



## Summary of work activities

Elina Seppälä

### Intervention Epidemiology path (EPIET), 2019 cohort

## Background

The ECDC Fellowship Programme is a two-year competency-based training with two paths: the field epidemiology path (EPIET) and the public health microbiology path (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 provide training and practical experience using the 'learning by doing' approach in acknowledged training sites across European Union (EU) and European Economic Area (EEA) Member States.

According to Articles 5 and 9 of ECDC's founding regulation (EC No 851/2004) 'the Centre shall, encourage cooperation between expert and reference laboratories, foster the development of sufficient capacity within the community for the diagnosis, detection, identification and characterisation of infectious agents which may threaten public health' and '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'.

Moreover, Article 47 of the Lisbon Treaty states that 'Member States shall, within the framework of a joint programme, encourage the exchange of young workers. Therefore, ECDC initiated the two-year EUPHEM training programme in 2008. EUPHEM is closely linked to the European Programme for Intervention Epidemiology Training (EPIET). Both EUPHEM and EPIET are considered 'specialist pathways' of the two-year ECDC fellowship programme for applied disease prevention and control.

This report summarises the work activities undertaken by Elina Seppälä, cohort 2019 of the Intervention Epidemiology path (EPIET) at the Norwegian Institute of Public Health (NIPH).

## Pre-fellowship short biography

Elina Seppälä graduated as a licentiate of medicine from Tampere University, Finland in 2011. She spent several years working as a clinician, first in primary healthcare and later in secondary healthcare in the field of dermatology and venereology. She completed a master's degree in health sciences (international health) and a specialisation in public health medicine in 2019. As part of the master's programme in 2017, Elina completed an internship at Instituto de Salud Carlos III in Madrid, Spain, focusing on congenital rubella syndrome. From 2017 to 2019, she worked at the Finnish Institute for Health and Welfare, with tasks mostly related to infectious disease preparedness and response, and asylum seekers' healthcare.

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## Methods

This report accompanies a portfolio that demonstrates the competencies acquired during the EPIET fellowship by working on various projects, activities, theoretical fellowship training modules, other modules or trainings and from international assignments or exchanges.

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. The portfolio presents a summary of all work activities conducted by the fellow, unless prohibited due to confidentiality regulations.

## Results

The objectives of these core competency domains were achieved partly through project or activity work and partly through participation in the training modules. Results are presented in accordance with the EPIET core competencies, as set out in the ECDC Fellowship Manual<sup>1</sup>.

### 1. Epidemiological investigations

#### 1.1 Outbreak investigations

##### ***National outbreak of *Shigella sonnei* linked to imported snap peas, Norway, November – December 2019***

Supervisor: Heidi Lange

In December 2019, the NIPH was notified about several employees of Company A with gastrointestinal illness, all of whom had eaten at its canteen. We investigated to identify the outbreak source and implement control measures. We defined a case as a person with gastroenteritis symptoms for three or more days, with onset from 3 to 10 December and invited employees who had eaten at the canteen from 2 to 4 December to a retrospective cohort study, via online questionnaire. All food items consumed by  $\geq 50\%$  of cases with a p-value  $< 0.10$  were included in logistic regression analysis. Local laboratories tested stool samples for enteric pathogens and the National Reference Laboratory (NRL) performed core-genome multi-locus sequence typing (cgMLST) on *Shigella* spp/enteroinvasive *Escherichia coli* isolates.

Of 170 employees, 28 met the case definition; 79% were female, with a median age of 49 years (min-max 28–64 years). There were 126 employees who had eaten at the canteen and responded to the questionnaire. Eating uncooked snap peas (adjusted odds ratio (aOR): 5.2; 95% CI: 1.3–20.3) and salmon (aOR: 3.9; 95% CI: 1.1–14.5) were associated with illness. No snap peas were available for sampling. Seven employees tested positive for *S. sonnei*, and all isolates belonged to a new outbreak strain, which was observed in seven additional cases in the community. Six community cases reported eating uncooked snap peas, which had the same distributor as those served at Company A.

Imported snap peas were the likely source of this outbreak and have been associated with previous *Shigella* outbreaks. While package labels instruct consumers to cook snap peas before serving, the public and food services must be reminded about the risks associated with raw imported snap peas.

Elina was one of the co-investigators. She performed the data cleaning and analyses, drafted the outbreak report, wrote and submitted an abstract, and presented a poster at ESCAIDE 2020 [1].

##### ***Outbreak of cryptosporidiosis among Christmas lunch attendees, Norway, December 2019***

Supervisor: Heidi Lange

On 8 January 2020, the NIPH was notified of an outbreak of diarrhoea among employees of Companies A and B in Oslo who had been served Christmas lunch by Caterer A. Two cases had tested positive for *Cryptosporidium*. We investigated to identify the outbreak source and implement control measures. We defined a case as an employee of Company A or B who had attended a Christmas lunch event on 17 to 19 December 2019 and had gastroenteritis symptoms with onset from 18 December 2019 to 1 January 2020. We invited Christmas lunch attendees of Company A and B to a retrospective cohort study, via online questionnaire. We calculated risk ratios (RR) and 95% confidence intervals (CI) for the consumption of different food items and analysed the dose-response for food items with a p-value

<sup>1</sup> European Centre for Disease Prevention and Control. European public health training programme. Stockholm: ECDC; 2020. Available from: <https://www.ecdc.europa.eu/en/publications-data/ecdc-fellowship-programme-manual-cohort-2021>

of <0.10 in the univariable analysis. The Norwegian Veterinary Institute verified findings in stool samples positive for *Cryptosporidium*. The Norwegian Food Safety Authority performed environmental investigations.

There were 83 employees (83%) who responded to the questionnaire, of whom 62 (75%) met the case definition. 44% were female, with a median age of 43.5 years (min-max 21-65). Salad mix (RR: 2.0; 95%CI: 0.8-4.7) and Waldorf salad (RR: 1.5; 95%CI: 0.9-2.4) showed a dose-response and were identified as possible sources of infection. The two cases were confirmed infected with *Cryptosporidium parvum* IIaA21G1R1. None of the employees at Caterer A reported being ill; however, asymptomatic carriage could not be ruled out.

Either contaminated salad or asymptomatic, infected personnel were considered the most likely sources of this outbreak. Personnel working in food production or preparation should follow strict hand hygiene practices and abstain from handling food when experiencing gastrointestinal illness.

Elina was one of the co-investigators. She performed the data cleaning and analyses, and drafted the outbreak report.

### **Outbreak of *Yersinia enterocolitica* O:3, Norway, 2020**

Supervisor: Heidi Lange

The NRL at the NIPH reported a cluster of seven cases with the same *Yersinia enterocolitica* O3 MLVA profile on 9 June 2020. We investigated the outbreak to identify the source and implement control measures. We interviewed 24 of 25 cases to assess food consumption one week before symptom onset. We obtained cash receipts from 16 cases and carried out traceback investigations. The Norwegian Veterinary Institute analysed leftover food samples of frozen spinach. The NRL performed whole-genome sequencing on *Y. enterocolitica* isolates identified at the primary laboratories.

We identified 25 cases with similar MLVA profiles, 10 of which had nearly identical genotypes. 65% of the cases were female, with a median age of 28 (min-max 2-58) years. Cases were geographically widespread in Norway and had become ill in mid to late May 2020. More than 90% of the cases had consumed pre-washed spinach or baby spinach prior to illness. Traceback investigations indicated imported spinach as a possible source. No other product was linked to the outbreak. The leftover sample was negative for *Y. enterocolitica*.

We identified pre-washed spinach products as the probable source of infection. We communicated the results of the outbreak investigation through websites and by press releases. The Norwegian Food Safety Authority (NFSA) carried out additional inspections at production facilities in Norway in order to further improve routines and increase awareness of the possible risk for contamination of pre-washed spinach products.

Elina was one of the co-investigators. She supported another EPIET fellow in data entry, managing data and analysing data from trawling interviews, follow-up interviews and cash receipts. Elina also supported an EPIET fellow in the process of preparing a presentation for ESCAIDE 2020.

### **Training modules related to assignments/projects**

#### **EPIET/EUPHEM Introductory Course**

The module introduced the main concepts of outbreak investigations, study designs and analysis. The fellows familiarised themselves with the 10 steps of outbreak investigations, questionnaire design and formulating public health recommendations, and practiced outbreak investigations and analysis of data from outbreaks in case studies.

#### **Outbreak Investigation Module**

The module deepened the fellows' understanding of outbreak investigations. The module introduced the fellows to univariable and stratified data analysis, epidemic intelligence, mapping, and spatial analysis. A core component of the course is a multi-day case study on a cohort study for an outbreak of gastroenteritis.

### **Educational outcome**

Through the above-mentioned modules and investigations, Elina became familiar with the steps of an outbreak investigation. She investigated two outbreaks with analytical epidemiological methods and developed competencies in outbreak data management and analysis, outbreak report and abstract writing, and conference presentation.

## **1.2 Surveillance**

### **Outbreak Register – the surveillance system for the beginning of the coronavirus disease (COVID-19) pandemic in Norway**

Supervisors: Ragnhild Tønnessen, Anneke Steens, Trine Hessevik Paulsen, Astrid Louise Løvlie

As a part of the preparation for possible detection of cases in Norway, we set up the Outbreak Register to acquire a timely overview of the outbreak and to monitor disease trends, describe key epidemiological and clinical characteristics of the cases, collect data to inform contact tracing activities, and fulfil the requirements for reporting of cases to the European Surveillance System (TESSy) and the World Health Organization (WHO).

We developed a data collection form, which we published on the NIPH website. After the detection of the first confirmed case of COVID-19 in Norway on 26 February 2020, physicians were asked to fill out the data collection

form for each case, in parallel with the mandatory notification of cases to the Norwegian Surveillance System for Communicable Diseases (MSIS). We entered all data from the data collection forms manually into an Excel-based database. Due to the rapid spread of the outbreak and unfeasibility of the data collection procedure, the data collection was stopped on 9 March 2020.

We collected detailed data on the first 243 cases of COVID-19 in Norway, with large variation in data completeness for different variables. In early March, we used the data in the Outbreak Register for reporting to TESSy. We also used the data to supplement other data sources in a manuscript describing the beginning of the COVID-19 outbreak in Norway [2].

Elina developed the surveillance protocol and had a key role in developing the data collection form and the Excel-based database. She also performed data entry. Elina analysed the data and was the first author of the manuscript, which was published in a peer-reviewed journal [2].

### ***Surveillance of hospitalisations and intensive care admissions due to COVID-19, Norway***

Supervisor: Robert Whittaker

Testing for SARS-CoV-2 was established on 23 January 2020 in Norway and the first case of COVID-19 was confirmed on 26 February 2020. For the surveillance of COVID-19-associated hospitalisations and ICU admissions, the Norwegian Intensive Care and Pandemic Registry (NIPaR) was established on 10 March 2020. All hospitals and intensive care units in Norway report COVID-19 cases to NIPaR with demographic information, underlying risk factors, reason for admission, treatment, and outcome. From April to July 2020, the NIPH had access to aggregated data from NIPaR, after which case-based data has been transferred daily from NIPaR to the emergency preparedness registry, Beredt C19, operated by the NIPH. The NIPH uses the case-based data for producing daily and weekly reports on the COVID-19 epidemic in Norway, as well as for generating more detailed knowledge of different aspects of the epidemic through linkages with other data sources. This includes assessing the association between variants of concern and severe disease and vaccine effectiveness against severe outcomes, among others.

Elina was a co-investigator in this project. Her tasks have included data management and analysis, preparation of daily and weekly reports, quality control of data, and participation in the preparation of several manuscripts [3-6].

### ***Training modules related to assignments/projects***

#### **EPIET/EUPHEM introductory course**

The module familiarised the fellows with the core concepts in surveillance. It covered the development and evaluation of a surveillance system as well as key aspects of the analysis of surveillance data.

#### **Multivariable Analysis Module**

The module deepened the fellows' statistical skills by covering various aspects of multivariable analysis, confounding and effect modification. The module introduced a variety of regression methods that can be applied to surveillance data analysis and it also provided the basis on which the Time Series Analysis module could build.

#### **Time Series Analysis module**

The module prepared the fellows for more in-depth analysis of surveillance data, covering topics such as smoothing, trends, periodicity, outbreak detection, forecasting, assessing the impact of interventions, and multilevel modelling.

### ***Educational outcome***

Elina has been actively involved in the COVID-19 pandemic response through the above-mentioned surveillance activities. She has gained valuable experience in setting up and developing a surveillance system, adhering to legal obligations and ethical principles regarding data protection and confidentiality, managing and analysing surveillance data, and using surveillance data for decision-making, protocol development, reporting and manuscript writing.

## **2. Applied public health research**

### ***Pertussis epidemiology and impact of the childhood pertussis booster vaccinations, Norway, 1998–2019***

Supervisors: Anneke Steens, Anja Bråthen Kristoffersen, Håkon Bøås, Didrik Vestrheim

The acellular pertussis vaccine has been used in the Norwegian national immunisation programme since 1998. Following an increase in pertussis incidence in all age groups, booster doses were introduced for 7 to 8-year-olds in 2006, and for 15 to 16-year-olds in 2013/2014. We assessed the impact of the booster doses on pertussis incidence in different age groups.

We included all pertussis cases notified to the Norwegian Surveillance System for Communicable Diseases from 1998 to 2019. We calculated annual incidence rates (IR, per 100 000 population) by age group. We estimated

average annual changes in incidence rates (incidence rate ratios (IRRs) for each age group for the periods 2006 to 2012 and 2013 to 2019 using Poisson regression.

From 1998 to 2019, 74 675 cases of pertussis were notified. Coinciding with booster introduction, between 2006 and 2012, the IR decreased among 8 to 15-year-olds (from 433 to 199/100 000; IRR: 0.89; 95% CI: 0.88-0.90). A similar decrease was seen between 2013 and 2019 among 16 to 19-year-olds (from 171 to 77/100 000; IRR 0.84; 95% CI: 0.82-0.86). There was no significant change in IRs among children <1 year of age between 2006 and 2012 or 2013 and 2019. The IR decreased in both periods among adults aged 20 to 39 years and 40 years or older. Despite steady, high vaccination coverage, from 2013 to 2019 there was an increase in the IR among children aged 1 to 7 years (63 to 86/100 000; IRR 1.05; 95% CI: 1.03-1.07) and 8 to 15 years (88 to 122/100 000; IRR 1.08; 95% CI: 1.06-1.10).

Pertussis booster doses have offered direct protection in the targeted age groups. We also observed a decrease in incidence among adults, but not in infants. The recent increase in IRs among 1 to 15-year-olds warrants close monitoring and further evaluation of the vaccination schedule.

Elina was the primary investigator in this project. She wrote the protocol, contributed to obtaining ethical approval and applying for data, performed data cleaning and analysis, presented preliminary findings to EPIET/EUPHEM audiences, prepared and submitted an abstract, and prepared a manuscript for submission to a peer-reviewed journal.

### ***Training modules related to assignments/projects***

#### **EPIET/EUPHEM Introductory Course**

The module familiarised the fellows with the core concepts of operational and applied research. It covered the development of study protocols and the drafting of aims and objectives relevant to a national public health institute, as well as data analysis and presentation for the other modules to build on.

#### **Multivariable Analysis Module**

The module deepened the fellows' statistical skills by covering various aspects of multivariable analysis, confounding and effect modification. The module introduced a variety of regression methods that can be applied to data analysis in research projects and it also provided the basis on which the Time Series Analysis module could build.

#### **Time Series Analysis module**

The module prepared the fellows for more in-depth data analysis, covering topics such as smoothing, trends, periodicity, outbreak detection, forecasting, assessing the impact of interventions, and multilevel modelling. This module was useful for the project on pertussis, where time series analysis of the pertussis notifications supported the other analyses.

#### **Vaccinology module**

The module covered various aspects of vaccinology, including the impact and evaluation of vaccination programmes, investigation of and response to outbreaks of vaccine preventable diseases, adverse events after immunisation, measuring and improving vaccination coverage, barriers to vaccination uptake, and introduction of new vaccines. The entire module was very useful for the project on pertussis.

### ***Educational outcome***

Through this project, Elina developed competencies in protocol development, adhering to ethical principles regarding data protection and confidentiality, data management and analysis, abstract and manuscript writing, and project leadership.

## **3. Teaching and pedagogy**

### ***Mapping workshop using QGIS***

Elina organised a one-hour workshop on mapping with QGIS at the NIPH for EPIET and EUPHEM fellows (cohorts 2019 and 2020) and EUPHEM alumni on 17 December 2020 using MS Teams. The workshop included a short refresher on key concepts in mapping and a practical exercise where fellows were guided through the process of mapping the incidence of a selected infectious disease by county in Norway in 2020. The participants found the workshop very useful.

### ***Case study on a COVID-19 outbreak among foreign temporary workers of an industrial plant in a small municipality in Norway***

Following a real-life COVID-19 outbreak in Norway, a small team at the NIPH, including Elina, developed a case study targeted at relevant actors in Norwegian municipalities. Upon request from the ECDC, the case study was adapted for the EPIET/EUPHEM audience and used as a communication exercise (2 h) during the online Rapid Assessment and Survey Methods Module in May 2021. Elina was one of the facilitators.

### ***Training modules related to assignments/projects***

#### **EPIET/EUPHEM Introductory Course**

The module familiarises the fellows with the principles of adult education, including development and facilitation of

training activities. It was also the first of many modules where case studies were used as a teaching method. This provided a valuable introduction to case studies as tools for teaching.

### Outbreak Investigation Module

Among other topics, the module introduced fellows to mapping and spatial analysis. The teaching assignment on mapping was based on knowledge and skills acquired during this module.

### Educational outcome

Elina developed competencies in planning and organising a workshop, as well as developing and facilitating a case study.

## 4. Communication

### Publications related to the EPIET fellowship

1. **Seppälä E**, Kristoffersen AB, Bøås H, Vestrheim DF, Greve-Isdahl M, De Blasio BF, Steens A. Pertussis epidemiology including direct and indirect effects of the childhood pertussis booster vaccinations, Norway, 1998-2019. (in preparation)
2. **Seppälä E**, Tønnessen R, Veneti L, Paulsen TH, Steens A, Whittaker R, Bragstad K, Berild JD, Løvlie AL, Naseer U, MacDonald E, Vold L. COVID-19 cases reported to the Norwegian Institute of Public Health in the first six weeks of the epidemic. *Tidsskr Nor Laegeforen*. 2020 Dec 11;140(18). English, Norwegian. doi: 10.4045/tidsskr.20.0525. PMID: 33322882.
3. Whittaker R, Grøslund M, Buanes EA, Beitland S, Bryhn B, Helgeland J, Sjøflot OI, Berild JD, **Seppälä E**, Tønnessen R, Telle K. Hospitalisations for COVID-19 - a comparison of different data sources. *Tidsskr Nor Laegeforen*. 2020 Dec 14;140(18). English, Norwegian. doi: 10.4045/tidsskr.20.0759. PMID: 33322870.
4. Veneti L, **Seppälä E**, Storm ML, Valcarcel Salamanca B, Buanes EA, Aasand N, Naseer U, Bragstad K, Hungnes O, Bøås H, Kvåle R, Golestani K, Feruglio S, Vold L, Nygård K, Whittaker R. Increased risk of hospitalisation and intensive care admission associated with infection with SARS-CoV-2 variants B.1.1.7 and B.1.351 in Norway, December 2020 – May 2021 (2021). Available at SSRN: <https://ssrn.com/abstract=3866560> or <http://dx.doi.org/10.2139/ssrn.3866560> (under review).
5. Whittaker R, Kristoffersen AB, **Seppälä E**, Valcarcel Salamanca B, Veneti L, Storm ML, Bøås H, Aasand N, Naseer U, Bragstad K, Hungnes O, Kvåle R, Golestani G, Feruglio S, Vold L, Nygård K, Buanes EA. Trajectories of hospitalisation for patients infected with SARS-CoV-2 variant B.1.1.7 in Norway, December 2020 – April 2021. *Journal of Infection*, 2021. ISSN 0163-4453, <https://doi.org/10.1016/j.jinf.2021.07.025>.
6. Funk T, Innocenti F, Gomes Dias J, Nerlander N, Melillo T, Gauci C, Melillo J, Lenz P, Sebestova H, Slezak P, Vlckova I, Berild JD, Mauroy C, **Seppälä E**, Tønnessen R, Mossong J, Masi S, Huiart L, Vergison A, Culle G, Murphy N, O'Connor L, O'Donnell J, Mook P, Pebody R, Bundle N. Age specific associations between underlying health conditions and hospitalisation, death and in-hospital death among confirmed COVID-19 cases: a multi-country study. (submitted)
7. Starrfelt J, Danielsen AS, Kacelnik O, Børseth AW, **Seppälä E**, Meijerink H. Vaccine effectiveness of COVID-19 vaccines among residents and staff of long-term care facilities in Norway. medRxiv 2021.08.08.21261357; doi: <https://doi.org/10.1101/2021.08.08.21261357>
8. **Seppälä E**, Veneti L, Bragstad K, Hungnes O, Starrfelt J, Taxt A, Wattle SV, Meijerink H. Vaccine effectiveness against infection with the Delta (B.1.617.2) variant, Norway, April to August 2021 (under review)

### Reports

9. Folkehelseinstituttet. Ukerapporter for koronavirus og covid-19 (Weekly reports for coronavirus and COVID-19). Available from: <https://www.fhi.no/publ/2020/koronavirus-ukerapporter/>

### Conference presentations

10. **Seppälä E**, Lund HM, MacDonald E, Naseer U, Helleve A, Bjørnstad P-O, Berendtsen H, Lange H. Outbreak of *Shigella sonnei* linked to imported snap peas, Norway, November-December 2019. ESCAIDE; 2020 November 24–27; online. (poster)
11. **Seppälä E**, Kristoffersen AB, Bøås H, Vestrheim DF, Greve-Isdahl M, De Blasio BF, Steens A. Pertussis epidemiology including direct and indirect effects of the childhood pertussis booster vaccinations, Norway, 1998-2019. ESCAIDE; 2021 November 16–19; online. (oral presentation)

## Other presentations

12. Outbreak of *Shigella sonnei* linked to imported snap peas, Norway, November-December 2019 – Annual meeting of the National Food Safety Committee (Matsmittekomiteen), 3 December 2020
13. Pertussis epidemiology and impact of the childhood pertussis booster vaccinations, Norway, 1998-2019 – Nordic Mini Project Review Module, 24 March 2021
14. Influenza surveillance in Finland – Weekly meeting of the influenza surveillance group at the NIPH, 30 June 2021

## Other training modules

15. 1. Nordic Mini Project Review Module, 23 and 24 March 2021

## 5. Other activities

1. Weekly shifts as epidemic intelligence duty officer, March 2020–January 2021
2. Preparing and presenting national and global updates on COVID-19 epidemiology, as well as media and literature updates in daily internal outbreak meetings, February to March 2020
3. Monitoring the international COVID-19 situation to inform travel restrictions and quarantine requirements, July to August 2020
4. Participating in the surveillance of COVID-19-associated deaths, April to July 2020; participating in setting up a population-based cohort study assessing the effectiveness of COVID-19 vaccines (particularly regarding outcomes involving severe COVID-19), April to August 2021 [7-8]
5. Participating in weekly influenza surveillance meetings, November 2019 to February 2020 and September 2020 to June 2021; development of new surveillance systems for influenza and other respiratory pathogens, May to August 2021

## 6. EPIET/EUPHEM modules attended

1. EPIET/EUPHEM Introductory Course, 23/09/2019 – 11/10/2019, Spetses, Greece
2. Outbreak Investigation Module, 09/12/2019 – 13/12/2019, Nicosia, Cyprus
3. Multivariable Analysis Module, 20/04/2020 – 24/04/2020 and 18/03/2021, online
4. Project Review Module, 24/08/2020 – 27/04/2020, online
5. Time Series Analysis Module, 25/01/2021 – 29/01/2021, online
6. Rapid Assessment and Survey Methods Module, 17/04/2021 and 05/05/2021 – 06/05/2021, online
7. Vaccinology Module, 14/06/2021 – 18/06/2021, online

## 7. Other training

1. Norwegian lessons, October 2019 – December 2020

## Discussion

### Coordinator's conclusions

One of the main goals of the EPIET programme is for fellows to develop core competencies in field epidemiology. This is achieved mainly through project or activity work, but also by participating in training modules and applying epidemiological methods to provide evidence to guide public health interventions for communicable disease

prevention and control. This report summarises all activities and projects conducted by Elina during her two-year EPIET fellowship (cohort 2019) as an EU-track fellow at the Norwegian Institute of Public Health (NIPH).

During the fellowship, Elina successfully found suitable projects that allowed her to further develop her competencies and skills. She especially gained a lot of experience in public health and surveillance, contributing a lot to the (Norwegian) response to the COVID-19 pandemic. She markedly improved her skills in teaching, developing a case study that was also successfully used for an EPIET module, and gave several presentations to different audiences, making her more confident in scientific oral communication. She participated in three outbreak investigations in different settings and her research project allowed her to improve her skills in data analysis.

It was a great pleasure working with Elina as her frontline coordinator. I have found her to be highly motivated and very diligent. I am pleased that Elina will continue to work at NIPH following graduation. This will provide an excellent opportunity for her to build further on her competencies and support the COVID-19 response in Norway. I wish her all the very best for her future career.

## Supervisor's conclusions

During her fellowship, Elina has shown to be a sharp, helpful, and hard-working person. She has taken on a wide variety of tasks and activities, resulting in outputs that have added to national and international public health activities. She became involved in response activities as soon as the COVID-19 pandemic started and has contributed a lot to both the establishment of the initial COVID-19 surveillance system as well as the subsequent surveillance, including participation in epidemic intelligence. Part of this work has also been shared internationally through publication of results in peer-reviewed journals. Elina has developed teaching material that has been used inside the institute and during one of the EPIET courses. Her research activity on pertussis has shown the effect of adding a booster vaccination on the epidemiology of the Norwegian population, which is important knowledge for the evaluation of the national immunisation programme in Norway, but which also provides useful knowledge for other countries.

In her projects and activities, Elina collaborated with supervisors and co-workers from several departments of the institute in a very friendly way. Her useful contribution to the institute and public health has led to her getting a job at the institute to continue her good work on, among other topics, surveillance of respiratory diseases.

## Personal conclusions of fellow

The fellowship has been a wonderful and enriching experience. I came into the programme with some experience in infectious disease preparedness and response and infectious disease research. I was looking to fill gaps in my competencies, first and foremost surveillance, outbreak investigations and data analysis, as well as to learn more about a wider range of diseases. These two years have offered me the opportunity to do this. Being closely involved in the response to the COVID-19 pandemic has been a unique and extremely valuable experience, and it has allowed me to develop a solid set of skills in surveillance and data analysis. I had the great pleasure of participating in three outbreak investigations, all of which occurred in different settings. My research project has broadened my knowledge of vaccine-preventable diseases and enhanced my skills in data analysis. The teaching assignments have encouraged me to step outside of my comfort zone, teaching me valuable lessons about the specific characteristics of adult education. The modules provided a good theoretical basis and encouraged me to explore and apply the methods to the work I conducted on site. Being an EPIET fellow at the NIPH provided numerous opportunities for professional growth and I am truly grateful for everything I have experienced.

## Acknowledgements of fellow

First and foremost, I would like to express my warmest and most heartfelt thanks to my site supervisor Anneke Steens, who has been an exemplary supervisor and friend during the fellowship. I would also like to extend warm thanks to Didrik Vestrheim, who took over as my site supervisor during Anneke's leave. Even during the busiest times of the pandemic, both Anneke and Didrik were always approachable, open to discussion, and an immense pleasure to work with and learn from. I would also like to thank the frontline coordinators I had throughout my fellowship, Lisa Hansen, Mari Morgan, and Tanja Charles, for all their guidance and support. A big thanks to Emily MacDonald and Pawel Stefanoff for their facilitation of the fellowship programme at the NIPH. I would also like to thank my other project supervisors for supporting me and sharing their expertise in the various projects I had. A big thank you goes to the EPIET/EUPHEM family and other close colleagues at the NIPH. The support, both professional and private, has been of utmost value during the pandemic. Thanks as well to the NIPH and ECDC for making the fellowship programme possible. It has been a great pleasure to learn and develop alongside other like-minded fellows, and it was an absolute joy to be a part of the 2019 cohort.