



TECHNICAL DOCUMENT

Core competencies for EU public health epidemiologists in communicable disease surveillance and response

Second revised edition

ECDC TECHNICAL DOCUMENT

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Abbreviations

ASPHER	Association of Schools of Public Health in the European Region
CDC	United States Centers for Disease Control and Prevention
CSTE	Council of State and Territorial Epidemiologists
EAN	EPIET Alumnae Association
ECDC	European Centre for Disease Prevention and Control, Stockholm
EEA	European Economic Area
EPIET	European Programme for Intervention Epidemiology Training
EUPHA	European Public Health Association
FETP	Field Epidemiology Training Programme
MS	Member States
TEPHINET	Training Programmes in Epidemiology and Public Health Interventions Network

Background

In Article 9, the European Centre for Disease Prevention and Control (ECDC) founding regulation details the Centre's role in providing training: 'The Centre shall, as appropriate, support and coordinate training programmes in order to assist Member States and the Commission to have sufficient numbers of trained specialists, in particular in epidemiological surveillance and field investigations, and to have a capability to define health measures to control disease outbreaks'.

During the first consultation with the EU Member States (MS) on training in field epidemiology, held in 2005 in Stockholm, the development of a list of core competencies for field epidemiologists in the European Union (EU) was identified as a priority.

ECDC, along with a group of experts ('core competencies group') has developed a list of suggested core competencies for field epidemiologists working in public health institutions in the European Union, at all levels, from sub-national (provinces, districts, regions) to national and supra-national (European and international).

Other areas where ECDC provides 'capacity building through training' include the assessment of epidemiological capacity and training resources/needs in the Member States of the EU, the organisation of training modules for EU and EEA Member States, and the integration of the European Programme for Intervention Epidemiology Training (EPIET) into the Centre.

What are core competencies?

Definition of competency

A competency is a combination of knowledge, skills and abilities that a professional must demonstrate and that are essential to performing work effectively.

Definition of core competency

Core competencies listed in this document are defined with the mid-level professional in mind, as opposed to junior or senior epidemiologists.

'Mid-level' is defined as related to three years of experience in the area, or having completed a two-year training programme in field epidemiology. Typically, professionals with these qualifications work as unit supervisors for surveillance or preparedness and response activities. Despite the risk of creating artificial categories in the career development ladder, this approach has been taken to facilitate the process. At a later stage, the list of competencies can be expanded to cover additional career stages.

The term 'core' indicates that these competencies are considered minimum prerequisites for all field epidemiologists, regardless of their administrative level (international, national, sub-national, local, etc.) in the public health system. Core competencies apply to all professionals in this field.

Among the competencies, one can distinguish 'workforce' competencies, as opposed to 'instructional' ones, depending on the perspective taken for their development: i.e. employers' or trainers' views, respectively.

A list of sub-competencies may be developed in the future, in order to facilitate curriculum development.

Use of the list of core competencies

This list of core competencies is intended to be used as a reference document for various institutions and individuals related to public health in the countries of the EU.

It will be updated periodically, in collaboration with its intended users (public health institutes in the EU, training programmes, etc.).

Important uses include:

- the evaluation of trainees during the recruitment process and beyond: assessment of learning progress and achievements against competencies or sub-competencies (defined as the ability to perform specific tasks);
- curriculum development and instructional design;
- accreditation of training programmes: competencies and curricula of training programmes should be assessed as part of every accreditation process.

This list is also intended as a tool during country visits, for example when identifying, assessing and evaluating areas of work or expertise that require strengthening.

We believe that the list may have several users:

- employers, such as public health institutes and administrative bodies at all levels in the EU, who may use the list to assess their epidemiological capacities and needs; and
- epidemiologists who may use the list for planning and evaluating their own career development.

In addition, teachers and facilitators can use the list to design strategies and programmes to train future generations of epidemiologists in order to meet the needs of public health agencies.

Note: This list is not intended as a regulatory document, a prescriptive text or a ready-to-use curriculum.

Development process

Literature review and first draft

In 2006, ECDC reviewed several lists of competencies for field epidemiologists and field epidemiology training programmes (FETPs). Special attention was given to the list of the Indian FETP, which was developed as a means of producing an assessment tool for trainees. Also consulted were the lists of competencies produced by the Training Programmes in Epidemiology and Public Health Interventions Network (TEPHINET) and the United States Centers for Disease Control and Prevention (US CDC). The latter was produced in collaboration with the Council of State and Territorial Epidemiologists (CSTE).

The 'Vademecum: The European master of public health' by the Association of Schools of Public Health in the European Region (ASPHER) was reviewed since it represents an essential reference work in the area of public health science and policy. 'Part 5: Catalogue of potential competencies' was of particular relevance.

Regarding methodology, special attention was given to the US CDC/CSTE process of developing core competencies in applied epidemiology and to insights gained during a Leonardo da Vinci project at Jagiellonian University in Poland. Also taken into account were the different phases of obtaining a master's degree through ASPH's 'Public Health Core Competency Development Project'.

In November 2006, a working paper and a list of competencies was drafted and reviewed by ECDC staff, EPIET coordinators, and members of the EPIET Alumnae Association (EAN).

Expert meeting and review

In January 2007, 18 experts from 15 different institutions discussed a first draft of the list of core competencies. Participating institutions included several institutes of public health surveillance in the EU, the European Public Health Association (EUPHA), several FETP from EU and other countries, EPIET, EAN, the US CDC, TEPHINET, ASPHER, and the World Health Organization (WHO). A meeting report is available from: http://ecdc.europa.eu/en/files/pdf/Publications/Core_Comp_Expert_Meeting_Jan2007.pdf.

As core competencies are needed at all administrative levels (national, sub-national, local, etc.), these were only considered when we wanted to identify any overlap among the tasks to be performed. During the workshop, the experts conducted a critical review of each core competency, frequently referring to the US CDC/CSTE's list of 'Applied epidemiology competencies for governmental public health agencies', particularly 'Tier 2: Mid-level epidemiologist'.

As a result of the meeting, it was decided that the first draft of the list should be amended. A structured questionnaire (with categories, areas and domains) and a list of competencies were sent to the participants of the expert meeting who were asked to comment on content and structure. The questionnaire provided three different options for every competence: (1) accept without changes; (2) accept with specific edits/changes; or (3) delete. It was also possible to propose additional competencies for each domain.

Review by the Advisory Forum's Working Group on Preparedness and Response

In May 2007, the results of the January expert meeting were presented to the AF's Working Group on Preparedness and Response. The Working Group was asked to review the list using the same questionnaire.

Web-based review

In July and August 2007, a questionnaire open to professionals in the area of epidemiology in communicable disease surveillance and response was posted on the ECDC website. Public health institutes, professional associations, and trainers and coordinators of epidemiology training programmes were encouraged to participate.

An accompanying article was published in *Eurosurveillance* on 2 August 2007 to promote participation.

The participants were categorised according to current job position, sector (public administration/private company), level (region or province/national/international), number of years in the current job, profession, postgraduate degree, age, and country of residence.

General comments were collected. 85 competencies were rated in this survey by using a Likert scale: 1 for strong disagreement, 2 for disagreement, 3 for not sure, 4 for agreement, and 5 for strong agreement.

A total of 38 questionnaires were returned from public health professionals in Belgium (1), the Czech Republic (1), Denmark (1), Finland (1), France (7), Germany (2), Greece (1), Hungary (1), Ireland (2), Italy (1), Norway (1), Portugal (1), Romania (2), Spain (9), Sweden (2), the Netherlands (3), the United Kingdom (1), and Croatia (1).

20 of the responding public health professionals were FETP graduates and considered specialists in applied epidemiology. 28 were medical doctors, and three veterinarians. 11 respondents held a PhD, and at least 13 had a master's degree in public health, epidemiology or other health sciences. 34 (90 %) worked in the administration at various levels in the EU. The median age of the respondents was 40, with a range of 27 to 63.

No respondent expressed disagreement with any of the 85 competencies. Strong agreement (above 4) was expressed for 67 of the proposed competencies. A score of 3.5 or above was taken as agreement, which resulted in a total of 81 competencies remaining on the list.

The following four competencies scored between 3.2 and 3.4 (uncertain importance) and were therefore deleted from the list:

- Number 10: 'Apply economic methods and tools to support and evaluate decision making in health' (domain: public health policy; area: public health). Score 3.2.
- Number 36: 'Create a protocol for specimen collection' (domain: laboratory issues; area: applied epidemiology). Score 3.2.
- Number 37: 'Identify the appropriate tests needed for the diagnosis of a disease' (domain: laboratory issues; area: applied epidemiology). Score 3.3.
- Number 55: 'Use software packages for other types of data analysis (modelling, etc.)' (domain: statistical and other data analysis; area: applied informatics). Score 3.4.

After striking from the list the four competencies listed above and a fifth one (number 83 in the original list: 'Promote ethical conduct amongst colleagues') that appeared to have been implicitly included under 'ethics' and 'capacity development' and therefore redundant, a total of 80 competencies remained.

A new competency was added as number 35 ('Be familiar with transmission dynamics of infectious diseases'), after some members of the Advisory Forum pointed out the need to include transmission dynamics.

The results of this survey were presented and discussed during the 'Second ECDC consultation with the EU Member States on the ECDC training strategy' on 11 and 12 September 2007, and during the 13th meeting of ECDC's Advisory Forum on 13 and 14 September 2007. Both meetings were held in Stockholm.

List of core competencies

The Appendix of this document contains a complete table of categories, areas and domains, as well as a complete list of proposed competencies. The list of competencies also includes general competencies outside the field of public health or applied epidemiology if these competencies are essential to accomplishing the task at hand.

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Appendix: List of core competencies for field epidemiologists in the public health administrations of the European Union, grouped by categories and domains

Table: Areas and domains in public health epidemiology

Category	Area	Domain
Specific for the profession	Public health	1. Public health science
		2. Public health policy
	Applied epidemiology	3. Risk assessment
		4. Public health surveillance
		5. Outbreak investigation
		6. Epidemiological studies
		7. Infectious diseases
		8. Laboratory issues
		9. Public health guidance
Common to other professions	Biostatistics	10. Probability
		11. Inferential statistics
		12. Sampling
	Applied informatics	13. Internet
		14. Statistical and other data analysis
		15. Editing and presentations
	Communication	16. Risk communication
		17. Written communication
		18. Oral communication
	Management	19. Use of new technologies
		20. Planning and use of resources
	Capacity development	21. Team building and negotiation
		22. Mentorship
	Ethics	23. Training
		24. Protection of individuals
		25. Confidentiality
		26. Conflicts of interests

1. Areas specific for the profession

1.1 Public health

Domain 1.1.1 Public health science

1. Use current knowledge of epidemiology of diseases to guide public health or epidemiological practice.
2. Provide epidemiological input to develop measurable relevant objectives of public health programmes.
3. Use knowledge of specific sociological and cultural factors in the population to conduct studies and recommend public health actions relevant for the affected community.

Domain 1.1.2 Public health policy

4. Understand and analyse legal public health policy documents at local, national and European level.
5. Use epidemiological findings to plan public health programmes.
6. Implement public health programmes: translate policy into public health practice.
7. Identify effective health promotion measures for specific problems.
8. Identify appropriate health prevention measures for specific problems.
9. Evaluate the impact of an intervention on population health.
10. Measure health outcomes to guide decision making in prevention strategy.
11. Use evaluation results of programme progress towards objectives and outcomes in further programme planning and modification.
12. Identify an appropriate public health intervention based on surveillance data.

1.2 Applied epidemiology

Domain 1.2.1 Risk assessment

13. Identify sources of information about potential public health threats.
14. Conduct risk assessments: verify, using critical thinking, if a public health problem exists and describe its magnitude.
15. Identify surveillance data needs for risk assessments of public health threats.

Domain 1.2.2 Public health surveillance

16. Run a surveillance system.
17. Conduct surveillance data management.
18. Perform descriptive analysis of surveillance data.
19. Interpret disease and public health events trends from time series analysis.
20. Identify key findings from surveillance data analysis and draw conclusions.
21. Evaluate surveillance systems.
22. Recognise the need for and set up a new surveillance system.
23. Use event-based surveillance, also called epidemic intelligence, to detect health threats.
24. Be familiar with laws on surveillance and reporting of communicable diseases at national, EU level and globally (International Health Regulations).

Domain 1.2.3 Outbreak investigation

25. Create a case definition and adjust it as necessary during the investigation.
26. Describe the outbreak in terms of person, place and time.
27. Generate hypothesis about the cause and/or risk factors of the outbreak.
28. Conduct analytical epidemiological investigation to identify the source.
29. Recommend appropriate evidence based measures to control the outbreak.
30. Report and present results of an investigation.

Domain 1.2.4 Epidemiological studies

31. Write a study protocol using investigation techniques consistent with the public health problem.
32. Conduct epidemiological studies.
33. Report and present results of a study.
34. Recommend evidence-based interventions in response to epidemiological findings.

Domain 1.2.5 Infectious diseases

35. Be familiar with transmission dynamics of infectious diseases.

Domain 1.2.6 Laboratory issues

36. Interpret the diagnostic and epidemiological significance of reports from laboratory tests.
37. Be familiar with different methods for diagnosis and typing, including molecular tests.
38. Communicate effectively with the laboratory team.

Domain 1.2.7 Public health guidance

39. Identify, review and assess relevant literature and other evidence.
40. Develop evidence based guidelines for surveillance, prevention and control of communicable diseases and other acute public health events.
41. Identify appropriate target groups for guidelines.

2 General areas, common to other professions

2.1 Biostatistics

Domain 2.1.1 Probability

42. Apply basic concepts of probability.

Domain 2.1.2 Inferential statistics

43. Calculate and interpret point estimates and confidence intervals of measures of central tendency and dispersion.
44. Calculate and interpret point estimates and confidence intervals of measures of disease frequency.
45. Calculate and interpret point estimates and confidence intervals of measures of association and impact.
46. Calculate and interpret significance tests.

Domain 2.1.3 Sampling

47. Select an appropriate sampling strategy.

2.2 Informatics

Domain 2.2.1 Internet

48. Use internet sources to conduct literature search.
49. Use web-enabled databases.

Domain 2.2.2 Statistical and other data analysis

50. Use database software packages for entering and managing data.
51. Use software packages for statistical analysis (measures of association, testing, and logistic regression).
52. Draw conclusions from the results of analysis.

Domain 2.2.3 Editing and presentations

53. Use software for writing, editing and creating presentations.

2.3 Communication

Domain 2.3.1 Risk communication

54. Apply the basic principles of risk communication, adjusting the message when presenting results of an investigation to different audiences: media, general public, professionals and policy makers.

Domain 2.3.2 Written communication

55. Write a report of an epidemiological investigation for decision makers.
56. Write an article for a scientific journal.
57. Write an abstract.
58. Write a press release.
59. Produce documents, reports, letters, meeting minutes, etc.

Domain 2.3.3 Oral communication

60. Incorporate interpersonal skills in communication with colleagues and with the other audiences.
61. Analyse and synthesise main points in a speech.
62. Provide objective feedback (descriptive, rather than judgemental).

Domain 2.3.4 Use of new communication technologies

63. Use communication technologies (videoconference, teleconference, e-mail, etc.) effectively.

2.4 Management

Domain 2.4.1 Planning and use of resources

64. Plan, prioritise and schedule tasks in a project.
65. Monitor progress and quality against specific targets, adjust schedules and make changes if necessary.
66. Manage available resources (staff, time, budget, etc) effectively.
67. Conduct epidemiological activities within the financial and operational planning context.
68. Prepare an activity report.

Domain 2.4.2 Team building and negotiation

69. Be an effective team member, adopting the role needed to contribute constructively to the accomplishment of tasks by the group (including leadership).
70. Promote collaborations, partnerships and team building to accomplish epidemiology programme objectives.
71. Develop community partnerships to support epidemiological investigations.
72. Mutually identify those interests that are shared, opposed or different with the other party to achieve good collaborations and conflict management.

2.5 Capacity development

Domain 2.5.1 Mentorship

73. Mentor peers or junior epidemiologists.
74. Assist others to clarify thinking, create consensus, and develop ideas into actionable plans.

Domain 2.5.2 Training

75. Train junior epidemiologists.

2.6 Ethics

Domain 2.6.1 Protection of individuals

76. Respect and adhere to ethical principles regarding human welfare.
77. Follow ethics principles and guidelines for planning studies, conducting research, and collecting disseminating and using data.
78. Apply relevant laws to data collection, management, dissemination and use of information.

Domain 2.6.2 Confidentiality

79. Respect and adhere to ethical principles regarding data protection and confidentiality regarding any information obtained as part of the professional activity.

Domain 2.6.3 Conflicts of interests

80. Handle conflicts of interests.

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