

David Kelly

The European Programme for Intervention Epidemiology Training (EPIET), Cohort 2022
Santé publique France Paca Corse, France

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. The Administrative Decisions [ECDC/AD/2023/23](#) and [ECDC/AD/2023/06](#) govern the EU-track and MS-track, respectively, of the ECDC Fellowship Programme, field epidemiology path (EPIET) and public health microbiology path (EUPHEM).

Both curriculum paths provide training and practical experience using the 'learning by doing' approach at acknowledged training sites across the European Union/European Economic Area (EU/EEA). This final report describes the experiences and competencies the fellow acquired by working on various projects, activities, theoretical fellowship training modules, other modules or trainings, and international assignments or exchanges during the fellowship.

Pre-fellowship short biography

David Kelly is a medical doctor specialised in public health medicine from Ireland. He is a graduate of Trinity College University of Dublin and Ecole des hautes études en santé publique. Before starting the EU-track EPIET fellowship, David completed public health specialist training at the Health Protection Surveillance Centre, Department of Public Health HSE East, the Department of Health in Ireland, and the Integrated Health Services of the World Health Organization in Geneva. His previous work involved the investigation and control of outbreaks of Shiga toxin-producing *E. coli* (STEC), cryptosporidiosis, tuberculosis and hepatitis A in Ireland, and evidence review and risk assessment of transfusion-transmitted HIV and hepatitis B infection to inform changes in national blood donor policy.

Results

The objectives of the core competency domains were achieved partly through project and activity work and partly by participating in the training modules. Results are presented in accordance with the EPIET/EUPHEM core competencies, as set out in the ECDC Fellowship Manual¹.

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

1. Epidemiological investigations

1.1. Outbreak investigations

Investigation of a waterborne outbreak of cryptosporidiosis in Alpes-Maritimes, France, May to June 2023

Supervisors: Lauriane Ramalli, Pascal Chaud (Santé publique France cellule Paca-Corse)

Category: Food- and waterborne diseases

Aim: On 25 May 2023, the National Reference laboratory (NRL) for *cryptosporidium* alerted Santé publique France to a cluster of six cases of cryptosporidiosis in Alpes-Maritimes, France. We aimed to investigate the outbreak and implement control measures.

Methods: Santé publique France requested all local laboratories to report new *cryptosporidium* detections and interviewed all cases by telephone. The regional environmental health authority collected drinking water samples for *cryptosporidium* analysis. *Cryptosporidium* isolates were referred to the NRL for genotyping.

Results: 31 confirmed cases were linked to the outbreak, across five neighbouring communes in Alpes-Maritimes. Median duration of symptoms was 10 days, with hospitalisation of 1 case. Date of symptom onset ranged from 1 May to 10 June 2023, and cases peaked on 24 May. 30/31 (97%) of cases resided or worked in one of the five communes served by a common water supply in an agricultural zone. 30/31 (97%) cases consumed tap water. All 26 isolates genotyped were *Cryptosporidium parvum*, of which 25 shared an identical IIdA22G1 genotype. Presence of *cryptosporidium* oocysts was detected in five drinking water samples. Drinking water restrictions implemented on 2 June for 18,000 residents were maintained for 45 days pending installation of UV filters. No further cases were reported after these public health measures were implemented.

Public health implications: Prompt signalling and investigation of cases of cryptosporidiosis enabled rapid detection and control of this waterborne outbreak. Combined epidemiological, microbiological and environmental investigations informed public health response measures and strengthened future preparedness in this region prone to seasonal waterborne outbreaks of cryptosporidiosis.

Role: Lead co-investigator. David interviewed cases on symptoms, and waterborne, food-borne and animal risk exposures for cryptosporidium. He was responsible for coordinating the input of and analysis of case-based surveillance data into a database by a team of epidemiologists and public health doctors, and produced bi-weekly situation reports for the six-week duration of the outbreak. He presented an epidemiological overview at regional health authority meetings and with local stakeholders including the county council and elected representatives of the affected communes in June 2023 to inform the outbreak control measures for assuring water quality.

Investigation of a community and nosocomial pseudo-outbreak of pertussis in Vaucluse, France, June to July 2023

Supervisors: Laurence Pascal, Pascal Chaud (Santé publique France Paca-Corse)

Category: Vaccine-preventable diseases, respiratory disease

Aim: On 6 July 2023, a hospital in Vaucluse, France, reported nine nosocomial cases of *Bordetella parapertussis* to the regional health authority. Santé publique France investigated this alert, given the unexpected rise in cases.

Methods: Cases were defined as laboratory-confirmed qPCR detection of *B. parapertussis* (IS1001 target) in a person residing in Vaucluse area, tested using nasopharyngeal swabs and qPCR (*B. parapertussis* R-GENE® and Rotor-Gene Q platform, from 1 June 2023). A sample of positive specimens underwent confirmatory qPCR testing (*B. parapertussis* R-GENE® and LC480-II platform) at the National Reference Centre (NRC) for *Bordetella* at Institut Pasteur, Paris.

Results: 136 specimens tested qPCR-positive for *B. parapertussis* from 24 June to 15 July 2023. Only 15 cases (11%) were children. Among 26 case-patients interviewed, few had pertussis-like symptoms. No other laboratories in Vaucluse reported positive *B. parapertussis* specimens since 1 April 2023. Local cycle threshold (Ct)-values for 131 positive specimens ranged from 31.3–36.5 (mean 33.7, standard deviation 1.1). The NRC retested four positive specimens, and all had Ct-values >39. Testing of sterile swabs from the same hospital batch detected *B. parapertussis* with IS1001 Ct-values >39. A materiovigilance enquiry was initiated in July 2023.

Public health implications: The elevated and homogeneous Ct-values, atypical clinical presentation, absence of positive specimens from other laboratories and detection of *B. parapertussis* in sterile swabbing materials, strongly indicated false positives. Regional and national health authorities, advised by microbiologists, concluded a pseudo-outbreak due to contamination of the swabs used. This investigation calls for cautious interpretation of Ct-values, considering epidemiological and clinical contexts, when validating epidemic alerts.

Role: Lead investigator. David led the outbreak investigation and was responsible for coordinating the collection and input of case-patient and laboratory data. He analysed case-based data using R software to produce epidemic curves,

mapping of the outbreak cases and descriptive analysis of cases. He produced weekly situation reports and provided interpretation of epidemiological and laboratory findings to guide the investigation for hospital, local laboratory, national reference laboratory and regional public health authority stakeholders. He liaised with the national reference laboratory for bordetellosis at Institut Pasteur for validation of sample positivity, and the Regional public Health authority to conclude a likely pseudo-outbreak which prompted initiation of a materiovigilance enquiry by the French National Medication and Health Devices Safety Agency (ANSM) and standing down of the outbreak control measures. He presented the investigation as an oral poster presentation at the European Scientific Conference on Applied Infectious Disease Epidemiology ([ESCAIDE conference 2023](#)) in Barcelona, Spain, and prepared the oral presentation at [Journées Nationales d'Infectiologie 2024](#) in Deauville, France.

Investigation of an outbreak of gastroenteritis due to norovirus linked to a food truck premises at a volleyball tournament in Bouches-du-Rhône, France, May 2023

Supervisors: Clémentine Calba, Pascal Chaud (Santé publique France Paca-Corse)

Category: Food- and waterborne diseases

Aim: On 9 May 2023, the Marseille hospital ambulance reported several cases of vomiting and diarrhoea among participants at a three-day volleyball tournament in Bouches-du-Rhône. We aimed to investigate the outbreak source.

Methods: A case finding exercise was conducted using an online questionnaire of food and beverage consumption issued by email to all participants by Santé publique France via the tournament organiser on 9 May 2023. A cohort study analysis was conducted using the data collected. Attack rates among exposed and non-exposed participants, and relative risk were calculated by univariate logistic regression for each food item. Ill participants were advised to provide stool samples for microbiological analysis.

Results: In total, 146/160 participants responded to the online questionnaire (91% response rate). 71/146 fulfilled the case definition for gastroenteritis linked to the tournament (attack rate=49%). Date of symptom onset ranged from 5 to 9 May 2023. Consumption of several food items served from a food truck were significantly ($p<0.01$) associated with illness: chicken (RR=2.2, 95% CI[1.4–3.8]), flan (RR=1.7, 95% CI[1.2–2.5]), vegetables (RR=1.6, 95% CI[1.1–2.2]), tomatoes (RR=1.8, 95% CI[1.3–2.4]), lasagne (RR=1.7, 95% CI[1.2–2.5]) and salad (RR=1.7, 95% CI[1.2–2.3]). Detection of norovirus was reported in a single stool sample. No environmental samples were available for analysis.

Public health implications: The results indicated a point-source food-borne outbreak of gastroenteritis, with several possible food-borne sources all served from the same food truck. The short incubation period, high proportion of vomiting among cases, and detection of norovirus provided strong evidence of norovirus being the causative agent.

Role: Lead co-investigator. David collected additional information about the suspected outbreak from the organiser of the tournament by telephone interview. He conducted a cohort study analysis and constructed epidemic curves using R studio from data collected from the online questionnaire. He discussed findings with Santé publique France epidemiologists and the regional public health department to decide on the likely source and transmission vehicle for the outbreak. He drafted the interpretation and conclusion of the epidemiological report sent to the regional health authority: a likely food-borne outbreak of norovirus propagated by a food handler on site.

Investigation of a food-borne outbreak of gastroenteritis linked to a staff canteen in Vaucluse, France, May 2024

Supervisor: Lauriane Ramalli (Santé publique France Paca Corse)

Category: Food- and waterborne diseases

Aim: On 6 May 2024, the occupational health unit of the Vaucluse civil service reported a number of cases of gastroenteritis among staff who frequented the canteen of a training centre in Vaucluse. We aimed to investigate the outbreak source.

Methods: An online questionnaire of food and beverage consumption was issued to all staff via email by Santé publique France the same day. A case-control study analysis was conducted using the collected data. Attack rates among exposed and non-exposed participants, and odds ratios were calculated for each food item using univariate logistic regression.

Results: In total, 20 staff responded to the online questionnaire (response rate unknown). 13/20 fulfilled the case definition for gastroenteritis defined as diarrhoea or vomiting within 48 hours of consuming the canteen meals served at 13:00 and 18:00 on 3 May 2023. Date of symptom onset ranged from 18:00 on 3 May to 12:00 on 4 May 2023. No cases were hospitalised or provided stool samples. Consumption of rice (OR=14, [95% CI 1.8–170]) and turkey stew (OR=16, [95% CI 1.7–390]) were both significantly ($p<0.05$) associated with illness. Environmental sampling of leftover food did not detect any presence of bacterial or viral pathogens.

Public health implications: The results indicated a point-source food-borne outbreak of gastroenteritis, linked to the communal canteen meals served on 3 May 2024. The short incubation period <24 hours and diarrhoeal illness

without vomiting, suggested a pre-formed bacterial toxin as the likely causative pathogen. This hypothesis was strengthened by possible inadequate reheating and reserving of food served at the 13:00 meal.

Role: Lead investigator. David designed the online e-TIAC questionnaire and organised rapid dissemination to staff. He conducted the case-control study analysis of data collected from the online questionnaire using R studio software. He prepared a descriptive analysis of all cases, and calculated attack rates and odds ratios for each food exposure. He constructed the epidemic curve by time and date of symptom onset. He discussed the epidemiological and environmental results with the regional public health department to decide on the likely source and transmission vehicle for the outbreak.

1.2. Surveillance

Estimation of childhood vaccination coverage for 11 mandatory vaccines using school vaccination records as a source of surveillance data in Alpes-Maritimes, France in 2020, 2021 and 2022

Supervisors: Lauriane Ramalli, Clémentine Calba (Santé publique France Paca-Corse)

Category: Vaccine-preventable diseases

Aim: In response to suboptimal vaccination coverage rates, France implemented a vaccination mandate in January 2018 for 11 childhood vaccines against diphtheria-tetanus-polio (DTP), pertussis (PER), haemophilus influenzae B (HIB), hepatitis B (HEPB), measles-mumps-rubella (MMR), pneumococcal (PCV) and meningococcal C (MENC) infection. We evaluated if the vaccine mandate had any impact on vaccination coverage and on geographical disparities among schoolchildren born in 2017, 2018 and 2019 in Alpes-Maritimes, France.

Methods: The Alpes-Maritimes council collects annual school vaccination records of children aged 3–4 years. We defined overall vaccination coverage as having received all age-appropriate doses according to the French National vaccine schedule, excluding MENC. We compared the coverage for each vaccine and overall vaccination coverage between birth cohorts using a chi-square test. We estimated the median overall vaccination coverage of the communes in Alpes-Maritimes and calculated the interquartile range to assess geographical disparities.

Results: In total 9,584, 11,429 and 9,299 vaccination records were collected for schoolchildren born in 2017, 2018 and 2019. Comparing children born in 2017 versus 2019, vaccination coverage increased significantly ($p < 0.001$) for HEPB (88.2% to 96.8%), MMR (88.1% to 94.1%) and PCV (91.3% to 95.7%), and remained unchanged for DTP, PER and HIB. Overall vaccination coverage increased significantly from 75.9% to 82.8% ($p < 0.001$). Median overall vaccination coverage of communes progressively increased (74.3% to 83.3% to 88.3%), while the interquartile range decreased (16.9% versus 14.7% versus 13.8%) from 2017 to 2019.

Public health implications: Following the 2018 vaccination mandate, vaccination coverage among schoolchildren aged 3–4 years increased while geographical disparities in vaccination coverage reduced in Alpes-Maritimes, France.

Role: David validated and cleaned three datasets each containing approximately 10,000 school vaccination records from the 2020, 2021 and 2022 school years. He analysed the temporal trend in vaccination uptake between three birth cohorts and mapped vaccination coverage rates of the communes of Alpes-Maritimes, and utilised mapping software to provide visual indicators of geographical disparities. He presented the findings to the Alpes-Maritimes council authority stakeholders responsible for school vaccination records and the Regional Health Authority of Provence-Alpes-Cote-d'Azur tasked with vaccination strategy and discussed the findings. He authored and summarised the findings in an article submitted to the *Bulletin épidémiologique hebdomadaire* journal of Santé publique France, and an abstract accepted for oral presentation at the ESCAIDE 2024 conference.

Surveillance and reporting of an ongoing dengue epidemic in the French Caribbean islands of Guadeloupe, Martinique, Saint Martin and Saint Barthélemy, October to November 2023

Supervisors: Lucie Léon, Jacques Rosine, Mathilde Melin (Santé publique France Antilles)

Category: Emerging and re-emerging diseases including vector-borne diseases

Aim: During week 30 (end of July) of 2023, an epidemic of dengue cases was declared in Guadeloupe and Martinique, requiring overseas deployment of a field epidemiologist to support the surveillance system. The aim was to provide on-site epidemiological support to the French Caribbean team of Santé publique France.

Methods: The fellow coordinated the surveillance of the dengue epidemic from 12 October to 17 November 2023 in collection, analysis, and interpretation of syndromic, virological and hospital surveillance indicators to inform the epidemic risk assessment and response.

Results: In Guadeloupe, the epidemic peaked during week 38 (September) of 2024 reaching 860 weekly clinical cases. In Martinique, the epidemic peaked during week 38 (September) of 2024 reaching 1,010 weekly clinical cases. As of week 45 (November), a total of 31 severe cases with 7 dengue-related deaths were reported in

Guadeloupe, and a total of 19 severe cases with 6 dengue-related deaths in Martinique. Clinical cases continued to rise to 170 weekly cases in Saint Martin and to 83 weekly cases in Saint-Barthélemy by week 45 (November) of 2023. The epidemic surveillance alert and response (PSAGE) level for Martinique and Guadeloupe remained in epidemic phase 4 (confirmed epidemic), while Saint-Martin and Saint Barthélemy entered epidemic phase 3 (epidemic phase) during week 44 (November) of 2024. DENV2 was confirmed as the epidemic serotype circulating in all four French Caribbean islands.

Public Health implications: The French Caribbean islands experience cyclical epidemics of dengue. Its widespread transmission impacts hospital admissions of severe dengue cases, requiring a sensitive surveillance system and timely provision of epidemiological reports to inform preparedness and response measures.

Role: David analysed syndromic, virological and hospital surveillance indicators for dengue as part of the integrated surveillance system. He was responsible for coordinating the production of weekly integrated epidemiological situation reports for the four French Caribbean territories from 15 October to 17 November 2023, published online by Santé publique France. He provided epidemiological inputs for presentation at regional public health council meetings to inform the escalation to epidemic phase control measures on the island territories of Saint Martin and Saint Barthélemy.

A multi-country description and comparison of national surveillance systems and response measures for Aedes-borne diseases in three countries in southern Europe (France, Italy and Portugal)

Supervisors: Lauriane Ramalli, Clémentine Calba, Florian Franke (Santé publique France Paca-Corse), Tanja Charles (EPIET training programme)

Category: Emerging and re-emerging diseases including vector-borne diseases

Aim: Southern Europe is increasingly colonised by *Aedes albopictus* with increasing incidence of autochthonous dengue in France and Italy, and imported cases of dengue in Portugal in recent years. We aimed to describe and compare *Aedes*-borne diseases and vector surveillance systems and response measures in place across France, Italy, and Portugal in order to improve surveillance, prevention, preparedness, and response in southern Europe.

Methods: We performed a benchmarking analysis to systematically describe and compare the different systems. We collected data from key-informant interviews, national guidelines and reports, and scientific literature using a standardised questionnaire adapted from the ECDC framework.

Results: All countries have an integrated surveillance system for *Aedes*-borne diseases (dengue, chikungunya and Zika viruses) and share similarities in surveillance type, geographic coverage, and case definitions. Differences mainly pertain to event-based and active surveillance activities. Geographic coverage of vector surveillance is national in France and Portugal, and regional in Italy. In response to autochthonous transmission, all countries implement active case-finding and blood safety protocols, whilst France and Italy strongly rely on vector control. Upon vector detection in non-colonised areas, all countries implement ad-hoc entomological surveillance on vector control, and Portugal also conducts xenomonitoring.

Public health implications: Surveillance systems in France, Italy, and Portugal exhibit similarities, yet their response measures vary, reflecting historic differences in national epidemiological and entomological risk. Collaboration between European countries can facilitate shared best practices in surveillance and response to *Aedes*-borne diseases. Risk-based surveillance, considering national and cross-border epidemiological and entomological situations, can strengthen preparedness and early warning for *Aedes*-borne diseases in Europe.

Role: Along with EPIET fellows Max Fotakis (Istituto Superiore di Sanità, Italy) and Berta Grau-Pujol (Direção-Geral da Saúde, Portugal), David jointly coordinated the cross-border project between the EPIET training sites of public health institutes in France, Italy and Portugal. He drafted the original project proposal to outline the scope and objectives of the project. He contributed to adapting and validating the ECDC framework questionnaire used to describe the human surveillance systems. He conducted key informant interviews with regional and national epidemiologists and entomologists at Santé publique France to complete the questionnaire framework to describe both the epidemiological (human) and the entomological (vector) arbovirus surveillance systems in France using the agreed benchmarking criteria. David co-authored and reviewed the abstracts accepted for presentation at the European Public Health 2024 conference in Lisbon. He drafted and reviewed the surveillance article submitted to the journal, *Eurosurveillance*.

2. Applied public health research

Health Mediation in Marseille: a cross-sectional study to evaluate the effectiveness of health mediation on vaccination uptake and cancer screening participation

Supervisors: Lauriane Ramalli, Florian Franke, Pascal Chaud (Santé publique France Paca-Corse)

Category: Vaccine-preventable diseases

Aim: Social determinants of health extend to knowledge, attitudes and participation in preventive actions such as vaccination and cancer screening. We aimed to estimate the attitudes, knowledge and participation in vaccination and cancer screening, among the urban population of Marseille experiencing social deprivation, for whom health mediation can serve as an evidence-based intervention.

Methods: We conducted a cross-sectional study of Marseille residents in September 2022 by interviewing 2,647 participants face-to-face on socio-demographic characteristics, awareness and participation in breast, cervical and colorectal cancer screening and knowledge and uptake of HPV vaccination. We tested the association between participation in cancer screening and uptake of vaccination with sociodemographic factors using logistic regression, at a significance level of 0.05.

Results: The reported participation rates in breast (51%), cervical (68%) and colo-rectal (31%) cancer screening are lower than participation rates in France. Knowledge of cervical (OR=4.9 [95% CI 3.5–6.9]) and colo-rectal (OR=7.3 [95% CI 4.3–13.4]) cancer screening and receipt of invitation to breast (OR=2.6 [95% CI 1.6–4.1]), cervical (OR=2.7 [95% CI 2.0–3.7]) and colo-rectal (OR=5.4 [95% CI 3.6–8.3]) cancer screening are significantly associated with participation. Knowledge of HPV vaccination is observed to be low (43% of females and 17% of males). The HPV vaccination coverage among females aged 18–35 years (24%) is low.

Public health implications: Health mediation to improve knowledge of cancer screening and HPV vaccination among the urban population of Marseille is a potential mean to increase sub-optimal participation rates and coverage.

Role: David reviewed the cross-sectional survey questionnaire, formulated the analysis plan and conducted the statistical analysis using R studio. He drafted two reports summarising the findings for Santé publique France and the Regional Public Health Authority of Provence-Alpes-Côte d'Azur. He drafted a letter outlining key recommendations to the Regional Public Health Authority for the promotion of vaccination and cancer screening in the urban population of Marseille. He co-authored a 40-page report of the cross-sectional study for publication on the SpF website. He reviewed the abstract accepted by the 2024 European Public Health (EPH) conference.

HPV vaccine awareness but not vaccine trust as the main determinant of HPV vaccination uptake in the urban female population of Marseille, France in 2022

Supervisors: Lauriane Ramalli, Florian Franke, Pascal Chaud (Santé publique France, Paca-Corse)

Category: Vaccine-preventable diseases

Aim: Universal HPV vaccination is a public health priority in France, recommended for adolescents aged 11 years since 2021. Vaccination uptake rates however remain sub-optimal in Marseille. We aimed to measure vaccination trust and awareness among the urban population of Marseille, to inform interventions for improving HPV vaccination uptake.

Methods: We conducted a cross-sectional study of Marseille residents in September 2022 by interviewing 2,647 participants face-to-face on socio-demographic characteristics, awareness of and uptake of HPV vaccination for those aged 18–35. We tested the association of being HPV-unvaccinated with: socio-demographic characteristics and awareness of HPV vaccination using multivariate logistic regression, at a significance level of 0.05. We measured vaccination trust using the 7C vaccination scale (confidence, complacency, constraints, calculation, collective responsibility, compliance and conspiracy) to produce a linearised score of 0–100. We compared the mean 7C scores according to HPV vaccination status using a Kruskal-Wallis test of statistical significance.

Results: 33% (784/2370) of participants were aware of HPV vaccination (43% of females versus 17% of males). 24% (111/457) of females and 6% (18/304) of males were HPV-vaccinated. Being HPV-unvaccinated was significantly associated with unawareness of HPV vaccination (OR=14.8, 95% CI 6.94–36.1) among females. HPV vaccination uptake was not significantly associated with socio-demographic characteristics. No significant difference in mean 7C score was observed among HPV-vaccinated (56.6) versus unvaccinated (52.8) females ($p=0.4$).

Public health implications: Interventions to increase HPV vaccination coverage in Marseille should aim to improve awareness of the HPV vaccine. Vaccine trust does not appear to be a determinant of HPV vaccination uptake in this urban female population.

Role: David analysed the survey data relating to HPV vaccination uptake and vaccine hesitancy. He summarised the association of HPV vaccination with socio-demographic factors, and statistical difference in vaccination hesitancy scores by HPV vaccination status. He submitted an abstract and designed a [poster for presentation \(online\)](#) at the 2024 ESCAIDE conference in Barcelona.

Time series analysis of the number of HIV diagnosis among four subpopulations in France from 2010 to 2022 and the impact of population HIV prevention measures

Supervisors: Françoise Cazein, Amber Kunkel, Florence Lot (HIV, viral hepatitis and STI unit, Santé publique France)

Category: HIV, STI and viral hepatitis

Aim: In France, HIV prevention measures including HIV testing, treatment and access to pre-exposure prophylaxis (PrEP) have increased throughout the last decade. We aimed to analyse their impact on the temporal trends in HIV diagnoses among four main subpopulations in France.

Methods: We performed a time series analysis of monthly HIV diagnoses reported via the national HIV surveillance database from January 2010 to December 2022 among four main subpopulations by mode of transmission and country of birth: men who have sex men (MSM) born in France, MSM born abroad, heterosexuals born in France and heterosexuals born abroad. We mapped HIV promotional campaigns with a time series of monthly HIV testing and PrEP initiators from 2014 to 2022. We performed an interrupted time series of HIV diagnoses among MSM born in France following introduction of PrEP in 2016.

Results: New HIV diagnoses progressively decreased among MSM and heterosexuals born in France, whereas HIV diagnoses increased among MSM born abroad. HIV testing activity and PrEP utilisation in France both increased progressively from 2014 to 2020, with little short-term monthly variation following promotional campaigns. The decline in HIV diagnoses among MSM born in France preceded the introduction of PrEP in 2016, and continued post-2016 without any significant additional rate of decline observed.

Public health implications: The diverging trends among subpopulations reflect different HIV transmission networks, sexual risk practices and uptake of HIV prevention measures in France. PrEP introduction likely contributed to sustaining the pre-existing decline in HIV diagnoses observed among MSM born in France. Increased awareness of, access to and uptake of HIV prevention measures remain essential to the progress of HIV elimination in France, especially among MSM born abroad.

Role: David conceptualised the study design and proposed the study objectives to the HIV unit at Santé publique France, and identified surveillance data sources on HIV diagnoses, HIV testing activity and PrEP utilisation for analysis. The fellow reviewed the relevant literature and reports in France and internationally for methodology approaches, and drafted the study protocol. He performed time series analysis using R software to produce temporal trends in HIV diagnoses, testing and PrEP users in France from 2010–2022, and presented findings to the HIV team and the Sexual Health unit and the National HIV Working group of Santé publique France. He drafted the surveillance article manuscript and submitted to the journal, *Eurosurveillance*.

3. Teaching and pedagogy

Teaching of public health medical residents, May 2023–July 2024

The fellow provided two-hour tutorials to two public health medical residents on outbreak detection and investigation using the ECDC 10-steps toolkit, and on communicable disease surveillance systems and reporting. David outlined differences in surveillance systems in France and between EU/EEA Member States of the ECDC. The fellow complemented teaching sessions with practical examples from gastroenteric and vaccine-preventable disease outbreaks investigated in Santé publique France. David supervised both residents' involvement in outbreak investigations of cryptosporidiosis and paraptussis. He supervised their write-up of an end-of-placement report of the outbreaks for presentation.

IDEA International field epidemiology course at EHESP Rennes, March 2024

The IDEA international field epidemiology course for 50 health professionals, ministry of health officials and public health Master's-degree student participants was held at the Ecole des hautes études en santé publique (EHESP) in Rennes from 18 to 22 March 2024. The fellow delivered two one-hour lectures on surveillance systems and questionnaire methods. He facilitated small groups of participants working through five case studies. The fellow explained epidemiological principles, provided worked examples, and illustrated basic epidemiological calculations and their epidemiological interpretations.

4. Communications related to the EPIET/EUPHEM fellowship

4.1. Manuscripts published in peer-reviewed journals

Kelly D, Ramalli L, Sanchez Ruiz MA, Faraut I, Aymard I, Perasso V et al. Utilisation of school vaccination record checks at 3-4 years to estimate vaccination coverage at the subregional level: feasibility study in Alpes-Maritimes, France. *Bulletin Epidémiologique Hebdomadaire*. Publication pending.

Kelly D, Kunkel A, Ramalli L, Mercier A, Lot F, Cazein F. Diverging trends in new HIV diagnosis among key populations in France from 2010 to 2022 and the impact of pre-exposure prophylaxis (PrEP) at population level. Submitted for publication in *Eurosurveillance*

Fotakis EA, Grau-Pujol B, **Kelly D**, Charles T, Vasconcelos P, Pinto Leite P et al. A multi-country description and comparison of national surveillance systems and response measures for Aedes-borne diseases in three countries in Southern Europe (France, Italy and Portugal). Submitted for publication in *Eurosurveillance*.

4.2. Other reports

J Rosine, M Melin, F Assogba, F Dorléans, G Gbaguidi, C Gentil-sergent, E Hassan, **Kelly D**, L Léon, C Martias, C Thelise. Weekly epidemiological reports on dengue epidemic in French Antilles, 19 October, 9 November, 16 November. *Santé publique France Antilles*; 2023. Available at: <https://www.santepubliquefrance.fr/regions/antilles/documents/bulletin-regional/2023/dengue-aux-antilles.-point-au-16-novembre-2023>

Kelly D, L Ramalli, F Franke, P Chaud, J Gaudart, Y Attalah, S Rebaudet, D Balma, A Dutrey Kaiser, E Nerrière, S Nauleau, C Ménager. Health Mediation in Marseille – cross-sectional study on breast, cervical and colorectal cancer screening knowledge, attitudes and participation in 2022; 2024.

Kelly D, L Ramalli, F Franke, P Chaud, J Gaudart, Y Attalah, S Rebaudet, D Balma, A Dutrey Kaiser, E Nerrière, S Nauleau, C Ménager. Health Mediation in Marseille – cross-sectional study on vaccination knowledge, attitudes and uptake in 2022. *Santé publique France*; 2024.

Kelly D, L Ramalli. Investigation of a waterborne cryptosporidiosis outbreak in Alpes-Maritimes, France in May 2023. *Santé publique France*; 2023.

4.3. Conference presentations

Kelly D, F Pospisil, C Rodrigues, S Aboukais, Pascal L, S Beretta et al. A pseudo-outbreak of *Bordetella parapertussis* centred on a hospital in France revealing contamination of nasopharyngeal swabs, July 2023. Presented at: ESCAIDE 2023; November 2023; Barcelona, Spain. [Oral poster Presentation](#).

Kelly D, Marron L, O'Donnell K, R Dwyer, M Power, C Migone et al. A case-case study design using national surveillance data underlines the role of immunocompromise among vaccinated COVID-19 cases requiring critical care in Ireland in 2021. Presented at: ESCAIDE 2023; November 2023; Barcelona, Spain. [Oral poster presentation](#).

F El Belghiti, **Kelly D**, C Rodrigues, S Brisse, P Chaud, S Aboukais et al. Une pseudo-épidémie de *Bordetella parapertussis* dans un centre hospitalier, causé par la contamination d'écouvillons nasopharyngés. Presented at: Journées Nationales d'Infectiologie; June 2024; Deauville, France. [Oral presentation](#).

4.4. Other presentations

Kelly D, L Pascal. Overview of testing, positivity rates and incidence of HIV and STIs in 2021 from data reported to Santé Publique France for Provence Alpes Côte d'Azur region. Presented at: Journée de santé sexuelle; May 2023; Aix-en-Provence, France.

Kelly D, F Pospisil, C Rodrigues, S Aboukais, Pascal L, S Beretta et al. A pseudo-outbreak of *Bordetella parapertussis* centred on a hospital in France, revealing contamination of nasopharyngeal swabs, July 2023. Presented at: Séminaires de Santé publique France; September 2023; Saint Maurice, France.

Kelly D, L Ramalli, MA Sanchez Ruiz, I Faraut, I Aymard, V Perasso et al. Temporal trend in the vaccination coverage rates of mandatory childhood vaccines for children born in 2017, 2018 and 2019 in Alpes-Maritimes using school vaccination records as a source of surveillance data. Presented at: Regional Health Authority Provence-Alpes-Côte d'Azur; December 2023; Marseille, France.

Kelly D. Coordination of a One Health response at regional, national and international level to an imported cases of rabies infection with human and animal contacts in France. Presented at: Regional Health Authority Provence-Alpes-Côte d'Azur; January 2024; Marseille, France.

EA Fotakis, B Grau-Pujol, **Kelly D**. Benchmarking tool for description and comparison of surveillance systems and response measures for arbovirus infection across three countries in southern Europe (France, Italy, Portugal). Presented at: Aedes-borne disease workshop, European Centre for Disease Prevention and Control; April 2024; Stockholm, Sweden, virtual.

Kelly D, C Calba. Methodology for estimating vaccination coverage at the infra-departmental level using school vaccination records as a source of surveillance data. Presented at: Santé publique France working group for small area indicators; May 2024; virtual.

Kelly D, A Kunkel. Time series analysis of HIV diagnoses among four main subpopulations in France from 2010 to 2022. Presented at: National HIV and STI working group of Santé publique France; June 2024; virtual.

5. EPIET/EUPHEM modules attended

- Introductory Course, 26 September–14 October 2022, Spetses, Greece
- Outbreak Investigation, 5–9 December 2022, Berlin, Germany
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2022, 23–25 November 2022, Stockholm, Sweden
- Multivariable Analysis, 22–26 May 2023, Frankfurt, Germany
- Rapid Assessment and Survey Methods, 19–23 June 2023, Stockholm, Sweden
- Project Review Module 2023, 28 August–1 September 2023, Lisbon, Portugal
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2023, 22–24 November 2023, Barcelona, Spain
- Time Series Analysis, 11–15 December 2023, Rome, Italy
- Vaccinology, 4–8 March 2024, virtual
- Management, Leadership and Communication in Public Health, 24–28 June 2024, Stockholm, Sweden
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2024, 20–22 November 2024, Stockholm, Sweden

6. Other training

- R intermediate course, 6–7 February 2023, Santé Publique France, France, virtual
- Measles Eradication, ESCMID post-graduate training, 8–10 March 2023, virtual
- WHO Mass Gatherings: Risk Assessment and Management for Mass Gatherings, 25 August 2023, virtual
- BSAFE, United Nations Department of Safety and Security (e-learning), 28 November 2023, virtual
- Introduction: Prevention and Sexual Exploitation and Abuse (PRSEAH), WHO, (e-learning), 27 November 2023, virtual
- United to Respect: Preventing Sexual Harassment and Prohibited Conduct, WHO (e-learning), 27 November 2023, virtual
- Molecular epidemiology training, 5–6 December 2023, Santé publique France, Saint Maurice, France
- One Health: multisectoral collaboration at human-animal-environment interface, WHO (e-learning), 10 June 2024, virtual

7. International assignments

- Five-week deployment to support and coordinate dengue epidemic surveillance activities of Santé publique France in French Caribbean islands, Basse-Terre, Guadeloupe, France, 12 October 2023–17 November 2023
- Cleared for eight-week WHO deployment on GOARN mission for diphtheria outbreak in Conakry, Guinea, 15 December 2023

8. Other activities

Monthly participation in the on-call service providing epidemiological support from Santé publique France to the regional Public health authority of Provence-Alpes-Cote d'Azur for risk assessment and investigation of complex communicable disease alerts. March 2023–July 2024, Marseille, France.

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