

Scientific researcher training

Epidemiologist B

Programme guide

August 2024

Afbeelding met symbool, embleem

Automatisch gegenereerde beschrijving

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Preface

The Department of Clinical Epidemiology provides the training to be registered as ´Epidemiologist B´, according to the Foundation for Biomedical Scientific Research Training (Stichting voor opleiding tot Medisch-Biologisch Wetenschappelijk Onderzoeker (SMBWO). The Netherlands Society for Epidemiology (Vereniging voor Epidemiologie, VvE) defines the requirements for this training and also assesses regularly the quality of the programme.

The programme at the LUMC aims to school versatile independent researchers who, during their training, acquire the knowledge and skills to set up, carry out, interpret, and teach epidemiological research. The training combines education of the theoretical basis of epidemiology with conducting one´s own high-quality research.

The programme has a number of compulsory courses. In addition, there are a number of elective courses so that candidates can create a programme that suits their needs best and thus prepares for a future as an independent epidemiologist. Candidates are encouraged to follow a number of courses at other institutes, either in the Netherlands or abroad.

Epidemiology and research involving humans are of great importance for research in (general) populations and in hospitals. Epidemiologists therefore play an indispensable role in keeping this research in the Netherlands at a high level and ultimately in improving care. We consider it our mission to contribute to this.

Prof. dr F.R. Rosendaal, head of department and programme director

Prof. dr R.H.H. Groenwold, programme co-director

1. General information

The Training Scientific Researcher Epidemiologist B (hereafter referred to as Epidemiologist B) of the Department of Clinical Epidemiology focuses on patient-related clinical scientific research. The programme is followed mainly by PhD students from the academic programmes of Medicine and Biomedical Sciences, but can also be followed by persons with other background, provided these are approved by the VvE [[1]](#footnote-1). When completed successfully, the candidate can request to be registered as Epidemiologist B by the SMBWO.

* 1. Ambition

The general aim of the programme is to train independent scientific researchers and to provide them with the necessary competences (skills, knowledge, insight, scientific attitude and experience) aimed at the future profession of (clinical) epidemiologist. An important aspect of epidemiological research is the theoretical basis that is necessary for a good execution of the research. During the PhD project, people usually only carry out one or two types of research. In later professional life, however, people are expected to also be able to assess, advise on and help to set up and carry out other forms of research, which necessitates a broad programme. The specific objective of the training is twofold.

1. The candidate receives theoretical training in epidemiological research. The associated competencies are derived from those laid out by the Netherlands Society for Epidemiology (VvE).
2. The epidemiological research of the candidate leads to a PhD dissertation, the content of which is published in international peer-reviewed journals.

After successful completion of the programme, the candidate is equipped with the described requirements for professional practice and registration as Epidemiologist B with the Stichting Medisch-Biologisch Wetenschappelijk Onderzoeker (SMBWO) can be requested via the VvE. The department offers an ambitious programme: after completing the programme, the candidate will also be familiar with the most recent methodological insights into epidemiology, and will be able to appraise these critically.

* 1. Vision on training and the profession

The Department of Clinical Epidemiology aims to support the development of independent scientific researchers and hence to provide a training that is in line with developments in science, health care, and society. By establishing and maintaining national and international contacts with training courses and networks, the research of the department can develop further. The candidate is expected to play an active role in this regard.

The starting point of the training is a situation in which all take on their own responsibility: the candidate is responsible for his/her development, the trainer is responsible for providing the optimal environment for this development.

The epidemiologist training is based on modern training principles, such as self-study and self-direction, with competence development and professional competence as the core elements of the education. While acquiring and further developing scientific skills, repetition of equivalent educational activities in different settings increases the learning effect. Intensive consultation with trainers and teachers, mutual exchange and discussion about methods and interpretation of results encourage critical scientific thinking. In addition, teaching is an important learning tool for developing required competences.

* 1. Core competencies scientific researcher Epidemiologist B

Core competencies are personal, cross-professional competencies that are a precondition for a good functioning in the work situation. The core competencies below are necessary to be able to function as a scientific researcher (Epidemiologist B), both during the training and in the future.

|  |  |
| --- | --- |
| **Core Competency** | **Description** |
| Decisive | Making decisions by taking actions or committing oneself by expressing opinions. |
| Coaching | To be able to guide students in research projects derived from their own project. Attention must be paid to the personal and scientific development of the student. |
| Conceptual flexibility | Building frameworks or models and formulating multiple conceptions, hypotheses or ideas based on complex information. It is about integrating biological, clinical and numerical information. |
| Creativity | Come up with original solutions to problems related to the scientific problem. Devise new working methods to replace existing ones. |
| Helicopter view | Keeping an overview of the parts and the whole of an issue, data or project, and field. |
| Initiative | Identifying upcoming problems and opportunities in one’s own scientific research and act accordingly. Taking action before a problem arises or an opportunity disappears. |
| Innovative thinking and acting | Focusing on future renewal of knowledge with an inquiring and curious mind. |
| Oral presentation skills | Conveying one's own scientific results clearly and, if necessary, in an interesting or enthusiastic way to others. |
| Well-organized | Being able to coordinate activities of oneself and of others and determine their order so that goals can be achieved effectively and efficiently. |
| Result-oriented | Focusing on acting effectively and delivering agreed work on time. |
| Leadership | Establishing and maintaining effective partnerships by involving and motivating patients, subjects, colleagues, and staff from other departments. |
| Collaborative | Contributing to a joint result, even when this is not of direct personal interest. Committed to achieving goals with others. |
| Communicative in writing | Describing research, results and interpretation in a clear manner.  Expressing ideas and opinions in a document that is properly formatted and structured, is grammatically correct, and contains appropriate language and terminology for the reader. |
| Self-development | Keeping epidemiological knowledge up-to-date by reading articles, attending conferences effectively, staying in touch with colleagues, being open to new developments. Demonstrating the ability to use new experiences effectively. |

* 1. Structure of the programme

The programme consists of a theoretical and a practical component. During the programme, the candidate has an appointment for the duration of the training/doctorate track (preferably 4 years) at the Department of Clinical Epidemiology or another department of the LUMC (see section 2.3). In the latter case, a stay of 1 year in the Clinical Epidemiology Department is mandatory.

At the start of the training, a training and supervision plan is written, including requirements for the training as Epidemiologist B. The plan is written together with the supervisor and under the supervision of the epidemiology trainer.

Theoretical component of the training

The theoretical component of the education to become Epidemiologist B consists of various courses in the field of epidemiology and statistics (see overview 'Education programme'). The courses need not be followed in fixed order, although some courses are considered more basic and it is advised that these are followed first. For Epidemiologist B training, the theoretical education to be received is described in the training and supervision plan.

Practical component of the training

The practical component of the training consists of conducting scientific epidemiological research, both independently and in groups, in close collaboration with various clinical departments. This ultimately leads to the elaboration of research proposals, sometimes setting up new studies, collaborating with and sometimes supervising fellow researchers, collecting, managing and analysing data, and writing scientific articles.

Portfolio

During the training, the candidate keeps a portfolio. The portfolio is a file with documentary evidence of the acquired competences. The candidate is responsible for keeping the portfolio up to date. The portfolio is an important aspect of the registration as Epidemiologist B.

* 1. Quality assurance

In order to collect information about the quality of the training, evaluations are carried out at predetermined moments. Improvements or changes are made to the courses and the educational programme or parts thereof on the basis of evaluation data. The programme is evaluated together with the candidates, lecturers and related departments. All this fits in with the NIAZ[[2]](#footnote-2) quality assurance system of the LUMC.

1. Training Requirements

The Epidemiologist B programme trains the candidate to become an independent clinical scientific researcher with knowledge of research methodology that is widely applicable. This must be evidenced by successful completion of courses, by international publications in which the methodology has played a significant role, and by an academic promotion (or a similar number of publications with an epidemiological signature).

* 1. Targets

The Epidemiologist B training consists of:

1. training aimed at the acquisition of insight into methods and techniques of epidemiological research and into the occurrence and determinants of important diseases and health problems. This training is broader than the own research project, with a view to a general training in research methodology. It aims to connect with the most recent methodological insights.
2. a PhD track in the field of epidemiology that results in scientific articles and ultimately in a dissertation. The PhD candidate must demonstrate that he/she is able to conduct independent research, write it down clearly and according to professional standards and then defend it (for those who have already obtained their doctorate: four epidemiologically oriented publications).

The training to become Epidemiologist B results in the following skills:

* to independently develop a scientific hypothesis and formulate the associated research question  
   and study design;
* to set up and carry out research in collaboration with experts from different fields;
* to obtain independency regarding statistical analysis and interpretation of the results of a study;
* to present clearly research results and analyses both in writing and orally;
* to know and correctly apply the requirements for the collection, storage and analysis of scientific   
   data;
* to be aware of the legal and medical-ethical context in which the investigation takes place and be   
   able to appreciate, follow and apply the applicable integrity and conduct codes.

The Epidemiologists B that we want to train are researchers who are able to set up and coordinate research projects. They master various research methods, some based on personal experience and some through education. They are aware of the social context of scientific research. They can teach epidemiological research techniques to students, candidates, and clinicians. Finally, they can guide students in conducting research and critically reflect on the results of studies.

* 1. Learning objectives

The learning objectives of the Epidemiologist B training at the LUMC are in accordance with those formulated by the Netherlands Society for Epidemiology (VvE) (a through h below). We have added some specific final objectives (i through l). All in all, it is about having knowledge of, understanding and being able to work with:

1. epidemiological measures for disease frequency, association measures and effect measures
2. epidemiological research forms such as cross-sectional research, cohort research, case-control research, diagnostic research, prognostic research and intervention research (trials)
3. collecting, processing and storing data
4. properties and quality of measuring instruments, measuring and analysis methods
5. concepts such as randomisation, causality, effect modification, confounding, generalisation, precision, validity and bias
6. basic epidemiological methods such as patient-year analysis, use of the life table and methods for correction of confounding such as direct and indirect (SMR) standardization and stratification
7. basic statistics, including various distributions, simple statistical tests, p-values and confidence intervals
8. multivariable (regression) analysis and survival analysis
9. systematic review and meta-analysis
10. to have insight in advanced methods and techniques to correct confounding (propensity score, inverse probability weighting, instrumental variable analysis) and repeated measures
11. to be able to train an Epidemiologist A candidate both theoretically and practically
12. be aware of relevant legislation and codes of conduct for medical research

The candidate has completed courses on the above concepts and is able to explain, apply and use them in epidemiological research. The candidate can perform analyses independently and interpret and present the results.

* 1. Admission Requirements

The education for Epidemiologist B is open for candidates, on the condition that they:

* have completed a suitable previous education[[3]](#footnote-3).
* will work under the supervision of a registered Epidemiologist B (from one's own department or  
   from the Department of Clinical Epidemiology).
* will participate in weekly research meetings in which methodology is also given ample attention.
* will follow (parts of) the courses described in the training programme.
* will submit a written request to the programme director. If they are appointed to another   
   department, this request should be supported by the relevant department head.
* will spend at least 1 year at the Department of Clinical Epidemiology.

The number of new candidates that can be admitted to the programme may be limited, due to limits in office space and available supervisors. An interview may therefore be part of the selection process. Note, the training is also open to non-Dutch speaking candidates.

* 1. Structure and duration of training

The training consists of a combination of established courses of which a number of courses can be regarded as basic courses that are followed in the first year of the training. In general, there is a certain logical order in the different courses. Moreover, a conscious choice has been made for some degree of overlap between courses, so that the subjects can take root and sink in better.

Candidates are expected to register for courses on their own initiative. Candidates are encouraged to also follow courses elsewhere.

The training for Epidemiologist B consists of a total duration of approximately 1.5 years (75 ECTS). It consists of 22.5 ECTS (15 weeks) of courses, of which courses representing 19.5 ECTS are compulsory. The remainder (52.5 ECTS) is reserved for practical training, in which the candidate conducts epidemiological scientific research and develops the skill needed to become an independent scientific researcher.

An education programme to be followed as part of the training and supervision plan is written or adjusted annually in consultation with the trainer/supervisor. The training plan also includes the epidemiological scientific research in which the candidate participates and the resulting activities (conferences, symposia, professional courses). The plans are evaluated at predefined moments.

* 1. Assessment & Portfolio
     1. Assessment

The purpose of assessment is to promote the learning process (formative function), to assess the PhD candidate (summative function), and to evaluate the programme. In principle, all modules end with a test (oral or written), which is graded. In addition to attendance, proof of active participation, and handing in assignments is often also required. The trainer/supervisor also checks whether the candidate meets the learning objectives (see section 2.2) and whether what has been learned is sufficiently put into practice.

* + 1. Portfolio

The PhD candidates who wish to be considered for registration as Epidemiologist B keep an (electronic) portfolio with evidence of the acquired competences, such as:

* education followed and test result
* congresses attended
* performed research
* publications
* presentations
* self-evaluations and assessments
* methodological work discussion or essay (part of the Capita selecta course)
* teaching (see explanation in section 3.2)
  + 1. Disputes

Disputes between the candidate and the trainer are first submitted to the Doctorate and Supervision Committee with the request to mediate and advise. Confidential issues regarding scientific integrity and independence that cannot be discussed in the workplace can be submitted to the confidential advisor of the department, or the confidential advisor of the LUMC, or to other relevant LUMC committees.

* 1. Exemption Policy

Applications for exemption from previous education or compulsory courses are assessed on an individual level by the programme director.

* 1. Completion of training

To be eligible for registration as a scientific researcher Epidemiologist B, the following requirements apply. The candidate has:

* successfully completed courses on epidemiological methodology (≥ 22.5 ECTS, of which 19.5 ECTS   
   compulsory and ≥ 3 ECTS optional);
* written four original publications applying epidemiological methodology in internationally   
   recognised scientific journals, or conducted PhD research, written and successfully defended an   
   epidemiological thesis;
* at least 3 years of experience in academic scientific epidemiological research, resulting in an   
   academic dissertation (PhD thesis);
* spent at least one year at the Clinical Epidemiology Department.
* taught epidemiology to students (≥ 20 contact hours).

The application for registration as Epidemiologist B is approved after all conditions have been met and the portfolio has been approved by the programme director. Formal approval is by the SMBWO.

1. Training programme
   1. Theoretical training

The candidate must in any case have met all requirements set for the training to become an epidemiologist and followed and successfully completed the courses listed below. In view of the pursuit of training that is in line with the latest insights in epidemiology, the theoretical component exceeds the minimum requirements set by the VvE. Candidates are encouraged to take part in courses elsewhere (in the Netherlands or abroad) in consultation with their supervisor.

* + 1. Theoretical epidemiological knowledge and skills

A) The following courses are compulsory (in total 19.5 ECTS):

* Onderzoeksopzet en analyse (in Dutch) (2) [Note, for non-Dutch speaking candidates suitable alternatives can be discussed]
* Study designs and their application in etiological research training (‘START’) (3)
* Basic methods and reasoning in biostatistics (1.5)
* Regression analysis (1.5)
* Prediction modelling and intervention research (‘PINT’) (3)
* Causal Inference (3)
* Survival analysis (1.5)
* Meta-analysis (1)
* Clinical trials (1)
* Capita Selecta (2)

B) Examples of elective courses within the LUMC:

* Analysis of repeated measurements (1.5)
* Advanced epidemiological methods (2)
* Skills for the practising epidemiologist (‘SKIPE’) (1.5)
  + 1. Epidemiology of Diseases

The epidemiology of diseases is extensively discussed in various teaching blocks of the Medicine and Biomedical Sciences curricula at Leiden University and also in similar (bio)medical courses at other UMCs. Candidates who have a different (bio)medical education where this is not covered in the curriculum can follow a course in 'epidemiology of diseases' elsewhere, such as at the epidemiology and biostatistics department of the VU University Medical Center (EpidM).

* + 1. Knowledge of illness and health

The subject matter of the Medicine and Biomedical Sciences programmes at the LUMC meets the requirements of the VvE with regard to knowledge of disease and health. Candidates with a different previous education that does not offer sufficient basic medical knowledge, will have to acquire this knowledge. A course in basic medical knowledge is not provided by the LUMC.

* + 1. Other elective courses offered by the LUMC to PhD students

Didactics courses offered to employees of the LUMC include:

* Academic writing for PhD Students
* Supervising working groups
* Supervising science internships
* Co-assistant guidance
* Communications in Science
* give lectures
* Making and giving education
* Developing blended learning
* Developing study assignments
* Present
* Writing and reading skills
* Review
* Train the Trainers
  1. Teaching

Candidates must teach, with the aim of integrating theory and practice. This should be at least 20 hours of teaching (excluding preparation), where epidemiology is central. This requirement is independent of any educational obligations at the department where one is appointed. Candidates are expected to follow didactic courses that are offered by the LUMC. Beginning candidates start by giving relatively simple tutorials to, for example, first-year students of Medicine or Biomedical Sciences. These working groups have a fixed structure with questions and assignments for the students. The candidate/lecturer has a teacher's manual in which good answers and in-depth questions are described. Prior to a series of working groups, there is a teacher's instruction in which both substantive and didactic tips are given. In principle, candidates first attend the 'research design and analysis' course at Schiermonnikoog before teaching working groups to students. In addition, they first join a more experienced candidate who teaches the relevant working group. After some experience has been gained, candidates can teach more advanced topics.

* 1. Practical training

The practical training is aimed at an academic promotion. The candidate learns to conduct independent epidemiological scientific research under the supervision of the promotor and the epidemiology trainer. In addition, he/she strives to become acquainted with various forms of scientific research, preferably by collaborating with other ongoing studies.

To promote the educational climate, the Department of Clinical Epidemiology aims for a culture in which there is open discussion about the design, analysis, and interpretation of research. To this end, the department organises weekly research meetings in which the candidates give a presentation about their own research twice a year. The entire research staff is present and actively participates in the discussions. In addition, the thematically organised research groups within the department organise work discussions where recent literature is discussed and presentations are practiced. Researchers regularly visit each other for informal consultation ('open doors') and in principle candidates share a room with people who work on another project, so that cross-fertilization can easily occur.

The candidates also participate in discussions of analysis plans for the science committee.

The candidate keeps abreast of developments in epidemiology by attending conferences and seminars. In addition, the candidate gives a lecture on epidemiological research at an (international) scientific meeting at least once a year. During the practical training, the candidate writes at least four articles as first author. The articles have an epidemiological character and are published in recognized, international *peer-reviewed* scientific journals. Epidemiological character is understood to mean:

* the publication concerns a study in which people are the minimal unit of perception;
* the study was set up using an epidemiological design and analysed using epidemiological analysis   
   method.

The promotor annually assesses the progress of the PhD project and the depth of the work experience gained. During the practical period, the candidate independently applies knowledge of epidemiology and statistics.

* 1. Training plan

Within three months of the start of the employment of a PhD candidate, a training and supervision plan is written together with the supervisor, according to the template available in Converis. In addition to general components and mandatory courses (according to the Graduate School), the training plan also includes specific components for Epidemiologist B training. This plan is approved by the (intended) supervisor after consultation with the candidate.

The plan is evaluated at least once a year by the promotor and the programme director together with the candidate and adjusted if necessary. In addition, it is then recorded in writing as accurately as possible which research objectives must be achieved in the coming period.

It is important for the trainer to have insight into the planning of the theoretical training to be followed and completed courses. The candidate is expected to discuss that planning regularly (at least once per year) with the supervisor.

* 1. Supervision of PhD track

All candidates who qualify for registration as Epidemiologist B at the LUMC, are under the direct supervision of an qualified epidemiologist (Epidemiologist B) at the Department of Clinical Epidemiology for at least 1 year. The progress of the PhD trajectory is monitored and assessed in regular discussions with the direct supervisor. The majority of candidates who qualify for registration as Epidemiologist B work in the Department of Clinical Epidemiology. These candidates are directly supervised by experienced epidemiologists. There is weekly contact with these supervisor(s).

For each PhD track, the supervisor sets up a guidance committee consisting of two or three scientists in accordance with the PhD regulations. This committee is tasked with supervising the PhD candidate at some distance in his work, and should be open to discussing matters related to the PhD track. The guidance committee meets at least once per year to discuss the progress of the PhD track.

* 1. Assessment procedure

After 6, 10, 22, 34 and 46 months, the supervisors/promotor will make a formal assessment. The main assessment criterion is whether the training and supervision plan is properly carried out by the PhD candidate and whether the research is carried out properly. In addition, both theoretical and practical competence development is evaluated. That is why the PhD candidate provides insight into his/her portfolio during the assessment interview.

During the assessment ten months after the start of the appointment, the supervisors express their opinion on the expectation that the doctoral programme will lead to a doctorate. If this is not the case, the PhD track will be terminated after consultation with the supervisory committee. In special cases, more than one assessment per year can be made after the first year. In such a case, the period between different assessments is at least 5 months. In addition to the above-mentioned assessments of the PhD candidate, the annual interviews are also held with the PhD candidate as an employee. The progress of the PhD project and all associated forms and permissions are archived in Converis.

* 1. Termination of the training

The Epidemiologist B training programme ends the day the programme director approves the application for registration as Epidemiologist B (and thus approves the portfolio to support that application).

The training can be terminated prematurely, if the PhD project that forms the basis of the epidemiology training ends prematurely.

# 4. Other articles

This training guide was published for the first time in 2012, and in addition to minor adjustments, the course offering was then completely revised in 2018. It was again revised in 2022. Courses that no longer appear in the programme in 2022, but have already been taken before, remain valid and count towards the total number of ECTS. and can replace modules added later in the programme.

Deviations from the programme can be made in consultation with the programme director, e.g., when the training has started at another institute.

1. Preliminary education approved by the VvE are: medicine, veterinary medicine, dentistry, health sciences, biomedicine, biomedical sciences, exercise sciences, nutrition and health, pharmacy, biopharmaceutical sciences [↑](#footnote-ref-1)
2. Netherlands Institute for Healthcare Accreditation (NIAZ) [↑](#footnote-ref-2)
3. Preliminary education approved by the VvE are: medicine, veterinary medicine, dentistry, health sciences, biomedicine, biomedical sciences, exercise sciences, nutrition and health, pharmacy, biopharmaceutical sciences [↑](#footnote-ref-3)