



InterVA-5.1 User Guide

(updated April 2020 for version InterVA-5.1)

1. Introduction

This document describes how to use the InterVA-5 model for processing and interpreting verbal autopsy (VA) data in order to arrive at probable causes of death. InterVA-5 is designed to be applied to deaths at the whole community level, that is for all ages and causes (although it is perfectly acceptable to use it for datasets relating to population sub-groups). InterVA-5 supersedes InterVA-4, bringing the model in line with the WHO-2016 VA standard. WHO-2016 is described in more detail in Nichols et al., PLoS Med 2018; 15:e1002486. The WHO-2016 standard is at <http://www.who.int/healthinfo/statistics/verbalautopsystandards/en/> and full details and evaluations of InterVA-5 are described in BMC Med 2019; 17:102.

WHO-2016 was deliberately designed to harmonise various approaches to VA, and InterVA-5 follows the same principle, being designed to process WHO-2016 format data, while also being compatible with WHO-2012 format data (which is a subset of WHO-2016, as previously processed by InterVA-4) and SmartVA format data (a different subset of WHO-2016, developed from previous work by the Population Health Metrics Research Consortium (PHMRC)).

InterVA-5 is a model specifically for determining cause of death from verbal autopsy data. It is not intended as a software package for death registration (details for which are also covered in the WHO-2016 instrument). This documentation relates to the PC version of InterVA-5 which runs in a batch-processing mode on any personal computer, and can be downloaded on a public-domain basis from www.interva.net

Disclaimer

It is a condition of downloading and using the InterVA-5 software that users take complete responsibility for its use and for any consequences arising. In particular, it should be emphasised that the model is designed to enable the epidemiological interpretation of whole-community mortality data, and it is not intended for, and should not be applied to, investigations of individual deaths.

InterVA-5.1 is released under the terms of the GPL version 3 open source licence, and includes the source code for the software.

InterVA-5.1 supersedes all previous versions, and is also recommended for handling WHO-2012 (InterVA-4) format data.

2. Download and installation

The InterVA-5.1 model is available as a zipped file of approximately 4 MB. It is designed to run on PCs under Windows. It is known to work satisfactorily under Windows XP, Vista and 7. InterVA-5 was first released in February 2018, and InterVA5.1 in April 2020. Although based on the basic design of the InterVA-4 software, the InterVA-5 open-source code is designed to be data driven, so that minor updates and modifications to the WHO-2016 standard only require changes to InterVA-5's data files.

After downloading the zipped file from www.interva.net, the files should be unpacked into a convenient folder on your hard disk. There is no additional installation procedure required and no files are placed in other folders. It is probably a good idea to create a folder specifically for this application, for example C:\InterVA

The following files should be found after unpacking the download of InterVA-5:

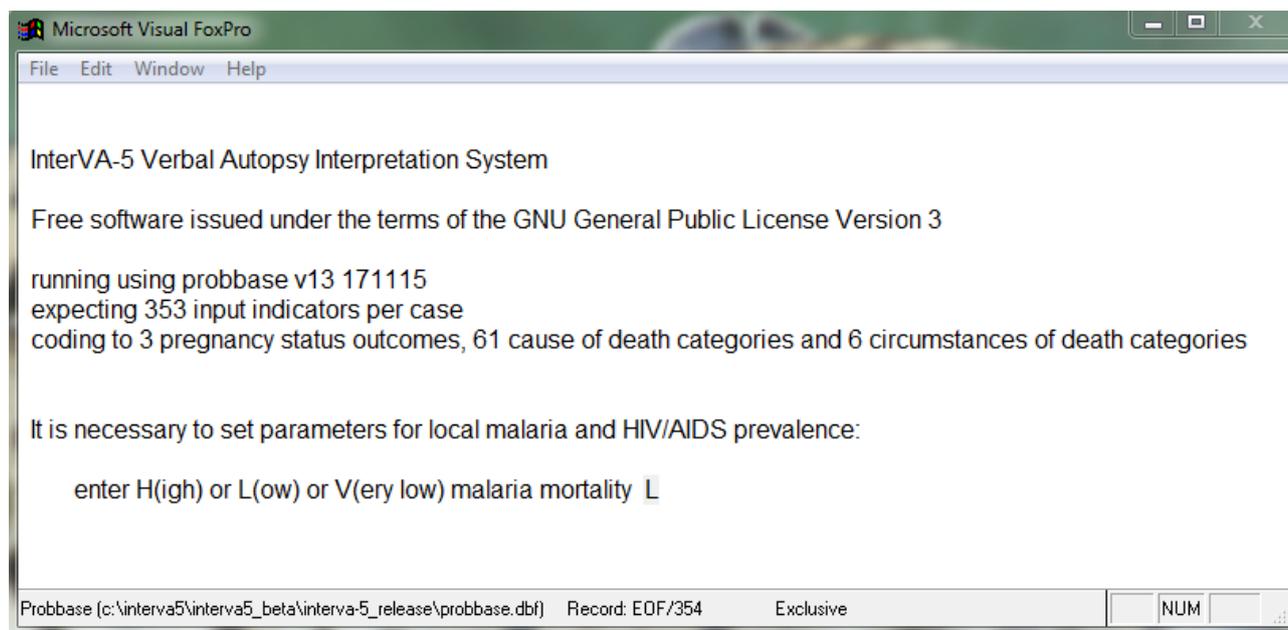
- batchin1.dst
- batchin2.dst
- causetxt.dbf
- dbstr.dst
- GNU general public license v3.txt
- interva5_1.bat
- interva5_1.exe
- interva-5.1 UG.pdf (*this document*)
- interva5_1.prg.txt
- iv5_sample.csv
- memvars.dbf
- msvcr71.dll
- probbase.xls (*version 18 20200403*)
- readin.dbf
- vfp9r.dll
- vfp9enu.dll

All the files needed to run the software are included in the download. Although the software is compiled under FoxPro, it is not necessary to have FoxPro software installed on your computer in order to run InterVA-5. The InterVA-5 program code, should you wish to see it, is included in the file `interva5_1.prg.txt`, but this file is not

required to run the software. This release of InterVA-5.1 is hereby made on a fully open-source basis.

The program should run by double-clicking on `interva5_1.bat`, giving an opening screen as shown below. It is possible when running InterVA-5 for the first time, that, depending on your system's security settings, you may get warning messages at this stage. You may need to accept running InterVA-5 as an unrecognised application.

To test that the software is operating successfully after installation, if all the default values are accepted (by pressing <ENTER> in response to all the prompts) then the four example cases contained in the `iv5_sample.csv` file provided in the download will be run. The program will close, and the readable output will be found in the file `iv5_sample_out_<date>.csv` which will contain 3 records, since one of the sample input records was incomplete and rejected - as documented in the file `iv5_sample_warnings_<date>.txt`



So, assuming the sample data run was successful, you have downloaded and installed InterVA-5.1 correctly.

3. Basic InterVA concepts

InterVA accepts a range of "indicators" relating to a particular death, processes them in a mathematical model based on Bayes' theorem, and produces as its output likely cause(s) of death. Further details of the approach used in InterVA models are

available in a range of peer-reviewed publications, which are listed on the InterVA website at www.interva.net

“Indicators” is the blanket term used by InterVA to describe the whole range of items of information from a VA interview about the circumstances of a death, including basic background characteristics, details of any illness (signs and symptoms) leading to death, previous medical history, etc. Indicators are posed as questions - and each indicator is defined as having either “yes” or “no” as its substantive response. No distinction is made by the InterVA-5 model between different non-substantive responses. Thus if other responses, such as “D” for “don’t know”, are included in the input data, they will be disregarded by InterVA-5. Items defined in the WHO-2016 VA standard which relate to determining cause of death have been reduced to InterVA-5 indicators as described above and are included in the InterVA-5 input data format. Datasets based on WHO-2012 or SmartVA data, both of which are different subsets of WHO-2016, can be converted into InterVA-5 format for processing, leaving the contents of the non-included indicators blank. Details of equivalence between InterVA-5, SmartVA and InterVA-4 indicators are shown in Appendix 1.

Although some indicators relate to WHO-2016 questions on durations of various symptoms, which might be asked as questions like “How long did (s)he have fever?”, within InterVA-5 such parameters are categorised according to predefined limits, as detailed in Appendix 1.

It is not intended that a VA interview should consist of going through all the InterVA-5 indicators one-by-one. It may be that a set of indicators for a particular death can be compiled from historic questionnaire-based interviews, using both closed and open-ended questions. WHO-2016 also defines quite complex skip patterns through the overall set of items, depending on responses.

Alternatively it may be that reasonably experienced VA interviewers can construct the “interview” more as a conversation - starting from “*What happened when XXXX died?*” - and following the story as it unfolds, ticking relevant indicators as the conversation proceeds. This involves prompting the respondent and probing where needed, while having the sense not to ask questions that are clearly inappropriate or potentially insensitive. However, this approach risks missing important details and is not recommended as a means of achieving consistently high-quality interviews.

A complete list of all the indicators included in InterVA-5, together with those that are also included in WHO-2012/InterVA-4 and SmartVA, is given in Appendix 1. This table cross-references the indicators to the corresponding items in the WHO-2016

VA standard, details the question behind the indicator, give the substantive value, and shows the age-sex groups to which the indicators apply when the model runs.

A "cause" is one of a range of possible causes of death handled by the model. The causes handled by InterVA-5 follow the VA cause of death categories defined in the WHO-2016 VA standard, which are listed in Appendix 2, together with WHO cause codes and corresponding ICD-10 categories. These are almost identical to WHO-2012 cause categories, except that dengue fever is now separated from other haemorrhagic fevers. For tetanus and reproductive neoplasms, InterVA-5 output is determined irrespective of age or sex, and these can be split afterwards into WHO categories by age (neonatal tetanus (10.05) and other tetanus (01.08)), or by sex (female reproductive neoplasms (02.05) and male reproductive neoplasms (02.06)).

In addition, InterVA-5 calculates, for women of reproductive age who have died, the likelihood of being in one of the following three categories, based on responses to pregnancy-related indicators:

- Not pregnant or recently delivered
- Pregnancy ended within 6 weeks of death
- Pregnant at death

For some deaths, more than one cause will be found to be probably relevant. Sometimes these may be alternatives, or in other cases they may be co-causes (for example, TB and HIV/AIDS). The interpretation of this is discussed further in section 6.

A new concept introduced into InterVA-5 is that, additionally to and independent of the medical cause of death assignment, a Circumstances Of Mortality CAtegory (COMCAT) is computed separately for each case. The conceptual framework for this is described in D'Ambruso et al., *Global Health Research and Policy* 2016; 1:2, and the implementation within InterVA-5 is fully described in Hussain-Alkhateeb et al., *Global Health Action* 2019; 12:1680068. The likelihood of the most probable circumstantial category associated with a death (traditions, emergencies, health systems, inevitability, recognition, resources, or an indeterminate combination of multiple factors) are reported for each case. These outputs may be used to monitor circumstances associated with mortality patterns, or ignored entirely. These COMCAT categories depend to a significant extent on the availability of the last ten indicators (i450o to i459o) in the dataset, and should be interpreted cautiously if these indicators are not present.

4. Basic parameters for InterVA-5

The inputs and outputs for the InterVA-5 program involve text files in the comma separated variable (.csv) format. This has been chosen as the simplest possible format, not depending on any proprietary considerations, and which interfaces easily with other software such as common statistical packages. CSV files can be opened by many spreadsheet and statistical software packages.

When InterVA-5 runs, it prompts for the name of the input data file (with a default value of "iv5_sample.csv"). The name of the input data file can be changed on-screen.

There are two possible formats for the output file, which can be chosen interactively at the start of the run. Either a text file called "<input_file>_out_<date>.txt" can be produced, which gives a case-by-case report of input details and cause(s) of death, or alternatively a delimited (.csv) file which is suitable for reading into other software, called "<input_file>_out_<date>.csv"

Two other important outputs are also produced. A text file of warnings is generated called "<input_name>_warnings_<date>.txt", containing details of any input records that could not be processed, or problems with specific indicators in particular records. Another file "<input_file>_memvars_<date>.csv" contains a complete dump of the model's calculations for every possible cause of death for every processed record, intended mainly for troubleshooting purposes.

The next parameter on the opening screen specifies the location of the batch file containing the input data. The default is iv5_sample.csv, and in the download of InterVA-5 the file iv5_sample.csv contains four example records.

As the next step, consistency checks are automatically run on the input data and any warnings generated about consistency within specific records (for example "male" and "pregnant") will be stored in the file warnings.txt in order of ID. Any records which do not have any valid data for age and sex will be excluded from processing, as will any that contain no symptom data at all. Warnings do not prevent cases from being processed, and where possible errors will be adjusted in the working copy of the data (but not in the input file). For example, if a record relates to a young child, any responses to questions about pregnancy will be automatically ignored in processing the data, but this information is still recorded in the warnings log. However, since warnings indicate inconsistencies within input data, outputs from such data should be interpreted with care. Ideally a well-prepared data input file should not generate any warnings, although InterVA-5 tries to handle discrepancies giving rise to warnings in a conservative way.

Next it is necessary to specify basic epidemiological parameters for two important diseases whose prevalence varies widely from place to place. These are malaria and HIV/AIDS. You can choose either "H" for "high", "L" for "low" or "V" for "very low" separately for each of these diseases. These settings approximate to "high" being more than 1:100 of all deaths in a population, "low" being around 1:1000 and "very low" being under 1:10000. The default settings are "low". Examples of appropriate responses might be low malaria, low HIV for many Asian locations; high malaria, high HIV for many East African locations; high malaria, low HIV for some West African locations, etc. The "very low" setting should be used for locations where deaths from malaria or HIV are known to be extremely rare. The choices for these settings do not directly determine the cause of death, but conceptually they are similar to a physician knowing that (s)he is working in a high or low malaria or HIV population, irrespective of the details of a specific case currently under consideration.

5. InterVA-5 batch files

An example of the file needed for batch data, `iv5_sample.csv`, is provided in the initial download. This is a file in which each record represents one case, ending with a field representing the record identifier (up to 20 characters). The first 353 fields are the answers to all the indicators listed in Appendix 1, and must be strictly in the specified order. It is not allowed to change the order of the indicators or leave any indicators out of the input file, even if all responses are null. Although WHO recommends that VA interviews record responses as Yes or No or Unknown, for the purposes of InterVA-5 processing the only relevant responses are those corresponding to the substantive value for each indicator. In the input data file, "Yes" answers can be recorded as "Y" or "y", "No" as "N" or "n" - and anything else is not regarded with any particular significance.

All the records in the batch file will be processed sequentially and the output stored in the output file. The on-screen display shows the progress through the records. This is normally quite a rapid process, depending of course on the hardware in use, but usually over 100 cases per minute.

It is important to realise that any deviation from the specified input file format will either cause the software to reject the whole file, or possibly give wrong output. In particular, the order of the variables in the file cannot be changed. The first row of the file contains the variable names - the actual names can be different, but must relate to the same set of 353 variables in the pre-defined order.

It is easiest, for any substantial quantity of data, to prepare the input data file within another software application. A file script in a user's software of choice is useful for achieving this. Basically this consists of setting up the variables required by InterVA-5, inserting values into them from other variables, deleting all but the InterVA-5 variables and then saving the required .csv file. Further resources and examples for InterVA-5 are found at <https://github.com/peterbyass/InterVA-5>

6. Managing and interpreting InterVA-5 output

If the readable output file option is used, then the output is a text file setting out details case-by-case in the following format:

```
InterVA-5 Verbal Autopsy Interpretation System

Malaria prevalence set to LOW
HIV/AIDS prevalence set to LOW

run at 02/06/18 07:43:39

ID: 10010481

data input

Was she female? = yes
Was s(he) aged 1 to 4 years at death? = yes
Did the final illness last less than 3 weeks? = yes
Did (s)he die suddenly? = yes
During the illness that led to death, did (s)he have a fever? = yes
Did the fever last less than a week before death? = yes
During the illness that led to death, did (s)he have a cough? = yes
During the illness that led to death, did (s)he have any difficulty breathing? =
yes
Did you see the lower chest wall/ribs being pulled in as the child breathed? = yes
Did (s)he receive appropriate immunizations? = no
In the final days before death, did s/he travel to a hospital or health facility?
= no
Over the course of illness, did the total costs of care and treatment prohibit
other household payments? = yes

Pregnancy status: n/a

Most likely cause: 01.02 Acute resp infect incl pneumonia, likelihood 99 %

Indeterminate component: 1 %

Circumstances of mortality category: Culture, likelihood 99 %
```

This output can be used in whatever way is most convenient. Up to 3 likely causes may be given for a particular case, each with its own likelihood. If the model is unable to reach a conclusion, usually for lack of sufficient input, or contradictory indicators, then it will record the outcome as 100% "indeterminate".

If the delimited text output format is chosen, then a delimited text file will be produced with the following structure:

1	IV5_ID	Character	20	<i>identifier from batch file</i>
2	MALPREV	Character	1	<i>selected malaria prevalence</i>
3	HIVPREV	Character	1	<i>selected HIV prevalence</i>
4	PREGSTAT	Character	5	<i>most likely pregnancy status</i>
5	PREGLIK	Numeric	3	<i>likelihood of PREGSTAT</i>
6	CAUSE1	Character	25	<i>most likely cause</i>
7	LIK1	Numeric	3	<i>likelihood of 1st cause</i>
8	CAUSE2	Character	25	<i>second likely cause</i>
9	LIK2	Numeric	3	<i>likelihood of 2nd cause</i>
10	CAUSE3	Character	25	<i>third likely cause</i>
11	LIK3	Numeric	3	<i>likelihood of 3rd cause</i>
12	INDET	Numeric	3	<i>indeterminate likelihood</i>
13	COMCAT	Character	25	<i>most likely circumstantial category</i>
14	COMNUM	Numeric	3	<i>likelihood of COMCAT</i>

The interpretation of the output from InterVA depends to some extent on users' needs. We have discussed some of the issues in scientific publications, and suggest that VA findings are most suitable for determining cause-specific mortality fractions (CSMFs). In this case, it may well be reasonable to attribute deaths having multiple causes as fractional deaths for particular causes, proportional to likelihoods. In addition the concept of a residual indeterminate component ($100\% - \text{lik1} - \text{lik2} - \text{lik3}$) for each case is a useful way of discounting less certain cause attributions and preserving the total likelihood as the overall number of deaths. Optimal ways of handling InterVA outputs are matters for further investigation and debate. Examples of handling InterVA-5 output are at <https://github.com/peterbyass/InterVA-5>.

Whatever approach is taken to handling InterVA-5 output, it is certainly the case that the model will deliver exactly the same conclusions every time it is presented with exactly the same set of indicators. This consistency of interpretation over time and between locations is a major advantage.

As happens with any suite of software, InterVA has developed through various versions since 2003. InterVA-5 is a major step forward, integrating previous versions and moving into line with new WHO-2016 recommendations. However, it is important for users to carefully document the version of InterVA used for any particular analysis. This document relates to version 5.1, which is functionally equivalent to the WHO-2016 VA standard.

7. Acknowledgements and support

The development of InterVA general model originated at the Umeå Centre for Global Health Research, Umeå, Sweden, with support from Forte, and continued in

partnership with the Immpact project at the University of Aberdeen, Scotland (where the specific interest was in characterising pregnancy-related deaths). Further details and website links are available at the www.interva.net website.

We would be grateful if anyone making use of this model would make clear in any publication or other communication that "*the InterVA-5 model (version 5.1) was used for the interpretation of VA material*". For the purposes of scientific citations, we suggest you refer to our latest publications, which can be found under the "more info" section of the www.interva.net website.

Although we have limited resources for technical support, we will be pleased to hear about both good and frustrating experiences of using this InterVA-5 model, and give advice if possible. Please contact us via global.health@epiph.umu.se

Please also follow us @InterVA on Twitter for latest news and updates.

APPENDIX 1: InterVA-5 indicators

The following pages specify the details of the InterVA-5 input indicators, in the order in which they appear in the data input file. The columns are as follows:

InterVA-5 indicators	
iv5_indic	reference number for the InterVA-5 indicator (also used as column headings in the input data file). The suffix letter is "o" where the indicator is identical to the corresponding WHO-2016 indicator, or "a", "b", "c"... where multiple indicators cover one WHO-2016 item.
iv5_question	question from which the indicator derives, based on WHO-2016 source questions (but categorised as necessary e.g. for open-ended duration items in WHO-2016)
derived from corresponding items	
who_2016	reference number of the source item in WHO-2016 (the last three digits of which are the same as the middle three digits of iv5_indic).
interva_4	for the sake of backwards compatibility with InterVA-4, these are the names of the corresponding InterVA-4 indicators (which are also the column headings in InterVA-4 input data).
sva_adult	for the sake of compatibility with SmartVA data, these are the column headings in SmartVA input data that relate to adult deaths (12 years and over).
sva_child	for the sake of compatibility with SmartVA data, these are the column headings in SmartVA input data that relate to child deaths (1 month up to <12 years).
sva_neonate	for the sake of compatibility with SmartVA data, these are the column headings in SmartVA input data that relate to neonatal deaths (first month of life).
specification	
subst_val	the substantive value for the iv5_indic (the value which InterVA-5 notices as the non-missing important answer to the indicator)
male	indicator required by InterVA-5 if deceased is male
female	indicator required by InterVA-5 if deceased is female
neonate	indicator required by InterVA-5 if deceased died <= 28 days
infant	indicator required by InterVA-5 if deceased died 29 d - 11 mths
under5	indicator required by InterVA-5 if deceased died 1 - 4 years
child	indicator required by InterVA-5 if deceased died 5 - 14 years
adult	indicator required by InterVA-5 if deceased died 15 - 49 years
midage	indicator required by InterVA-5 if deceased died 50 - 64 years
elder	indicator required by InterVA-5 if deceased died >= 65 years

APPENDIX 2: InterVA-5 (WHO-2016) VA cause categories

The following pages specify the details of the InterVA-5 output cause of death categories, according to the WHO-2016 VA standard definition, with ICD-10 codes.

APPENDIX 1: InterVA-5 indicators

The following pages specify the details of the InterVA-5 input indicators, in the order in which they appear in the data input file. The columns are as follows:

InterVA-5 indicators	
iv5_indic	reference number for the InterVA-5 indicator (also used as column headings in the input data file). The suffix letter is "o" where the indicator is identical to the corresponding WHO-2016 indicator, or "a", "b", "c"... where multiple indicators cover one WHO-2016 item.
iv5_question	question from which the indicator derives, based on WHO-2016 source questions (but categorised as necessary e.g. for open-ended duration items in WHO-2016)
derived from corresponding items	
who_2016	reference number of the source item in WHO-2016 (the last three digits of which are the same as the middle three digits of iv5_indic).
interva_4	for the sake of backwards compatibility with InterVA-4, these are the names of the corresponding InterVA-4 indicators (which are also the column headings in InterVA-4 input data).
sva_adult	for the sake of compatibility with SmartVA data, these are the column headings in SmartVA input data that relate to adult deaths (12 years and over).
sva_child	for the sake of compatibility with SmartVA data, these are the column headings in SmartVA input data that relate to child deaths (1 month up to <12 years).
sva_neonate	for the sake of compatibility with SmartVA data, these are the column headings in SmartVA input data that relate to neonatal deaths (first month of life).
specification	
subst_val	the substantive value for the iv5_indic (the value which InterVA-5 notices as the non-missing important answer to the indicator)
male	indicator required by InterVA-5 if deceased is male
female	indicator required by InterVA-5 if deceased is female
neonate	indicator required by InterVA-5 if deceased died <= 28 days
infant	indicator required by InterVA-5 if deceased died 29 d - 11 mths
under5	indicator required by InterVA-5 if deceased died 1 - 4 years
child	indicator required by InterVA-5 if deceased died 5 - 14 years
adult	indicator required by InterVA-5 if deceased died 15 - 49 years
midage	indicator required by InterVA-5 if deceased died 50 - 64 years
elder	indicator required by InterVA-5 if deceased died >= 65 years

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i004a	Did s(he) die during the wet season?	id10004	wet_seas				y	y	y	y	y	y	y	y	y	y
i004b	Did s(he) die during the dry season?	id10004	dry_seas				y	y	y	y	y	y	y	y	y	y
i019a	Was he male?	id10019	male	g1_05	g1_05	g1_05	y	y	y	y	y	y	y	y	y	y
i019b	Was she female?	id10019	female	g1_05	g1_05	g1_05	y	y	y	y	y	y	y	y	y	y
i022a	Was s(he) aged 65 years or more at death?	id10022	elder	g1_07a			y	y	y							y
i022b	Was s(he) aged 50 to 64 years at death?	id10022	midage	g1_07a			y	y	y						y	
i022c	Was s(he) aged 15 to 49 years at death?	id10022	adult	g1_07a			y	y	y					y		
i022d	Was s(he) aged 5-14 years at death?	id10022	child	g1_07a	c1_25a; c1-25b		y	y	y				y			
i022e	Was s(he) aged 1 to 4 years at death?	id10022	under5		c1_25a; c1_25b		y	y	y			y				
i022f	Was s(he) aged 1 to 11 months at death?	id10022	infant		c1_25a; c1_25b		y	y	y		y					
i022g	Was s(he) aged < 1 month (28 days) at death?	id10022	neonate			c1_25a; c1_25b	y	y	y	y						
i022h	Was s(he) a live baby who died within 24 hours of birth?	id10022	died_d1			c1_25a; c1_25b; c1_26	y	y	y	y						
i022i	Was s(he) a baby who died between 24 and 48 hours of birth?	id10022	died_d23			c1_25a; c1_25b	y	y	y	y						
i022j	Was s(he) a baby who died more than 48 hours from birth, but within the first week?	id10022	died_d36			c1_25a; c1_25b	y	y	y	y						
i022k	Was s(he) a baby who died after the first week, but within the first month?	id10022	died_w1			c1_25a; c1_25b	y	y	y	y						
i022l	Was she a woman aged 12-19 years at death?	id10022	magegp1	g1_05; g1_07a			y		y				y	y		
i022m	Was she a woman aged 20-34 years at death?	id10022	magegp2	g1_05; g1_07a			y		y					y		

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i022n	Was she a woman aged 35 to 49 years at death?	id10022	magegp3	g1_05; g1_07a			y		y					y		
i059o	Was she married at the time of death?	id10059	married	g1_08			y		y				y	y		
i077o	Did (s)he suffer from any injury or accident that led to her/his death?	id10077	injury	a5_08_1	c4_47_11		y	y	y	y	y	y	y	y	y	y
i079o	Was (s)he injured in a road traffic accident?	id10079	traffic	a5_01_1	c4_47_1		y	y	y	y	y	y	y	y	y	y
i082o	Was (s)he injured in a non-road transport accident?	id10082	o_trans				y	y	y	y	y	y	y	y	y	y
i083o	Was (s)he injured in a fall?	id10083	fall	a5_01_2	c4_47_2		y	y	y	y	y	y	y	y	y	y
i084o	Was (s)he poisoned in any way?	id10084	poison	a5_01_4			y	y	y	y	y	y	y	y	y	y
i085o	Did (s)he die of drowning?	id10085	drown	a5_01_3	c4_47_3		y	y	y	y	y	y	y	y	y	y
i086o	Was (s)he injured by the bite or sting of a venomous animal?	id10086	venom	a5_01_5	c4_47_5		y	y	y	y	y	y	y	y	y	y
i087o	Was (s)he injured by an animal or insect (non-venomous)?	id10087					y	y	y	y	y	y	y	y	y	y
i089o	Was (s)he injured by burns or fire?	id10089	fire	a5_05_6	c4_47_6		y	y	y	y	y	y	y	y	y	y
i090o	Was (s)he subject to violence (suicide, homicide, abuse)?	id10090	assault	a5_01_7	c4_47_7		y	y	y	y	y	y	y	y	y	y
i091o	Was (s)he injured by a fire arm?	id10091					y	y	y	y	y	y	y	y	y	y
i092o	Was (s)he stabbed, cut or pierced?	id10092					y	y	y	y	y	y	y	y	y	y
i093o	Was (s)he strangled?	id10093					y	y	y	y	y	y	y	y	y	y
i094o	Was (s)he injured by a blunt force?	id10094					y	y	y	y	y	y	y	y	y	y
i095o	Was (s)he injured by a force of nature?	id10095	force				y	y	y	y	y	y	y	y	y	y
i096o	Was (s)he electrocuted?	id10096					y	y	y	y	y	y	y	y	y	y
i098o	Was the injury accidental?	id10098					y	y	y	y	y	y	y	y	y	y
i099o	Was the injury or accident self-inflicted?	id10099	suicide	a5_02			y	y	y				y	y	y	y
i100o	Was the injury or accident intentionally inflicted by someone else?	id10100	inflict	a5_03			y	y	y	y	y	y	y	y	y	y
i104o	Did the baby ever cry?	id10104	cried			c1_12	n	y	y	y						

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i105o	Did the baby cry immediately after birth, even if only a little bit?	id10105				c3_07	y	y	y	y						
i106a	Was it more than 5 minutes after birth before the baby first cried?	id10106				c3_08	y	y	y	y						
i107o	Did the baby stop being able to cry?	id10107				c3_09	y	y	y	y						
i108a	Did the baby stop crying more than a day before (s)he died?	id10108				c3_10	y	y	y	y						
i109o	Did the baby ever move?	id10109				c1_13	n	y	y	y						
i110o	Did the baby ever breathe?	id10110				c1_14	n	y	y	y						
i111o	Did the baby breathe immediately after birth, even a little?	id10111	baby_br			c3_04	y	y	y	y						
i112o	Did the baby have a breathing problem?	id10112				c3_05	y	y	y	y						
i113o	Was the baby given assistance to breathe at birth?	id10113	born_nobr			c3_06	y	y	y	y						
i114o	If the baby didn't show any sign of life, was it born dead?	id10114	no_life			c1_15	y	y	y	y						
i115o	Were there any bruises or signs of injury on child's body after the birth?	id10115				c1_16	y	y	y	y						
i116o	Was the baby's body soft, pulpy and discoloured with the skin peeling away?	id10116	mushy			c1_17	y	y	y	y						
i120a	Did the final illness last less than 3 weeks?	id10120	acute	a1_01a; a1_01_b	c1_21a; c1_21b	c1_21a; c1_21b	y	y	y		y	y	y	y	y	y
i120b	Did the final illness last at least 3 weeks?	id10120	chronic	a1_01a; a1_01_b	c1_21a; c1_21b	c1_21a; c1_21b	y	y	y		y	y	y	y	y	y
i123o	Did (s)he die suddenly?	id10123	sudden	a1_01a; a1_01_b	c1_21a; c1_21b	c1_21a; c1_21b	y	y	y	y	y	y	y	y	y	y
i125o	Was there any diagnosis by a health professional of tuberculosis?	id10125	tuber	a1_01_13			y	y	y		y	y	y	y	y	y

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interv_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i127o	Was there any diagnosis by a health professional of HIV/AIDS?	id10127	hiv_aids	a1_01_14			y	y	y		y	y	y	y	y	y
i128o	Did (s)he have a recent positive test by a health professional for malaria?	id10128	malaria				y	y	y		y	y	y	y	y	y
i129o	Did (s)he have a recent negative test by a health professional for malaria?	id10129	malarneg				y	y	y		y	y	y	y	y	y
i130o	Was there any diagnosis by a health professional of dengue fever?	id10130					y	y	y		y	y	y	y	y	y
i131o	Was there any diagnosis by a health professional of measles?	id10131	measles				y	y	y		y	y	y	y	y	y
i132o	Was there any diagnosis by a health professional of high blood pressure?	id10132	hypert	a1_01_10			y	y	y		y	y	y	y	y	y
i133o	Was there any diagnosis by a health professional of heart disease?	id10133	heart_dis	a1_01_9			y	y	y	y	y	y	y	y	y	y
i134o	Was there any diagnosis by a health professional of diabetes?	id10134	diabetes	a1_01_7			y	y	y		y	y	y	y	y	y
i135o	Was there any diagnosis by a health professional of asthma?	id10135	asthma	a1_01_1			y	y	y		y	y	y	y	y	y
i136o	Was there any diagnosis by a health professional of epilepsy?	id10136	epilepsy	a1_01_8			y	y	y		y	y	y	y	y	y
i137o	Was there any diagnosis by a health professional of cancer?	id10137	cancer	a1_01_3			y	y	y		y	y	y	y	y	y
i138o	Was there any diagnosis by a health professional of Chronic Obstructive Pulmonary Disease (COPD)?	id10138	copd	a1_01_4			y	y	y					y	y	y
i139o	Was there any diagnosis by a physician or health worker of dementia?	id10139	dement	a1_01_5			y	y	y					y	y	y
i140o	Was there any diagnosis by a health professional of depression?	id10140	depress	a1_01_6			y	y	y					y	y	y

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i141o	Was there any diagnosis by a health professional of stroke?	id10141	stroke	a1_01_12			y	y	y				y	y	y	y
i142o	Was there any diagnosis by a health professional of sickle cell disease?	id10142	sickle				y	y	y		y	y	y	y	y	y
i143o	Was there any diagnosis by a health professional of kidney disease?	id10143	kidney_dis				y	y	y		y	y	y	y	y	y
i144o	Was there any diagnosis by a health professional of liver disease?	id10144	liver_dis				y	y	y		y	y	y	y	y	y
i147o	During the illness that led to death, did (s)he have a fever?	id10147	fever	a2_01b	c4_01	c3_26	y	y	y	y	y	y	y	y	y	y
i148a	Did the fever last less than a week before death?	id10148	ac_fever	a2_03a; a2_03b	c4_02a; c4_02b	c3_28a; c3_28b	y	y	y	y	y	y	y	y	y	y
i148b	Did the fever last at least one week, but less than 2 weeks before death?	id10148		a2_03a; a2_03b	c4_02a; c4_02b	c3_28a; c3_28b	y	y	y	y	y	y	y	y	y	y
i148c	Did the fever last at least 2 weeks before death?	id10148	ch_fever	a2_03a; a2_03b	c4_02a; c4_02b	c3_28a; c3_28b	y	y	y	y	y	y	y	y	y	y
i149o	Did the fever continue until death?	id10149			c4_03		y	y	y	y	y	y	y	y	y	y
i150a	Was the fever severe?	id10150		a2_04	c4_04		y	y	y		y	y	y	y	y	y
i151a	Was the fever continuous?	id10151		a2_05	c4_05		y	y	y		y	y	y	y	y	y
i152o	Did (s)he have night sweats?	id10152	night_sw	a2_06			y	y	y		y	y	y	y	y	y
i153o	During the illness that led to death, did (s)he have a cough?	id10153	cough	a2_32	c4_12		y	y	y	y	y	y	y	y	y	y
i154a	Did the cough last less than 3 weeks before death?	id10154	ac_cough	a2_33a; a2_33b	c4_13a; c4_13b		y	y	y	y	y	y	y	y	y	y
i154b	Did the cough last at least 3 weeks before death?	id10154	ch_cough	a2_33a; a2_33b	c4_13a; c4_13b		y	y	y		y	y	y	y	y	y
i155o	Was the cough productive, with sputum?	id10155	pr_cough	a2_34			y	y	y			y	y	y	y	y
i156o	Was the cough very severe?	id10156			c4_14		y	y	y		y	y	y	y	y	y
i157o	Did (s)he cough up blood?	id10157	bl_cough	a2_35			y	y	y			y	y	y	y	y

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i158o	Did (s)he make a whooping sound when coughing?	id10158	whoop				y	y	y	y	y	y	y			
i159o	During the illness that led to death, did (s)he have any difficulty breathing?	id10159	breath	a2_36	c4_16	c3_17	y	y	y	y	y	y	y	y	y	y
i161a	Did the difficult breathing last for at least 3 days before death?	id10161		a2_37a; a2_37b	c4_17a; c4_17b	c3_19a; c3_19b	y	y	y	y	y	y	y	y	y	y
i165a	Was the difficult breathing continuous during this period?	id10165		a2_38			y	y	y		y	y	y	y	y	y
i166o	Did (s)he have fast breathing?	id10166	rapid_br	a2_40	c4_18	c3_20	y	y	y	y	y	y	y	y	y	y
i167a	Did the fast breathing last for less than two weeks before death?	id10167	ac_rpbr	a2_41a; a2_41b	c4_19a; c4_19b	c3_22a; c3_22b	y	y	y	y	y	y	y	y	y	y
i167b	Did the fast breathing last for at least 2 weeks before death?	id10167	ch_rpbr	a2_41a; a2_41b	c4_19a; c4_19b		y	y	y	y	y	y	y	y	y	y
i168o	Did (s)he have breathlessness?	id10168	br_less				y	y	y	y	y	y	y	y	y	y
i169a	Did the breathlessness last for less than 2 weeks before death?	id10169	ac_brl				y	y	y	y	y	y	y	y	y	y
i169b	Did the breathlessness last for at least 2 weeks before death?	id10169	ch_brl				y	y	y	y	y	y	y	y	y	y
i170o	Was (s)he unable to carry out daily routines due to breathlessness?	id10170	exert_br				y	y	y				y	y	y	y
i171o	Was (s)he breathless while lying flat?	id10171	lying_br	a2_39_1			y	y	y				y	y	y	y
i172o	Did you see the lower chest wall/ribs being pulled in as the child breathed?	id10172	chest_in		c4_20	c3_23	y	y	y	y	y	y	y			
i173a	Did his/her breathing sound like wheezing or grunting?	id10173	wheeze	a2_42	c4_22; c4_23; c4_24	c3_24	y	y	y	y	y	y	y	y	y	y
i174o	During the illness that led to death, did (s)he have chest pain?	id10174	ch_pain	a2_43			y	y	y			y	y	y	y	y
i175o	Was the chest pain severe?	id10175					y	y	y			y	y	y	y	y

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i210o	During the illness that led to death, did (s)he have a painful neck?	id10210					y	y	y		y	y	y	y	y	y
i211a	Did (s)he have a painful neck for at least one week before death?	id10211					y	y	y		y	y	y	y	y	y
i212o	During the illness that led to death, did (s)he have mental confusion?	id10212	men_con	a2_78			y	y	y					y	y	y
i213o	Did (s)he have mental confusion for at least 3 months before death?	id10213	mencon1	a2_79a; a2_79b			y	y	y					y	y	y
i214o	During the illness that led to death, was (s)he unconscious?	id10214		a2_74	c4_26		y	y	y	y	y	y	y	y	y	y
i215o	Was (s)he unconscious for at least 24 hours before death?	id10215	coma	a2_76a; a2_76b	c4_27		y	y	y	y	y	y	y	y	y	y
i216a	Was (s)he unconscious for at least 6 hours before death?	id10216		a2_76a; a2_76b			y	y	y		y	y	y	y	y	y
i217o	Did the unconsciousness start suddenly, quickly (at least within a single day)?	id10217	co_ons	a2_75			y	y	y		y	y	y	y	y	y
i218o	Did the unconsciousness continue until death?	id10218		a2_77			y	y	y		y	y	y	y	y	y
i219o	During the illness that led to death, did (s)he have any convulsions?	id10219	convul				y	y	y	y	y	y	y	y	y	y
i220o	Did (s)he experience any generalized convulsions or fits?	id10220		a2_82	c4_25		y	y	y		y	y	y			
i221a	Did the convulsions last for less than 10 minutes?	id10221	ac_conv	a2_83a; a2_83b			y	y	y		y	y	y	y	y	y
i221b	Did the convulsions last for at least 10 minutes?	id10221	ch_conv	a2_83a; a2_83b			y	y	y		y	y	y	y	y	y
i222o	Did (s)he become unconscious immediately after the convulsion?	id10222	unc_con	a2_84			y	y	y		y	y	y	y	y	y
i223o	During the illness that led to death, did (s)he have any urine problems?	id10223	urine				y	y	y		y	y	y	y	y	y

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i224o	Did (s)he stop urinating?	id10224	uri_ret				Y	Y	Y		Y	Y	Y	Y	Y	Y
i225o	Did (s)he go to urinate more often than usual?	id10225	exc_urine				Y	Y	Y			Y	Y	Y	Y	Y
i226o	Did (s)he pass blood in the urine?	id10226	uri_haem				Y	Y	Y		Y	Y	Y	Y	Y	Y
i227o	During the illness that led to death, did (s)he have any sores or ulcers anywhere?	id10227	skin				Y	Y	Y		Y	Y	Y	Y	Y	Y
i228o	Did (s)he have sores?	id10228	sk_les	a2_10			Y	Y	Y		Y	Y	Y	Y	Y	Y
i229o	Did the sores have clear fluid and/or pus?	id10229		a2_11			Y	Y	Y		Y	Y	Y	Y	Y	Y
i230o	Did (s)he have an ulcer (pit) on the foot?	id10230	sk_feet	a2_13			Y	Y	Y		Y	Y	Y	Y	Y	Y
i231o	Did any ulcer ooze pus?	id10231		a2_14			Y	Y	Y		Y	Y	Y	Y	Y	Y
i232a	Did the ulcer ooze pus for at least 2 weeks?	id10232		a2_15a; a2_15b			Y	Y	Y		Y	Y	Y	Y	Y	Y
i233o	During the illness that led to death, did (s)he have any skin rash?	id10233	rash	a2_07	c4_30		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
i234a	Did (s)he have the skin rash for less than one week?	id10234	ac_rash	a2_08a; a2_08b	c4_33a; c4_33b		Y	Y	Y		Y	Y	Y	Y	Y	Y
i234b	Did (s)he have the skin rash for at least one week?	id10234	ch_rash	a2_08a; a2_08b	c4_33a; c4_33b		Y	Y	Y		Y	Y	Y	Y	Y	Y
i235a	Did (s)he have a rash on the face?	id10235		a2_09_1a	c4_31_1		Y	Y	Y		Y	Y	Y	Y	Y	Y
i235b	Did (s)he have a rash on the trunk or abdomen?	id10235		a2_09_1a	c4_31_1		Y	Y	Y		Y	Y	Y	Y	Y	Y
i235c	Did (s)he have a rash on the extremities?	id10235		a2_09_1a	c4_31_1		Y	Y	Y		Y	Y	Y	Y	Y	Y
i235d	Did (s)he have a rash everywhere?	id10235		a2_09_1a	c4_31_1		Y	Y	Y		Y	Y	Y	Y	Y	Y
i236o	Did (s)he have measles rash?	id10236	measrash				Y	Y	Y		Y	Y	Y	Y	Y	Y
i237o	Did (s)he ever have shingles or herpes zoster?	id10237	herpes				Y	Y	Y					Y	Y	Y
i238o	During the illness that led to death, did her/his skin flake off in patches?	id10238			c4_38		Y	Y	Y		Y	Y	Y	Y	Y	Y

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i239o	During the illness that led to death, did he/she have areas of the skin that turned black?	id10239			c4_46		y	y	y	y	y	y	y	y	y	y
i240o	During the illness that led to death, did he/she have areas of the skin with redness and swelling?	id10240					y	y	y	y	y	y	y	y	y	y
i241o	During the illness that led to death, did (s)he bleed from anywhere?	id10241			c4_44		y	y	y	y	y	y	y	y	y	y
i242o	Did (s)he bleed from the nose, mouth or anus?	id10242	bl_orif		c4_45		y	y	y		y	y	y	y	y	y
i243o	During the illness that led to death, did (s)he have noticeable weight loss?	id10243	wt_loss	a2_18			y	y	y		y	y	y	y	y	y
i244o	Was (s)he severely thin or wasted?	id10244	wasting	a2_19	c4_35		y	y	y		y	y	y	y	y	y
i245o	During the illness that led to death, did s/he have a whitish rash inside the mouth or on the tongue?	id10245	or_cand		c4_43		y	y	y		y	y	y	y	y	y
i246o	During the illness that led to death, did (s)he have stiffness of the whole body or was unable to open the mouth?	id10246	rigidity				y	y	y		y	y	y	y	y	y
i247o	During the illness that led to death, did (s)he have puffiness of the face?	id10247	swe_oth	a2_25			y	y	y			y	y	y	y	y
i248a	Did (s)he have puffiness of the face for at least one week before death?	id10248		a2_26a			y	y	y			y	y	y	y	y
i249o	During the illness that led to death, did (s)he have swollen legs or feet?	id10249		a2_23	c4_36		y	y	y		y	y	y	y	y	y
i250a	Did the swelling last for at least 3 days before death?	id10250		a2_24a; a2_24b	c4_37a; c4_37b		y	y	y		y	y	y	y	y	y
i251o	Did (s)he have both feet swollen?	id10251	swe_legs				y	y	y			y	y	y	y	y
i252o	During the illness that led to death, did (s)he have general puffiness all over his/her body?	id10252		a2_27			y	y	y		y	y	y	y	y	y

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i266a	Did (s)he have the yellow discolouration for at least 3 weeks before death?	id10266		a2_22a; a2_22b			y	y	y		y	y	y	y	y	y
i267o	During the illness that led to death, did her/his hair change to a reddish or yellowish colour?	id10267	hair		c4_39		y	y	y		y	y	y	y	y	y
i268o	During the illness that led to death, did (s)he look pale (thinning/lack of blood) or have pale palms, eyes or nail beds?	id10268	anaemia		c4_41		y	y	y		y	y	y	y	y	y
i269o	During the illness that led to death, did (s)he have sunken eyes?	id10269	eye_sunk				y	y	y		y	y	y			
i270o	During the illness that led to death, did (s)he drink a lot more water than usual?	id10270	exc_drink				y	y	y			y	y	y	y	y
i271o	Was the baby able to suckle or bottle-feed within the first 24 hours after birth?	id10271	fed_d1			c3_11	n	y	y	y	y					
i272o	Did the baby ever suckle in a normal way?	id10272				c3_12	n	y	y	y	y					
i273o	Did the baby stop suckling?	id10273				c3_13	y	y	y	y	y					
i274a	Did the baby stop suckling on the 2nd day of life or later?	id10274	st_suck			c3_14a; c3_14b	y	y	y	y	y					
i275o	Did the baby have convulsions starting within the first 24 hours of life?	id10275	conv_d1				y	y	y	y	y					
i276o	Did the baby have convulsions starting more than 24 hours after birth?	id10276	conv_d2				y	y	y	y	y					
i277o	Did the baby's body become stiff, with the back arched backwards?	id10277	arch_b				y	y	y	y	y					
i278o	During the illness that led to death, did the baby have a bulging or raised fontanelle?	id10278	font_hi		c4_29	c3_34	y	y	y	y	y					
i279o	During the illness that led to death, did the baby have a sunken fontanelle?	id10279	font_lo				y	y	y	y	y					
i281o	During the illness that led to death, did the baby become unresponsive or unconscious?	id10281				c3_33	y	y	y	y	y					

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i282o	Did the baby become unresponsive or unconscious soon after birth, within less than 24 hours?	id10282	unw_d1				y	y	y	y	y					
i283o	Did the baby become unresponsive or unconscious more than 24 hours after birth?	id10283	unw_d2				y	y	y	y	y					
i284o	During the illness that led to death, did the baby become cold to touch?	id10284	cold			c3_29	y	y	y	y	y					
i285a	Was the baby more than 3 days old when it started feeling cold to touch?	id10285				c3_30a; c3_30b	y	y	y	y	y					
i286o	During the illness that led to death, did the baby become lethargic, after a period of normal activity?	id10286				c3_32	y	y	y	y	y					
i287o	Did the baby have redness or discharge from the umbilical cord stump?	id10287	umbinf			c3_35; c3_36	y	y	y	y	y					
i288o	During the illness that led to death, did the baby have skin ulcer(s) or pits?	id10288				c3_39	y	y	y	y	y					
i289o	During the illness that led to death, did the baby have yellow skin, palms (hand) or soles (foot)?	id10289	b_yellow			c3_47	y	y	y	y	y					
i290o	Did the baby or infant appear to be healthy and then just die suddenly?	id10290			c3_49	c3_49	y	y	y	y	y					
i294o	During the illness that led to death, did she have any swelling or lump in the breast?	id10294	swe_breast	a3_01			y		y					y	y	y
i295o	During the illness that led to death, did she have any ulcers (pits) in the breast?	id10295		a3_02			y		y					y	y	y
i296o	Did she ever have a period or menstruate?	id10296					y		y					y	y	y
i297o	During the illness that led to death, did she have excessive vaginal bleeding in between menstrual periods?	id10297	vb_bet	a3_05			y		y				y	y	y	y
i298o	Was the bleeding excessive?	id10298					y		y				y	y	y	y

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i299o	Did her menstrual period stop naturally because of menopause?	id10299	vb_men	a3_03			y		y					y	y	y
i300o	Did she have vaginal bleeding after cessation of menstruation?	id10300	vb_after	a3_04			y		y					y	y	y
i301o	Was there excessive vaginal bleeding in the week prior to death?	id10301		a3_06			y		y				y	y	y	y
i302o	At the time of death was her period overdue?	id10302		a3_07			y		y				y	y		
i303a	Had her period been overdue for at least 4 weeks?	id10303		a3_08a; a3_08b			y		y				y	y		
i304o	Did she have a sharp pain in her abdomen shortly before death?	id10304		a3_09			y		y				y	y		
i305o	Was she pregnant at the time of death?	id10305	pregnant	a3_10			y		y				y	y		
i306o	Did she die within 6 weeks of delivery, abortion or miscarriage?	id10306	del_6wks				y		y				y	y		
i309o	Was she, or had she been, pregnant for less than 6 months when she died?	id10309	pend_6wks	a3_11a; a3_11b			y		y				y	y		
i310o	Please confirm: When she died, she was NEITHER pregnant NOR had recently been pregnant NOR had recently delivered when she died - is that right?	id10310	not_preg				y		y				y	y		
i312o	Did she die during labour, but before delivery?	id10312	died_lab	a3_15			y		y				y	y		
i313o	Did she die after delivering a baby?	id10313					y		y				y	y		
i314o	Did she die within 24 hours after delivery?	id10314	death_24				y		y				y	y		
i315o	Did she die within 6 weeks of childbirth?	id10315		a3_18			y		y				y	y		
i316o	Did she give birth to a live baby (within 6 weeks of her death)?	id10316	baby_al				y		y				y	y		
i317o	Did she die during or after a multiple pregnancy?	id10317	multip				y		y				y	y		
i318o	Was she breastfeeding the child in the days before death?	id10318	breast_fd				y		y				y	y		

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i319a	Did she die during or after her first pregnancy?	id10319	first_p				y		y				y	y		
i319b	Did she have four or more pregnancies before this one?	id10319	more4				y		y				y	y		
i320o	Had she had any previous Caesarean section?	id10320	cs_prev				y		y				y	y		
i321o	During pregnancy, did she suffer from high blood pressure?	id10321	bpr_preg				y		y				y	y		
i322o	Did she have foul smelling vaginal discharge during pregnancy or after delivery?	id10322	disch_sm				y		y				y	y		
i323o	During the last 3 months of pregnancy, did she suffer from convulsions?	id10323	fit_preg				y		y				y	y		
i324o	During the last 3 months of pregnancy did she suffer from blurred vision?	id10324	vis_bl				y		y				y	y		
i325o	Did she have excessive bleeding during pregnancy or shortly after delivery?	id10325	bleed				y		y				y	y		
i326o	Was there vaginal bleeding during the first 6 months of pregnancy?	id10326	e_bleed				y		y				y	y		
i327o	Was there vaginal bleeding during the last 3 months of pregnancy but before labour started?	id10327	s_bleed	a3_13			y		y				y	y		
i328o	Did she have excessive bleeding during labour, before delivery?	id10328	d_bleed	a3_14			y		y				y	y		
i329o	Did she have excessive bleeding after delivery or abortion?	id10329	p_bleed	a3_19			y		y				y	y		
i330o	Was the placenta completely delivered?	id10330	placent_r				n		y				y	y		
i331o	Did she deliver or try to deliver an abnormally positioned baby?	id10331	baby_pos				y		y				y	y		
i332a	Did her labour last longer than 24 hours?	id10332	lab_24	a3_16a; a3_16b			y		y				y	y		
i333o	Did she attempt to terminate the pregnancy?	id10333	term_att				y		y				y	y		

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i334o	Did she recently have a pregnancy that ended in an abortion (spontaneous or induced)?	id10334	abort				y		y				y	y		
i335o	Did she die during an abortion?	id10335		a3_12			y		y				y	y		
i336o	Did she die within 6 weeks of having an abortion?	id10336		a3_17			y		y				y	y		
i337a	Did the mother deliver at a health facility or clinic?	id10337	del_fac				n		y				y	y		
i337b	Did the mother deliver at home?	id10337	del_home				y		y				y	y		
i337c	Did the mother deliver elsewhere (not at a health facility nor at home)?	id10337	del_else				y		y				y	y		
i338o	Did she receive professional assistance during the delivery?	id10338	prof_ass				y		y				y	y		
i340o	Did she have an operation to remove her uterus shortly before death?	id10340	hyster				y		y				y	y		
i342o	Was the delivery normal vaginal, without forceps or vacuum?	id10342	del_norm				n		y				y	y		
i343o	Was the delivery vaginal, with forceps or vacuum?	id10343	del_ass				y		y				y	y		
i344o	Was the delivery a Caesarean section?	id10344	del_cs				y		y				y	y		
i347o	Was her baby born more than one month early?	id10347	mon_early				y		y				y	y		
i354o	Was the child part of a multiple birth?	id10354	twin		c1_01	c1_01	y	y	y	y	y					
i355a	If the child was part of a multiple birth, was it born first?	id10355			c1_02	c1_02	n	y	y	y	y					
i356o	Is the child's mother still alive?	id10356			c1_03	c1_03	n	y	y	y	y					
i357o	Did the child's mother die during or shortly after the delivery?	id10357			c1_04	c1_04	y	y	y	y	y					
i358a	Did the child's mother die in the baby's first year of life?	id10358			c1_05a; c1_05b	c1_05a; c1_05b	y	y	y	y	y					

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i360a	Was the baby born in a health facility or clinic?	id10360	b_bfac		c1_06a; c2_13a	c1_06a; c2_13a	n	y	y	y	y					
i360b	Was the baby born at home?	id10360	b_bhome		c1_06a; c2_13a	c1_06a; c2_13a	y	y	y	y	y					
i360c	Was the baby born somewhere else (e.g. on the way to a clinic)?	id10360	b_bway		c1_06a; c2_13a	c1_06a; c2_13a	y	y	y	y	y					
i361o	Did the mother receive professional assistance during the delivery?	id10361	b_bprof		c2_15a	c2_15a	y	y	y	y	y					
i362o	At birth, was the baby of usual size?	id10362	ab_size		c1_07	c1_07	n	y	y	y	y					
i363o	At birth, was the baby smaller than normal (weighing under 2.5 kg)?	id10363	born_small		c1_07	c1_07	y	y	y	y	y					
i364o	At birth, was the baby very much smaller than usual, (weighing under 1 kg)?	id10364			c1_07	c1_07	y	y	y	y	y					
i365o	At birth, was the baby larger than normal (weighing over 4.5 kg)?	id10365	born_big		c1_07	c1_07	y	y	y	y	y					
i367a	Was the baby born during the ninth month (at least 37 weeks) of pregnancy?	id10367	born_38		c2_02a; c2_02b	c2_02a; c2_02b	n	y	y	y	y					
i367b	Was the baby born during the eighth month (34 to 37 weeks) of pregnancy?	id10367	born_3437		c2_02a; c2_02b	c2_02a; c2_02b	y	y	y	y	y					
i367c	Was the baby born before the eighth month (less than 34 weeks) of pregnancy?	id10367	born_early		c2_02a; c2_02b	c2_02a; c2_02b	y	y	y	y	y					
i368o	Were there any complications in the late part of the pregnancy (defined as the last 3 months), but before labour?	id10368					y	y	y	y	y					
i369o	Were there any complications during labour or delivery?	id10369	comdel		c2_01_10	c2_01_10	y	y	y	y	y					
i370o	Was any part of the baby physically abnormal at time of delivery? (for example: body part too large or too small, additional growth on body)?	id10370	born_malf		c1_18	c1_18	y	y	y	y	y	y	y			

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i371o	Did the baby/child have a swelling or defect on the back?	id10371	mlf_bk		c1_19_3	c1_19_3	y	y	y	y	y	y	y			
i372o	Did the baby/child have a very large head?	id10372	mlf_lh		c1_19_2	c1_19_2	y	y	y	y	y	y	y			
i373o	Did the baby/child have a very small head?	id10373	mlf_sh		c1_19_1	c1_19_1	y	y	y	y	y	y	y			
i376o	Was the baby moving in the last few days before the birth?	id10376				c2_04	n	y	y	y						
i377o	Did the baby stop moving in the womb before labour started?	id10377	move_lb				y	y	y	y						
i382a	Did labour and delivery take more than 24 hours?	id10382				c2_10a; c2_10b	y	y	y	y						
i383o	Was the baby born 24 hours or more after the waters broke?	id10383	waters			c2_07	y	y	y	y						
i384o	Was the liquor foul smelling when the waters broke?	id10384				c2_09	y	y	y	y						
i385a	Was the liquor a green or brown colour when the waters broke?	id10385				c2_08a	y	y	y	y						
i387o	Was the delivery normal vaginal, without forceps or vacuum?	id10387	b_norm			c2_17	n	y	y	y						
i388o	Was the delivery vaginal, with forceps or vacuum?	id10388	b_assist			c2_17	y	y	y	y						
i389o	Was the delivery a Caesarean section?	id10389	b_caes			c2_17	y	y	y	y						
i391o	Did the child's mother receive any vaccinations since reaching adulthood including during this pregnancy?	id10391				c2_11	n	y	y	y						
i393o	Did the mother receive tetanus toxoid (TT) vaccine?	id10393	mttv				n	y	y	y						
i394a	Was this baby born from the mother's first pregnancy?	id10394	b_first				y	y	y	y						

InterVA-5 indicators		derived from corresponding items					specification									
iv5_indic	iv5_question	who_2016	interva_4	sva_adult	sva_child	sva_neonate	subs_val	male	female	neonate	infant	under5	child	adult	midage	elder
i394b	Did the baby's mother have four or more births before this one?	id10394	b_more4				y	y	y	y						
i395o	During labour, did the baby's mother suffer from fever?	id10395				c2_01_9	y	y	y	y						
i396o	During the last 3 months of pregnancy, labour or delivery, did the baby's mother suffer from high blood pressure?	id10396	b_mpbr			c2_01_2	y	y	y	y						
i397o	Did the baby's mother have diabetes mellitus?	id10397				c2_01_4	y	y	y	y						
i398o	Did the baby's mother have foul smelling vaginal discharge during pregnancy or after delivery?	id10398	b_msmds				y	y	y	y						
i399o	During the last 3 months of pregnancy, labour or delivery, did the baby's mother suffer from convulsions?	id10399	b_mcon			c2_01_1	y	y	y	y						
i400o	During the last 3 months of pregnancy did the baby's mother suffer from blurred vision?	id10400	b_mbvi				y	y	y	y						
i401o	Did the baby's mother have severe anaemia?	id10401				c2_01_3	y	y	y	y						
i402o	Did the baby's mother have vaginal bleeding during the last 3 months of pregnancy but before labour started?	id10402	b_mbvl			c2_01_8	y	y	y	y						
i403o	Did the baby's bottom, feet, arm or hand come out of the vagina before its head?	id10403	ab_posit			c2_01_5	y	y	y	y						
i404o	Was the umbilical cord wrapped more than once around the baby's neck at birth?	id10404	cord			c2_01_7	y	y	y	y						
i405o	Was the umbilical cord delivered first?	id10405				c2_01_6	y	y	y	y						
i406o	Was the baby blue in colour at birth?	id10406	cyanosis				y	y	y	y						
i408o	Before the illness that led to death, was the baby/child growing normally?	id10408	devel				n	y	y	y	y	y				
i411o	Did (s)he drink alcohol?	id10411	alcohol	a4_05			y	y	y					y	y	y
i412o	Did (s)he use tobacco?	id10412		a4_01			y	y	y					y	y	y

APPENDIX 2: InterVA-5 (WHO-2016) VA cause categories

The following pages specify the details of the InterVA-5 output cause of death categories, according to the WHO-2016 VA standard definition, with ICD-10 codes.

WHO VA cause category	ICD-10 codes
01 Infectious and parasitic diseases	
01.01 Sepsis	A40-A41
01.02 Acute respiratory infection, including pneumonia	J00-J22
01.03 HIV/AIDS related death	B20-B24
01.04 Diarrhoeal diseases	A00-A09
01.05 Malaria	B50-B54
01.06 Measles	B05
01.07 Meningitis and encephalitis	A39; G00-G05
01.08 Tetanus	A33-A35
01.09 Pulmonary tuberculosis	A15-A16
01.10 Pertussis	A37
01.11 Haemorrhagic fever	A92-A99
01.12 Dengue fever	A90-A91
01.99 Other and unspecified infectious disease	A17-A19; A20-A38;A42-A89; B00-B19; B25-B49; B55-B99
02 Neoplasms	
02.01 Oral neoplasms	C00-C06
02.02 Digestive neoplasms	C15-C26
02.03 Respiratory neoplasms	C30-C39
02.04 Breast neoplasms	C50
02.05 Female reproductive neoplasms	C51-C58
02.06 Male reproductive neoplasms	C60-C63
02.99 Other and unspecified neoplasms	C07-C14; C40-C49; C60-D48
03 Nutritional and endocrine disorders	
03.01 Severe anaemia	D50-D64
03.02 Severe malnutrition	E40-E46
03.03 Diabetes mellitus	E10-E14
04 Diseases of the circulatory system	
04.01 Acute cardiac disease	I20-I25
04.02 Stroke	I60-I69
04.03 Sickle cell with crisis	D57
04.99 Other and unspecified cardiac disease	I00-I09; I10-I15; I26-I52; I70-I99
05 Respiratory disorders	
05.01 Chronic obstructive pulmonary disease (COPD)	J40-J44
05.02 Asthma	J45-J46
06 Gastrointestinal disorders	
06.01 Acute abdomen	R10
06.02 Liver cirrhosis	K70-K76
07 Renal disorders	
07.01 Renal failure	N17-N19
08 Mental and nervous system disorders	
08.01 Epilepsy	G40-G41
98 Other NCDs	

98 Other and unspecified non-communicable disease	D55-D89; E00-E07; E15-E35; E50-E90; F00-F99; G06-G09; G10-G37; G50-G99; H00-H95; J30-J39; J47-J99; K00-K31; K35-K38; K40-K93; L00-L99; M00-M99; N00-N16; N20-N99; R00-R09; R11-R94
09 Pregnancy-, childbirth and puerperium-related disorders	
09.01 Ectopic pregnancy	O00
09.02 Abortion-related death	O03-O08
09.03 Pregnancy-induced hypertension	O10-O16
09.04 Obstetric haemorrhage	O46; O67; O72
09.05 Obstructed labour	O63-O66
09.06 Pregnancy-related sepsis	O75.3; O85
09.07 Anaemia of pregnancy	O99.0
09.08 Ruptured uterus	O71
09.99 Other and unspecified maternal cause	O01-O02; O20-O45; O47-O62; O68-O70; O73-O84; O86-O99
10 Neonatal causes of death	
10.01 Prematurity	P05-P07
10.02 Birth asphyxia	P20-P22
10.03 Neonatal pneumonia	P23-P25
10.04 Neonatal sepsis	P36
10.05 Neonatal tetanus	A33
10.06 Congenital malformation	Q00-Q99
10.99 Other and unspecified perinatal cause of death	P00-P04; P08-P15; P26-P35; P37-P94; P96
11 Stillbirths	
11.01 Fresh stillbirth	P95
11.02 Macerated stillbirth	P95
12 External causes of death	
12.01 Road traffic accident	V01-V89
12.02 Other transport accident	V90-V99
12.03 Accidental fall	W00-W19
12.04 Accidental drowning and submersion	W65-W74
12.05 Accidental exposure to smoke, fire and flames	X00-X19
12.06 Contact with venomous animals and plants	X20-X29
12.07 Accidental poisoning and exposure to noxious substance	X40-X49
12.08 Intentional self-harm	X60-X84
12.09 Assault	X85-Y09
12.10 Exposure to force of nature	X30-X39
12.99 Other and unspecified external cause of death	S00-T99; W20-W64; W75-W99; X50-X59; Y10-Y98
99 Unknown	
99 Cause of death unknown	R95-R99