FELLOWSHIP REPORT

# Summary of work activities

Viktor Zöldi
Intervention Epidemiology path (EPIET)
Cohort 2015

# Background

The ECDC Fellowship Training Programme includes two distinct curricular pathways: Intervention Epidemiology Training (EPIET) and Public Health Microbiology Training (EUPHEM). After the two-year training EPIET and EUPHEM graduates are considered experts in applying epidemiological or microbiological methods to provide evidence to guide public health interventions for communicable disease prevention and control.

Both curriculum paths are part of the ECDC fellowship programme that provides competency based training and practical experience using the 'learning by doing' approach in acknowledged training sites across the European Union (EU) and European Economic Area (EEA) Member States.

## Intervention Epidemiology path (EPIET)

Field epidemiology aims to apply epidemiologic methods in day to day public health field conditions in order to generate new knowledge and scientific evidence for public health decision making. The context is often complex and difficult to control, which challenges study design and interpretation of study results. However, often in Public Health we lack the opportunity to perform controlled trials and we are faced with the need to design observational studies as best as we can. Field epidemiologists use epidemiology as a tool to design, evaluate or improve interventions to protect the health of a population.

The European Programme for Intervention Epidemiology Training (EPIET) was created in 1995. Its purpose is to create a network of highly trained field epidemiologists in the European Union, thereby strengthening the public health epidemiology workforce at Member State and EU/EEA level. Current EPIET alumni are providing expertise in response activities and strengthening capacity for communicable disease surveillance and control inside and beyond the EU. In 2006 EPIET was integrated into the core activities of ECDC.

The objectives of the ECDC Fellowship—EPIET path are:

- To strengthen the surveillance of infectious diseases and other public health issues in Member States and at EU level;

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*The views expressed in this publication do not necessarily reflect the views of the European Centre for Disease Prevention and Control (ECDC).*

*This portfolio does not represent a diploma. Fellows receive a certificate acknowledging the 2-year training and listing the theoretical modules attended. Additionally, if all training objectives have been met, they receive a diploma.*

Stockholm, July 2016

- To develop response capacity for effective field investigation and control at national and community level to meet public health threats;
- To develop a European network of public health epidemiologists who use standard methods and share common objectives;
- To contribute to the development of the community network for the surveillance and control of communicable diseases.

Fellows develop core competencies in field epidemiology mainly through project or activity work, but also partly through participation in training modules. Outputs are presented in accordance with the EPIET competency domains, as set out in the EPIET scientific guide[*].

## Pre-fellowship short biography

Prior to EPIET, Viktor Zöldi worked for 12 years on infectious diseases vectors and their control at Department of Vectors and Public Health Pests of National Centre of Epidemiology, Budapest, Hungary. He holds a Doctor of Philosophy (PhD) degree from the Szent István University (Budapest, Hungary), a Master of Epidemiology from the University of Debrecen (Hungary) and a Master of Biology from the University of Eötvös Loránd (Budapest, Hungary).

## Fellowship assignment: Intervention Epidemiology path (EPIET)

On 15 September 2015, Viktor started his EPIET fellowship at the National Institute for Health and Welfare (THL), Helsinki, Finland, under the supervision of Outi Lyytikäinen. This report summarizes the work performed during the fellowship.

# Fellowship portfolio

This portfolio presents a summary of all work activities (unless restricted due to confidentiality regulations) conducted by the fellow during the ECDC Fellowship, EPIET path. These activities include various projects, and theoretical training modules.

Projects included epidemiological contributions to public health event detection and investigation (surveillance and outbreaks); applied epidemiology field research; teaching epidemiology; summarising and communicating scientific evidence and activities with a specific epidemiology focus. The outcomes include publications, presentations, posters, reports and teaching materials prepared by the fellow.

This portfolio also includes a reflection from the fellow on the field epidemiology competencies developed during the 2-year training, a reflection from the supervisor on the added value of engaging in the training of the fellow, as well as a reflection by the programme coordinator on the development of the fellow's competencies.

# Fellowship projects

## 1. Surveillance

### *Title:* Risks of infections among Finnish international travellers 1995-2015

*Background*

Overnight international travels made by Finns expanded from 3 to 7.7 million during 1995-2015. To estimate risks and observe trends of travel-related notifiable sexually transmitted and food- and water-borne infections (STIs and FWIs) among travellers, we analysed national reports of gonorrhoea, syphilis, hepatitis A, shigellosis, campylobacteriosis and salmonellosis cases and relate them to travel statistics of the same time period.

[*] European Centre for Disease Prevention and Control. European public health training programme. Stockholm: ECDC; 2015. Available from: http://ecdc.europa.eu/en/epiet/Documents/Scientific%20guides/EPIET%20Scientific%20Guide_C2016.pdf

*Methods*
Cases notified as travel-related to the Finnish infectious diseases register were used as numerators and overnight stays of Statistics Finland surveys as denominator. We calculated overall risks (per 100,000 travellers) and trends (using binomial regression).

*Results*
Of all travel-related cases during 1995-2015, 2,304 were STIs and 70,929 FWIs. During 2012-2015, Asia-Oceania showed highest risk estimates for gonorrhoea (11.0; 95%CI, 9.5-13), syphilis (1.4; 0.93-2.1), salmonellosis (157; 151-164), and campylobacteriosis (135; 129-141), and Africa for hepatitis A (4.5; 2.5-7.9), and shigellosis (35; 28-43). During 2000-2011, the campylobacteriosis risk increased in all regions, except Africa, for other FWIs it decreased in Africa, Asia-Oceania, Russia, Baltics and Europe. For STIs, the risk decreased in Russia and Baltics.

*Conclusions*
Combining nation-wide databases of infectious diseases register and travel statistics provided destination-specific risks of contracting notifiable infections abroad and trends in risks. We observed positive trends in risks of contracting infections abroad; however, we recommend maintaining, or regarding high risk destinations, even strengthening public awareness. The data can prove helpful for health care professionals providing travel advice.

### ***Role and outputs:*** Primary investigator
Wrote the protocol, cleaned data, analysed data, wrote a report [18][†], submitted a manuscript to a peer-reviewed journal [4].

### ***Supervisors:*** Jussi Sane, Outi Lyytikäinen

### ***Competencies developed:***
During this surveillance project, I learned how to handle large datasets and how to clean and prepare the data prior to the analysis. I became well aware of the importance of good data quality and gathering and combining data from other sources than the surveillance system. I learned how the completeness of routine surveillance data can be improved. By being involved in this project, I gained confidence in performing statistical analyses using STATA. I improved my writing skills with taking the lead of the report and manuscript writing. This project also provided me the opportunity to gain confidence in delivering presentations at the ESCAIDE conference.

## 2. Outbreak investigations

### ***Title:*** Norovirus outbreak on a cruise ship operating between Helsinki and Stockholm, May 2016

*Background*
In May 2016, a gastroenteritis outbreak among passengers was detected on a cruise ship in Helsinki. We investigated the outbreak in order to identify the agent and its source and to implement control measures and prevent future outbreaks.

*Methods*
Passengers and crew members were requested to fill out an electronic questionnaire gathering demographic, clinical and exposure data. Cases were persons who had been on board within 27 May–1 June, 2017 and developed diarrhoea or vomiting within one week after their trip. We compared cases regarding their on-board exposures with non-cases by calculating risk ratios with 95% confidence intervals. Stool, surface, food and water samples were obtained for microbiological analysis.

*Results*
The questionnaire was filled out by 854 (8%) passengers and all 219 crew members. We identified 252 cases (55%males, age range 2–87, median age 43,) with a peak on 30 May. Two buffet meals, served on 28 and 30 May,

[†] References cited in the text are not ordered by appearence but follow the structure given in the Communication section (see page 6).

associated with the illness explained less than one third of cases. Respondents reported having seen vomits and stool in public areas and cabins as well. Norovirus GII. P16/GII.2 was found in 12 stool samples and norovirus GII were identified in 3 toilet surface samples. All food and water samples were tested negative.

*Conclusions*
The likely source of the outbreak was surface contamination by norovirus in the public areas and cabins of the cruise ship. Regular and more efficient cleaning of those areas and intensified hand washing with soap for passengers and crew in an outbreak situation were recommended.

### ***Role and outputs:*** Investigation team member
Wrote the protocol, cleaned data, analysed data, wrote a report [20].

### ***Supervisors:*** Ruska Rimhanen-Finne

### ***Competencies developed:***
By being involved in this outbreak investigation, I understood how challenging the analysis might be in the lack of a well-designed questionnaire tailored for well-defined objectives. I learned how to prepare and clean the data before analysis. I also learned about the importance of the descriptive analysis. I improved my analytical skills, using STATA, and experienced the challenges of interpretation when hundreds of possible exposures included in the dataset.

## ***Title:*** A cluster of measles linked to an imported case, Finland, 2017

*Background*
Measles outbreaks continue to occur in several EU/EEA countries. In June 2017, a young Italian adult was diagnosed with measles in Finland. During the stay in Finland and subsequent travel to Estonia, the index case exposed altogether hundreds of persons to measles. We investigated the cluster in order to implement control measures and to prevent future outbreaks.

*Methods*
Detection of measles-specific IgG and IgM antibodies was performed in serum samples and viral RNA was detected by Real-Time PCR directed against measles nucleoprotein gene.

*Results*
Case 1 attended an international work camp in Finland. After developing fever, respiratory symptoms, and rash, Case 1 was admitted to the hospital of City A on 21 June. Serum and throat specimens were taken on 22 June. While the confirmatory laboratory results were still pending, the case was discharged and returned to the camp on 24 June. On 25 June, Case 1 travelled to Helsinki by train and to Tallinn by ferry. On 27 June Case 1 was laboratory-confirmed for measles infection. Subsequently, three secondary cases of measles were identified. Case 2 and 3 were unvaccinated siblings, attended a summer camp organized at the same premises as the work camp. Case 4 was an unvaccinated person visited the camp on 19 June and had lunch in the same canteen used by other camp attendees, including Case 1. Based on the Measles Nucleotide Surveillance database, this strain shared very high nucleotide similarity (>99%) with >600 sequences detected on five continents in 2015–2017. Cases 2–4 were individuals belonging to the same immigrant community residing in Finland.

*Conclusions*
Potentially exposed people were instructed to check their vaccination status and informed about the actions required in case of experiencing symptoms compatible with measles. Passengers travelling on the same trains and ferry as Case 1, were contacted through the respective operators. In Finland, a country with nationally high MMR vaccination coverage, extensive outbreaks of measles are unlikely to occur. However, transmission chains among unimmunized individuals linked to an imported case are possible. Ensuring universally high vaccination coverage is essential to prevent clusters and outbreaks in the future. The screening visits offered to immigrants should be promoted and utilized to check and update vaccination status.

### ***Role and outputs:*** Investigation team member
Contributed to cluster investigation, contact tracing and data collection, cleaned data, submitted a co-first authored manuscript to a peer-reviewed journal [4].

### ***Supervisor:*** Jussi Sane

### *Competencies developed:*

By being involved in this investigation I had the opportunity to follow all the steps needed to be done at the local and national level in order to implement control measures. During this measles outbreak I learned the importance of timely response and how the EU countries can be informed through the Early Warning and Response System (EWRS). I performed a telephone interview with the index case. I became well aware of the importance of maintaining as high vaccine coverage as possible and learned that even in a highly immunized population, pockets of susceptible individuals may exist and therefore transmission chains can occur. This project also provided me the opportunity to react quickly when it comes to communication unless it is directing colleagues (e.g. briefings), the public (e.g. press releases, bulletins) or the scientific community (rapid communication).

# 3. Applied epidemiology research

## *Title:* Epidemiology of pertussis in Finland, 1995-2015

*Background*

In 2005, in Finland, the whole-cell pertussis vaccine was replaced by acellular given at 3-5-12 months, and boosters at 4 and 11-15 years of age. From July 2012, military conscripts have been offered a pertussis booster dose. Conscription is mandatory for Finnish men, and >95% were 19-21 years old when enrolled during 2012-2015. We aimed to describe the epidemiology of pertussis in Finland during 1995-2015, and examine the indirect effect of the booster in conscripts on pertussis incidence in the Finnish population.

*Methods*

We extracted data on laboratory confirmed notified pertussis cases from the National Infectious Diseases Register. We calculated annual incidence using as denominator population data and incidence rate ratios (IRR) using Poisson regression. We calculated annual incidence using as denominator population data and incidence rate ratios (IRR) using Poisson regression.

*Results*

During the period, a total of 12,412 cases (range 165-1631 cases per year) were reported. The overall pertussis incidence peaked in 2004 (31/100,000) and was lowest in 2015 (3.0/100,000), with 66 reported cases in <3 months infants in 2004 versus 6 in 2015. The majority of the cases were female (59%) with the male-to-female case ratio of 1:1.5. Cases were spread throughout the year with highest incidence during August-February.

Among the 19- to 21-year-olds in the general population, incidence decreased from 49/100,000 in 2011 to 0.51/100,000 in 2015 (IRR=0.01; 95%CI, 0.00-0.16). Among the same age group, comparing the 3.5-year period before and after July 2012, incidence decreased from 33/100,000 to 5.3/100,000 (IRR=0.16; 95%CI, 0.06-0.40) in males and from 16/100,000 to 5.0/100,000 (IRR=0.31; 95%CI, 0.11-0.84) in females.

*Conclusions*

Implementation of the pertussis booster dose in the Finnish Defence Forces was followed by a significant decrease in pertussis incidence both among the 19- to 21-year-old males and females, possibly reflecting herd immunity effect. Together with booster doses in adolescents this has resulted in low incidence in the whole population including infants. Our results support the implementation of the conscript booster dose. We recommend continuing monitoring pertussis epidemiology to optimize pertussis vaccination strategies in Finland.

### *Role and outputs:* Primary investigator

Wrote the protocol, cleaned data, analysed data, wrote a report [19], submitted a manuscript to a peer-reviewed journal [2], contributed to a working paper on pertussis prevention strategy in Finland [24].

### *Supervisors:* Hanna Nohynek, Jussi Sane

### *Competencies developed:*

During this project I learned about specific features of vaccine preventable diseases epidemiology. I learned how the changing vaccination programme may affect the immunization status of the various birth cohorts. I also understood the importance of the personal identification number, which provides the opportunity of linkage between the surveillance system and other databases (e.g. hospital discharge register) using the same identifier. I had the opportunity to attend an international working group meeting held by the ECDC, contribute to a working paper on

pertussis prevention strategy in Finland, and improved my writing skills with preparing a report and a manuscript. Finally, this project allowed me to contribute to an international data collection regarding infant pertussis.

### *Title:* Knowledge, attitudes, and practices regarding ticks and tick-borne diseases, Finland

*Background*
Tick-borne encephalitis (TBE) and Lyme borreliosis (LB) are endemic in Finland with tens and thousands of cases, respectively, reported annually. We performed a field survey to investigate people's knowledge, attitudes and practices (KAP) regarding ticks, tick-borne diseases, and prevention strategies.

*Methods*
The KAP were assessed using a pre-validated anonymous questionnaire consisting of 39 questions and statements in the cities of Parainen and Kotka, located in high-risk areas of tick-borne diseases, particularly of TBE. On two consecutive days in July 2016, individuals were approached and invited to participate in the survey. In attitudes and practices sections, each question was scored and analysed with ordered logistic regression model.

*Results*
In total, 101 individuals responded for a response rate of approximately 80%. The TBE vaccination rate among respondents was 40%. The best known preventive measures were having vaccination against TBE (88%), and wearing long sleeves and pants against ticks (81%). Two-thirds incorrectly identified the ring-like rash as a symptom of TBE. Of all respondents, 78% could not exclude that TBE can be treated with antibiotics; 55% that vaccine protects against LB; and 46% that it protects against ticks. The minority (14%) believed tick repellents to be effective. Among preventive behaviour, the quick removal of an attached tick was most frequently applied (97%). Repellents were used by 21% when visiting tick-infested areas. Significant associations were found between the vaccinated status and having a correct belief that the vaccine protects against TBE ($P<0.001$) but not against ticks ($P<0.05$), or LB ($P<0.001$).

*Conclusions*
For the first time in Finland, we collected information on people's knowledge, attitudes and practices regarding ticks and tick-borne diseases in high-risk areas. We identified a number of gaps in knowledge and misbeliefs. Our results improve public health communication tools on tick-borne diseases, especially those on intervention strategies.

### *Role and outputs:* Investigation team member
Wrote the protocol, developed questionnaire, performed interviews, performed data entry, analysed data, wrote a report, submitted a manuscript to a peer-reviewed journal [1], contributed to a flyer for the general public [23].

### *Supervisors:* Jussi Sane, Outi Lyytikäinen

### *Competencies developed:*
By being involved in this research project I developed my skills in designing questionnaire and performing interviews. I performed data entry, data validation and cleaning, stratified analysis. I also learned how to work as an effective and constructive team member. I understood how to gain useful data quickly when no preliminary data available, and how to use the results of a questionnaire study in identifying public health needs. I contributed to the flyer about ticks and tick-borne diseases, which was distributed at the end of the interviews among the participants. Following the project, this leaflet was disseminated through THL's websites and became part of the public communication.

## 4. Communication

### *Publications in peer reviewed journals*

- 3 original research articles [1,2,3]
- 1 rapid communication [4]

### *Conference presentations*

- 1 oral presentation at international conference [5]

- 3 poster presentations at international conferences [6, 7, 8]

### *Other presentations*

- 2 oral presentations at the Nordic mini project review meetings [9, 10, 11]
- 2 oral presentation at scientific seminars [12, 13]
- 1 oral presentation at a meeting of a national technical advisory body [14]
- 1 oral presentation on the EPIET/EUPHEM Programme [15]
- 1 briefings on an outbreak investigation [16]
- 1 oral presentation at an international scientific meeting [17]

### *Reports*

- 1 surveillance report [18]
- 1 research report [19]
- 1 outbreak report [20]
- 2 reports on training public health professionals – reflection and evaluation [21, 22]

### *Other*

- flyer for the general public on ticks and tick-borne diseases [23]
- contributing to a working paper on pertussis prevention strategy in Finland [24]

## 5. Teaching activities

### *Title:* Facilitation of the Nordic Society of Veterinary Epidemiology (NOSOVE) training module

Facilitated a 5-hour training module at the international course on veterinary epidemiology organised by NOSOVE (19 July 2016, Turku, Finland) for participants with a broad spectrum of background and experiences.

Lecture given and case study was facilitated independently:

- Lecture with discussion on Parasitic outbreaks in Finland
- Case study: An outbreak of trichinellosis in Paris

***Supervisors:*** Ruska Rimhanen-Finne, Outi Lyytikäinen

***Educational outcome:***

Being involved in this one-day teaching, I gained confidence in conducting a case study independently and learned about initiating discussions following lectures and during the case study among the group. I also learned how to choose and tailor material for the course, according to the participants' expected range of interests.

### *Title:* Facilitation of the "Outbreak management" training module

Facilitated a 7-hour training module at Laurea University of Applied Sciences (18 February 2016, Helsinki, Finland) for students of MSc in Global Development and Management in Health Care programme.

Lecture given and case study was facilitated independently:

- Lecture with discussion on steps of an outbreak investigation, including basics of cohort and case-control study design
- Case study: Trichinellosis in France

***Supervisors:*** Outi Lyytikäinen

### *Educational outcome:*

Being involved in this teaching activity, I learned how to prepare and tailor the material for the course. I gained confidence in conducting case study independently and learned about initiating discussions following lectures and during the case study among the group.

***Title:*** **Nordic mini project review 2017**

Organized the Nordic mini project review, a two-day event where EPIET and EUPHEM fellows trained in one of the Nordic countries (Norway, Denmark, Sweden, and Finland) present their projects to peer-fellows and experts in the topic. The event was organized at the National Institute for Health and Welfare in Helsinki, on 3–4 April 2017.

***Supervisor:*** Outi Lyytikäinen

### *Educational outcome:*

During the organization of the mini project review, I had to plan and schedule tasks, and cooperate with fellows and facilitators.

## 6. Other activities

### *Other training than EPIET/EUPHEM modules:*

1. Scientific Abstract Writing (1st edition), 4 January–29 February 2016, ECDC Virtual Academy (EVA), e-learning course
2. Nordic Mini Project Review, 18–19 April 2016, Stockholm, Sweden
3. United Nations Department of Safety and Security (UNDSS)—Basic Security in the Field, 6 June 2016, e-learning course
4. United Nations Department of Safety and Security (UNDSS)—Advanced Security in the Field, 6 June 2016, e-learning course
5. Nordic Society of Veterinary Epidemiology (NOSOVE) course, 18–20 July 2016, Turku, Finland
6. Nordic Mini Project Review, 3–4 April 2017, Helsinki, Finland
7. Learning Finnish language during the fellowship and taking the general language exam *"YKI"* (*Yleiset kielitutkinnot*, National Certificates of Language Proficiency) in Finnish at the Institute of Adult Education in Helsinki (Helsingin aikuisopisto), level 3 (equivalent to level B1 of Common European Framework) on 8 April 2017

### *Invited expert/participant to other scientific meetings:*

1. Vaccine Preventable Diseases (VPD) Network biannual meeting, ECDC, Stockholm, Sweden, 26–27 September 2016.
2. VectorNet Annual General Meeting, Antwerp, Belgium, 16–18 February 2016.

## 7. EPIET/EUPHEM modules attended

1. EPIET/EUPHEM Introductory Course, 28 September–16 October 2015, Spetses, Greece
2. Outbreak Investigation Module, 7–11 December 2015, Berlin, Germany
3. Multivariable Analysis Module, 14–18 March 2016, Vienna, Austria
4. Rapid Assessment and Survey Methods Module, 20–25 June 2016, Athens, Greece
5. Project Review Module, 22–26 August 2016, Lisbon, Portugal

6. Time-series Analysis Module, 7–11 November 2016, Bucharest, Romania
7. Vaccinology Module, 12–16 June 2017, Stockholm, Sweden
8. Project Review Module, 28 August–1 September 2017, Lisbon, Portugal

## Supervisor's conclusions

During the two-year fellowship at THL Viktor Zöldi been involved in a variety of public health activities, including outbreak investigations (norovirus, measles), surveillance (travel-related infections), descriptive and analytical epidemiology and research (pertussis, tick-borne diseases) as well as teaching, as described in the core competencies of the EPIET programme.

The outcome of his work has been excellent, benefitting the department of health security at THL as well as the domestic and international community. He has contributed to the evaluation of surveillance for travel-related sexually transmitted and food- and water-borne infections, pertussis vaccine strategy and public communication about risks of tick-borne diseases in Finland.

The two-year experience at THL has broadened his knowledge in the field of infectious diseases and applied various epidemiological methods in his projects. His participation in the daily work of the department has made it possible for the supervisors to carry out projects that would otherwise have been impossible to accomplish.

The fellow developed both personally and professionally during the fellowship and solved the given tasks in a highly competent way with a high and increasing degree of independence, but at the same time seeking assistance when necessary. A positive attitude towards challenges in the field of infectious diseases, for example in the field survey and outbreak investigations, and an open mind towards colleagues makes the fellow a very good team player.

Based on his personal and professional skills, we can highly recommend Viktor Zöldi for any kind of public health work.

## Coordinator's conclusions

During these two years Viktor has shown a great capacity of work with excellent outcomes as can be seen in these portfolio. As his frontline coordinator, I would like to highlight both his professionalism and his capacity to bring into the fellowship his previous background and knowledge on vectors and integrate the epidemiological perspective. Viktor is an independent professional and an excellent team player and the competencies he developed working at THL makes him a highly recommended epidemiologist for any kind of public health position.

## Personal conclusions of fellow

Throughout my training I have been based with the Infectious Disease Control and Vaccinations Unit at the Finnish National Institute for Health and Welfare. During my EPIET fellowship I have had the opportunity to work on a wide range of fascinating projects across the competencies, including research and surveillance projects and outbreak investigations. I have got the chance to experience the different working style and way of thinking in another EU country and being exposed to a different culture on each and every day of these unforgettable two years. Also, I have had the opportunity to work with and learn from national level experts of various fields.

I have greatly developed my skills in field epidemiology, particularly in study design, data analysis and communication.

## Acknowledgements

I would like to acknowledge all my training site supervisors for their support, guide, and mentoring during the two years. Outi Lyytikäinen, who made it possible for me to come to Finland as an EPIET fellow and supervised me, deserves special thanks. I also owe a very special thank you to Jussi Sane, who effectively guided me along all the projects. I am also grateful to Hanna Nohynek for involving me to research in vaccine preventable diseases.
I would like to thank Ruska Rimhanen-Finne for her help with my activities in food-, waterborne and parasitic diseases.

Their careful and yet pragmatic approach proved to be genuinely helpful and I gained considerable knowledge and experience under their supervision.

I wish to acknowledge all colleagues in the Infectious Disease Control and Vaccinations Unit (formerly Infectious Disease Control Unit) and the Department of Health Security (formerly Dept. of Infectious Diseases) for their help during my fellowship: Sari Jaakola, Sari Huusko, Terhi Hulkko, Liisa Palonen, Satu Murtopuro, Hanna Soini, Eeva Pekkanen, Laura Pentikäinen, Karolina Tuomisto, Salla Toikkanen, Saara Salmenlinna, Paula Tiittala, Otto Helve, Mikko Virtanen, Jan-Erik Löflund, Teemu Möttönen, Markku Kuusi, Taneli Puumalainen, Mika Salminen, and Petri Ruutu.
A special thank you goes to Marja Palander who has always been very kind not only to me but also to my whippet Mokka. Jukka Ollgren is thanked for providing statistical support in various projects and for exciting discussions on almost everything from Finnish history to astronomy, not to mention p-value. Infectious diseases doctors Topi Turunen and Elina Seppälä are thanked for the weekly "epidemiapalaveri" meetings and also for being my co-authors.

I would also like to thank all the overlapping EUPHEM and EPIET fellows in Helsinki; Francesca Latronico and Jožica Škufca from cohort 2014, and Janko van Beek and Jana Prattingerová from cohort 2016, for practically everything.

I also want to thank my frontline coordinator Alicia Barrasa from the National Centre for Epidemiology (Madrid) for her support, and all the other EPIET coordinators and trainers for sharing their expertise and knowledge during our modules.

I would like to thank the fellow colleagues from my cohort for being always kind and helpful.

Last but not least, many thanks to my partner who helped me make a new home in Helsinki.

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