Used for Inclusion and Exclusion terms to indicate that neither the words precede it nor after it are complete terms. E.g. N85.4 Malposition of uterus Anteversion Retroflexion Retroversion } of uterus
( ) Parentheses	Used in alphabetical list to enclose words that may be present or absent in the statement without affecting the code.	
† , * Dagger or asterisk	Found in both volumes. Dagger represents the primary code or underlying disease while Asterisk represents the manifestation of the disease.	
: Colon		Used in the Inclusion and Exclusion terms when the words precede them are not complete terms for assignment of code.
, Comma	Used after the Lead terms to identify modifiers (essential)	

QUALITY CONTROL

Quality control is an important part of the coding process. Ten percent of the all coded forms should be reviewed by an experienced coder; and coders should receive feedback about common mistakes.

The experienced coder will review and verify that each diagnostic description provided for clinical coding is given the correct code each time according to the guidelines provided in the ICD. The assessment includes the accuracy of the codes in the areas of individual codes, totality of codes and sequencing of codes:

First, assessment for each individual code will be reviewed and make sure that each clinical statement of diagnosis and operative procedure has the correct code assignment. It will be noted that individual patients may have many diagnosis or procedures and consequently many individual codes.

Second, assessment of totality of codes is done to ensure that all codes necessary to give an accurate clinical picture of the patient's diagnosis, problems, or other reasons for a hospital stay are recorded appropriately.

Third, the sequencing of codes are assessed to make sure that codes are organized in a sequence that is statistically consistent.

QUALITY CONTROL FOR COMMON CATEGORIES WITH COMMON CHARACTERISTICS

Quality control includes checking for consistency of categories that have common characteristics. Some of these include the following:

Asterisk categories — Asterisk codes must not be used alone; they must always be used with an additional dagger code. Categories that are not used alone, e.g. D63*, D77*, E35*, and many more as it appears in Vol. 2, must be used in addition with a dagger.

Categories limited to one sex — Categories that can only apply to males or females should be made appropriately. For example:

Malignant Neoplasm of male genital organ (C60 – C63)

Pregnancy, Childbirth and puerperum (O00 – O99)

Sequela categories — These are for conditions that are no longer in an active phase, such as:

Sequelae of Injuries, poisoning and other consequences of External causes (T90 – T98). In mortality coding, the S00 – T98 codes are not used; instead the codes V01 – Y89 are used.

Post procedural disorders — These categories are not to be used for underlying cause mortality coding. These are:

- E89.-, G97.-, H95.-, I97.-, J91.-, K91.-, M96.-, and N99.-.

Summary of codes not to be used in underlying cause mortality coding follows:

Codes not to be used for underlying cause mortality coding (code to item in parentheses; if no code is indicated, code to R99).

B95 – B97	
E89.-	
G97.-	
H59.-	
H95.-	
I15.-	
I23.-	(code to I21 or I22)
I24.0	(code to I21 or I22)
I65.-	(code to I63)
I66.-	(code to I63)
I97.-	
J95.-	
K91.-	
M96.-	
N99.-	
O08.-	
O80 – O84	(code to O75.9)
R69.-	(code to R95 – R99)
S00 – T98	(code to V01 – Y89)
Y90 – Y98	
Z00 – Z99	

Death Certification in ICD

6

See the WHO manual *Verbal Autopsy Standards* for material relevant to this chapter. Parts of this chapter have been taken from the WHO manual.

The World Health Assembly, the decision-making body of the World Health Organization (WHO), has defined the causes of death as **all those diseases, morbid conditions, or injuries which either resulted in or contributed to death and the circumstances of the accident or violence which produced any such injuries**. The definition does not include symptoms and modes of dying, such as heart failure or respiratory failure.

The purpose of the definition is to ensure that all the relevant information is recorded and that the certifier does not select some conditions for entry and reject others.

For the purpose of mortality tabulation and statistical use, the selection of a **single condition** is required. However, there may be several causes that can be attributed to the death from which only one cause needs to be identified and selected. The identification and selection of only one cause for tabulation is based on the principle of preventing the primary or underlying cause of death had there been effective preventive programs. This is the basis of the WHO development and definition of the principle of the **underlying cause of death**, which resolves the situation where there are several causes to a **one death-one cause situation**.

The *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*.

The terminal event that occurred, just before the death, is called immediate cause of death (e.g. aspiration pneumonia, cerebral edema, shock). While constructing the chain of events, it is very important to note that mode of death (such as respiratory failure, heart failure, brain death, etc.) should NOT be considered as the underlying cause of death.

INTERNATIONAL FORM OF MEDICAL CERTIFICATION OF CAUSE OF DEATH

	Cause of death	Approximate interval between onset and death
I	(a).....	.....
Disease or condition directly leading to death*	due to (or as a consequence of)	
Antecedent causes	(b).....	.....
Morbid conditions, if any, giving rise to the above cause stating the underlying condition last	due to (or as a consequence of)	
	(c).....	.....
	due to (or as a consequence of)	
	(d).....	.....
II		
Other significant conditions contributing to the death, but not related to the disease or condition causing it	.....	.....
	.....	.....

** This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.*

Death certificates are the primary source of mortality information. The international death certificate provided in ICD-10 (shown above) consists of two parts. Part I of the form has four lines, which represent the causal chain of death and their approximate interval between onset and death. Part II is used to record other contributing causes of death but not related to those in Part I.

The condition recorded on the lowest used line of part I of the form shown above is usually the "underlying cause of death" (UCOD). However, it is possible that a cause listed on another line is the underlying cause, if the death certificate is not completed correctly or for some other reason. To differentiate between these two possibilities, the "originating antecedent cause" (OAC) will be used to refer to the condition proper on the last used line of Part I of the certificate, and the expression "underlying cause of death" will be used to identify the cause selected for tabulation.

The "**underlying cause of death**" that initiated the chain of events leading to death is the cause used for tabulation.

It is valid to have a death certificate using only one line if there is only one step in the chain of events leading to death.

PART I OF THE CERTIFICATE

Part I of the certificate has four lines to record the sequence of events leading to death. It is completed for diseases related to the sequence of events leading directly to the death.

The condition thought to be the underlying cause of death should appear in the lowest completed line of Part I.

The direct cause of death is entered on the first line I (a). There

must always be an entry on line I (a). The entry on line I (a) may be the only condition reported in Part I of the certificate.

Where two or more conditions must be recorded, you should record the sequence of events leading to death. Each event in the sequence should be recorded on a separate line.

Exception: Two independent diseases may be occasionally thought to have contributed equally to the sequence at a particular point. In such unusual circumstances they may be entered on the same line.

- I (a) Disease or condition directly leading to death
- (b) Other disease or condition, if any, leading to I (a)
- (c) Other disease or condition, if any, leading to I (b)
- (d) Other disease or condition, if any, leading to I (c)

The underlying cause of death is entered on the lowest used line.

The certifier should make every attempt to provide a clear sequence of events on the certificate in Part I.

If the cause of death is unknown, even after investigation, it is correct to document "unknown". This is preferable to speculating on a possible cause of death.

PART II OF THE CERTIFICATE

Part II is used for conditions which have no direct connection with the events leading to death but which, by their nature, contributed to the death.

REPORTING DURATION OF CONDITIONS

The duration is the time interval between the onset of each condition entered on the certificate (not the time of the diagnosis of the condition), and the **date of death**, recorded in the column to the right of the disease or condition.

Where the time or date of onset is not known, a best estimate should be recorded.

The unit of time should be entered for each diagnosis:

- years

- ☒ months
- ☒ days
- ☒ hours
- ☒ minutes
- ☒ unknown

In a correctly completed certificate, the duration entered on each line will not exceed the duration entered for the condition on the line underneath since the causal sequence requires that antecedent conditions are reported in ascending sequence.

The duration information is useful in coding certain diseases and also provides a useful check on the accuracy of the reported sequence of conditions.

INTERNATIONAL FORM OF MEDICAL CERTIFICATE OF DEATH

Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death *)	VA-1.12 Pneumonia a) due to (or as a consequence of)	2 weeks
Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	VA-3.4 Malnutrition b) due to (or as a consequence of)	Months
	c) due to (or as a consequence of)	
	d)	
II Other significant conditions contributing to the death, but not related to the disease or conditions causing it	Diabetes	

**This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.*

HOW TO CERTIFY A DEATH IN SAVVY

In the SAVVY system physicians have the primary responsibility for certifying the verbal autopsy (VA) cause of death. Despite training in medical certification, death certificates produced are often inappropriate or inconsistent with WHO's ICD guidelines. This includes causes of death that are recorded that are not properly sequenced or may contain two causes entered on the same line of the death certificate.

Physicians (death certifiers) review all of the information that is recorded in the verbal autopsy form. This information includes

identifying information about the deceased (such as age, sex, and place of death), the narrative history of the illness as told by the respondent, the structured questions on specific symptoms with their durations, details of past medical illness, and summary of medical evidence available at the household. Other information includes evidence from laboratory test reports, prescriptions, and other medical documents, and health services used by the deceased during illness in a period before death.

When a number of conditions have been identified as having occurred in the deceased, it is necessary to construct a chain of events that places the various conditions in sequence.

In children below the age of 4 weeks, special attention should be paid to the condition of the deceased child's mother during pregnancy and events during birth. For women of reproductive age, a checklist of symptoms and their duration should be reviewed carefully so that a pregnancy event is not missed, as this information is crucial in counting and assigning maternal causes of death.

It is crucial to be aware of and take into account the absence of a symptom or sign as this helps in ruling out certain causes of death.

Carefully read sections of the completed verbal autopsy forms. Write the relevant key pieces of information on a paper. Select the key words in the history. Look for cardinal symptoms and signs. Consider any significant negative evidence, i.e. absence of a particular symptom/sign or past history, similar to the classical teaching of clinical history taking and diagnosis.

Put the key words in chronological and pathophysiological sequence. You should not imagine the sequential events that are not documented in VA forms. It is important to stick to the words/sentences/facts provided in the VA forms only.

Lastly, come up with a tentative diagnosis.

Completing a death certificate includes the following:

- write clearly and do not use abbreviations;
- always have an entry in line (a) of part I; and
- list all conditions in a causal sequence (on top the last/direct cause — on the bottom the first/oldest).

Procedures for Selecting the Underlying Cause of Death and Sequence of Death Events

7

See the WHO manual *Verbal Autopsy Standards* for material relevant to this chapter. Parts of this chapter have been taken from the WHO manual.

OVERVIEW

As previously mentioned, clinicians review verbal autopsies and fill out death certificates to summarize the events that led to the death. The next step in the process is to validate the death certificate. This step is performed by coders.

The aim of validation is to ensure that the sequence of events written on the death certificate is correct and that the underlying cause of death is on the lowest used line. The term "sequence" refers to two or more conditions entered on successive lines, each condition being an acceptable cause of the one entered on the line above it. When only one cause of death is recorded, this cause is selected for tabulation. When more than one cause of death is recorded, selection should be made in accordance with the rules outlined in this chapter.

The primary guide is the "General Principle." If this does not apply, there are three selection rules that should be applied. In some circumstances, further modification rules are applied. These principles and rules are detailed in this chapter.

The General Principle will apply in a properly constructed death certificate. It can also apply even if the death certificate is not properly constructed and the sequence of causes listed above the last recorded cause is wrong provided the last recorded cause could have given rise to all the causes listed before it.

Where the General Principle cannot be applied, clarification should be sought from the certifier. Selection rules are applied only when a certifier cannot provide adequate clarification.

In situations where the doctors are trained to write death certificates and to assign ICD codes, emphasis will have to be made on writing correct death certificates with valid underlying cause of death and sequence of events. If this is achieved, then the need of applying the coding and modification rules will be less. In these cases, the General Principle will apply.

The General Principle — The General Principle is stated as follows:

> *When more than one condition is entered on the certificate, the condition entered alone on the lowest used line of Part I should be selected only if it could have given rise to all the conditions entered above it.*

The cause entered on the lowest used line can be the underlying cause of death only if it could have given rise to all other causes listed above it.

Example — Consider a patient who had diabetes mellitus and developed myocardial infarction which led to cerebro-vascular accident and death. The death certificate will be filled as follows:

	Cause of death	**Approximate interval between onset and death**
I Disease or condition directly leading to death*	(a) Cerebro-vascular accident due to (or as a consequence of)	……unknown…
Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) Myocardial infarction due to (or as a consequence of)	……unknown…
	(c) Diabetes mellitus due to (or as a consequence of)	……unknown…
	(d)……	……
II Other significant conditions contributing to the death, but not related to the disease or condition causing it	……NIL……	……
	……	……
** This does not mean the mode of dying e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.*		

In this case, diabetes mellitus could have given rise to all the conditions stated above it in the death certificate.

SELECTION RULES

If the General Principle does not apply, then "selection rules 1-3" should be used.

Selection Rule 1 — If the General Principle does not apply and there is a reported *sequence terminating in the condition first entered* (leftmost on line Ia.) on the certificate, select the originating cause of this sequence. If there is more than one sequence, select the one that ends with the first term in line Ia. It worth re-iterating that selection rule 1 applies when there is a reported sequence but the cause on the lowest line in Part I of the death certificate does not explain all the diseases mentioned above.

If the General Principle does not apply and:

- there is a reported sequence terminating in the condition first recorded on the death certificate, the cause originating this sequence is the underlying cause of death; and
- there is more than one sequence terminating in the condition first recorded on the death certificate,
- then the first-mentioned condition causing the first mentioned sequence is taken as the underlying cause of death.

For example, a certificate showing:

- (a) bronchopneumonia
- (b) cerebral infarction and hypertensive heart disease

In this example, the physician certified that there are two reported sequences terminating in the condition first entered on the certificate; bronchopneumonia due to cerebral infarction, and bronchopneumonia due to hypertensive heart disease. The originating cause of the first-mentioned sequence is selected. Therefore, rule 1 results in selecting cerebral infarction.

Selection rule 1 also applies if the single condition entered on the certificate could not have resulted in all of the conditions listed above. For example, a certificate showing:

- (a) acute myocardial infarction
- (b) atherosclerotic heart disease
- (c) influenza

Select atherosclerotic heart disease. The reported sequence terminating in the condition first mentioned on the certificate is acute myocardial infarction due to atherosclerotic heart disease.

If there is no logical sequence (that is, neither the General Principal nor rule 1 is applicable), "selection rule 2" should be applied.

Selection rule 2 — If there is *no reported sequence* terminating in the condition first recorded on the certificate, select the first-mentioned cause on line Ia. For example:

- (a) pernicious anaemia and gangrene of foot

- (b) atherosclerosis

In this example, select pernicious anaemia. In this case, there was no reported sequence terminating in the pernicious anaemia, which is the first mentioned condition.

Selection Rule 3 — If the underlying cause of death produced by applying the General Principle or by rule 1 or rule 2 is obviously a direct consequence of another reported condition, whether in parts I or II, then this primary condition is the underlying cause of death.

In some cases, there is a condition reported in Part I or II that has not been selected using the General Principle, selection rule 1 or 2, but which would have caused the other conditions on the certificate. In these cases, selection rule 3 is applied.

If the underlying cause of death produced by applying the General Principle or the other rules is obviously a direct consequence of *another reported condition*, whether in Part I or II, then this primary condition is the underlying cause of death.

In some cases, there is a condition reported in Part I or II that has not been selected using the General Principle or rule 1 or 2, but which could have obviously caused the other conditions on the certificate. In such cases, selection rule 3 is applied. In most cases, information produced from VA will not contain sufficient details to enable identification or specification of several conditions.

Here is an example of rule 3:

- (a) cardiac failure
- (b) anemia
- (c) tonsillitis and malaria

Select malaria (B54). Tonsillitis, which would be selected by rule 1, cannot be considered as a direct sequel to the other conditions in the death certificate.

Another example:

- (a) cerebral hemorrhage
- (b) hypertension
- (c) chronic pyelonephritis and prostatic obstruction

Select prostatic obstruction (N40). Chronic pylonephritis, which would be selected by selection rule 1, is considered a direct sequel of prostatic obstruction.

In verbal autopsy, there are circumstances where, due of lack of sufficient information, the selected cause in the death certificate is not necessarily the most useful and informative condition for tabulation. In such cases, modification rules need to be applied after the General Principle and selection rules have been applied.

Modification Rule A (Senility and other ill-defined conditions) — This rule is applicable for senility and other ill-defined conditions that are classifiable in ICD-10 to Chapter XVIII — Symptoms, Signs and Abnormal Clinical and Laboratory Findings, Not Elsewhere Classified (R00 – R99). The conditions in Chapter XVIII include cases where the information that is available in the completed verbal autopsy forms does not allow to make a definite diagnosis. The chapter also includes cases where the information that exists is of only a provisional or tentative diagnosis that was made and the patient could not be evaluated further to establish definitive diagnosis before he died. In addition, there are cases where a patient presents with symptoms, signs, or abnormal clinical or laboratory findings before death but medical records from a health facility he or she visited may exist that have information of specific medical conditions, even if such information has no direct relevance with symptoms, signs, or abnormal clinical or laboratory findings that were present at the time of death.

In such cases, the consequent death certificate will have not only a condition classifiable to Chapter XVIII (R00 – R94 and R96 – R99), but may also have another condition that is classified elsewhere. This situation calls for a reselection of the underlying causes of death because the reported condition modifies the coding.

Example — Consider an elderly patient who died and the only available information is an ill-defined symptom of painful micturition, and that the patient could not be evaluated further before death. If in addition the patient had additional information that pointed to a diagnosis of scoliosis, the death certificate would appear as:

- (a) Senility with painful micturition
- (b) Scoliosis

Note: In this case, both senility (R54) and painful micturition (R30.9) are ill-defined conditions that are classifiable to Chapter XVIII, but were reported with a scoliosis (M41.9), which is a condition that is classifiable to Chapter XIII — Diseases of the Musculoskeletal System and Connective Tissue (M00 – M99). In this case the underlying cause of death should be selected again.

Since there is no reported sequence, senility would have been selected according to rule 2. However, scoliosis that is classified in Chapter XIII calls for a reselection of the underlying causes of death. Here, senility that would be selected by rule 2 is ignored and the General Principle is applied, and scoliosis unspecified (M41.9) is selected.

Modification Rule B (Trivial conditions) — This rule applies when trivial conditions that are unlikely to have caused death are reported in death certificates in the presence of either:

- a reported serious condition; or
- an adverse reaction to treatment of the trivial conditions.

This situation calls for a reselection of the more serious condition as the underlying cause of death.

Examples are when Part I of the death certificate reports a trivial condition (e.g. headache, tendonitis, in-grown toe nail etc.) and Part II of the death certificate reports a more serious condition (acute gastroenteritis, measles, tuberculosis, renal failure, etc.).

Here is an examples of rule B:

- (a) intraoperative haemorrhage
- (b) surgical removal of ganglion
- (c) ganglion

A ganglion (M67.4 selected by rule 1) is a trivial condition, but intraoperative haemorrhage, which is an adverse reaction of surgical removal of the ganglion, is a more serious condition and is therefore selected using modification rule B.

Modification Rule C (linkage) — Some causes are linked to others in the classification scheme and this affects whether they can be stand-alone underlying causes of death or whether they have to be recorded as linked combinations. For example:

- (a) coma
- (b) unspecified viral hepatitis

In this case, modification rule C applies because the selected underlying cause (unspecified viral hepatitis) is linked to coma. Therefore, for this type of death certificate, code to unspecified viral hepatitis with coma (B19.9).

Modification Rule D (specificity) — Where the selected cause describes a condition is in general terms and a term that provides

more precise information about the site or nature of this condition is one the certificate, use the more informative term. For example:

- (a) encephalitis
- (b) measles

In this example, code measles encephalitis (B05.1†) because "measles encephalitis" is the more informative term as it describes both the nature of the infection and the site.

Modification Rule E (early and late stages of disease) — If both an early and a more advanced stage of a disease is recorded, code to the more advanced stage. This rule does not apply when a chronic form of a disease arises from an acute form. For example:

- (a) eclampsia during pregnancy
- (b) pre-eclampsia

In this example, code "eclampsia during pregnancy" (O15.0).

Modification rule F (sequelae) — Where the selected cause is an early form of a condition for which the classification provides a separate "Sequelae of . . . " category, and there is evidence that death occurred from residual effects of this condition rather than from those of its active phase, code to the appropriate "Sequelae of . . . " category. Therefore, the coder will use the certain categories where the underlying cause of death resulted from late (residual) effects of a given disease or injury rather than from the active phase. This rule applies to "Sequelae of . . . " categories that are found in B90 – B94, E64.-, E68, G09, I69, O97 and Y85 – Y89 codes.

For example, consider a woman who had postpartum haemorrhage and develops postpartum acute renal failure, and dies from chronic renal failure one year or more after delivery. The death certificates would be written as:

The underlying cause of death to be used for coding would be O97, which is death from sequelae of direct obstetric causes (postpartum haemorrhage), because the maternal death was a result of the residual effects of a direct maternal death.

Similar applications apply to sequelae of tuberculosis, poliomyelitis, leprosy, inflammatory diseases of the central nervous system, cerebrovascular diseases, and sequelae of external causes of injuries. For example:

- (a) Pulmonary fibrosis
- (b) Old pulmonary tuberculosis

	Cause of death	Approximate interval between onset and death
I Disease or condition directly leading to death*	(a) chronic renal failure due to (or as a consequence of)	……over one year…
Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) acute Renal failure due to (or as a consequence of)	……few days…
	(c) postpartum haemorrhage due to (or as a consequence of)	……unknown…
	(d)……	……
II Other significant conditions contributing to the death, but not related to the disease or condition causing it	……NIL……	……
	……	……
** This does not mean the mode of dying e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.*		

In this example, code to sequelae of respiratory tuberculosis (B90.9).

CONTRIBUTORY CAUSES

There are situations where a clear sequence of events exists; however there are also frequent instances, where other significant medical conditions exist, which although do not fit into sequence, may contribute in an indirect manner to the final event of death. In such situations, those diseases or conditions that are independent of the causal chain of events are often called contributory causes of death.

For example, if a person dies of a stroke but had diabetes in the past, then diabetes may have contributed also to this condition. Similarly, if a neonate dies of diarrhoea and also has low birth weight, then low birth weight may be a contributory cause of death. It is often a judgement call as to what is the underlying and what the contributory cause of death.

Contributory causes are recorded in Part II of the ICD death certificate.

Guidelines for the Most Common Diagnoses: The Short List

8

This section provides guidelines for physicians on how to interpret and use the symptom duration check list and other information in the verbal autopsy forms in assigning cause of death.

Reliability and validity of cause of death assignment from verbal autopsy data are the key elements in determining their usefulness. Previous experience has proved that physician review of completed VA instruments is the preferred method for cause of death assignment. However, a standard approach to assigning causes of death is essential, to reduce inter-observer variation.

The following principles guide the process of cause of death assignment:

- Independent review by two physicians, followed by a third opinion in case of disagreement on the diagnosis, is the recommended method to obtain reliable cause of death assignment.
- A panel of physician reviewers should be established for each population subgroup for which mortality tabulation is planned.
- Physician reviewers should receive formal training in cause of death assignment, using real, current verbal autopsy forms.
- Use of standard disease/condition specific diagnostic criteria will increase reliability and reduce inter observer bias.

The task of ascertaining causes of death has been streamlined according to these principles to ensure overall uniformity from different reviewers. It is important to rely on presence of key words or cardinal symptoms of the disease (e.g. sudden onset chest pain for diagnosing myocardial infarction) as well as associated symptoms (e.g. radiation of pain, associated sweating etc. for myocardial infarction), as is usually done while making a clinical diagnosis. Respondents may not always be able to recall minute details, especially when they are mostly subjective in nature.

It is crucial that reviewers use these criteria as general guide-

lines and to use clinical diagnostic knowledge and skills to assess the information from verbal autopsies to assign a probable cause of death. Physicians are expected to provide expert opinion on the cause of death based on the information available, and to bear in mind that the data are collected for the purpose of generating population mortality cause structures for policy formulation and program evaluation, and not for any legal or individual case diagnostic purposes.

Reviewers are required, wherever possible, to assign specific disease entities or condition and codes, rather than ill-defined conditions such as senility, abdominal pain, fevers etc. In case it is not possible to arrive at a diagnosis, symptoms can be written. Also, wherever available, information on the illness before death from medical documents available at the home of the deceased, or as revealed to the relatives by health personnel, should be considered in assigning causes of death.

The table that begins on the next page provides guidelines for the criteria that physicians will use to assign cause of death. The table is organized according the layout in the verbal autopsy forms.

CAUSE OF DEATH	CRITERIA
Intestinal	
Diarrhoea/gastroenteritis/dysentery	Frequent/liquid/water loose or soft stools **AND** any of the following: • low/nil urine content • restricted fluid intake • vomiting • eyes sunken or depressed fontanelle • blood in stool (dysentery)
Tuberculosis	
Pulmonary tuberculosis	Chronic cough of long duration with fever **AND** any one of the following signs or symptoms: • evening fevers • chronic cough (over 4 weeks) • blood in sputum • chest pain • breathlessness • loss of appetite • chronic weight loss **OR** family history of TB
Tetanus	
Tetanus, neonatal	Baby able to suck after birth **AND** stopped sucking after 2-3 days **AND** baby's body became rigid with or without convulsions **Possibly with** umbilical cord inflammation **OR** fever
Measles	
Measles	Rash all over body after an attack of fever > 3 days **AND** red or watery eyes or cough, running nose (coryza)
Viral hepatitis	
Acute viral hepatitis	Marked **acute** jaundice with abdominal pain; progressive yellowness of eyes and skin **AND** any of the following signs or symptoms: • fever • headache • nausea • vomiting • loss of appetite • urine is yellow in color **AND** no other obvious cause

CAUSE OF DEATH	CRITERIA
Human immunodeficiency virus (HIV)	
AIDS	History of severe weight loss in less than 3 months **AND** history of prolonged unexplained fever or diarrhea or persistent cough for more than 1 month (intermittent or continuous) **OR** HIV +ve serology **Possibly with** mouth sores/white patches in mouth; skin rash; generalized swelling of nodes in armpits, neck, groin; history of spouse/partner with similar illness/death of spouse partner from illness
Malaria	
Malaria	Acute onset of high grade fever, with chills and rigor. Fever may be intermittent **AND** blood rest positive for malaria **AND** any one of the following: • jaundice • breathlessness • decreased urine output • convulsion/unconscious (cerebral) • headache **AND** none of the following: • ARI • burning sensation during micturition • body rash • heatstroke
Malignant neoplasm	
Oral cancer (mouth)	Lump or mass or swelling on the tongue/cheek/mouth cavity/gum/palate, usually progressive **AND** any one of the following: • non-healing sore or ulcer • bleeding on touch • restriction/difficulty in opening mouth • weight loss **OR** diagnosed as mouth cancer
Pharynx (C10-C11) **larynx (throat) (C32)** **rachea (C33) cancer**	Growth in throat/neck or hoarseness of voice **AND** weight loss over several months **OR** diagnosed as throat cancer
Esophageal cancer	Progressive difficulty in taking foods. **AND** weight loss over several months **OR** diagnosed as esophageal cancer
Stomach cancer	Vomiting/vomiting of blood. Difficulty in swallowing **AND** mass in upper abdomen **AND** any of the following: • pain in abdomen • weight loss • enlarged liver • black stools

CAUSE OF DEATH	CRITERIA
Colon/rectal cancer	Bleeding from anal opening **AND** any of the following: • constipation alternating with loose stools or constipation alone • weight loss • painful abdominal distension • lump in lower part of abdomen **OR** diagnosed as colorectal cancer
Liver cancer	Enlargement of liver **AND** abdominal distension (ascites) within weeks **AND** weight loss **AND** h/o hepatitis or jaundice **AND** no regular fever there is usually a rapid (usually within 6 months) progression from onset of symptoms and signs to death **OR** diagnosed as liver cancer
Bronchus and lung cancer	Chronic cough and blood streaked sputum eventually leading to haemoptysis and not responding to antibiotics and anti-tuberculosis drugs **AND** any of the following: • breathlessness • chest pain • hoarseness of voice • recurrent history of Pneumonia • rapid loss of weight towards end **AND** no history of tuberculosis (no fever) **OR** diagnosed as lung cancer
Breast cancer	Painless lump in one or both breasts **AND** any of the following: • discharge from nipple • skin ulceration over breast • enlarged glands in the neck/maxilla **OR** diagnosed as breast cancer
Carcinoma cervix	Non-menstrual bleeding often after menopause **OR** intermenstrual bleeding **OR** foul smelling vaginal discharge with blood **AND** weight loss **OR** diagnosed as carcinoma cervix
Nutritional anemia	
Anemia	Marked paleness of body **AND** any of the following: • weight loss • fatigue or weakness or breathlessness on exertion • giddiness • history of bleeding anywhere **OR** diagnosed as anemia **Possibly with** pallor of fingers **OR** ankle swelling **OR** swelling of the whole body **OR** health professional's remarks about need for blood transfusions

CAUSE OF DEATH	CRITERIA
Diabetes mellitus	
Diabetes mellitus	Frequent urination or increased thirst or and increased hunger **AND** any of the following: • recurrent infection (particularly respiratory)/ septicaemia • ulcers/foot sores or wounds not healing properly/gangrene • neuropathy • progressive organ disease • renal complications • septicaemia • vascular complications
Malnutrition	
Malnutrition	Not growing properly or losing weight and becoming very thin over months **AND** any of the following: • recurrent febrile illness • reddish brown discoloration of hair • flaking of skin • pallor • abnormality distended abdomen • swelling of feet
Meningitis	
Meningitis	Continuous fever until death **AND** neck stiffness, headache, vomiting **Possibly with** loss of consciousness **OR** no symptoms of ARI (there is a need to exclude malaria in endemic areas)
Ischaemic heart diseases	
Myocardial infarction	Severe chest pain lasting for more than ½ hour but less than 24 hours, within the last month before death **AND** any of the following: • shortness of breath • vomiting • anxiousness • pain radiating to left arm • sweating • sudden death **OR** diagnosed heart attack/myocardial infarction
Congestive heart failure	Progressive shortness of breath on exertion and later on lying down or at night, improving on sitting up **AND** any of the following signs or symptoms: • swelling of feet • distension of abdomen • progressive cough **OR** history of previous MI, heart disease or hypertension

CAUSE OF DEATH	CRITERIA
Pneumonia	
Pneumonia	Acute cough (dry or productive) **AND** high fever **AND** any of the following: • shortness of breath/fast breathing • chest pain • blood in sputum **AND** any of the following: • no wheezing • no swelling of legs • no distension of abdomen
Chronic obstructive pulmonary disease	
Chronic obstructive pulmonary disease	Recurrent episodes of productive cough >2yrs **AND** breathlessness, initially episodic (more in winter) later progressive or ankle swelling late in disease **AND** exclude TB
Cirrhosis of liver	
Cirrhosis of liver	Gradual abdominal distension (fluid in abdomen-ascites) **AND** swelling of lower limbs **AND** any of the following signs or symptoms: • early progressive jaundice • painless liver • vomiting of blood • passing of blood in stool • drowsiness or coma • history of chronic alcoholism or hepatitis **AND** no fever
Disorders of the kidney	
Acute renal failure	Progressive or acute onset of decreasing urinary output for more than 1 day **AND** any of the following signs or symptoms: • progressive loss of appetite • hiccups • drowsiness • confusion • unconsciousness • swelling of eyelids/face/body in the morning **OR** history of dialysis

CAUSE OF DEATH	CRITERIA
Pregnancy	
Abortion	Abortion (termination before 28 weeks of pregnancy) in less than 42 days before death **AND** any of the following: • lower abdominal pain • excessive vaginal bleeding • abnormal vaginal discharge • fever (in septic abortion)
Eclampsia	History of convulsions for first time in pregnancy **OR** reported high blood pressure with convulsions **Possibly with** face and ankle swelling
Antepartum hemorrhage	Vaginal bleeding in pregnancy after 28 weeks of gestation but before birth of baby
Postpartum hemorrhage	Excessive bleeding after delivery of baby (for example, blood completely covering the floor or used many garments to soak blood)
Obstructed labor	Abnormal presentation (breech, shoulder, hand, or transverse) **AND** baby not delivered **OR** difficulty in delivering baby, forceps/vacuum delivery **AND** prolonged labor >24 hours; in first pregnancy > 12 hours
Puerperal sepsis	High fever before or after delivery persisting till death **AND** any of the following: • membranes ruptured several hours before delivery • foul smelling vaginal discharge with or without blood • lower abdominal pain/distention • vomiting **AND** no cough, no burning, micturition, no yellowness of eyes
Low-birth-weight (full term pregnancy)	Smaller than average size baby; if baby's weight was taken, birth weight below 2.5 kilograms **AND** no other obvious causes of death **Possibly with** poor sucking after birth **OR** death at 3-7 days
Prematurity (not full term)	Baby died after being born alive before 37 weeks of gestation **AND** no other obvious causes of death
Birth trauma	Bruises at birth, or elongation/swelling over skull **OR** any limb broken at birth **OR** convulsions in first 72 hours of birth **Possibly with** instrumental delivery **OR** complicated delivery
Asphyxia at birth	Delayed or poor breathing or no breathing at birth **OR** delayed or no cry at birth **AND** any sign of life present at birth (i.e. exclude stillbirths) **OR** convulsions in first 72 hours **Possibly with** prolonged or difficult labor
Bacterial sepsis of newborn	Fever **AND** no other obvious causes of death (like ARI, diarrhea) **Possibly with** failure to breastfeed and umbilical sepsis
Congenital malformations	Abnormality of head (small, flat, swelling), spine, body, arms or legs reported at birth (for specific diagnoses refer to codes Q65-Q88)

CAUSE OF DEATH	CRITERIA
Abdominal pain	
Acute abdominal pain (not elsewhere classified)	Severe acute abdominal pain; vomiting of blood; abdominal distension **AND** any of the following signs or symptoms: • fever • constipation • collapse/unconsciousness **OR** history of peptic ulcer
Convulsions not elsewhere classified	
Encephalitis	Convulsion of body/body parts or asymmetrical weakness or paralysis **AND** fever until death **AND** any of the following: • vomiting • unconsciousness • stiff neck **Possibly with** confusions, altered sensorium
Acute lower respiratory tract infection	Cough **OR** fever **AND** rapid breathing **OR** difficult breathing with in-drawing of chest (often local term)
Dengue fever (usually as epidemic outbreak)	Sudden onset of high fever **AND** any one of the following: • vomiting • prominent aches and pains in muscles, bones, forehead • and behind eyeballs • bleeding from body orifices **OR** blood test positive for dengue
Epilepsy/seizures	History of convulsions of body or parts of body over years, with fit on the day of death **AND** loss of consciousness following fits **AND** no history of injury to head or fever or neck stiffness
Stroke	Sudden onset of paralysis of one or more limbs in the month preceding death **AND** any of the following: • unconsciousness • loss of vision • urinary incontinence • loss of sensations on any part of body • altered speech • sudden onset of headache with altered sensorium
Hyperplasia of prostrate	Difficulty in passing urine with frequent urging usually in elderly man >60 years **AND** lower abdominal pain **AND** any of the following signs or symptoms: • patient becomes dull and drowsy • hiccups • vomiting • face is swollen • delirium or coma **AND** rule out prostrate cancer

CAUSE OF DEATH	CRITERIA
Pyrexia of unknown origin	Fever of long duration (more than 4 weeks) **AND** no possible cause found **OR** diagnosed pyrexia of unknown origin by a doctor
Jaundice (not elsewhere classified)	Progressive yellowness of eyes and skin **AND** any of the following signs and symptoms: • fever • headache • nausea • vomiting • loss of appetite • urine yellow in color **AND** no other obvious cause (exclude: viral hepatitis)

How to Code a Death Certificate

9

See the WHO manual *Verbal Autopsy Standards* for material relevant to this chapter. Parts of this chapter have been taken from the WHO manual.

OVERVIEW

Previous chapters dealt with completing a death certificate and applying rules to validate a death certificate in order to determine the underlying cause of death. This section of the manual provides step-by-step guidelines on how to code death certificates derived from verbal autopsy forms to conform to International Classification of Disease (ICD-10) guidelines. This chapter provides examples to enable coders to understand the "ICD language" and conventions used (as described in the previous chapter).

The following sections provide a description of the procedures and step by step process which the coders should follow. As much as possible the conventions used in ICD-10 have been elaborated and examples in their use have been provided. While the coders are required to be acquainted with all these procedures and comprehend the terms used there is no substitute to extensive practical experience. The three ICD volumes are invaluable tools that every coder should be familiar with.

A STEP-BY-STEP PROCESS TO CODING

When coding, all coders should have volume 1, the tabular list; volume 2, the instructional manual; and volume 3, the alphabetical index of ICD-10 available to be able to follow conventions, principles, and notations used in ICD coding.

Four basic steps should be followed to obtain a correct code for a diagnostic statement.

Step 1: Interpret the medical terminology — At this stage, the clinical statement describing the patient's underlying cause of death will have been done and what remains is to determine the condition that is to be coded. To do this, the coder will need to identify the lead terms and modifiers in the statement provided by the clinician.

The coder should now examine the diagnostic statement, which usually has two components — the lead term and one or more mod-

ifiers.

Step 2: Locate the lead terms — The lead term that was identified in the diagnostic statement is used to locate the appropriate lead term in the alphabetical index (Volume 3 of ICD-10 books). The lead term is written in bold letters in the index and modifiers are indented. For example, in volume 3:

Gonorrhea (acute) (chronic) A54.9
-Bartholin's gland (acute) (chronic) (purulent) A54.0
-Bladder A54.0

In this example, the description implies that A54.9 is the code number for the word "gonorrhea" alone, or when qualified by any word (or combination of words) in parentheses. The term "gonorrhea" is the lead term and "acute, chronic" are nonessential modifiers that appear in parentheses, and the indented words below are the essential modifiers. The words "Gonorrhea (acute) (chronic)" are highlighted in bold and appear in the first line.

In another example in volume 3:

Malaria, malarial (fever) B54
- with
- - blackwater fever B50.8
- - - haemoglobinuric (bilious) B50.8
- - haemoglobinuria B50.8

Note that the lead term is written in bold letters and modifiers are indented. Also note that indentation starts at the extreme left hand side and progressively occupies the immediate right position.

Step 3: Assign a tentative code — after the identification of the lead term the coder will be able to assign a tentative code using the Alphabetical Index.

The codes shown in the Index are those for the three-character category to which the condition is classified. If the category is subdivided at the four-character level, that number is usually displayed.

Sometimes, however, the fourth character is replaced by a dash (. –) .

This is to show that a range of fourth characters are available and should be used. These fourth characters may be identified either in a note in the Index or in the relevant category in the Tabular list. If two codes are provided in the index, record them in the sequence given as they represent the etiology (†) and manifestation (*) of the condition.

Before assigning the tentative code the coder should:

- check cross references if applicable;
- read notes for definition, coding instruction and fourth character subdivision; and
- locate modifiers in parentheses (non-essential modifiers or essential modifiers).

Step 4: Assign the final code — In this final step, the coder should be able to assign the code. The coder should use the tentative code that was assigned in step 3 to check the suitability of the code using the tabular list and assign the final code.

Steps 3 and 4 require clear understanding of the conventions used in the ICD. The coder should be guided by inclusion and exclusion terms under the selected code, chapter, block, or category heading.

In summary:

Examine the diagnostic term and identify the lead term and any modifying terms and record the diagnosis on your note book.

Refer to the index (volume 3) and look up the lead term and modifying terms and check the rest indentations until all the terms mentioned in the diagnosis have been accounted for on the SAVVY adaptation of the International Death Certificate. Write the ICD code in the space provided next to the diagnosis.

SAVVY ADAPTATION OF THE INTERNATIONAL DEATH CERTIFICATE

	Cause of death	**ICD–10 CODE**	**Approximate interval between onset and death**
PART I			
Disease or condition directly leading to death*	(a) _____	_____	_____
	due to (or as a consequence of)		
Antecedent causes			
Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(b) _____	_____	_____
	due to (or as a consequence of)		
	(c) _____	_____	_____
	due to (or as a consequence of)		
	(d)_____	_____	_____
PART II			
Other significant conditions contributing to the death, but not related to the disease or condition causing it	_____	_____	_____

* *This does not mean the mode of dying e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.*

Then refer to the tabular list (volume 1) and examine, and take into account, the:

- exclusions (these are/may be found at chapter, section, block, and code levels);
- inclusions (these are/may be found at chapter, section, block, and code levels); and
- notes (these are/may be found at chapter, section, block, and code levels).

Assign the code and write the final diagnosis and the code on the appropriate line of the death certificate. Circle the final diagnosis and code for the underlying cause of death so that each can be easily identified by the data processing team.

- Start by identifying the lead term from the diagnostic term. Using the appropriate section in the index, look up the lead term modifiers. Remember, the index has three sections and external causes are classified in section 2. Read, be guided by, and note what appears under the lead term. Read all the terms that are indented until all the words in the diagnostic term are accounted for. Write the ICD code provided next to the diagnosis. Follow carefully cross references ("see" and "see also").
- Then refer to the tabular list and note any fourth character with a dash (.-) that were identified in the index. Then read and take care of all the exclusions, inclusions, and notes that will be found at the chapter, section, block, and code levels.
- Finally, assign the ICD code for the underlying cause of death.

POTENTIAL PITFALLS

In coding verbal autopsy forms, two coders code the forms independently. When there is consensus between the two coders, that code is taken as the final code and is used for statistical purposes. When the two coder's codes do not match, they discuss and resolve the final code. It is important that the coders are well-versed with ICD-10. A clear understanding and practical experience in the use of ICD helps to minimize errors.

Coding errors could result from any of the following situations:

- The use of the alphabetical index alone or the tabular list alone can result in different codes. It should be emphasized that all the three volumes need to be used appropriately. This is the most common cause of a mismatch between two coders.
- The coder is unaware of dual codes, manifestations, sequelae etc. and the procedure of recording the correct code for tabulation.
- The coder does not have a clear understanding of the conventions and guidelines that are used in ICD-10 coding.
- The distinction between application of mortality and morbidity codes is not clear. For example the use of R69 for morbidity could be incorrectly coded when the situation calls for R99 for undetermined causes of mortality.

SPECIAL CASES

See the WHO manual *Verbal Autopsy Standards* for material relevant to this chapter. Parts of this chapter have been taken from the WHO manual.

This section consists of a set of special cases for coding and a list of verbal autopsy categories proposed by WHO. This list is the result of a comparison of the existing verbal autopsy systems. An individual verbal autopsy system may be using only a subset of the proposed categories. This list makes it possible to merge data resulting from verbal autopsy on an international scale and for coding the categories with ICD-10. Thus, the results of verbal autopsy can be compared with data resulting from full vital registration and medical certification. Some diagnoses mentioned in the list cannot be assigned with the information gathered in the verbal autopsy interview, but they may result from medical records or other sources.

Some causes of death deserve special attention in coding. These are either frequent causes encountered in verbal autopsy or frequent combinations of causes of death. The cases mentioned in this manual are not exhaustive.

Dealing with multiple causes — Verbal autopsy can result in the identification of more than one cause of death, as different diagnoses may be reported by relatives or mentioned in medical records.

Several categories of ICD 10 are designed to code relevant combinations of diseases, while in other cases guidance is provided on how to select and report the most useful cause of death. It is important to follow the coding rules, using the Index and Tabular Lists and the rules and conventions specified in volume 2, in order to locate the most useful codes. Some frequent examples include the following:

HIV with malaria	B20.8

There is no classification rule that automatically gives HIV precedence over malaria, or vice versa. It all depends on how the death certificate has been filled out, whether the death is classified to HIV or malaria.

HIV and pneumonia	B23.8 (if the agent causing the pneumonia is unknown)
Hypertension and stroke	I64
Hypertension and acute MI/heart failure	I21
Hypertension and heart failure	I11.0
Diabetes and stroke	E14.6
Diabetes and hypertension	Depends on the way the certificate is filled in — only one will be retained
Prematurity/low birth weight and respiratory distress	P22.0
Diarrhoea and pneumonia	A09

The conditions that can cause confusion in verbal autopsy are those presenting with multiple diagnoses/sequelae within one individual. Examples are stillbirths with known or unknown underlying maternal causes, and external causes of injuries. Experience in coding verbal autopsies has shown that the following conditions need special attention:

Malaria — The ICD is suitable for malaria as a cause of death but the unspecific nature of the disease and the lack of sufficient details from the verbal autopsy poses special difficulties in assigning an ICD code. Clinically diagnosed malaria is coded B54.

A special case is cerebral malaria. It is usually a diagnosis based on excluding other encephalopathies (e.g. HIV/AIDS encephalopathy, hypoglycemia, meningoencephalitis, eclampsia, intoxications, head injuries, cerebrovascular accidents and metabolic disorders, and other infections) **and** confirming the presence of malaria. In the absence of further details in the VA form that may help to confirm malaria or exclude other forms of encephalitis, an assumption is usually made based on the physician's knowledge and local experience and on careful assessment of the information available on the VA

forms, as well as the prevailing epidemiology of other conditions, in order to make a decision as to the appropriate diagnosis.

In the ICD-10, the classification "cerebral malaria" falls under the category of malaria caused by *Plasmodium falciparum*. Since this level of detail (a blood slide that shows *P. falciparum* malaria species) is unlikely to be found by verbal autopsy (or even medical records), the diagnosis or cause of death as cerebral malaria (and most other forms of malaria) cannot, strictly speaking, be made based on the symptoms and signs alone.

The possible causes of deaths for Malaria in VA settings would therefore be B54 and B53.8 only:

B54 Unspecified malaria
Clinically diagnosed malaria without parasitological confirmation

This would mean that in verbal autopsy it is not possible to use the following codes for malaria: B51, B52, B53.0, or B53.1. This is because these codes require information on the specification of Plasmodium, which cannot be found in verbal autopsies.

Given this, it may be appropriate to certify and code a death from cerebral malaria, in the absence of the identification of *P. falciparum* parasites, specifically as:

B50.0 Plasmodium falciparum malaria with cerebral complications
Cerebral malaria NOS

In this example, the justification is "NOS" (not otherwise specified).

HIV and tuberculosis — In clinical practice, it can be very difficult to differentiate between an HIV infection and tuberculosis (TB). It is only possible to be certain with evidence from HIV serology and sputum for TB bacilli. That is, a patient with symptoms and signs suggestive of HIV or TB, but who shows a negative HIV serology and a positive bacteriological sputum for TB, is suffering from TB but not from HIV. In many cases, the two conditions can coexist, but it is difficult to determine which condition is the underlying cause of death. With the limited information that comes from verbal autopsy, this situation presents a problem that requires agreed guidelines.

HIV disease can present with many complications and infections, each having its own unique cause of death, from B20 to B24. Even though in the ICD-10 the fourth character subcategories of B20

to B23 are provided only for optional use, it is important to differentiate TB with HIV and TB alone when possible.

Considering the public health importance of tuberculosis, and in order to maintain uniformity of the causes of deaths assigned, the following 4-character categories should be used for HIV disease with tuberculosis, where neither the sequence can be identified nor a single cause be selected. :

Example:

I	(a)	Tuberculosis
	(b)	HIV
	(c)	- - -
	(d)	- - - -
II		- - - -

Select B20.0, HIV disease resulting in mycobacterial infection

Example:

I	(a)	Tuberculosis
	(b)	HIV
	(c)	- - -
	(d)	- - - -
II		HIV

Select A16.9, Tuberculosis, NOS

B22.0 HIV disease resulting in encephalopathy
HIV dementia

This cause of death, B22.0, is used when there is history of confusion, dementia, and loss of consciousness of more than one day or other central nervous system (CNS) manifestations, such as stroke associated with HIV.

B20.7 HIV disease resulting in multiple infections

This cause of death should be used where there is evidence of more than a single infection in HIV (e.g. candidiasis, mycoses, parasitic diseases, etc.). The use of this cause of death when there is more than one infection avoids assigning several causes of death (one for each type of associated infection), builds uniformity, and helps facilitate a consensus among coders.

As previously mentioned, where there is evidence of tuberculosis infection or disease in addition to HIV, the cause of death B20.0 (HIV with tuberculosis) is used. In cases of HIV disease with only one infection identified, such as candidiasis, then the cause of death assigned is “HIV resulting in candidiasis” B20.4.

Where HIV presents with Kaposi sarcoma, this complication is not coded separately but is included in the multiple infection category. In cases where Kaposi sarcoma is the sole complication of HIV disease, then the appropriate ICD code is used:

B21.0 HIV disease resulting in Kaposi's sarcoma

This is because Kaposi sarcoma is multi-centric and is regarded as a malignancy with a viral infectious origin.

When there is a case of HIV disease with tuberculosis and CNS manifestations, the cause of death "HIV resulting in encephalopathy" B22.0 is used as immediate cause of death.

Diagnosis of TB from verbal autopsy may present challenges. Definitive diagnosis of TB can only be made where an acid-fast bacillus smear (AFB) identifies the disease, typically from sputum. In developing countries, such information is rarely available in medical records of the deceased. Interpret the clinical signs and the history with caution or try to get information about:

- sputum positive for AFB
- a chest X-ray suggestive of pulmonary tuberculosis(PTB)
- current history of taking anti-TB drugs
- history suggestive of TB, e.g. prolonged cough for more than one month, wasting, and prolonged fevers

(in these cases, it is difficult to differentiate between TB and HIV disease).

Paediatric HIV — ICD-10 does not provide specific classification and cause of death of HIV disease in children. Due to difficulties in diagnosing HIV in children in clinical practice, let alone with verbal autopsy, the following guidelines should be used to assign cause of death in children who presented with HIV disease:

- Clinical symptoms suggesting HIV disease in a child in the absence of other obvious causes of immune suppression (e.g. malnutrition);
- Clinical symptoms suggesting HIV disease and a family and social history suggestive of HIV, e.g. parental death due to HIV disease including cases where the child's mother was sick at the time of death of the child; or

- Clinical symptoms suggesting HIV disease and the attending physician had requested an HIV test to confirm the diagnosis.

The following are notes intended to help clarify matters involving several other conditions surrounding death. Such conditions as maternal deaths, stillbirths, and deaths from cholera have been potentially confusing during training sessions.

Maternal mortality — Given that maternal causes of death are a frequent cause among women of reproductive age in most developing countries, it is important for death certifiers and coders to be clear as to what constitutes a maternal death, and the direct and indirect causes. The definitions related to maternal deaths are provided in volume 2, section 5.8, of the ICD and, for uniformity, should always be used.

A "maternal death" is the death of a woman while pregnant or her death within 42 days of termination of pregnancy, irrespective of the duration or site of pregnancy, from any cause related to pregnancy, but not from accidental and incidental causes. "Late maternal death" refers to a woman's death during the period of 42 days to one year after termination of her pregnancy.

"Pregnancy-related death" is the death of a woman during pregnancy or within 42 days of delivery, irrespective of the cause of death.

Maternal deaths can either be direct or indirect.

Direct causes refer to obstetric complications of pregnancy, labour, and puerperum as death due following pregnancy with haemorrhage, obstructed or prolonged labour, eclampsia, sepsis, pregnancy with abortive outcome, multiple gestation, or complications of caesarean section.

Example of a DIRECT maternal death:

I (a) Haemorrhagic shock
(b) Ruptured uterus
(c) Obstructed labour

Select obstructed labor (O66.9; obstructed labour unspecified).

Indirect causes refer to deaths resulting from pre-existing disease or diseases that developed during pregnancy but not due to direct obstetric cause. Such diseases include pre-existing hypertension, diabetes mellitus and heart disease, thromboembolism, anaemia, malaria, TB, etc.

Maternal deaths that arise from HIV disease (B20 – B24) or

from obstetrical tetanus (A34) are coded in chapter 1 of ICD and care should be taken to include them in the maternal mortality rate.

It is therefore important to specify whether the numerator includes either direct or indirect causes or both.

Stillbirth or fetal death — The term "stillbirth" or "fetal death" is used (not intrauterine fetal death), because the death is recorded after birth of the dead fetus and not while in the uterus.

There is no difference in cause of death between stillbirths recorded as "fresh" or "macerated." Where a fetal death or stillbirth can be attributed to a particular cause (e.g. antepartum hemorrhage, maternal infection, eclampsia), the cause of death that is recorded is: "stillbirth" (fetal death) due to "the appropriate obstetric cause."

Where there is no identifiable cause for the stillbirth (from the history), the appropriate cause of death will be: Stillbirth due to unspecified cause (P95). However, the death certifier/coder needs to examine the information in verbal autopsy forms very carefully before arriving at this decision. Common mistakes include ignoring the information contained in the section on pregnancy history in verbal autopsy form 1. The information in this section is related to ICD codes P00 – P04, "Fetus and newborn affected by maternal factors and by complications of pregnancy, labor and delivery."

Neonatal deaths: Deaths among live births during the first 28 completed days of life — Certification for perinatal deaths would normally require information regarding both the mother and the neonate.

Sometimes there are difficulties encountered in distinguishing stillbirths and neonatal deaths. If there is evidence in the records of life after birth of the fetus, with death occurring later, such a death is classified as a neonatal death. In many cases it is difficult to ascertain from verbal autopsy responders that the baby was alive after birth and died shortly thereafter. This results in many neonatal deaths being classified as stillbirth.

If the neonatal death could be attributed to a particular cause, the cause of death should be classified and recorded as "Neonatal death due to . . . appropriate cause."

Diarrhoea — Some difficulties arise in differentiating non-infectious diarrhoea (K52.9) from diarrhoea and gastroenteritis of presumed infectious origin (A09). The note and exclusion term in the index under A09, as well as the exclusion and inclusion terms at the beginning of the chapter, should be read carefully and understood. The distinction is important because it has major public

health implications. Several sets of guidelines aimed at identifying specific diseases such as cholera have been formulated and are mentioned in the manuals of the individual verbal autopsy tools.

External causes — Chapter XX codes classify environmental events, circumstances and conditions as the cause of injury, poisoning and other adverse events. Four letters of the alphabet (V, W, X and Y) have been used in this chapter, the longest chapter in ICD. Chapter XIX is **NOT** used for mortality coding.

Categories range from V01 to Y98. Of the 400 available categories, 372 have been used. There are major blocks according to the intent of the injury: accidental (W00 – X59); intentional self harm (X60 – X84); and undetermined intent (Y10 – Y34).

The intent of an event that causes injury (traffic, knife, punch …) could be accidental, intentional self-harm or intentional harm to others (assault). Where the intent remains unclear, the event is defaulted to "accidental". In cases where thorough legal and medical inquiries have been made and no judgment about the intent could be achieved, the conditions are coded to "undetermined intent"(Y10 – Y34).

The index for the external causes in Volume 3 of ICD-10 allows the appropriate code to be found rapidly.

For the mechanism that finally kills a person in contact with animals:

Crushed by a snake W59
Bitten by a venomous snake X20

Exercise: Look up the blocks W50 – W64 and X20 – X29 and try to identify the differences.

In cases where a mother or a child are injured and killed by an external cause, a code of the chapters XV or XVI may take priority for tabulation of a single cause of death:

Example:

Hypothermia newborn	P80.-
Adult: Exposure to excessive natural cold	X31
Mother: Complication of anaesthesia	O74.- or 89.-

Exercise: Look up O74.- and O89.-; what is the difference?

More special cases — When convulsions occur in malaria-endemic areas, especially in children where no apparent cause is evident, many clinicians assign a diagnosis of "febrile convulsions." During coding, "febrile convulsions" is not used to represent the

cause of death, as this is a diagnosis of exclusion. Instead "convulsions" is used as the lead term. If the cause of death is unknown or undetermined, the code used is "undetermined cause of mortality," R99, rather than R69, which is the undetermined cause of morbidity. ICD-10 allows for classification of diseases and health problems even in cases where there are only symptoms and signs that are recorded, without a definitive clinical diagnosis. Where there was no definitive diagnosis, the main symptom, abnormal finding, or problem is selected as the main condition. Any presenting symptom (when cause of death could not be determined) is used for coding (e.g. abdominal pain that led to unspecified disease). This process minimizes the number of deaths that are classified as "undetermined cause of mortality," R99.

The allocation of a high proportion of causes of death to "symptoms, signs, and abnormal clinical findings, not elsewhere classified" (Chapter XVIII) indicates the need to check the tabulated data that are allowed to more specific causes.

Glossary of Terms

10

Address — The physical location of a building or living quarters. May be comprised of a building number and street name (e.g., 123 Anywhere Street). See "location description" in this glossary.

Address listing book — Used to record the addresses or location descriptions of all known buildings and living quarters in an assignment area. This book is prepared during each census round and is given to the key informant upon completion.

Assignment area (AA) — A geographic area established for data collection purposes. An assignment area usually represents the average workload for one census interviewer or one key informant.

Assignment area map — Shows the boundaries, features, and landmarks of an assignment area is an "assignment area map." This map is prepared during each census round and given to the key informant upon completion.

Assignment area number — Identifies a specific assignment area on SAVVY maps and forms.

Callback — A return visit to an address to complete the required information.

Canvassing — Systematically traveling all streets, roads, paths, etc., of each block in an assignment area to identify every place where people live or could live.

Census — An official, periodic count.

Census interviewer — Responsible for conducting baseline census interviews or update census interviews. He or she is attached to the SAVVY area and is knowledgeable about that assigned area. The census interviewer is also responsible for identifying the boundaries of the assignment area and canvassing the entire assignment area to determine the location of each building, housing unit, and household.

Confidentiality — A guarantee that the information respondents provide to a SAVVY employee and SAVVY office will not be

revealed to others.

Duration — For all signs or symptoms that were not associated with a previously diagnosed condition, nor related to an injury, "duration" is defined as the period starting from the *appearance* of that particular sign or symptom to the cessation of that symptom, regardless of the presence of that sign or symptom at the time of death, and irrespective of whether the sign or symptom appeared intermittently. For example, if a woman began to have fever 10 days before death, but she ceased having fever two days before death, the duration of her fever would be eight days, even if she did not have fever for each and every one of those eight days.

Head of household — See "reference person" in this glossary.

Household — This is an arrangement in which one or more persons make common provisions for their own food or other essentials for living. These people may have a common budget, be related or unrelated, or a combination. There may be more than one household in a housing unit. In short, a household is defined as a group of people who "eat from the same pot."

Household number — This is a number assigned by a SAVVY census interviewer to each household within a housing unit. The household identification number must be unique within the housing unit.

Housing Unit – A housing unit is a separate and independent place of abode intended for habitation by a single household, or one not intended for habitation but occupied as living quarters by a household at the time of the census.

Key informant (KI) — A person who lives in the SAVVY assignment area and is responsible for reporting any deaths that occur in her or his assignment area to the verbal autopsy interviewer. The key informant is also responsible for arranging the date and time of the verbal autopsy interview with each bereaved family.

Location description — A description of the physical location of a living quarters that tells anyone unfamiliar with the assignment area how to find that living quarters, so the living quarters can be located by another SAVVY employee. This may be an address, if one is available.

Reference person — The person who makes decisions for the household on a daily basis and who is a permanent resident of the household (spends the night at least six months out of the year

at the house) is the "reference person." If the household reports someone who spends the majority of his or her time away from home, then make that person's spouse the reference person. If there is no spouse, then make the eldest family member the reference person, as long as he or she is at least 15 years of age or older. If there is no family member 15 years of age or older, then make the eldest nonfamily member the reference person as long as he or she is 15 years of age or older. If there is no permanent household member who is at least 15 years old, then make the eldest relative or resident the reference person.

Resident — See "usual residence" in this glossary.

Respondent — There are two types of respondents in the SAVVY system, **the census respondent** and **verbal autopsy respondent**.

Census respondent is the person supplying census information about a household and all of its members. The respondent should be a responsible family member of the household. Possible respondents are listed in order of preference:

- reference person
- spouse of reference person
- eldest family member available, at least 15 years of age or older
- nonfamily member at least 15 years of age or older
- family member less than 15 years of age
- nonfamily member less than 15 years of age
- neighboring reference person or spouse of neighboring reference person
- local knowledgeable informant

Verbal autopsy respondent is the adult being interviewed, who is typically a resident in the household. The respondent must be someone who is able to give reliable and accurate information regarding the members of the household. In the case of a death in the family, the respondent will be able to give information about the circumstances leading to the death.

Ideally, the verbal autopsy respondent for the verbal autopsy interview would be the one who cared for the deceased during the period of illness. Possible verbal autopsy respondents are listed in order of preference:

- main care-giver of the deceased in the period before death
- reference person
- spouse of reference person
- parents, particularly if the deceased was a child
- eldest family member available, at least 15 years of age or older
- nonfamily member at least 15 years of age or older
- family member less than 15 years of age
- nonfamily member less than 15 years of age
- neighboring reference person or spouse of reference person

Sample area — The geographic area selected for the SAVVY system.

Stillbirth — A baby that shows no signs of life when born. Stillbirths may be due to injuries, illness, infections, or catastrophic events happening to the mother or to the child while in the womb or during birth. In order to distinguish from abortion or miscarriage (for which verbal autopsy is not conducted), the SAVVY verbal autopsy system only includes births that occur after 28 weeks of pregnancy.

Usual residence — The place where the person lives and sleeps most of the time. This place is not necessarily the same as a person's legal residence. Also, noncitizens are included if this is their usual residence. Following are some common examples of usual residences:

- For people temporarily away on vacation or a business trip, their usual residence is the place where they live and sleep most of the time.

- The usual residence for commuter workers living away part of the week while working is the residence where they stay most of the week.
- For children in joint custody, usual residence is where they live most of the time. If time is equally divided, they are counted where they are staying during the interview period.
- Usual residence for people who own more than one residence is the residence where they live most of the time.
- Usual residence for college students living away from home while attending college is where they are living at college, if they are in a household. College students living in dormitories are not counted in the SAVVY census.
- For college students living at their parental home while attending college, usual residence is their parental home.
- The usual residence for a live-in nanny or other live-in house worker is where that person lives most of the week.
- For foster children, usual residence is where they are living during the interview period.
- Usual residence for renters or boarders is where they are living during the interview period.
- Usual residence for housemates or roommates is where they are living during the interview period.
- For people in the military who are residing off-base in the country, their usual residence is the place where they live and sleep most of the time. Military people on-base are not counted in the SAVVY census unless they are in residential style housing.
- Usual residence for staff members living in hospitals, nursing homes, prisons, or other institutions is where they report that they live and sleep most of the time; otherwise it is the living quarters that they inhabit at the institution.

- For students living in school dormitories but who are not enrolled in college, the usual residence is their parental home.

- Usual residence for citizens of foreign countries who have established a household or are part of an established household in the country while working or studying, including family members who are with them, is the household where they are residing (spending the majority of their time while in-country).

Verbal autopsy (VA) — Verbal autopsy is a process used to collect information (using a specially-designed form) from relatives or caregivers of a deceased person. The process involves interviewing relatives or caregivers of the deceased regarding their knowledge of the symptoms, signs, and circumstances leading to death. The information that is collected is used by medical personnel to assign a probable cause of death for each reported death.

Verbal autopsy form — This is a form used to collect information on the history of illness of the deceased and presence of signs and symptoms. The form is to be completed by the interviewer during verbal autopsy interviews. There are three types of verbal autopsy forms used by the SAVVY system:

- International Verbal Autopsy Questionnaire 1: Death of a Child under 4 Weeks

- International Verbal Autopsy Questionnaire 2: Death of a Child Aged 4 Weeks to 14 Years

- International Verbal Autopsy Questionnaire 3: Death of a Person Aged 15 Years and Above

Verbal autopsy interviewer (VAI) — The verbal autopsy interviewer is the person responsible for conducting VA interviews with the bereaved family members in the household. He or she is attached to the SAVVY area and is knowledgeable about that assigned area. The verbal autopsy interviewer must be accepted by the community in which he or she works. Some requirements of the verbal autopsy interviewer include having attained the highest primary level of the national education system (at minimum) and the ability to speak the dialect of the area to which he or she is assigned.

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