ANACONDA

Analysis of Causes of (National) Death for Action

ANACONDA is an electronic tool that assesses the accuracy and completeness of mortality and cause of death data by checking for potential errors and inconsistencies. The training courses on ANACONDA build capacity and confidence in participants to assess data quality using basic epidemiological and demographic concepts, and how to interpret and apply the results.

The challenge

All countries need accurate and up-to-date mortality data for a variety of purposes including:

- Guiding policy debates about priority actions for improving population health
- Monitoring progress towards national and global development goals, particularly the Sustainable Development Goals (SDGs)
- Monitoring trends in diseases and injuries
- Evaluation of policies designed to improve health outcomes, and
- Informing health research priorities.

However, the systems that produce mortality and cause of death data in many countries are often poorly developed and fragmented, resulting in **poor quality data** that are generally not fit-for-purpose, and as a result are grossly under-used or **not used at all.**

A common concern with any mortality dataset, including data produced from civil registration systems, is their reliability in describing actual mortality patterns in the population to which they refer.

As a first step to improving the policy utility of vital statistics systems in countries, it is very **important to have a detailed understanding of problems in the data**, particularly with regard to **completeness and accuracy.** Higher quality data reduces uncertainty about the leading causes of death in a population and how they are changing, thus better meeting policy needs.

Our approach

Training in ANACONDA **builds capacity among individuals and institutions to comprehensively and systematically assess the quality of mortality and cause of death data.** Through extended modules, it also teaches how to apply this knowledge to enhance the policy value of mortality data, and how to correctly analyse and interpret vital statistics to monitor progress towards the SDGs. This is done through building analytic capacity in the core **epidemiological and demographic concepts** that underlie ANACONDA, based on decades of recorded observations in a wide range of countries.

ANACONDA is an easy-to-use electronic tool that does not require more than basic computer skills and familiarity with Microsoft Excel. It performs the calculations needed for a **comprehensive data quality review** and automatically generates the associated figures and tables from which a report can be written.

The structure of the tool is logical and all the computational steps are automated. ANACONDA starts with a broad overview of the input data, applies systematic consistency checks to total (all-cause) mortality data, followed by a detailed assessment of the quality of cause of death data, and finally computes an overall index of mortality data quality, based entirely on the input data.

The tool is particularly useful for those who are responsible for the production of **routine mortality data**, as it allows them to regularly monitor the quality of their datasets.

The technical basis of ANACONDA was developed by the Melbourne School of Population and Global Health at the University of Melbourne. The software was built by the Swiss Tropical and Public Health Institute (Swiss TPH) at the University of Basel.

Course structure

The ANACONDA training course has been developed in a modular approach, so that countries can select from both core and optional modules to compose a course that best meets their training needs. Course pre-requisites are minimal; however it is critical that all participants have access to laptops or desktop computers and that their mortality dataset is disaggregated by age and sex and compiled into three- or four-digit codes based on the International Classification of Diseases (ICD). Participants should have basic computer skills, preferably including Excel. Some knowledge of the ICD is helpful in order to understand the concepts and rationale of approaches and classifications used to analyse the data.

ANACONDA Basic

Core modules 1 and 2 provide participants with an overview of the epidemiological and demographic concepts, classifications and standards used in ANACONDA, and are pre-requisites for all other modules. Building capacity in these core skills allows participants to critically assess the quality of their data and identify areas for improvement, using locally-supplied datasets. The overall length of ANACONDA Basic is 2 to 2.5 days, during which time participants become proficient in using the software and interpreting the results through exercises and practical examples.

Course objectives:

■ Understand the technical aspects of the tool, including how to download the software and import data

■ Understand basic demographic and epidemiological concepts and indicators, as well as how to use these to check and evaluate datasets for consistency and plausibility

■ Learn how to use ANACONDA to critically appraise routine national or sub-national mortality data, and how to interpret the results

■ Understand the importance of quality in mortality statistics and why it is fundamental for health policy and program monitoring at all levels

■ Build confidence in how to evaluate and report on data quality as a first step in guiding actions to improve them.

MODULE	DURATION	CONTENT	ADDITIONAL INFORMATION
Core module 1: Introduction to ANACONDA	1 day	■ Concepts, classifications and standards used in ANACONDA ■ The structure of ANACONDA ■ What is ANACONDA? Steps 1-5 ■ What is ANACONDA? Steps 6-10 ■ Technical guidance and virtual tour of ANACONDA ■ Basic exercises with local data	This basic introductory module is required for any country that has not had previous training in ANACONDA. It is a pre-requisite for all other modules. Participants become part of the ANACONDA community of users.
Core module 2: Practical exercises	1 to 1.5 days	■ Practical exercises with local datasets (national and/or sub-national) ■ Practice with reporting back results ■ Basic report writing skills, using the in-built report generation function in ANACONDA	It is recommended that countries include this module to ensure participants gain practical experience in applying their new skills to local datasets.

ANACONDA Plus

ANACONDA Plus is recommended for countries with previous experience in ANACONDA who wish to further expand their knowledge on the epidemiological and demographic concepts underlying the tool, including how to adjust and analyse data to improve their value for policy. A key feature of ANACONDA Plus is guidance on how to correctly interpret CRVS data (of variable quality) in order to monitor country progress towards the Sustainable Development Goals (SDGs), several of which depend heavily on the availability and timeliness of CRVS data.

The core modules provide detailed information on the theory and conceptual thinking behind each of the main steps in ANACONDA, allowing participants to explore fundamental data quality issues, learn about advanced epidemiological and demographic techniques that will strengthen the evidence base for policy, and be introduced to the range of cost-effective strategies available to improve routine mortality data systems. Countries can also select from the seven optional modules (which range from 1 to 2 hours each), depending on the status of their CRVS system and current national priorities. The modules in this course are especially relevant for countries that wish to have their own cadre of local 'master trainers' to expand course delivery at the sub-national level.

While ANACONDA Plus can be taught immediately after the Basic course, countries may prefer to gain experience in using the tool first, before doing the more advanced training. The overall length of the course is 2 to 2.5 days depending on the modules selected.

Course objectives:

- Understand the demographic and epidemiological concepts behind ANACONDA

- Identify the causes of data quality issues identified by ANACONDA, and understand the potential interventions available to improve CRVS systems and data quality

- Learn and apply methods to adjust poor quality data to enable data analysis

- Learn and apply basic and advanced methods to produce mortality statistics to inform health policy

- Provide necessary additional knowledge and skills to participants who are interested in becoming ANACONDA 'master trainers'.

MODULE	DURATION	CONTENT	ADDITIONAL INFORMATION
Core module 1: Concepts and analytical skills for all-cause mortality	1 to 1.5 days	■ Review of ANACONDA results for all-cause mortality data from routine mortality surveillance systems ■ Explaining patterns in all-cause mortality data using the demographic concepts underlying ANACONDA	These core modules provide participants with a more detailed explanation of the epidemiological and demographic concepts used in ANACONDA. They provide participants with the skills required to identify and analyse issues of policy relevance in their data using ANACONDA, critically assess the issues, apply data adjustment techniques, and propose solutions for system improvements. **Core module 1** focuses on analytical concepts underlying the fact of death, and how to asses death registration completeness. **Core module 2** provides participants with more advanced skills required to critically appraise the diagnostic accuracy of cause of death datasets, how to conduct advanced analyses, and how to apply data adjustment techniques.
Core module 2: Concepts and analytical skills for cause-specific mortality		■ Review of ANACONDA results for cause-specific mortality data from routine mortality surveillance systems ■ Explaining patterns in cause-specific mortality data using the epidemiological concepts underlying ANACONDA	
Core module 3: Data sources, causes of data quality issues and data quality 'fixes' for all-cause mortality		■ Understanding routine mortality data sources ■ Identifying the fundamental causes of data quality issues ■ Strategies to improve completeness and age reporting of mortality data in civil registration and vital statistics systems	

MODULE	DURATION	CONTENT	ADDITIONAL INFORMATION
Core module 4: Data sources, causes of data quality issues and data quality 'fixes' for cause-specific mortality	1 to 1.5 days	■ Understanding routine mortality data sources ■ Identifying fundamental causes of data quality issues ■ Strategies for improving quality of cause of death data	**Core modules 3 and 4** provide an overview of the main data sources that 'feed' a CRVS system, describe the common data quality issues that affect accurate measurement of all-cause and cause-specific mortality, and outline the scope and aims of intervention strategies designed to improve data quality.
Core module 5: Data adjustment		■ Preparing data for input into ANACONDA ■ Adjusting poor-quality data to better support policy needs	**Core module 5** describes methods for input data adjustment, if required, to benefit from ANACONDA, as well as approaches to adjusting poor quality data in order to improve their policy value.
Core module 6: Data analysis and interpretation		■ Basic and advanced analysis of mortality and cause of death data ■ Caveats when analysing cause of death trends ■ How to use and interpret CRVS data to measure progress towards the SDGs	**Core module 6** builds analytical skills for basic CRVS data analysis and the interpretation of trends, including principles for monitoring the SDGs.
Optional module 1: Effective presentation of ANACONDA results	1 hour	■ Principles of effective presentation ■ How to explain ANACONDA results to senior management	This optional module will help build confidence and skills among participants to effectively share results from ANACONDA and advocate for system improvements.
Optional module 2: Verbal autopsy	1.5 hours	■ Technical issues of verbal autopsy ■ VA cause lists ■ Interpreting VA data	Verbal autopsy (VA) is an important source of data on community deaths, however it presents unique challenges in terms of data analysis and interpretation.
Optional module 3: Completeness of death registration	1 hour	■ Range of methods to estimate completeness of death registration ■ Estimating completeness using ANACONDA	Understanding the level of completeness of registration is one of the first steps in understanding and improving data quality.
Optional module 4: Life tables	1.5 hours	■ Basic construction of life tables ■ Interpretation of resultant mortality measures	Life tables present the probability of a person dying at each age or time interval and are used to calculate many summary mortality measures.
Optional module 5: Advanced mortality analyses	1.5 hours	■ Emerging patterns of mortality by age and sex ■ Analysis of the contribution of age and cause to trends in life expectancy	This optional module is recommended for countries with advanced CRVS systems.
Optional module 6: Redistribution of unusable codes	1 hour	■ In-depth exploration and application of algorithms to redistribute 'unusable' cause of death codes	ANACONDA applies algorithms to redistribute 'unusable' cause of death codes to be more useful for policy and planning. This module will provide an introduction to these algorithms.
Optional module 7: Vital statistics performance index (VSPI)	1 hour	■ Theory, components, calculation, interpretation and uses	The VSPI measures the quality of mortality data using five dimensions. It provides measures of the relative contribution of each dimension to the overall quality of data.

Refresher

The refresher module reinforces earlier learnings, introduces participants to new concepts and methods that have been introduced into ANACONDA, and emphasises the key and continuous role of critical appraisal of data quality in strengthening country vital registration systems.

MODULE	DURATION	CONTENT	ADDITIONAL INFORMATION
Refresher	1 day	■ Relevance of high quality mortality and cause of death data, including the extent of errors in local datasets and implications for policy ■ Concepts, classifications and standards used in ANACONDA ■ Technical guidance and virtual tour of ANACONDA ■ Basic exercises ■ Overview of core modules 1 and 2 ■ Innovations and new developments in ANACONDA	A condensed version of core modules 1 and 2, with an overview of content from the optional modules. Countries that have already had training in ANACONDA, or who wish to implement it at the sub-national level, are recommended to undertake this module. It provides opportunities to discuss lessons learnt from the community of practice of ANACONDA users, and feedback on policy implications.

Countries that become part of the ANACONDA community are asked to nominate a Focal Point for ANACONDA who will receive updates about new versions of the software and all communications regarding ANACONDA from the developers. Requests for translations of ANACONDA into other languages should be addressed to the developers at the University of Melbourne

For more information about ANACONDA, contact Dr Lene Mikkelsen, University of Melbourne Technical Lead and ANACONDA Course Co-ordinator (**l.mikkelsen@unimelb.edu.au**).

The program partners on this initiative include: The University of Melbourne, Australia; CDC Foundation, USA; Vital Strategies, USA; Johns Hopkins Bloomberg School of Public Health, USA; World Health Organization, Switzerland.

Civil Registration and Vital Statistics partners:

The University of Melbourne recognises the Swiss Tropical and Public Health Institute for their partnership and contribution

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