FELLOWSHIP REPORT

Summary of work activities

Anne Bernadou
Intervention Epidemiology path (EPIET)
Cohort 2017

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 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;
- To develop response capacity for effective field investigation and control at national and community level to meet public health threats;

This portfolio does not represent a diploma. Fellows receive a certificate listing the theoretical modules attended and the 23-month training. Additionally, if all training objectives have been met, they receive a diploma.

Stockholm, September 2018

- 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.

Pre-fellowship short biography

Anne Bernadou has a Bachelor in biology and a master of public health from Bordeaux School of Public Health (ISPED). She started working at Santé publique France in 2011 located first in Limoges, then in Bordeaux in 2016.

Fellowship assignment: Intervention Epidemiology path (EPIET)

In September 2017, Anne Bernadou started her EPIET fellowship at Santé publique France in the Regional office of Nouvelle-Aquitaine, Bordeaux, France, under the supervision of Stéphanie Vandentorren and Patrick Rolland. This report summarizes the work performed during this fellowship.

Methods

This portfolio demonstrates the competencies acquired during the ECDC Fellowship, EPIET path, by working on various projects, activities 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. 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 EPIET scientific guide[1].

Fellowship projects

1. Surveillance

Title: *Severe acute respiratory infections in French hospital to estimate the real burden on hospitals in influenza surveillance, 2012-2018*

In France, estimating the burden of seasonal influenza on hospital space and workload is restricted to influenza diagnoses in patients who present to emergency departments (ED) and are subsequently admitted. However, many hospitalizations for respiratory complications (e.g. pneumonia, bronchitis) occur without the virological confirmation of influenza, especially among the elderly. We aimed to estimate the burden of influenza on hospitals, from the proportion of severe acute respiratory infections (SARI) attributable to influenza, in order to improve the planning and response of the health authorities.

Using the national hospital discharge data from 1 July 2012 until 30 June 2018, we extracted SARI hospitalizations based on ICD-10 codes: J09-J11 (influenza codes) in main or associated diagnoses, and J12-J20 (pneumonia and bronchitis codes) in main diagnoses. We estimated influenza-attributable SARI hospitalisations, stratified by age group, as the number of influenza-coded hospitalisations plus the excess number of pneumonia- or bronchitis-coded hospitalisations using Serfling regression during influenza seasons.

Over six influenza seasons, we identified 533,456 SARI hospitalisations and estimated 227,154 influenza-attributable SARI hospitalisations (42%), which is approximately 9 times more than estimated by the current surveillance system.

[1] European Centre for Disease Prevention and Control. European public health training programme. Stockholm: ECDC; 2013. Available from: http://ecdc.europa.eu/en/publications/Publications/.pdf

Fifty-six percent had influenza as a diagnosis, 33% pneumonia and 11% bronchitis. The diagnoses varied among age groups: 10% of those 15 years and younger had pneumonia, versus 40% of those 65 years and older.

Compared to current influenza surveillance data, the analysis of SARI hospitalizations provided a much larger estimate of the true burden of influenza on hospitals, and allowed the assessment by age. This analysis should be implemented annually to better assess the socio-economic impact of influenza. These findings will inform the use of real-time SARI analysis from ED data, to measure the pressure on hospitals during the influenza season, and support better health services planning and interventions.

Role: *Main investigator*

Anne co-wrote the study protocol, analysed the data and wrote the study report (3).

Supervisor(s): *Bruno Hubert*

Title: *Chikungunya, dengue and Zika routine surveillance in Nouvelle-Aquitaine region, 2019 season*

Aedes albopictus, the vector of dengue and chikungunya, has been established in Nouvelle-Aquitaine Region since 2012. It introduced the risk of autochthonous transmission of these vector-borne infections due to the repeated introduction of the viruses by infected travellers returning from endemic regions.

In metropolitan France, the epidemiological surveillance of dengue, chikungunya and Zika viruses is based on the mandatory notification of probable and confirmed cases. Enhanced surveillance based on the immediate reporting of imported suspected clinical cases and active surveillance from a network of laboratories is conducted from 1 May to 30 November each year in the districts where Aedes albopictus is established. In 2019, 7/12 districts in Nouvelle-Aquitaine were involved in this surveillance (one more compared to 2018). In the beginning of the surveillance, we organized meetings with stakeholders to remind them about the surveillance objectives and inform them about updated procedures. During the season and at the end of the monitoring, we analysed and produced regular reports.

From 1 May to 6 August 2019, 48 suspected cases were notified in Nouvelle-Aquitaine. In total, four chikungunya cases, 38 dengue cases and one Zika case were confirmed. All of them were imported cases. We identified cases in six districts. The countries previously visited by these cases were Reunion Island (10 cases), Thailand (5 cases) and French Polynesia (4 cases); the other cases had travelled to different countries in Asia, South/Central America and Africa. In total, 26 entomological surveys were carried out by mosquito control operators and nine vector control treatments were carried out in four districts (Gironde, Dordogne, Landes and Lot-et-Garonne). We did not detect any autochthonous cases.

Preliminary data showed an increase in the number of cases compared to last year (16 cases in 2018), linked to a significant circulation of dengue and chikungunya viruses in 2019 in many countries. With the globally ongoing increasing burden of arboviruses, it is essential to inform travellers going to or returning from risk areas. Awareness regarding the diagnosis and surveillance of these arboviruses should also be increased amongst health professionals.

Role: *Co-investigator*

Anne participated in running the surveillance system, and she analysed the surveillance data and wrote monthly surveillance reports.

Supervisor(s): *Marie-Eve Raguenaud, Stéphanie Vandentorren*

2. Outbreak investigations

Title: *Large outbreak of measles in Nouvelle-Aquitaine Region, November 2017-March 2018*

Following the 2008-2012 measles epidemic, only sporadic measles cases were reported in Nouvelle-Aquitaine region (NA). In December 2017, clinicians notified four measles cases among Bordeaux University students and we observed an increase of measles cases in the same district at the time. We conducted an investigation to describe the outbreak, to identify clusters and to stop further transmission.

We included all cases reported through the mandatory notification system who lived in NA and developed rash with an onset between 30 October 2017 and 1 July 2018: clinical cases (possible), possible cases with an epidemiological link to a laboratory-confirmed case (probable) and laboratory-confirmed cases (confirmed). We interviewed cases to identify contacts at risk and detect clusters in high risk groups. Clusters were defined as at least three cases including one confirmed case in settings with high number of susceptible people and/or people at risk to develop complications.

In total, we identified 1,101 cases (466 possible, 199 probable, 436 confirmed). The incidence rate in NA was 18/100,000 population and reached 39/100,000 in the biggest district. Fifty-three percent were males and 58% were older than 15 years. Eighty-four percent were not vaccinated against measles as recommended. 248 cases required hospitalisation (23%), 98 suffered from complications (9%) and two died. In total, we identified 19 clusters (176 cases) among students, healthcare workers and vulnerable social population. We informed healthcare professionals and the public, and we ran catch-up and post-exposure vaccination campaigns.

This large measles outbreak occurred and spread within France due to low measles vaccine coverage- despite current vaccination recommendations. This resulted in many hospitalisations, complications, and even some deaths. Identification of clusters allowed the timely implementation of control measures and the limitation of further transmission. The increase of vaccination coverage above the 95% herd immunity threshold needs to be reinforced to achieve a high level of population immunity and measles elimination.

Role: *Main Investigator*

Anne wrote the outbreak investigation protocol, coordinated and participated in the investigations of clusters and analysed the surveillance data. She was the lead author on a rapid communication in Eurosurveillance on the results of surveillance and investigations (1). She made an oral presentation at the French National conference "Les Rencontres de Santé publique France" 2018 (7) and a poster presentation at the ESCAIDE 2018 (8) and at the French national conference of infectiology 2018 (6).

Supervisor(s): *Stéphanie Vandentorren, Denise Antona*

Title: *Foodborne outbreak in Rehabilitation centre in Nouvelle-Aquitaine Region, January 2019*

On 15 January 2019, the coordinating doctor of the rehabilitation centre in Creuse district reported to the Regional health agency in Nouvelle-Aquitaine (ARS) the occurrence of a suspected foodborne outbreak that involved 48 sick people after a common meal in a rehabilitation centre. We investigated to confirm the outbreak, estimate the magnitude of the outbreak, find the source of infection, and implement appropriate control measures.

We conducted a retrospective cohort study among residents and staff of a rehabilitation centre who have participated in the meal of 14 January noon, suspected meal of outbreak source. We defined a case as gastrointestinal illness in a resident or staff from 14 to 16 January 2019. We collected information on food exposures. We performed univariate analysis and estimated risk ratios with 95% confidence interval. We collected leftover food items and stool specimens for laboratory investigations.

We interviewed 67/103 (65%) of the residents (26) and staff (41). In total, we identified 46 cases: 19 cases among the residents (73% attack rate (AR)) and 27 cases among staff (66% AR). The risk was higher among those who consumed mashed potatoes (RR = 8.43; p-value<0.001) and chicken with mushrooms (RR = 7.54; p-value<0.001). No pathogens were identified from stools samples. The analysis of food items revealed unfavourable hygiene criteria with the presence of sulphate reducing anaerobic processes in chicken; the search for Clostridium perfringens was negative.

We confirmed that the foodborne outbreak was associated with the main course with strong clinico-biological arguments collected through epidemiological investigation, directed towards two possible agents: *Clostridium perfringens* or *Bacillus cereus*. Recommendations of good practices were recalled to the collective catering kitchen as the control of the temperature in the cold bake and confectionery area and the storage of food prepared in advance and kept in hot contact at a temperature from the end of their preparation to their final use.

Role: *Main Investigator*

Anne wrote the investigation protocol, developed the questionnaire, collected data together with the outbreak investigation team, developed a data entry mask on a web-platform, did the data analysis and wrote an outbreak investigation report (4).

Supervisor(s): *Stéphanie Vandentorren*

3. Applied epidemiology research

Title: *Spatial patterns, including socio-economic factors of tuberculosis incidence in France from 2008 to 2017*

Morbidity and mortality due to tuberculosis (TB) has globally decreased in France in recent decades, and France is now considered a low endemic country. However, foci of infection remain to exist in urban settings and in certain population groups, leading to an increase in the number of cases since 2017. Our study aimed to describe the geographical distribution of TB in France and to investigate the association between TB and socio-economic deprivation to guide local TB prevention and screening measures.

We conducted an ecological study using TB notifications at the municipality level from 2010 to 2017. We calculated smoothed standardised notification rates using spatial Bayesian models to identify high- and low-risk areas. We estimated the association between TB notification and the French deprivation index (FDep). Its component variables (the median household income, the percentage of high school graduates in the population aged 15 years and older, the percentage of blue-collar workers in the active population, and the unemployment rate) and other risk factor variables (e.g. the percentage of immigrants and the degrees of urbanization) were also identified and were included in the model.

Of the 39,454 TB notifications, 37,213 (94%) had a usable postal code (35,861 in metropolitan France and 1,352 in over-sea regions). Excluded TB cases were more likely to be man, from foreign countries and homeless. Analyses are ongoing to answer the study objectives.

Our results might help the regional public health agency and the regional tuberculosis control center to identify high notification rates of TB at local level to guide local TB prevention and screening measures and to prioritize Public Health actions among populations in need.

Role: *Main investigator*

Anne lead the working group, wrote the protocol (5), performed the data cleaning, and plans to analyse data and to submit a manuscript to a peer-reviewed journal (first author).

Supervisor(s): *Stéphanie Vandentorren*

Title: *Vaccination coverage of Diphtheria-Tetanus-Polio, Measles-Mumps-Rubella and Hepatitis B and associated factors in homeless children of the Paris area (France): results from the Observatoire of Samusocial of Paris survey, 2013*

The number of homeless families has increased considerably in last 20 years in France. However, the sociodemographic and health characteristics of this population are unknown to a large extent. We aimed to estimate vaccination coverages (VC) of diphtheria, tetanus, polio (DT-IPV), Measles-Mumps-Rubella (MMR) and hepatitis B (HepB) in homeless children, and identify associated factors related to insufficient VC.

We included children between 2 and 13 years of age from a cross-sectional survey conducted among homeless sheltered families in the greater Paris area (January to July 2013). A nurse conducted face-to-face interviews and checked their vaccination records. We analysed factors associated with insufficient vaccination, stratified by birthplace and vaccine, using Poisson regression.

In total 214 children born in France and 236 outside of France were included. The different VC were above 70% among children born in France and under 50% for those born outside France. Age, parents with French language difficulties and having changed domicile two or more times in the previous year were all significantly associated with insufficient VC among children born outside France. Children who had been in contact with the healthcare system at least once in the previous year had a significantly higher VC, irrespective of vaccine and birthplace.

Our findings show that homeless children born outside of France have a lower VC than homeless children born in France. Therefore, special attention should be paid to them, especially regarding opportunities for vaccination catch-up. European and French recommendations have recently been finalized and confirm the need for catch-up vaccination for children with undocumented VC.

Role: *co-investigator*

Anne analysed the data and was involved in writing an article as co-author (2).

Supervisor(s): *Stéphanie Vandentorren*

4. Communication

Publications

Publications in peer reviewed journals

1. **Bernadou A**, Astrugue C, Méchain M, Le Galliard V, Verdun-Esquer C, Dupuy F, et al. Measles outbreak linked to insufficient vaccination coverage in Nouvelle-Aquitaine Region, France, October 2017 to July 2018. Eurosurveillance. 2018;23(30):1800373.

Manuscripts submitted to peer reviewed journals (in review process)

2. Mansor-Lefebvre S, Le Strat Y, **Bernadou A**, Vignier N, Guthmann J, Arnaud A, et al. Coverage of Diphtheria-Tetanus-Polio, Measles-Mumps-Rubella and Hepatitis B vaccinations and associated factors among homeless children in Paris Region: Results from the ENFAMS survey; In progress.

Reports

3. **Bernadou A**, Fortin N, Hubert B. Estimation de l'impact des hospitalisations pour infections respiratoires aiguës basses (IRAB) en France, 2012-2018. Santé publique France, Internal report; In progress.
4. **Bernadou A**, Clarysse E. Foodborne outbreak in Rehabilitation centre in Nouvelle-Aquitaine Region, January 2019. Internal report, Santé publique France; 2019.
5. **Bernadou A**, Pelat C, Menudier L, Succo T, Vandentorren S. Etude de la distribution spatiale de la tuberculose en régions et de l'association entre l'incidence de la tuberculose maladie et les facteurs socio-économiques en France, 2008-2017. Internal protocol, Santé publique France; 2019.

Conference presentations

6. **Bernadou A**, Méchain M, Astrugue C, Delance S, Le Galliard V, Meurice L, et al. Epidémie de rougeole en Nouvelle-Aquitaine, Novembre 2017-avril 2018. Poster presentation at Jounées nationales infectieuses (JNI); 2018 June 13-15, Nantes.
7. **Bernadou A.** L'alerte au niveau de la Cire : l'exemple de l'épidémie de rougeole en Nouvelle-Aquitaine. Oral presentation at Les rencontres de Santé publique France; 2018 June 29-31, Paris, France.
8. **Bernadou A**, Astrugue C, Méchain M, Le Galliard V, Dina J, Antona D, et al. Large outbreak of measles due to low vaccine coverage in Nouvelle-Aquitaine Region, France, October 2017 to July 2018. Poster presentation at European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 2018 November 21-23, Saint Julian's, Malta.

Other presentations

9. Presentation of the tuberculosis study protocol to the scientific committee of project evaluation of Santé publique France in October 2018
10. Several presentations at regional stakeholder meetings about arboviruses surveillance

11. **Bernadou A**, Lefevre S, Raguenaud M, Sarlangue J, Fabre P, Vandentorren S, et al. Outbreak of multidrug-resistant Shigella sonnei infections in a primary school, Southwestern France, March 2017. Poster presentation at European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 2017 November 6-8, Stockholm, Sweden.
12. Lambert Y, Rolland P, Mouna L, Charron M, **Bernadou A**, Le Galliard V, et al. Relevance of sex ratio in the early detection of a foodborne hepatitis A outbreak in a context of epidemic among men who have sex with men, Bordeaux, France, June-July 2017. Poster presentation at European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 2018 November 21-23, Saint Julian's, Malta.

Other

13. **Bernadou A**, Lambert Y, Gache K. Cas groupés de Fièvre Q, CH Niort, avril-mai 2017. Saint-Maurice: Sante publique France; 2019. 30 p.

5. Teaching and pedagogy

Title: Course on surveillance and outbreak investigation, Bordeaux, France

In February and March 2019, Anne delivered a 2-hours lecture on public health surveillance and facilitated the 2-hours case study "Outbreak of gastrointestinal illness in 2011 in Warsaw, Poland" for approximately forty students in their 1st year of a MPH in Bordeaux School of Public Health (ISPED). The learning objectives for the surveillance lecture were to understand the different key surveillance concepts and types of surveillance.

Anne adapted the lecture of surveillance from the previous presentation. To ensure active participation, she started her surveillance lecture with a 30-minutes case study: "Monitoring of the outbreak of measles from data surveillance" and she also used examples from the French surveillance system to illustrate specific points (epi-curve, maps).

For the case study, she adapted a case study developed by the previous EPIET fellow, of which the learning objectives for the case study were to understand and implement the different steps of an outbreak investigation.

An evaluation of the whole training module was done by the teaching staff. Generally, the comments for Anne's session were positive.

Reflection

Giving this training session helped me to pass my knowledge. I also further developed my knowledge regarding some French surveillance systems. Starting the surveillance lecture with a case study made the course more interactive. I should allocate more time to present more examples to boost the remaining part.

It was the third time I facilitated the outbreak investigation case study. It is a good exercise to improve the skills of teaching. Students were interested and it was a good opportunity to tell them stories about my own experiences with outbreak investigations.

Title: IDEA course (International Course of Applied Epidemiology), Rennes, France

From 25 to 29 March 2019, Anne facilitated in the International Course of Applied Epidemiology (IDEA) in Rennes, France. IDEA is a 3-week introductory course to applied epidemiology. Participants included 42 French public health students and experienced professionals (29 participants for the 2nd and 3rd week). Most lectures were conducted during the 1st week, while the 2nd and 3rd weeks focus on a field survey entirely conducted by the participants. Anne facilitated during the second week.

She facilitated the following three case-studies: "SARS: early pandemic", "Outbreak of Haemorrhagic fever in Africa, 1976" and "Epidemiology of measles in France". Additionally, she updated and gave one lecture on Ebola virus to sum up the "Outbreak of Haemorrhagic fever in Africa, 1976" -case study and inform about international situation.

The main objective of the second training week was to set up and conduct a survey on the incidence and prevention of health risks associated with freshwater sport in Bretagne district. The specific learning objectives of the different workshops were to construct a protocol with objectives and data analysis plan, develop a questionnaire, and collect data in the field. Anne facilitated these activities.

An evaluation was done by the organisers of the training. Participants were satisfied by the clarity, quality and relevance of the lectures and cases studies. They appreciated the work and exchange in groups (between participants and facilitators). Regarding the survey, they were motivated by the fact that this is a real survey and learning by doing. However, some regretted the lack of time to assimilate and develop all the steps of the survey (questionnaire, analyses).

Reflection

The high level of knowledge and experience of students was challenging for me, and I spent time revising all the epidemiological concepts to be able to answer questions if needed.

I enjoyed and learned a lot by accompanying students to set up a study within a challenging time-frame (one week), from the protocol to the data collection. I appreciated to share the facilitating with some more experienced colleagues. It helped me to find the middle way: to guide the students into the right direction without giving them "the answer".

6. Other activities

Anne was regularly on-call duty for Santé publique France (3 days a month on average). In this context Anne cooperated with the local health authorities for the response to public health alerts (for example foodborne outbreaks, cluster of Q fever, heat wave alerts).

7. EPIET/EUPHEM modules attended

1. Introductory course, 25th of September to 13th of October 2017, Spetses, Greece
2. Outbreak investigation module, 4th to 8th of December 2017, Berlin, Germany
3. Multivariable analysis, 16th to 20th of April 2018, Nicosia, Cyprus
4. Rapid assessment and sampling module, 14th to 19th of May 2018, Athens, Greece
5. Project review module, 27th to 31st of August 2018, Lisbon, Portugal
6. Time series analysis module, 5th to 9th of November 2018, Brussel, Belgium
7. Vaccinology module, 24th to 28th of June 2019, Rome, Italy
8. Project review module, 26th to 30th of August 2019, Prague, Czech Republic

8. Other trainings

1. Molecular epidemiology applied to the monitoring and control of infectious diseases, 5th to 7th of March 2018, Paris, France
2. R training, 29th to 30th of November 2018, Paris, France

Discussion

Supervisor's conclusions

Anne Bernadou achieved all the EPIET competencies successfully. Anne has made good use of her EPIET learning experience. She has been able to put her educational objectives of research and surveillance into practice for the benefit of the Nouvelle-Aquitaine Cell and also at the national level. She delivered high-quality epidemiological work, resulting in relevant contributions to public health in France. She developed skills and competencies and used them for the scientific and partnership at the national office during the tuberculosis and SARI studies, and at the regional office during the measles investigation, the vaccination coverage among homeless children, and during her routine surveillance works. Her team spirit, her commitment, and her teaching skills have been considerably strengthened during this period. Anne also improved her communication capacities in terms of oral and written scientific communication and teaching. For Anne the EPIET fellowship generated a solid epidemiological background and the skills required to coordinate future projects as well as a higher level of confidence to carry out large-scale projects in public health for Santé publique France.

Coordinator's conclusions

Anne, who has a Master's degree in Epidemiology and a Bachelor's degree in nutrition, has been working in public health at sub-regional and regional level in France since 2009.

Throughout her fellowship, Anne has improved her epidemiological skills, especially regarding teaching, research methods, statistical analysis and scientific communication.

Anne was involved in different outbreak investigation including a large measles outbreak in Nouvelle-Aquitaine and was able to communicate the findings in Eurosurveillance. As MS-Track fellow she continued to be involved in routine disease-specific and syndromic surveillance activities. She studied severe acute respiratory infections in

French hospitals to estimate the real burden of influenza on hospitals. For her applied research project, she looked into spatial patterns and socio-economic factors of tuberculosis incidence in France.

Anne is an excellent communicator and networker and enjoyed the scientific exchange with her peers, facilitators and coordinators. She was often able to put skills that she learnt during EPIET & EUPHEM training modules directly into practice. Through the fellowship she became more involved and pro-active in her institute, and more confident in speaking in front of people and having scientific discussions.

She will stay in her previous position and continue with many of her previous activities. In addition, she will be the regional lead for surveillance of dengue and *Chikungunya* and will have more project responsibilities. I wish her great success in the future.

Personal conclusions of fellow

This programme has been a very enriching experience both professionally and personally. The program provided me with the unique opportunity to learn new tools of teaching, to learn new statistical methods and deepen my analytic skills, improve my scientific reporting and writing, and practice new software programs. Moreover, this programme allowed me to strengthen my epidemiological skills especially in the field of applied epidemiological research. I now feel much more confident setting up studies, carrying out analyses or investigating outbreaks than I did two years ago. This programme also allowed me to present my work at the national and international level and, thus, to gain confidence in scientific writing and communication. Overall, the fellowship allowed me to expand my knowledge and competencies in infectious diseases and to strengthen my ability to respond to a broader variety of public health issues.

Acknowledgements of fellow

First, I would like to thank my supervisors Stéphanie Vandentorren and Patrick Rolland for giving me the opportunity to follow this training and for their great support during the fellowship, for their guidance and for the time they dedicated to me during these two years.

I would like to thank all my colleagues. I really appreciated all their support during the fellowship.

I also would like to thank Christian Winter, my front line coordinator, for his great guidance, availability and support during the fellowship. I would like to express my gratitude also to the EPIET & EUPHEM coordinators and the organization teams for ensuring the quality of this program and for providing highly valuable training modules.

Finally, I would like to thank EPIET/EUPHEM/FETP fellows for this great professional and personal experience we shared together.