BIOMEDICAL SCIENCES
Epidemiology

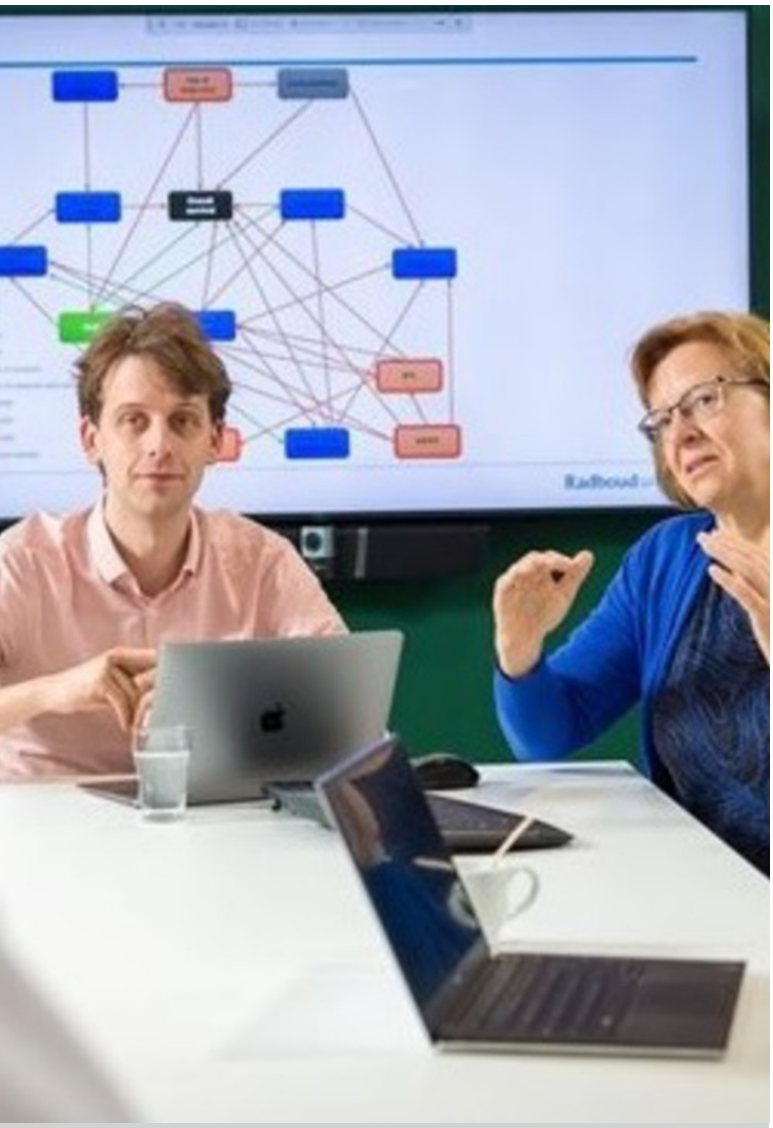
Clinical Research and Population Health

Radboud Universiteit Radboudumc

Epidemiology

A specialisation in the Biomedical Sciences Master's

Are you curious about the health of human populations? Do you want to understand how diseases emerge, spread, and can be prevented? Ever wondered why COVID-19 spread so rapidly, whether immunotherapy truly works for bladder cancer, or if drinking coffee could help prevent diabetes? Then epidemiology may be the specialisation for you!



Epidemiology – clinical research and population health

When populations face sudden or chronic diseases, infections or cancer, epidemiologists find solutions. In an ever-aging world, this makes epidemiology the cornerstone of modern medicine. Within the broad specialisation *Epidemiology*, you will explore what makes a population healthy and how we can prevent diseases. You will do so by studying risk factors and causal relations in health and disease, by assessing the efficacy of interventions and preventive measures, and by predicting health outcomes. As a student, you will learn how to set up and perform patient- and population-based research from A to Z. After completion of the specialisation, you can register as acknowledged epidemiologists at the Dutch Epidemiology Society.

Specialisation Coordinators

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The BMS Master's

Our Master's programme in Biomedical Sciences offers eight specialisations and four career profiles. In the first semester, each specialisation starts with four courses that reflect its central topics and methodology, followed by an elective course. In the second semester of the first year students do a research internship.
In the second year students follow elective courses and courses of their career profile, followed by a profile internships.
Furthermore, the course 'Personal & Professional Development' runs throughout the entire programme under the guidance of a coach. It covers topics such as personal learning goals, responsible research & innovation, well-being, and career prospects.

The specialisation

This specialisation delves deep into various health domains, from infectious diseases to cancer and from lifestyle to public health. It allows students to acquire valuable skills in every phase of research: from study design and data collection to analysis and the dissemination of results. We address questions such as:

- Does adherence to a Mediterranean diet decrease the risk of cardiovascular events?
- How is HIV infection distributed among different populations?
- Is immunotherapy effective in bladder cancer, and what are its side effects?
- Does early screening decrease the mortality of colon cancer?
- Do pregnancy complications such as preeclampsia have adverse effects on the offspring?

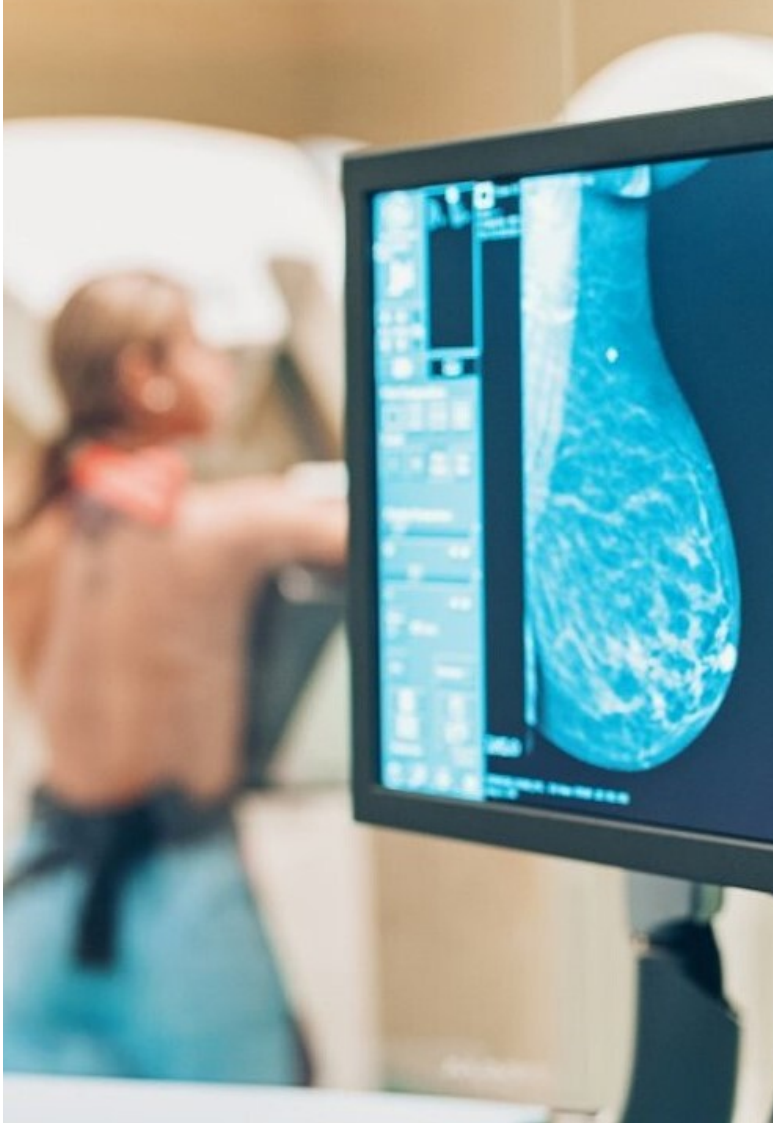
Internship possibilities

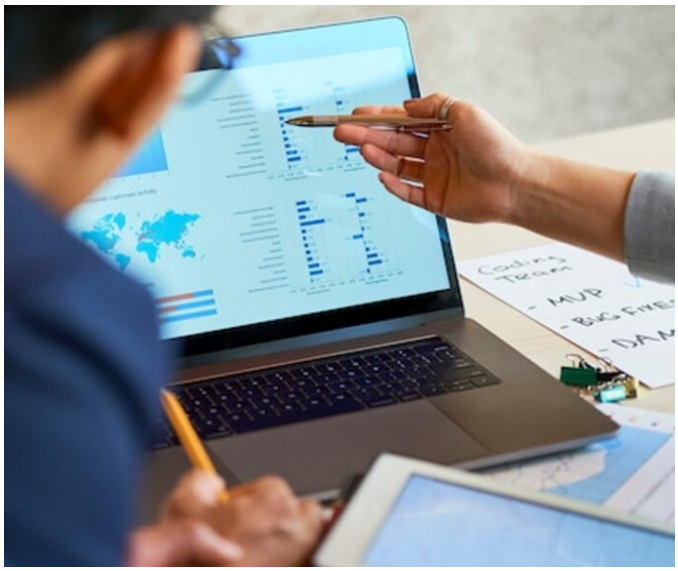
Internships in the field of epidemiology help students acquire valuable skills in every phase of research. The hands-on approach of these projects allows students to be curious and learn freely while actively contributing to clinical research or public health. These internships can be completed at various departments of the Radboudumc, but plenty of opportunities exist at other locations in the Netherlands or abroad as well. We have many connections with research institutes, companies, and universities all over the world. So, the possibilities are endless! Examples are other universities, academic hospitals, research organisations, such as Integral Cancer Center Netherlands (IKNL), governmental institutes, such as RIVM or GGDs, and consultancy companies, such as BeBright.

Career perspectives for Epidemiology alumni

A key feature of this specialisation is the ability to register as an acknowledged epidemiologist-A after completion. Career perspectives are diverse. Graduates work as epidemiologists:

- In academia as PhD candidates, researchers, or teachers
- In research organisations, such as IKNL, NIVEL, and Lareb
- At governmental institutions, such as RIVM, GGDs, and ZonMW
- In communication & consultancy roles, e.g. at P5COM or BeBright
- For professional and patient associations, including the Dutch Association of Medical Specialists and the Patient Federation
- For pharmaceutical or medical data companies, such as IQVIA





Internship example: Quality of life and survival of bladder cancer

For my Master's internship at IKNL, I explored how quality of life might predict survival in patients with muscle-invasive bladder cancer using data from the Dutch Cancer Registry and the BlaZIB study. Collaborating with the team and working with real-world data made the research feel meaningful.

1st year Master's student Epidemiology

Specialisation courses

Clinical and public health research: design and data collection

This course equips students with essential skills for designing and conducting medical research in human populations. It covers formulating research questions, choosing suitable study designs and using modern data collection techniques. Students learn to recruit participants effectively, considering inclusion criteria and bias reduction. They work with diverse data sources such as health registries, public databases, and biomarkers. Practical experience includes questionnaire development and addressing privacy, non-response, and measurement error. The course also features critical analysis of landmark studies and key examples from historical and modern epidemiological research, showing how methodological choices influence outcomes and public health impact.

From Etiology to Prognosis: Applying human-based research into Practice

This course provides a solid foundation for advanced human-based research, addressing etiological, diagnostic, and predictive questions in biomedical and population health. It begins with multivariable regression modeling, guiding students in technique selection, analysis, and interpretation. Next, it introduces causal inference principles. Students use Directed Acyclic Graphs (DAGs) to visualize bias and apply methods such as target trial emulation, propensity

scores, and instrumental variables. In the final part, students develop and validate clinical prediction models, distinguish predictive from causal aims, assess performance, and apply strategies to prevent overfitting and improve generalizability. Emphasis is placed on practical model use in clinical decision-making. Through theory and hands-on analysis, students gain skills to conduct robust research that informs disease understanding and health prediction, with applications in perinatal, reproductive, and cancer research.

Clinical trials and real-world evidence

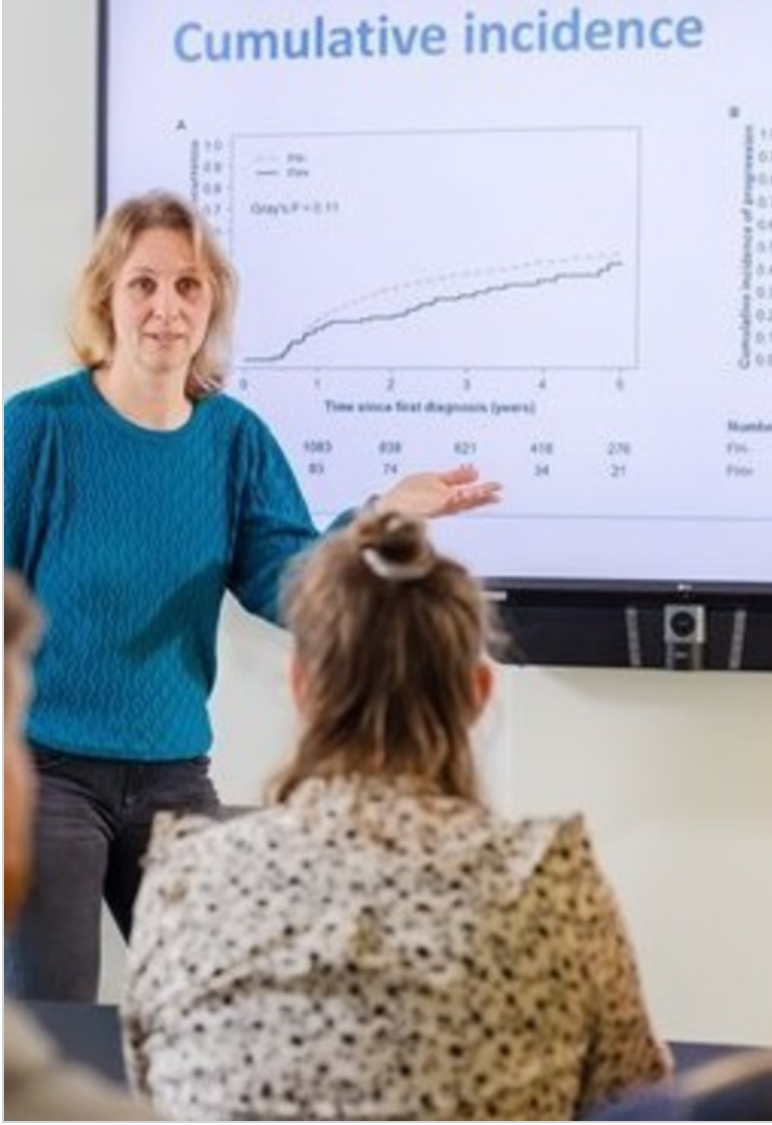
This advanced course examines the changing landscape of clinical research, emphasizing innovative trial designs and real-world data integration. Topics include advanced trial formats such as non-inferiority and stepped-wedge designs, and hybrid approaches combining randomized and observational data. Students learn to critically assess real-world data sources like electronic records, biobanks, hospital databases, and registries. The course focuses on evaluating safety, care quality, and practice variation, with practical examples of chronic diseases such as rheumatic and mental disorders illustrating how real-world evidence can complement traditional clinical trials in healthcare decision-making. Collaboration with students from the Health Technology Assessment specialization broadens your view by learning from each other's perspective.

Epidemiology – implementation, impact and future perspectives

This course teaches students how to connect medical research with society, focusing on bridging the gap between research and its impact on patients, professionals, and policymakers. Students learn to choose effective communication strategies and explore stakeholder involvement in research. The course highlights the role of health policy institutes such as the RIVM, Health Council, National Health Care Institute, and Regional Public Health Services. Students examine the benefits and challenges of involving patients and citizens in research. They also explore decision-making processes, evidence behind prevention programs, and how to calculate impact measures. Finally, future perspectives in clinical and public health research are discussed, including the role of AI in research, risk assessment, and efficiency studies. Applications focus on infectious diseases, cancer screening, and healthy ageing.

Other courses

In your elective space, you can take additional courses from the BMS programme that complement the Epidemiology specialisation. You're also welcome to explore courses outside Radboudumc or even outside the Netherlands.



Internship example: Internship example: Pesticide exposure in pregnancy and perinatal outcomes
During my Master's internship at IQ Health, Radboudumc, I contributed to the PRIDE Study, a large cohort study among pregnant women in the Netherlands. I focused on how occupational pesticide exposure might influence pregnancy outcomes. It was fascinating - and a bit concerning - to find possible links between exposure and reduced time to pregnancy, thus fertility. I gained valuable experience in reproductive epidemiology, data collection, and working with large cohort datasets. The internship environment was welcoming, with many knowledgeable researchers and interns to learn from.

1st year Master's student Epidemiology

Please email us for more information about the programme, the specialisation or the application process.
Admissions@radboudumc.nl

For general information, or a chat with current students, please visit our website.
www.ru.nl/masters/bms

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