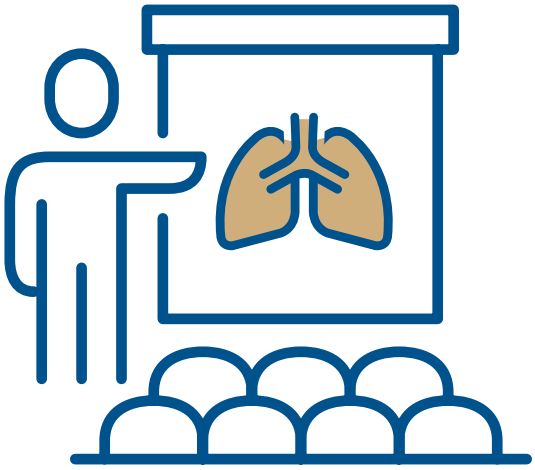
World Health Organization
REGIONAL OFFICE FOR Europe

Structured operational research training of the European Tuberculosis Research Initiative

ERI-TB SORT-TB Course 1: 2018–2019 Curriculum



Abstract

The European Tuberculosis Research Initiative (ERI-TB) was launched by the WHO Regional Office for Europe in 2016 to advance TB research in the WHO European Region. It is a platform intended to enhance the capacity for implementing operational research, which is considered to be an important source for evidence-informed TB programme management and relevant policy decision-making. The ERI-TB Structured Operational Research Training (SORT-TB) course was developed with the aim of helping WHO's counterparts in the fig ht against TB in eastern Europe and central Asia to establish institutional practices for evidence-informed management and to improve the performance of TB programmes. The course
is intended to build capacity and provide support for countries undertaking or planning to undertake operational research, in line with one of ERI-TB's main objectives. The SORT-TB course supports research projects identified as priorities by ministries of health and links them with eminent TB researchers from the Region.

Keywords

TUBERCULOSIS | PREVENTION AND CARE | OPERATIONAL RESEARCH | EPIDEMIOLOGY | EUROPEAN REGION

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Contents

Abbreviations

ERI-TB	European Tuberculosis Research Initiative
MDR-TB	multidrug-resistant tuberculosis
RR-TB	rifampicin-resistant tuberculosis
SORT IT	Structured Operational Research and Training Initiative
SORT-TB	ERI-TB Structured Operational Research Training (course)
TB	tuberculosis

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Authors

Masoud Dara
Acting Director, Communicable Diseases, Division of Health Emergencies and Communicable Diseases, WHO Regional Office for Europe, Copenhagen, Denmark

Andrei Dadu
Medical Officer, Joint Tuberculosis, HIV and Hepatitis programme, Division of Health Emergencies and Communicable Diseases, WHO Regional Office for Europe, Copenhagen, Denmark

Karapet Davtyan
Temporary Adviser, Joint Tuberculosis, HIV and Hepatitis programme, Division of Health Emergencies and Communicable Diseases, WHO Regional Office for Europe, Copenhagen, Denmark

Background

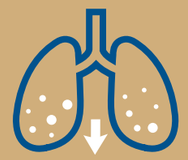
Strengthened health systems now offer universal access to tuberculosis (TB) treatment, but the high burden of rifampicin-resistant and multidrug-resistant TB (RR/MDR-TB), recent discovery of incurable extensively drug-resistant TB strains *(1)*, high levels of alcohol abuse, fatal combination with, and alarming spread of, HIV *(2,3)* are important threats that could halt further progress towards ending TB by 2035. At-risk groups, such as migrants *(4)* and prisoners, are considered neglected priorities *(5)* and little is known about the best TB response strategies among these populations.

At the current rate of TB decline, even European countries without a high TB burden will not meet the targets set by the WHO's End TB Strategy for 2035 *(6)*. Although TB is the ninth leading cause of deaths worldwide *(7)* and more research is clearly needed to end the suffering caused by TB, the field does not appear to attract much interest. Several calls have been made to intensify research efforts to find an effective vaccine, develop reliable and scalable point-of-care diagnostic tools, discover new and effective drugs, and use new models of care that ensure successful treatment outcomes *(8)*. A recent report by the Treatment Action Group describes TB research funding as having "been governed principally by inertia" *(9)*. A paper presented at the first Global Ministerial Conference on Ending TB in the Sustainable Development Era, held in Moscow, Russian Federation, in November 2016 emphasized that although science and technology hold great promise to better understand and control this complex pathogen, experience shows that unless rigorous standards are set for TB programmes, the new scientific advances may fail to achieve much progress *(10)*.

The WHO European Region comprises countries with marked variations in economic development, population health and the TB disease burden. Many countries within the Region are host to advanced academic institutions that are leaders in medical research and have high literacy rates among the general population. As different countries face different challenges, research priorities vary according to the needs and research gaps in each country. Research efforts that are prioritized, useful and collaborative are likely to make the most efficient use of scarce resources. The United Nations General Assembly High-level Meeting on the Fight Against Tuberculosis, which took place on 26 September 2018, offered a unique opportunity for the TB community to ensure that a serious commitment is made by both public and private global leaders to promote and fund more research to end TB *(11)*.

Since 2011 the WHO Regional Office for Europe has increased efforts towards stopping TB in the Region, and in 2016 efforts were intensified towards reaching the End TB Strategy target of 10 incident TB cases per 100 000 population by 2030 *(8)*.

Positive trends have been observed in the WHO European Region (12), including:



THE FASTEST REGIONAL **DECLINE** (5%) IN TB INCIDENCE FROM 2013 TO 2017 (COMPARED WITH AN ANNUAL DECLINE OF 2% WORLDWIDE)

THE FASTEST REGIONAL **DECLINE** IN TB MORTALITY RATE OVER THE 2013–2017 PERIOD, AT 11% PER YEAR (COMPARED WITH AN ANNUAL DECLINE OF 3% WORLDWIDE)

AN **INCREASE** IN THE COVERAGE OF DRUG-SUSCEPTIBILITY TESTING IN FOUR OF THE SIX WHO REGIONS BETWEEN 2016 AND 2017, WITH THE HIGHEST RATE OF 57% OBSERVED IN THE WHO EUROPEAN REGION IN 2017

ACHIEVING **UNIVERSAL** COVERAGE FOR MDR-TB TREATMENT IN THE REGION IN 2013

However, these achievements are threatened by considerable challenges.

- TB/HIV coinfection rates have been falling since 2008 in all WHO regions other than the European Region, where the proportion of TB patients with positive test findings for HIV increased from 3% in 2008 to 13% in 2017.

- The European Region has the highest estimated incidence rates of RR/MDR-TB – 17% of new TB patients and 53% of previously treated TB patients are estimated to have RR/MDR-TB, compared with the global averages of 3.5% and 18%, respectively.

Therefore, to meet the End TB Strategy target by 2035, countries urgently need to accelerate their response to TB. One of the three main challenges listed by the WHO Director General at the TB Innovation Summit on 23 September 2018 in New York, United States *(13)* was "[f]inding incentives to boost the discovery of the new TB diagnostics and medicines, direct investments in research, especially when they aim for the improvement of quality diagnosis, treatment and care of TB".

The European TB Research Initiative (ERI-TB) was launched by the WHO Regional Office for Europe in 2016 to advance TB research in the Region. It is a platform intended to enhance the capacity for implementing operational research, which is considered to be an important source of evidence-informed TB programme management and relevant policy decision-making. ERI-TB's main objectives are to (i) define regional research priorities towards the goal of Ending TB in the Region; (ii) set up a collaborative platform for implementing TB research; and (iii) build capacity for implementing the research. To meet the last objective, ERI-TB developed the SORT-TB course with the aim of helping WHO's counterparts in the fig ht against TB in eastern Europe and central Asia to establish institutional practices for evidence-informed management (in which policy and practice are informed by operational research) and improving the performance of national TB programmes.

The SORT-TB course is based on the Structured Operational Research and Training Initiative (SORT IT) framework and on the previous experience of the WHO Regional Office for Europe's collaboration with the Special Programme for Research and Training in Tropical Diseases in implementing the SORT IT *(14,15)*. The course is designed to meet the research agenda and priorities defined by ERI-TB for the WHO European Region *(16)* and priorities at country level. It links research delegated by ministries of health with expert TB researchers and SORT-TB course alumni from the Region. The material for the SORT-TB course is split into three modules and delivered in three workshops; successful completion of the tasks and milestones of Modules 1 and 2 is required before starting Module 3.

Overall purpose

The overall purpose of the ERI-TB SORT-TB course is for participants to develop the practical skills to conduct operational research, publish the findings and promote changes in policy and practice.

Course faculty

The course faculty consists of experienced researchers from the WHO Regional Office for Europe, collaborating partners and alumni of previous SORT IT or ERI-TB operational research courses who are familiar with TB-related challenges in the eastern part of the WHO European Region.

Benefits of participation

Benefits of participating in the course include:

- gaining practical skills in undertaking the entire operational research process, from conception to publication and beyond;
- experience in learning and sharing knowledge within a team of highly motivated participants and talented facilitators (who act as mentors) working in operational research in various countries; and
- an opportunity for participants to present their own experiences, gain visibility in operational research and prepare for increased research responsibilities and research leadership in their own countries.

Participants are strongly encouraged to help, train and eventually lead others as mentors in order to build long-lasting capacity for operational research and optimize its impact.

Follow-up

Between Workshops 2 and 3, participants will continue their routine work in health programmes and/or projects in their own countries and collect data for their research projects. They will be contacted intermittently after completion of the course to record their accomplishments and the policy and practical impact of their studies. Course facilitators will be available to provide assistance upon request. Course participants will also become part of the alumni group.

Requirements for attending the course

Participants are required to have a laptop computer with a Windows operating system and full up-to-date protection against malicious code; be proficient in its operation, including managing files and folders, the correct use of file names and extensions, displaying relevant file information (file name, extension, size and date), and being familiar with keyboard short cuts for efficient copying, pasting, searching and replacing; and be open to learning new computer tools and software. No prior knowledge of the course software is required.

Resources

During the workshops, experienced facilitators will be assigned to work with each participant. Each participant will also be given a course folder containing copies of course lectures, papers and documents.

Workshop 1:
Operational Research and Protocol Development

Workshop 1 is designed to give participants a thorough understanding of operational research, develop a research protocol based on an individual research topic and complete an ethics review application form. Workshop 1 of the first SORT-TB course took place on 1–5 October 2018.

Purpose
In this five-day workshop, each participant will gain a thorough understanding of operational research and draft a research protocol and ethics review application. Upon returning to their own country, participants will refine these documents and submit them to the course coordinator and their local ethics review board within three weeks of completing Module 1.

Brief overview
Workshop 1 will cover the following topics:

- introduction to operational research;
- research terminology;
- asking the right research questions;
- the aims and objectives of operational research;
- research ethics;
- developing an analysis plan; and
- drafting a research protocol.

Key deliverable
The key deliverable is a draft research protocol.

Training strategy
The training strategy will involve:

- the use of lectures and discussions focused on key areas of operational research and protocol development;
- showing examples of completed and published operational research projects to demonstrate the principles and practice of operational research;
- engaging participants in discussions on approaches to shape research questions and develop research methodology;
- assisting participants to prepare a research protocol using Microsoft Word; and
- assisting participants to complete protocols and ethics review exemption/application forms.

Timetable of activities

DAY 1

Introduction to operational research
Day 1 will include registration and general introductions; lectures on the course aims and the ERI-TB training model for structured operational research (SORT-TB); the what, why and how of operational research; how operational research can be translated into policy and practice; and examples of setting up and implementing operational research (Table 1). The determinants and outcome variables used in operational research will also be covered. Participants will spend the end of Day 1 thinking about their research projects.

TABLE 1: Timetable of activities for Day 1

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Opening and introduction		Masoud Dara
09:15	Lecture 1. Key speech: ERI-TB – a catalyst for innovative TB care	Slides	Masoud Dara
09:30	Lecture 2. Defining TB research priorities for the WHO European Region	Slides	Andrei Dadu
09:45	Lecture 3. Health research for policy-making – the existing mechanisms and tools available for the WHO European Region	Slides	Ryoko Takahashi
10:00	Lecture 4. The ERI-TB SORT-TB model for sustainable capacity-building in operational research	Slides	Andrei Dadu
10:15	Logistics and course administration	–	Michelle Frederiksen Ayodele Oyedokun
10:30	**Tea break**		
11:00	Lecture 5. Operational research – what, why and how?	Slides	Karapet Davtyan Dilyara Nabirova
11:40	Lecture 6. Translating operational research into policy and practice	Slides	Jamshid Gadoev Ana Ciobanu
12:30	**Lunch**		
13:30	Lecture 7. The research question	Slides	Rishi Gupta Karapet Davtyan
14:15	Practical activity: discussion of principal investigators' research questions	–	All facilitators
15:00	**Tea break**		
15:30	Plenary session 1: brief presentation of research questions	–	All facilitators
17:00	**Close of day** Evening task: participants think about the development of their research projects		

DAY 2

Research questions and methodology
Day 2 will focus on research terminology and definitions and on approaches for developing research questions, aims and objectives (Table 2). Examples of completed operational research projects undertaken by the facilitators will also be discussed.

TABLE 2: Timetable of activities for Day 2

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Lecture 1. Example of operational research project with a critique of the strengths and limitations	Slides	Karapet Davtyan
09:45	Lecture 2. Research terminology and definitions: study design, population, sampling and variables	Slides	Giorgi Kuchukhidze Arax Hovhannesyan
10:30	**Tea break**		
11:00	Lecture 3. Protocol template	Slides	Jamshid Gadoev Giorgi Kuchukhidze
11:15	Practical activity. Participants work on research protocol: background, research question, aim and objectives – exercises	–	All facilitators
12:30	**Lunch**		
13:30	Practical activity. Participants work on research protocol: background, research question, aim and objectives – exercises	–	All facilitators
15:00	**Tea break**		
15:30	Plenary session 2: formal presentations of research questions, aims and objectives (10 min per participant)	–	All facilitators
17:00	**Close of day**		

DAY 3

Research methodology, data analysis, literature search, references and ethics
Day 3 is dedicated to the methodology of research, with a focus on design, settings, patient samples, data, measurable outcomes, data collection, simple data analysis and ethics (Table 3). It also includes lectures on the use of PubMed for performing literature searches and techniques for source references, including a demonstration on the use of Mendeley free reference management software.

TABLE 3: Timetable of activities for Day 3

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Lecture 1. Data collection	Slides	Jamshid Gadoev Andrei Dadu
09:30	Lecture 2. Presentation of data and sample size calculations on Open Epi	Slides	Arax Hovhannesyan
10:30	Lecture 3. How to do a literature search using PubMed – an overview	Slides	Safieh Shah Olga Denisuk
11:00	**Tea break**		
11:30	Lecture 4. How to organize and cite references for the protocol	Slides	Alexandra Kruse
12:00	Lecture 5. Example of a completed research protocol	Slides	Jamshid Gadoev
12:30	**Lunch**		
13:30	Lecture 6. Ethical considerations of research protocols	Slides	Valerie Ann Luyckx
14:00	Lecture 7. How to complete ethics review exemption & application forms	Slides	Valerie Ann Luyckx
14:30	Practical activity: participants work on the research protocol – background, research question, aim and objectives, and methodology	–	All facilitators
15:00	**Tea break**		
15:30	Practical activity: participants work on the research protocol – background, research question, aim and objectives, and methodology	–	All facilitators
17:00	**Close of day**		

DAY 4

Role of investigators and authors
Day 4 will focus first on the role of investigators and authors in developing the research protocol and will then be dedicated to protocol development (Table 4). Participants will complete the development of their research protocols in Microsoft Word.

TABLE 4: Timetable of activities for Day 4

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Lecture 1. The role of investigators and authors	Slides	Dilyara Nabirova
09:30	Practical activity: participants complete their research protocols to present at Plenary session 3	–	All facilitators
10:30	**Tea break**		
11:00	Practical activity: participants complete their research protocols to present at Plenary session 3	–	All facilitators
12:30	**Lunch**		
13.30	Practical activity: participants complete their research protocols to present at Plenary session 3	–	All facilitators
15:00	**Tea break**		
15:30	Practical activity: participants complete their research protocols to present at Plenary session 3	–	All facilitators
17:00	**Close of day**		

DAY 5

Presentations of research protocols
The final day will comprise a plenary session, in which all participants will deliver a five-minute presentation of their research protocol, followed by a five-minute discussion (Table 5). The workshop will close with evaluation of the module, review of the next steps, and the tasks and milestones of Module 1 that need to be accomplished before starting Module 3. Failure to complete these tasks and milestones will preclude attendance at Module 3.

TABLE 5: Timetable of activities for Day 5

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Plenary session 3: presentation of research protocols	–	All facilitators
09:00–09:15 09:20–09:35 09:40–09:55 10:00–10:15	Participant 1 Participant 2 Participant 3 Participant 4	–	
10:30	**Tea break**		
11:00–11:15 11:20–11:35 11:40–11:55 12:00–12:15	Participant 5 Participant 6 Participant 7 Participant 8	–	All facilitators
12:30	**Lunch**		
13:30–13:45 13:50–14:05 14:10–14:25 14:30–14:45	Participant 9 Participant 10 Participant 11 Participant 12	–	All facilitators
15:00	**Tea break**		
15:30	Lecture 1. Next steps & milestones for Module 1	Slides	Karapet Davtyan Andrei Dadu
16:00	Candidates complete course evaluation forms	–	
16:30	Plenary session 3: feedback on Module 1	–	All participants
17:00	Faculty meeting	–	All faculty members and organizing staff
17:30	**Close of Workshop 1**		

Workshop 2:
Efficient, Quality-assured Data Capture and Analysis

Workshop 2 will start the next workday after the completion of Workshop 1. The aim of Module 2 is to help participants understand the best approaches to use for data management and data analysis. Workshop 2 of the first SORT-TB course took place on 8–12 October 2018.

Purpose

The implementation of operational research is commonly based on the collection and analysis of routinely collected programme data (paper based or electronic). The extent of errors made during data recording cannot be known and must be accepted. The purpose of this module is to ensure that participants understand the importance of high-quality data and have the skills required to create an efficient electronic data entry form (based on principles adapted to their specific needs) and understand how data analysis should be approached. At the end of Module 2, participants will:

- understand the importance of high-quality data (collection, entry and validation);
- have a working knowledge of basic EpiData software, including how to:
  - create a questionnaire (qes) file, a check (chk) file and a recording (rec) file; and
  - perform basic analysis;
- tailor their knowledge of EpiData to develop relevant data collection tools for their own specific studies;
- understand the basics of crude and stratified data analysis, as relevant to their research question(s); and
- be able to present in a plenary session their data collection instrument code book, which will serve as a road map for data collection and entry.

Brief overview

Workshop 2 will cover the following topics:

- designing an efficient data entry instrument;
- entering and validating data;
- introduction to data analysis;
- producing relevant analysis results in a tabular form; and
- daily homework on an electronic data entry instrument.

Key deliverables

The key deliverables are a draft of an electronic data entry instrument and an understanding of the key principles of conducting biostatistical analyses and interpreting the results.

Training strategy

The training strategy will involve:

- a sequence of lectures and exercises, using freely available EpiData software for data entry and analysis (available at http://www.epidata.dk);
- exercises to reflect the reality of an operational research project, and use of a specific example to highlight the general principles; and
- an overview of EpiData and tuition in the principles of creating a data collection instrument; participants will also perform a simple analysis as an exercise.

Timetable of activities

DAY 1

Introduction to EpiData and creating data files
Day 1 will focus on introducing the course, followed by an interactive session on the importance of collecting and using high-quality data (Table 6). The following lectures will present the different types of variables (continuous, categorical), with examples; and the process of EpiData installation and creation of a data documentations sheet using qes, rec and chk files for different types of variables.

TABLE 6: Timetable of activities for Day 1

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Welcome: introduction to the course and workshops	–	Andrei Dadu & Karapet Davtyan
09:15	Lecture 1. Overview of topics –covered in Module 2	Slides	Karapet Davtyan
09:30	Lecture 2. Importance of good data quality and enabling factors (interactive session)	Slides	Karapet Davtyan Arax Hovhannesyan
10:30	**Tea break**		
11:00	Lecture 3. Different types of variables (video: 58:05–1:05:09)	Slides	Yuliia Sereda
11:30	Lecture 4. Overview of EpiData & installation	Slides	Jamshid Gadoev
12:10	EpiData: entry, download & installation	Source	Karapet Davtyan
12:20	EpiData user: step by step guide for Module 2	Slides	Karapet Davtyan
12:30	**Lunch**		
13:30	Lecture 5. How to create a data documentation sheet Exercise: participants create a data documentation sheet	Slides	Karapet Davtyan
13:50	Download sample data	Source	
13:55	Download data documentation sheet	Source	
14:00	Lecture 6. EpiData entry: how to create qes/rec/chk files for various types of variables Exercise: participants create qes/rec/chk files using examples	Slides	Karapet Davtyan
15:00	**Tea break**		
15:30	Exercise: Participants continue creating a data documentation sheet & qes/rec/chk files	–	All facilitators
16:30	Lecture 7. Milestones for Module 2	Slides	Karapet Davtyan
17:00	**Close of day**		

DAY 2

More chk functions, data validation and summary statistics
Day 2 presentations will focus on revision of a rec file and provision of additional information on chk files (Table 7). Participants will perform double entry and data validation using a sample dataset. Lectures will be delivered on summary statistics (proportions, mean, median, interquartile range, 95% confidence interval), followed by individual work time (with facilitator support) for participants to create a data documentation sheet and qes, rec and chk files for their respective projects.

TABLE 7: Timetable of activities for Day 2

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Lecture 1. Summary of Day 1	Slides	Karapet Davtyan
09:15	Lecture 2. Revising a rec file	Slides Other resources	Karapet Davtyan
09:45	Lecture 3. More chk file functions	Slides	Karapet Davtyan
10:30	**Tea break**		
11:00	Lecture 4. Double entry and data validation/ comparing datasets Exercise: data entry and validation	Slides Other resources	Jamshid Gadoev
13:00	**Lunch**		
13:45	Lecture 5. Summary statistics: proportions, mean, median, interquartile range, confidence interval	Slides	Yuliia Sereda
14:30	Individual work time: creating a data documentation sheet & qes/rec/chk files for a specific project	–	All facilitators
15:00	**Tea break**		
15:30	Individual work time: creating a data documentation sheet & qes/rec/chk files for a specific project	–	All facilitators
17:00	**Close of day**		

DAY 3

Statistical analysis
On Day 3 participants will present their data documentation sheets. Lectures will cover the use of EpiData Analysis for performing summary statistics (Table 8). Participants will be given exercises to familiarize themselves with EpiData Analysis, using a sample database. Lectures will be given on P values, the chi-square test, chi-square test for trend, Student's t-test, Kruskal–Wallis test, odds ratios and relative risk, including a brief overview of the concept of confounding. This will be followed by individual work time for participants (with facilitator support) to create qes, rec and chk files for their respective projects.

TABLE 8: Timetable of activities for Day 3

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Plenary session 1: presentations of data documentation sheets (5 min per participant)	–	All facilitators
11:00	**Tea break**		
11:30	Lecture 1. Demonstration of EpiData commands for performing summary statistics & use of the EpiData editor	Slides Other files	Karapet Davtyan
13:00	**Lunch**		
14:00	Lecture 2. Chi-square test, chi-square test for trend, T-test, Kruskal–Wallis test. How to perform these statistics in EpiData Analysis	Slides Other resources	Yuliia Sereda
15:00	**Tea break**		
15:30	Lecture 3. Statistics continued: odds ratio, relative risk, concept of confounding	Slides	Yuliia Sereda
16:15	Individual work time: creating qes/rec/chk files and dummy tables for a specific project	–	All facilitators
17:00	**Close of day**		

DAY 4

Importing, exporting appending and merging databases and creating dummy tables
On Day 4 lectures will be given on approaches for data presentation, linked to the type of data variables being used and type of data analysis undertaken (Table 9). The processes of import/export, appending and merging data using EpiData will also be covered. During the interactive session participants will discuss their data analysis plans in groups. Participants will also have individual work time (with support from mentors) to create qes, rec and chk files, dummy tables and figures for their respective studies.

TABLE 9: Timetable of activities for Day 4

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Lecture 1. Presenting your results & linking them to the type of data variables you present and the type of data analysis you undertake	Slides	Karapet Davtyan
10:30	**Tea break**		
10:45	Interactive session in groups. Discussing a data analysis plan	–	All facilitators
11:45	Individual work time: creating qes/rec/chk files & dummy tables for a specific project	–	
13:00	**Lunch**		
13.30	Lecture 2. Importing & exporting data	Slides Other resources	Karapet Davtyan
13:45	Lecture 3. Appending & merging databases	Slides Other resources	Karapet Davtyan
13.30	Individual work time: creating qes/rec/chk files & dummy tables for a specific project	–	All facilitators
15:00	**Tea break**		
15:30	Individual work time: creating qes/rec/chk files and dummy tables for a specific project	–	All facilitators
17:00	**Close of day**		

DAY 5

Plenary presentations of data analysis plan and dummy tables
On the final day a plenary session will be held in which participants will present their study objectives, outcome measures, dummy tables and figures, and data analysis plan (Table 10). The module will finish with a workshop evaluation and a review of the next steps, tasks and milestones that need to be accomplished between Modules 2 and 3. Failure to complete these tasks and milestones will preclude attendance at Module 3.

TABLE 10: Timetable of activities for Day 5

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Plenary session 2: presentation of research protocol (10 min per participant), with a discussion (10 min per participant)	–	All facilitators
09:15–09:35 09:40–10:00 10:05–10:25	Participant 1 Participant 2 Participant 3	–	All facilitators
10:30	**Tea break**		
11:05–11:25 11:30–11:50 11:55–12:15	Participant 4 Participant 5 Participant 6	–	All facilitators
12:20	**Lunch**		
13:05–13:25 13:30–13:50 13:55–14:15 14:20–14:40	Participant 7 Participant 8 Participant 9 Participant 10	–	All facilitators
14:45	**Tea break**		
15:20–15:40 15:45–16:05	Participant 11 Participant 12	–	All facilitators
16:10	Lecture 1. Next steps & milestones for Module 2	Slides	Karapet Davtyan
16:20	Candidates complete course evaluation forms	–	
16:40	Plenary feedback session on Module 2	–	All participants
17:00	Faculty meeting	–	All faculty members and organizing staff
17:30	**Close of Workshop 2**		

Workshop 3:
Operational Research and Scientific Paper Writing

This six-day module will help participants write their own scientific papers, followed by online submission and tackling editor and reviewer comments. Workshop 3 of the first SORT-TB course took place on 4–9 March 2019.

Purpose
The purpose of this module is to turn the results of each participant's research into a draft article that is ready to be submitted for publication. Many researchers successfully work in the field, develop a research protocol, and collect and analyse data, but are less successful in writing up the results. This week should remove some of the myths surrounding scientific writing and help participants to develop confidence in their writing abilities. Writing is a skill like any other: it can be developed and improved and, with the necessary knowledge, can become satisfying and productive.

Brief overview
Workshop 3 will cover the following topics:

- learning the principles of writing a scientific paper; and
- learning how to deal with peer review.

Key deliverable
The key deliverable is submission of a draft manuscript to a scientific journal.

Note: The draft article that will be developed during the course must be discussed and agreed with your co-authors within and outside the country before submission.

Training strategy
The training strategy includes:

- teaching participants the principles and practice of scientific writing;
- working step by step through each section of a paper;
- using that information to write each section of a paper;
- learning the principles of writing in scientific English;
- learning how to handle tables/figures, references, online electronic submission, peer review and revision;
- providing individual feedback at every step; and
- ensuring that participants have a draft article ready for submission at completion of the workshop.

Timetable of activities

DAY 1

Introduction to paper writing and refreshing data analysis
On Day 1 lectures will cover the preparation of tables and figures for the manuscript, along with examples of writing the results section (Table 11). After the lectures, participants will work in groups to review the analysis, compile the results and finalize tables and figures, and draft the results section.

TABLE 11: Timetable of activities for Day 1

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Welcome: introduction to the module and practical issues	–	Masoud Dara Andrei Dadu
09:15	Overview of the archived milestones and practical consideration	Slides	Masoud Dara Andrei Dadu
09:45	Lecture 1. Tables & figures	Slides	Karapet Davtyan Samvel Gasparyan
10:30	**Tea break**		
11:00	Lecture 2. Writing the results section: an example	Slides	George Kuchukhidze Karapet Davtyan
11:30	Group work: review of data & analysis	–	All facilitators
13:00	**Lunch**		
14:00	Group work: review of data & analysis	–	All facilitators
15:00	**Tea break**		
15:30	Group work: complementing the data review & starting the first draft of the analysis	–	All facilitators
17:30	**Close of day** Targets for the day: data review, draft tables, figures & Results sections are complete, and an initial analysis performed		

DAY 2

Introduction and methods
On Day 2 an overview lecture of the core sections of a research paper will be presented and approaches to writing clearly in scientific English will be suggested (Table 12). An example of Introduction and Methods sections will also be presented. With the help of facilitators, participants will work on the Introduction and Methods sections of their respective research paper and brainstorm to choose a journal for publication.

TABLE 12: Timetable of activities for Day 2

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Lecture 1. Publishing without perishing	Slides	Olga Denisuk
10:30	**Tea break**		
11:00	Lecture 2. Journal selection: why choose WHO Public Health Panorama (http://www.euro.who.int/en/publications/public-health-panorama)	Slides	Nataliya Vorobyova
11:30	Lecture 3. Submission requirements for WHO Public Health Panorama	Slides	Nataliya Vorobyova
12:00	Lecture 4. Introduction & Methods: an example	Slides	Rishi Gupta
13:00	**Lunch**		
14:00	Group work: draft the Introduction & Methods sections	–	All facilitators
15:00	**Tea break**		
16:00	Group work: complete the draft Introduction & Methods sections	–	All facilitators
17:30	**Close of day** Targets for the day: draft Introduction & Methods sections are completed		

DAY 3

Plenary session 1: Introduction and Methods sections
On Day 3 participants will present their Introduction and Methods sections, followed by a lecture on writing the Discussion section (Table 13). Participants will continue working in groups on writing the Results and Discussion sections.

TABLE 13: Timetable of activities for Day 3

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Plenary session 1: presentation of the Introduction & Methods sections (15 min per participant)	–	All facilitators
10:30	**Tea break**		
11:00	Plenary session 1: presentation of the Introduction & Methods sections (15 min per participant)	–	All facilitators
13:00	**Lunch**		
13.30	Plenary session 1: presentation of the Introduction & Methods sections (15 min per participant)	–	All facilitators
14:30	Lecture 1. Writing the Discussion section: an example	Slides	Alexandra Kruse
15:00	**Tea break**		
15:30	Group work: draft the Results & Discussion sections, complete the Results section	–	All facilitators
17:30	**Close of day** Target for the day: draft Results section is complete		

DAY 4

Results And Discussion sections
On Day 4 participants will continue working in groups to complete the Results and Discussion sections.

TABLE 14: Timetable of activities for Day 4

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Group work: draft the Results & Discussion sections	–	All facilitators
10:30	**Tea break**		
11:00	Group work: draft the Results & Discussion sections	–	All facilitators
13:00	**Lunch**		
13.30	Group work: draft the Results & Discussion sections	–	All facilitators
15:00	**Tea break**		
15:30	Group work: complete the draft Results & Discussion sections	–	All facilitators
17:30	**Close of day** Draft Discussion section is complete		

DAY 5

Plenary session 2 and "bits and pieces"
On Day 5 participants will present their Results and Discussion sections (Table 15). The presentations will be followed by a lecture about authorship, reference styles, and writing the abstract and title. After the lecture, participants will continue with working in groups to complete the title, abstract and acknowledgements.

TABLE 15: Timetable of activities for Day 5

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Plenary session 2: presentation of the Results & Discussion sections (20 min per participant)	–	All facilitators
10:30	**Tea break**		
11:00	Plenary session 2: presentation of the Results & Discussion sections (20 min per participant)	–	All facilitators
13:00	**Lunch**		
13:30	Plenary session 2: presentation of the Results & Discussion sections (20 min per participant)	–	All facilitators
15:00	Lecture 1. Bits and pieces: abstract, title, funding statement, authorship, with examples	Slides Resources	Karapet Davtyan
15:15	Group work: write the titles, abstracts & acknowledgements		All facilitators
15:00	**Tea break**		
16:00	Group work: write the titles, abstracts & acknowledgements	–	All facilitators
17:30	**Close of day** Bits and pieces are completed; draft paper is in the final stages		

DAY 6

Plenary session 3: submission procedures, peer review and the final draft
On the final day, participants will present their research titles and abstracts in a plenary session (Table 16). Afterwards, lectures will be given on the submission process and approaches for handling the review process. The course will finish with an evaluation of Module 3 and a review of the next steps.

TABLE 16: Timetable of activities for Day 6

TIME	ACTIVITY	RESOURCES	FACILITATOR
09:00	Plenary session 3: presentation of titles and abstracts (5 min per participant)	–	All facilitators
10:30	**Tea break**		
12:00	Lecture 1. The review process: an example	Slides	Safieh Shah
12:30	Lecture 2. Next steps & milestones for Module 3	Slides	Andrei Dadu Karapet Davtyan
13:00	Candidates complete course evaluation forms	–	
14:00	**Close of Workshop 3** Draft paper ready for circulation to receive approval for submission from all authors		

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Annex 1. Participants and mentors: working partnerships

TABLE 17: A list of participants from each country, along with their assigned mentors

Group/ room	Participants	Group mentors			WHO mentor
		Workshop 1 Protocol Development	Workshop 2 Data Quality and Analyses	Workshop 3 Manuscript Writing	
Group 1 (Ukraine)/ Room 1	Olha Zaitseva	**Senior mentor:** Arax Hovhannisyan	Arax Hovhannisyan	Arax Hovhannisyan Olga Denisuk	Soudeh Ehsani
	Oleksandr Korotych	**Junior mentor:** Olga Denisuk			Masoud Dara
Group 2 (Georgia)/ Room 1	Nino Gogichadze	**Senior mentor:** Alexandra Kruse	George Kuchukhidze	Alexandra Kruse George Kuchukhidze	Martin van den Boom Antons Mozalevskis
	Mamuka Chincharauli	**Junior mentor:** George Kuchukhidze		Jan Drobeniuc	Masoud Dara
Group 3 (Armenia)/ Room 2	Anush Khachatryan	**Senior mentor:** Andrei Dadu **Junior mentor:** Karapet Davtyan	Karapet Davtyan	Andrei Dadu Karapet Davtyan	Andrei Dadu
	Eduard Kabasakalyan	**Senior mentor:** Ramona Groenheit **Junior mentor:** Karapet Davtyan		Katrina Hann Karapet Davtyan	Soudeh Ehsani
Group 4 (Republic of Moldova)/ Room 2	Tatiana Gulpe	**Senior mentor:** Andrei Dadu **Junior mentor:** Ana Ciobanu	Ana Ciobanu	Andrei Dadu Ana Ciobanu	Ogtay Gozalov
	Alexander Codreanu	**Senior mentor:** Ramona Groenheit **Junior mentor:** Ana Ciobanu		Katrina Hann Ana Ciobanu	Soudeh Ehsani
Group 5 (Belarus)/ Room 3	Dmitry Zhurkin	**Senior mentor:** Rishi Gupta	Jamshid Gadoev	Rishi Gupta Jamshid Gadoev	Ogtay Gozalov Masoud Dara
	Dzmitry Katovich	**Junior mentor:** Jamshid Gadoev			Soudeh Ehsani
Group 6 (Azerbaijan & Georgia)/ Room 3	Nelly Solomonia	**Senior mentor:** Safieh Shah	Yuliia Sereda	Safieh Shah	Soudeh Ehsani
	Shahin Khasiyev	**Junior mentor:** Dilyara Nabirova			Andrei Dadu

Office for Europe

The World Health Organization (WHO) is a specialized agency of the United Nations created in 1948 with the primary responsibility for international health matters and public health. The WHO Regional Office for Europe is one of six regional offices throughout the world, each with its own programme geared to the particular health conditions of the countries it serves.

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World Health Organization
Regional Office for Europe
UN City, Marmorvej 51, DK-2100 Copenhagen Ø, Denmark
Tel.: +45 45 33 70 00 Fax: +45 45 33 70 01
Email: eurocontact@who.int
Website: www.euro.who.int