FINAL REPORT

Liza Coyer
The European Programme for Intervention Epidemiology Training (EPIET), Cohort 2021
Bavarian Health and Food Safety Authority (LGL), Germany

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 at acknowledged training sites across European Union (EU) and European Economic Area (EEA) Member States.

According to Article 9 (6), Article 5 (8) and Article 11a (1) of Regulation (EU) 2022/2370 of the European Parliament and of the Council of 23 November 2022 amending Regulation (EC) No 851/2004 establishing a European centre for disease prevention and control (the ECDC Founding Regulation):

Article 9 (6) 'The Centre shall, as appropriate, support and coordinate training programmes, in particular in relation to epidemiological surveillance, field investigations, preparedness and prevention, response to public health emergencies, public health research and risk communication. Those programmes shall take into consideration the need for training to be kept up-to-date, take into account the training needs of Member States and shall respect the principle of proportionality.'

Article 5 (8) 'By encouraging cooperation between experts and reference laboratories, the Centre shall foster the development of sufficient capacity within the Union for the diagnosis, detection, identification and characterisation of infectious agents that have the potential to pose a threat to public health. The Centre shall maintain and extend such cooperation and support the implementation of quality assurance schemes'.

Article 11a (1) 'The Centre shall establish a EU Health Task Force and ensure that there is a permanent capacity and an enhanced emergency capacity to mobilise and use it. The EU Health Task Force shall provide assistance with regard to requests for prevention, preparedness and response planning, local responses to outbreaks of communicable diseases and after-action reviews in Member States and in third countries, in cooperation with the WHO. The EU Health Task Force shall include the Centre's staff and experts from Member States, fellowship programmes and international and non-profit organisations'.

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 final report describes the output of the fellow and the competencies they acquired by working on various projects, activities, theoretical fellowship training modules, other modules or trainings and international assignments or exchanges during the fellowship.

Stockholm, November 2023

Pre-fellowship short biography

Dr. Liza Coyer obtained her bachelor's degree in Liberal Arts and Sciences from Amsterdam University College (AUC) (2014). During her studies she attended McGill University in Canada for a semester abroad and did a research internship at the Public Health Service (GGD) of Amsterdam. In 2015−2016, Liza worked as a university research fellow at the Vrije Universiteit (VU) in Amsterdam, as a research assistant at the Amsterdam University Medical Centre (Amsterdam UMC) and as a student assistant for AUC's International Office. In 2016, she obtained her master's degree in Epidemiology from the London School of Hygiene and Tropical Medicine, undertaking her thesis research at Public Health England. From 2017 to 2021, Liza conducted research for her PhD on longitudinal trends in sexual behaviour, pre-exposure prophylaxis and sexually transmitted infections among men who have sex with men, followed by research on the occurrence of SARS-CoV-2 infection in several ethnic groups for her postdoc with the Public Health Service of Amsterdam and the Amsterdam University Medical Centre.

Results

The objectives of these 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 core competencies, as set out in the ECDC Fellowship Manual[1].

1. Epidemiological investigations

1.1. Outbreak investigations

Investigation of an outbreak of gastrointestinal illness after a wedding at Neuburg Castle, Landkreis Günzburg, Bavaria, Germany

Supervisors: Dr. Merle M. Böhmer (LGL), Dr. Aftab Jasir (ECDC), Dr. Katharina Katz (LGL)

Category: Food and waterborne diseases

On 12 September 2022, the Günzburg local public health authority reported 55 cases of diarrhoea to the Bavarian Health and Food Safety Authority (LGL) among 180 guests who had attended a wedding at Neuburg Castle in Bavaria, Germany on 10 September. We aimed to identify cases and investigate the source of illness from among the food items served at a buffet. We defined a case as any wedding guest or staff developing gastrointestinal illness (i.e. diarrhoea or vomiting, with/without additional symptoms) between 10 and 23 September 2022. Five food samples were tested. We conducted a retrospective cohort study by developing and implementing a questionnaire for all staff and guests identified. We described the outbreak by time, place and person. For each food item we calculated an attack rate (AR), risk ratio (RR) (using log-binomial regression), percentage of cases exposed and Population Attributable Fraction (PAF). In total, we identified 17 cases (attack rate 24%, n=17/70) from 70 responses (60 guests with response rate 33%, 10 staff). All cases were guests with symptom onset on 11 September 2022. RR of illness was highest for sekt (sparkling wine), radishes, roast beef and spaetzle (traditional German pasta). Of these, most cases were exposed to roast beef and spaetzle, which also had the highest PAFs. The cucumber salad tested positive for *Bacillus cereus*. In conclusion, the exact source of this outbreak could not be identified, due to clustering of food items, potential cross-contamination during buffet, and lack of tested food and case samples. However, given the mildness of symptoms, short incubation time and microbiological evidence, we suspect the outbreak was caused by *Bacillus cereus*, although other causes cannot be excluded. We recommended good food hygiene practices, with a specific focus on buffets, to prevent future outbreaks, and more rapid and comprehensive collection of food, human and environmental samples for source investigation in the event of similar future outbreaks.

Role: Lead investigator. Liza contacted the Günzburg public health institute, developed the questionnaire, implemented the questionnaire in Lamapoll, communicated with the public health authority concerning data collection, entered all paper questionnaire responses in Lamapoll, conducted the analysis and wrote the outbreak report (Other Reports, 1).

Educational outcome

The outbreak occurred in a well-defined population and involved stakeholders from the local and regional public health institute. Liza was able to address multiple elements of the 10 steps of an outbreak investigation. By the time she was involved, the outbreak was confirmed (i.e. abnormal number of cases of illness after an event). Liza was able to develop the case definition and perform the ensuing case identification and source investigation by designing a cohort study including a questionnaire for event attendees, while communicating with the local public health institute to ensure its practical implementation (taking into consideration data protection standards). Liza analysed, interpreted and reported on results, and formulated recommendations (See Section 4.1.3).

[1] 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

1.2. Surveillance

Linkage of SARS-CoV-2 sequencing results into the Bavarian surveillance system from January 2021 to February 2022, Germany

Supervisor: Dr. Katharina Katz (LGL)

In Germany, laboratories are legally required to upload SARS-CoV-2 sequencing results to a centralised database (DESH), which assigns an identification number (IMS-ID) for linkage to surveillance data. We evaluated the implementation of the IMS-ID in Bavaria, Germany from January 2021 to February, 2022, since linking genomic data to epidemiological data would provide valuable insights into the introduction and spread of SARS-CoV-2 variants, and their relation to COVID-19 severity. Within the surveillance dataset of all notified Bavarian SARS-CoV-2 cases, we determined completeness (proportion of records with IMS-ID of all those with an indication of sequencing) and internal validity (proportion of IMS-IDs with correct format). In addition, we assessed linkage of sequencing results through correctly formatted IMS-ID from (1) the Bavarian Health and Food Safety Authority (LGL) laboratory and (2) all Bavarian laboratories (including LGL) uploading to DESH, to the surveillance dataset. We also assessed submission of IMS-IDs from the surveillance dataset to the Robert Koch Institute (RKI). We evaluated all outcomes overall, over time, and per district and notification software, where possible. Of 2 469 612 surveillance records, 50 295 (2%) had an indication of sequencing; 29 586/50 295 (59%) had an IMS-ID (completeness), while 23 009 had an IMS-ID without indication of sequencing. Internal validity was 91% (47 839/52 595). Linkage to the surveillance dataset was 59% from the LGL laboratory and 44% from DESH, and >99% from the surveillance dataset to RKI. Completeness, internal validity and linkage improved over time (all $P<0.001$ for trend). Completeness and internal validity varied between district and software (both $P<0.001$). It was concluded that while IMS-ID implementation improved over time, it was suboptimal, with Bavarian surveillance data missing sequencing results. Action would be needed to improve the ability to evaluate the implementation of the IMS-ID and to streamline processes and, when performing analyses using linked data, a recommendation was given to be mindful of potential biases due to missing data.

Role: Liza wrote the study proposal and protocol (Section 4.1.4), merged different sources of data, cleaned and continuously updated these data, conducted statistical analysis, wrote the conference abstract and report (Section 4.1.3), and gave an oral presentation of the project results at ESCAIDE 2022 (Section 5.1.1).

Surveillance of vaccine-preventable notifiable infectious diseases in Germany

Supervisor: Dr. Katharina Katz

In accordance with the German Protection against Infection Act, the Robert Koch Institute (German National Public Health Institute, RKI) is responsible for recording and analysing data on the occurrence of certain infectious diseases in Germany. This information is subsequently used for early detection of infections/outbreaks, to develop prevention strategies and to implement infection control measures to protect the health of the German population. The German notification pathway is as follows: in the event of a notifiable disease among humans, the diagnosing clinician or laboratory reports it, together with relevant information, to the respective local public health service, which submits to the regional public health service, which subsequently submits it to the RKI, after routine verification of data. The regional public health authority – in the case of Bavaria, LGL – is also responsible for the analysis and reporting of Bavarian cases of notifiable infectious diseases at the regional level, and communicates results and relevant information on the diseases to several stakeholders through reports, webpages and email requests. The GI-TFI2 team, in which Liza was placed as part of her fellowship, performs these tasks.

Role: Liza carried out verification checks, analysis and reporting of primarily measles, mumps, rubella, pertussis, varicella and influenza cases, and occasionally COVID-19. In addition to the activities described above, this included updating relevant guides and webpages, answering queries submitted to the team (e.g. by national or public health services and the press), R code development and monitoring email boxes.

Educational outcome

Liza gained insight into routine surveillance of notifiable infectious diseases within Germany, including its practical implementation (including notification systems, information flows, plausibility checks, data curation, code development and standardised reporting), context (including data privacy, legal obligations, responsibilities, continuous changes), and communication with stakeholders (including team, local/regional/national partners, and the press) through her surveillance tasks and by attending the weekly Germany-wide EpiLag meeting. The surveillance evaluation taught her about specific objectives for surveillance systems, their evaluation in terms of specific attributes, and how different parties (laboratory, public health institutes) provide input. More specifically, it provided key insight into laboratory information pathways, which is a complex issue, especially from a legal/data privacy perspective.

2. Applied public health research

Knowledge, attitudes and behaviour regarding tick-borne encephalitis vaccination and prevention of tick-borne diseases among primary care physicians in Bavaria and Baden-Wuerttemberg, Germany, May–September 2022

Supervisor: Dr. Merle M. Böhmer

In Germany, cases of tick-borne encephalitis (TBE) and other tick-borne diseases (TBD) are on the increase. Strategies are needed to improve TBE vaccination uptake and TBD prevention. The key providers of vaccination and prevention are primary care physicians. To derive strategies, we aimed to investigate the knowledge, attitudes and behaviour of primary care physicians in the southern German federal states of Baden-Wuerttemberg and Bavaria, where TBD is endemic, with regard to TBE vaccination and TBD prevention. We invited all primary care physicians (N =14 046) in both federal states to participate by mail. Using standardised, self-administered questionnaires, available on paper and online, we asked physicians anonymously about their knowledge, attitudes and behaviour with respect to TBE vaccination and TBD prevention and their need for further information/educational materials. In total, 2 321 physicians participated between May and September 2022 (response rate 17%). Among participants, 56% were male, 71% were >50 years and 51% worked in an individual practice. Furthermore, 91% were aware of the German national vaccination guidelines, and 98% perceived their knowledge of the risks and benefits of vaccination to be adequate. A total of 97% offer TBE vaccinations, 67% provide vaccination counselling during initial consultations with new patients and 64% actively remind patients about vaccinations that are due. In addition, 24% expressed a need for further information materials, mainly traditional, analogue media such as flyers (82%) and posters (50%), and named timeliness, quality assurance, easy comprehensibility and independence from the pharmaceutical industry as the most important characteristics of such materials. Almost all participating physicians reported offering TBE vaccinations and feeling well-informed about TBE vaccination and TBDs. However, the offering of vaccinations and education could be further improved, and additional, low-threshold information materials are needed. Based on these results, we will develop and provide various materials on TBE vaccination and TBDs, in particular flyers and posters, for use by physicians during consultations.

Role: Liza wrote the study proposal and protocol (Section 4.1.4), implemented the questionnaire in the online tool Lamapoll, merged and cleaned data and conducted statistical analysis. She also wrote conference abstracts, which resulted into a poster presentation at ECCMID 2023, an oral presentation at BVÖGD 2023 (Section 5.1.1) and an abstract submitted to the Bayerischer Kongress für den Öffentlichen Gesundheitsdienst 2023 (Section 5.1.2). She also wrote the manuscript, which was published in Microorganisms (Section 4.1.1).

SARS-CoV-2 prevalence on and incidence after arrival in travellers on direct flights from Cape Town, South Africa to Munich, Germany shortly after emergence of the Omicron variant in November/December 2021: results from the OMTRAIR study

Supervisor: Dr. Merle M. Böhmer (LGL)

The highly-transmissible SARS-CoV-2-variant B.1.1.529 (Omicron) first appeared in South Africa in November 2021. In order to study Omicron entry into Germany, its occurrence related to incoming airline travel, symptomatology and compliance with entry regulations and recommendations, we conducted a cross-sectional study, followed by a retrospective cohort study among passengers and crew on 19 direct flights from Cape Town, South Africa, to Munich, Germany, between 26 November and 23 December 2021. Travellers were mandatorily PCR-tested on arrival and invited to complete an online questionnaire. SARS-CoV-2-prevalence on arrival was 3.3% (n = 90/2 728), and 93% were Omicron. Of the passengers, 528 (19%) completed the questionnaire. Among participants who tested negative on arrival, self-reported SARS-CoV-2-incidence was 4.3% within 14 days, of whom 74% reported a negative PCR-test ≤48 h before boarding, 77% were fully vaccinated, and 90% reported wearing an FFP2/medical mask during the flight. We found multiple associations between risk factors and infection on and after arrival, the most noteworthy f which was having a travel partner who had tested positive. We concluded that PCR testing before departure was insufficient to control the introduction of the Omicron variant. Additional measures (e.g. frequent testing, quarantine after arrival or travel ban) should be considered to delay virus introduction in such settings.

Role: this project was a collaboration with Dr. Cornelia Seidl, PAE fellow of Cohort 2021. Liza provided epidemiological input for the study design, proposal and protocol (including drafting English versions), cleaned line-list and passenger data for initiation of study participants, and curated data collection in Lamapoll. She also helped another fellow with data cleaning and analysis of the study data, and worked with the fellow to write the abstracts and manuscript. Results of this project were presented during a poster presentation at ECCMID 2023 (Section 5.1.1) and through a publication in Pathogens (Section 4.1.1). An abstract was also submitted to the Bayerischer Kongress für den Öffentlichen Gesundheitsdienst 2023 and to ESCAIDE 2022 (Section 5.1.2).

COVID-19 child vaccination coverage and intent among parents (COVIP) among kindergarten- and primary school-aged children in Munich, Germany, October 2022 to January 2023

Supervisor: Dr. Merle M. Böhmer (LGL)

Summary: COVID-19 vaccination reduces the risk of severe disease and onward transmission to risk groups, also in children, particularly for those belonging to or in contact with a risk group. We studied child vaccination coverage, determinants of vaccination and vaccination intent to inform vaccination communication strategies. We invited parents of children aged between six months and 11 years, attending eight primary schools in Munich, Germany, to participate in an online, anonymous survey between 13 October 2022 and 15 January 2023. Parents self-reported socio-demographic characteristics, COVID-19 vaccination and infection per child and for themselves, COVID-19 experiences and perceptions, 5C psychological antecedents of COVID-19 vaccination, and general vaccination hesitancy. For unvaccinated children, parents reported vaccination intent by giving scores to two questions (which were combined and categorised into high/medium/low). We determined child vaccination coverage by age group, and for children belonging to or in contact with a risk group, and identified determinants of vaccination (≥1 dose) using logistic and ordinal logistic regression, respectively. In total, 339 parents (83% female, 56% in the age group 25–44 years, 78% German-born, 13% healthcare workers) reported on 591 children (84% aged 5–11 years, 16% belonging to or in contact with a risk group). Vaccination coverage (≥1 dose) was 7% (6/86) among those aged six months to four years, 59% (294/497) among 5–11 year-olds and 60% among children belonging to or in contact with a risk group. A total of 183 parents reported the following vaccination intent for 285 unvaccinated children (71% aged 5–11 years): for those aged six months to four years, 31% high, 13% medium, 56% low; for 5–11 year-olds, 8% high, 20% medium, 71% low. Positive determinants of vaccination included higher parent education levels and parent COVID-19 vaccination; negative determinants were previous vaccination refusal and perceiving COVID-19 measures as exaggerated. Compared to parents of unvaccinated 5–11 year-olds, parents of vaccinated children had higher confidence and lower complacency. We concluded that a substantial proportion of 5–11 year-olds and children belonging to or in contact with a risk group attending Munich primary schools were vaccinated against COVID-19. Parents of unvaccinated children had little intention of vaccinating their children in the future. Vaccination communication should take into account parents' socio-demographic characteristics, and particularly address the individual risks and benefits of child vaccination.

Role: Together with Sarah van de Berg, PAE fellow of Cohort 2020, Liza wrote the study proposal and protocol, obtained ethics approval, communicated with schools, developed and piloted the questionnaire in the online platform Lamapoll, cleaned and analysed data and wrote three abstracts (two of which were submitted to ESCAIDE 2023 but not accepted) and one to the Bayerischer Kongress für den Öffentlichen Gesundheitsdienst 2023 (Section 5.1.2) which was accepted. A manuscript is in preparation (Section 4.1.2).

Educational outcome

Liza was already very experienced in applied public health research, including statistical analysis, but one aspect that stood out throughout the fellowship was the importance of the 'why' in public health research. She learned more about developing timely projects based on actual needs, obtaining information for action, and understanding the limits of practical, and sometimes imperfect, data. She also greatly enjoyed the collaboration with the other fellows.

3. Teaching and pedagogy

Basics of Git and Github, 5 May 2022, 23 June 2022, 21 and 28 October 2022, online

This teaching activity (~1.5 hours) involved a lecture about Git and Github, including an explanation of what they are and how they can be used for accessing files; version control and collaboration; an introduction to terminology; a set of practical exercises about cloning and forking existing public Github repositories; how to create a new R project from an existing or new Github repository and how to make and commit changes. The target audience was public health professionals interested in version control and collaboration without prior Git/Github experience. It was first held for the local GI-TFI2 team in Munich, Germany, and then for EPIET/EUPHEM fellows and other health professionals. Liza developed all the training material, implemented the teaching activity and evaluated the activity by means of pre- and post-evaluation surveys. She also provided a follow-up, collaborative session on 28 October 2022 for attendees of the first session who wanted more practice.

Lecture and case study – Outbreak Investigation and Control, Global Health Epidemiology course, Technical University of Munich (TUM), 19 May 2022, online

This activity (~3 hours) involved a lecture on the 10 steps of an outbreak investigation, including examples from a case study on giardiasis in Bergen, Norway, and other outbreaks (by Liza), a lecture on the outbreak investigation of the first COVID-19 cluster in Europe/Bavaria, Munich (by Merle M. Böhmer) and a case study on trichinosis in France (in groups of four, with Liza as flying facilitator). The target audience was students studying for an MSc in

Health Science, taking the Global Health Epidemiology course. Liza adapted existing training material based on the needs of the students (identified in pre-evaluation survey), implemented the teaching activity and evaluated the activity through pre- and post-evaluation surveys.

EAN mini-module 'Media and Infodemic Management', 21−22 November 2022, Stockholm, Sweden

Together with EAN and Dr. Henrieke Prins and Dr. Eftychia Kotronia, EPIET fellows from Cohort 2021, Liza organised and coordinated a mini-module (1.5 days) on media and infodemic management, which included lectures on infodemics and infodemic management, communication with journalists and media communication. The module also included a case study on the pandemic to apply theoretical concepts, understand how conspiracy theories can gain traction and spread from niche to general media, and to provide tools to participants for managing false claims and infodemics, to mitigate the spread of false information. The case study was adapted from the Media Manipulation Casebook (https://mediamanipulation.org/case-studies).

Facilitator interdisciplinary workshop on the epidemiological investigation of foodborne outbreaks for the Academy of Health and Food Safety (AGL), 18−20 July 2023, Bad Alexandersbad, Germany

Liza supported the three-day workshop for people working in local public health services in Bavaria, by leading a discussion on participant-generated first steps for an outbreak investigation and facilitating a case study.

Co-supervisor of two student internships and BSc/MSc theses, 2022−2023, Munich, Germany

Liza co-supervised two students for their BSc/MSc research. She usually met with each student on a weekly basis to discuss their research, well-being, progress and planning, but also more often, as necessary. She also gave feedback on their study proposals, protocols and reports. The topics were: intent to vaccinate children against COVID-19 among parents of vaccinated children (using data from the COVIP study) and spatiotemporal trends in lyme borreliosis and tick-borne encephalitis in southern Germany.

Facilitator of several modules for Cohorts 2021 and 2022, online and in Berlin, Germany

Liza was a facilitator for several modules: during the data management inject day and multivariable analysis module for Cohort 2021, and during the outbreak investigation module for Cohort 2022. She also helped develop and improve the R code for some of the case studies.

Educational outcome

The challenge with teaching is how to reach your objectives whilst staying interactive and keeping the attention of the audience, especially when online. The above teaching activities emphasised the importance of adapting the materials and method of teaching to the experience and needs of the audience (informed by pre- and post-course assessments, and on an ongoing basis), and of balancing different modes of teaching (theoretical and practical, both presenter and participant-driven teaching). Liza greatly enjoys teaching and hopes she was effective in sharing her enthusiasm and knowledge of epidemiology and applied public health with all attendees.

4. Communication

4.1 Publications related to the EPIET fellowship

4.1.1 Manuscripts published in peer-reviewed journals

1. Coyer L, Hoornenborg E. Reaching the full preventive potential of HIV pre-exposure prophylaxis. Lancet Public Health. 2022 Jun;7(6):e488-e489. doi: 10.1016/S2468-2667(22)00116-5.

2. Seidl C*, Coyer L* (shared first), Ackermann N, Katz K, Walter J, Ippisch S, et al. SARS-CoV-2 Prevalence on and Incidence after Arrival in Travelers on Direct Flights from Cape Town, South Africa to Munich, Germany Shortly after Occurrence of the Omicron Variant in November/December 2021: Results from the OMTRAIR Study. Pathogens. 2023 Feb 20;12(2):354. doi: 10.3390/pathogens12020354.

3. Coyer L*, Sogan-Ekinci A* (shared first), Greutélaers B, Kuhn J, Saller FS, Hailer J, et al. Knowledge, Attitudes and Behaviors regarding Tick-Borne Encephalitis Vaccination and Prevention of Tick-Borne Diseases among Primary Care Physicians in Bavaria and Baden-Wuerttemberg, Germany, May–September 2022. Microorganisms. 2023; 11(4):961. doi: 10.3390/microorganisms11040961.

4. McFarland SE, Marcus U, Hemmers L, Miura F, Martínez JI, Montalbán EG, Chazelle E, Mailles A, Silue Y, Hammami N, Lecompte A, Ledent N, VandenBerghe W, Liesenborghs L, Van den Bossche D, Cleary P, Wallinga

J, Robinson EP, Johansen TB, Bormane A, Melillo T, Seidl C, Coyer L, Boberg R, Jurke A, Werber D, Bartel A. Estimated incubation period distributions of Mpox using cases from two international European festivals and outbreaks in a club in Berlin, May–June, 2022. Euro Surveill. 2023 Jul;28(27). doi: 10.2807/1560-7917.ES.2023.28.27.2200806.

4.1.2 Manuscripts to be submitted to peer-reviewed journals

1. van de Berg S*, Coyer L* (shared first), von Both U, Kolberg L, Hoch M, Böhmer MM. Coverage and determinants of COVID-19 child vaccination: the COVIP study, Munich, Germany, October 2022-January 2023. Manuscript in preparation.
2. Böhmer MM, Haring V, Schmidt B, Saller FS, Coyer L, Chitimia-Dobler L, et al. One Health in Action: Investigation of the First Detected Local Cluster of Fatal Borna Disease Virus 1 (BoDV-1) Encephalitis, Germany 2022. [Manuscript in preparation].
3. Sogan-Ekinci A*, Coyer L* (shared first), Greutélaers B, Kuhn J, Saller FS, Hailer J, et al. TBD-Prev-Studie: Impfakzeptanz und Management der Impfberatung zur FSME bei niedergelassenen Ärtz:innen in Baden-Württemberg und Bayern. [Manuscript in preparation].
4. Prins H*, Coyer L* (shared first), De Angelis S, Bluemel N, Cauchi D**, Baka A** (shared last). Evaluation of mpox contact tracing activities and data collection in EU/EEA countries during the 2022 multi-country outbreak in non-endemic countries. Submitted to Journal of Medical Virology.
5. Kowo MS, Coyer L* (shared first), Victor S, Assonta C, Metomo GY, Wafeu GS, et al. Integrating hepatitis C screening and treatment into routine HIV care in Cameroon is feasible. Submitted to Journal of International AIDS Society.
6. Lee N, Zierer A, Wagner-Wiening C, Böhmer MM, Coyer L. Spatiotemporal trends of Lyme Borreliosis and Tick-Borne Encephalitis in Southern Germany. [Manuscript in preparation].

4.1.3 Other reports

1. Coyer L. Investigation of an outbreak of gastrointestinal illness after a wedding at Neuburg Castle, Landkreis Günzburg, Bavaria, Germany.
2. Coyer L, Marosevic DV, Weise L, Falk L, Berger C, Dangel A, et al. Linkage of SARS-CoV-2 sequencing results into the Bavarian surveillance system from January 2021 through February 2022, Germany.

4.1.4 Study protocols

1. Coyer L. Evaluation of the implementation of the IMS-ID into the German notification system during the SARS-CoV-2 pandemic from November 2020 until February 2022. 1 March 2022.
2. Coyer L. Knowledge, attitude and behaviours regarding TBE vaccination and prevention of tick-borne diseases among physicians in private practices in Bavaria and Baden-Wuerttemberg, Germany. 29 November 2021.
3. Seidl C*, Coyer L* (equal contribution). Occurrence of the SARS-CoV-2 Omicron variant (B.1.1.529) and evaluation of preventive measures in travellers returning from Cape Town, South Africa to Munich, Germany between 26 November and 23 December 2021: the OMTRAIR study (Study on Omicron Transmission in Aircraft). 17 May 2022.
4. van de Berg S*, Coyer L* (equal contribution). Virenwächter COVIP-Study: COVID-19 Child Vaccination Intent among Parents of kindergarten- and primary school aged children in Munich, Germany, June 2022. 5 May 2022.
5. Prins H*, Coyer L* (equal contribution). Evaluation of mpox (formerly monkeypox) contact tracing data collection in EU/EEA Member States during the 2022 multi-country outbreak in non-endemic countries. 21 February 2023.

5.1 Conference presentations

5.1.1 Presented abstracts

1. Coyer L, Boyd A, Schinkel J, Agyemang C, Galenkamp H, Koopman A, Leenstra T, van Duijnhoven Y, Moll van Charante E, van den Born B, Lok A, Verhoeff A, Zwinderman A, Jurriaans S, Stronks K, Prins M. SARS-CoV-2 incidence and its determinants in six ethnic groups of Amsterdam, the Netherlands: a population-based longitudinal study. Poster tour presentation, ESCAIDE 2021, 16 November 2021. [Output from before the fellowship, presented during the fellowship].
2. Agterhof S, Coyer L, Boyd A, Leenstra T, Galenkamp H, Agyemang C, Stronks K, Prins M. Self-assessment of SARS-CoV-2 infection in six ethnic groups during the first wave of the COVID-19 epidemic in Amsterdam, the Netherlands. Poster tour presentation, ESCAIDE 2021, 16 November 2021. [Output from before the fellowship, but presented during the fellowship].

3. Coyer L, Marosevic DV, Weise L, Falk L, Berger C, Dangel A, Böhmer MM, Ackermann N, Katz K, Sing A. Linkage of SARS-CoV-2 sequencing results into the Bavarian surveillance system from January 2021 through February 2022, Germany. Oral presentation, ESCAIDE 2022, 25 November 2022, Stockholm, Sweden.
4. Böhmer MM, Bauswein M, Haring V, Rubbenstroth D, Bonakdar A, Peters B, Saller FS, Coyer L, Chitimia-Dobler L, Rissland J, Ulrich RG, Schmidt B, Beer M. One Health investigation following a local cluster of rare, but lethal human Borna Disease Virus 1 (BoDV-1) infections in Germany, 2022. Oral presentation by Merle M. Böhmer, BVÖGD 2023, 16 April 2023, Potsdam, Germany.
5. Coyer L*, Sogan-Ekinci A* (shared first), Kuhn J, Greutélaers B, Saller FS, Hailer J, Böhm S, Wagner-Wiening C**, Böhmer MM** (shared last). Knowledge, attitudes and behaviours regarding tick-borne encephalitis vaccination and prevention of tick-borne diseases among physicians in private practices in Bavaria and Baden-Wuerttemberg, Germany, May–September 2022. Poster presentation, ECCMID 2023, 17 April 2023, Copenhagen, Denmark.
6. Seidl C*, Coyer L* (shared first), Ackermann N, Katz K, Walter J, Ippisch S, Hoch M**, Böhmer MM** (shared last). SARS-CoV-2 prevalence and incidence in travellers on direct flights from Cape Town, South Africa to Munich, Germany: the OMTRAIR study, 26 November–23 December 2021. Poster presentation, ECCMID 2023, 17 April 2023, Copenhagen, Denmark.
7. Sogan-Ekinci A*, Coyer L* (shared first), Kuhn J, Greutélaars B, Saller FS, Hailer J, Böhm S, Wagner-Wiening C*, Böhmer MM* (shared last). TBD-Prev-Studie–Impfakzeptanz und Management der Impfberatung zur FSME bei niedergelassenen Ärzt:innen in Baden-Württemberg und Bayern. Oral presentation, BVÖGD 2023, 27 April 2023, Potsdam, Germany.
8. Böhmer MM, Bauswein M, Haring V, Rubbenstroth D, Bonakdar A, Peters B, Saller FS, Coyer L, Chitimia-Dobler L, Rissland J, Ulrich RG, Schmidt B, Beer M. Dem Bornavirus (BoDV-1) auf der Spur: Beispiel eines „One-Health" -basierten Kooperationsprojekts in Bayern. Oral presentation by Merle M. Böhmer, BVÖGD 2023, 28 April 2023, Potsdam, Germany.

5.1.2 Other (to be) submitted abstracts

1. Seidl C*, Coyer L* (shared first), Scheuerer T, Katz K, Hoch M**, Böhmer MM** (shared last). Occurrence of SARS-CoV-2 in travellers on direct flights from Cape Town, South Africa to Munich, Germany: the OMTRAIR study, 26 November-23 December 2021. Submitted to ESCAIDE 2022, not accepted.
2. Coyer L*, van de Berg S* (shared first), von Both U, Hoch M, Böhmer MM. Coverage and predictors of COVID-19 child vaccination: the COVIP study, Munich, Germany, October 2022-January 2023. Submitted to ESCAIDE 2023, not accepted.
3. van de Berg S*, Coyer L* (shared first), von Both U, Hoch M, Böhmer MM. Parental intent to vaccinate their unvaccinated children against COVID-19: the COVIP study, Munich, Germany, October 2022-January 2023. Submitted to ESCAIDE 2023, not accepted.
4. McFarland SE, Marcus U, Hemmers L, Miura F, Martínez JI, Montalbán EG, Chazelle E, Mailles A, Silue Y, Hammami N, Lecompte A, Ledent N, VandenBerghe W, Liesenborghs L, Van den Bossche D, Cleary P, Wallinga J, Robinson EP, Johansen TB, Bormane A, Melillo T, Seidl C, Coyer L, Boberg R, Jurke A, Werber D, Bartel A. Estimation of incubation period distributions of Mpox using cases from two international European festivals and outbreaks in a club in Berlin, May – June, 2022. Submitted to ESCAIDE 2023 by lead author, no result yet.
5. van de Berg S*, Coyer L* (shared first), von Both U, Hoch M, Böhmer MM. COVID-19 child vaccination coverage and intent and their associated factors: a cross-sectional study (Virenwächter-COVIP) among parents in Munich, Germany, October 2022-January 2023. Submitted to the Bayerischer Kongress für den Öffentlichen Gesundheitsdienst 2023, accepted.
6. Greutélaers B, Coyer L, Sogan-Ekinci A, Kuhn J, Saller FS, Hailer J, Böhm S, Brosch R, Wagner-Wiening C, Böhmer MM. Lass dich nicht ZECKEN! Ergebnisse der TBD-Prev Studie in Baden-Württemberg und Bayern. Submitted to the Bayerischer Kongress für den Öffentlichen Gesundheitsdienst 2023, accepted.
7. Seidl C*, Coyer L* (shared first), Ackermann N, Katz K, Walter J, Ippisch S, Hoch M**, Böhmer MM** (shared last). SARS-CoV-2 Prävalenz und Inzidenz unter Reisenden auf Direktflügen von Kapstadt, Südafrika, nach München, Deutschland: die OMTRAIR-Studie, 26. November bis 23. Dezember 2021. Submitted to the Bayerischer Kongress für den Öffentlichen Gesundheitsdienst 2023, accepted.
8. Coyer L*, Prins H* (shared first), De Angelis S, Bluemel N, Cauchi D**, Baka A** (shared last). Evaluation of mpox contact tracing activities and data collection in EU/EEA countries during the 2022 multi-country outbreak in non-endemic countries. [Will be submitted to ESCAIDE 2023 as a late breaker].
9. Kowo MS, Coyer L* (shared first), Victor S, Assonta C, Metomo GY, Wafeu GS, Njouom R, Boers A, Coutinho R, Njoya O, Kouanfack C. Integrating hepatitis C screening and treatment into routine HIV care in Cameroon is feasible. [Will be submitted to ESCAIDE 2023 as a late breaker].

5.2 Other communication

1. Young Forum Gastein 2022 participant and work group leader during European Health Forum Gastein 2022 conference, including group communication and various activities (social media posts, session reports, interviews with attendees), 26–29 September 2022.
2. Curating of EAN twitter account on HIV in light of World Aids Day 2022, 28 November–2 December 2022.
3. Three-minute oral presentation on use of language in the HIV field, ECDC EPIET introduction week, 8 October 2021.
4. Three-minute oral presentation on *E.coli* outbreak for communication to local media, ECDC EPIET Outbreak Investigation module, 9 December 2021.
5. Pitched new research project idea on a cross-sectional survey relating to social media use by public health professionals during PAE meeting, 17 February 2022.
6. Presentation on a cross-sectional survey relating to social media use by public health professionals during Project Review Module, 19 April 2022.
7. Presentation on the demonstration project for integration of hepatitis C screening and treatment into routine HIV care in Cameroon to LGL GI-TFI2 team on 27 June 2023 and during Project Review Module, 28 August 2023.

6. EPIET/EUPHEM modules attended

1. Introduction course part 1 (20 September-9 October 2021), online.
2. Phylogeny inject day (20 October 2021), online.
3. Operational Research inject days (27–28 October 2021), online.
4. Data Management inject days (10–11 November 2021), online.
5. Outbreak Investigation (6–10 December 2021), online.
6. Multivariable Analysis (14–18 March 2022), online.
7. Project Review (19–22 April 2022), Spetses, Greece.
8. Introduction course part 2 (25–29 April 2022), Spetses, Greece.
9. Rapid Assessment and Survey Methods (6–10 June 2022), Solna, Sweden.
10. Second Project Review (29 August–3 September 2022), Lisbon, Portugal.
11. Time series analysis (7–11 November2022), Bilthoven, the Netherlands.
12. Vaccinology (13–17 February 2023), online.
13. Biorisk and Quality Management (16–17 March 2023), online.
14. Management, Leadership and Communication in Public Health (8–12 May 2023), Solna, Sweden.
15. Third Project Review (28 August–1 September 2023), Lisbon, Portugal.

7. Other training

1. PAE Jour Fixes (29 September to 1 October 2021, 25–26 November 2021, 30 June to 1 July 2023, 24–25 July 2023), Berlin, Germany and online.
2. SurvNet (German notification system) course by Bavarian Health and Food Safety Authority (3 November 2021), Oberschleissheim, Germany.
3. SurvNet instruction webinar by Robert Koch Institute (9 November 2021), online.
4. Laboratory module organised by EUPHEM fellows at Robert Koch Institute (27–29 June 2022), Berlin, Germany.
5. In-house training through short inject sessions on multiple testing, and open and reproducible science.
6. EAN mini-module 'Media and Infodemic Management' (21–22 November 2022), Stockholm, Sweden.

8. International assignments

Evaluation of mpox contact tracing activities and data collection in EU/EEA Member States during the 2022 multi-country outbreak in non-endemic countries (remote)

Supervisors: Dr. Daniel Cauchi (ECDC), Dr. Agoritsa Baka (ECDC), Stefania De Angelis (ECDC)

To stop human-to-human transmission of mpox, EU/EEA Member States conducted epidemiological investigation of cases and contact tracing during the multi-country mpox outbreak in 2022. However, an evaluation of contact tracing activities, guidelines, and data collection in the European region has not been performed. A web-based survey on contact tracing activities, experiences, and data collection was distributed to the European Centre for Disease Prevention and Control National Focal Points (NFPs) for Preparedness and Response in EU/EEA countries. NFPs were asked to forward the survey to other stakeholders in their country undertaking contact tracing activities.

Between 3 April and 12 May 2023, we received 139 responses from 27 of 30 EU/EEA countries. Most respondents reported performing case investigations (96%, n=133), forward CT (90%, n=121), backward CT (88%, n=122), and follow-up on contact outcomes (78%, n=107). Sixty percent (n=80) used a standardised CT form and 65% (n=91) used databases for data recording. The highest rated enablers were the need for clear guidelines, quick access to laboratory results and sufficient expertise. The highest rated barriers were inability to contact contacts or cases and lack of time or staff. Most needed improvements are more expertise on affected populations, including transmission behaviour, communication with community stakeholders, availability of staff, time, and adequate systems and tools/templates for data collection. We concluded that to improve CT of mpox and other diseases with similar transmission patterns, EU/EEA countries should increase workforce capacity in public and sexual health, offer training on CT operations and on communication with affected communities, and agree on the use of common CT data collection tools and reporting systems.

Role: Together with Dr. Henrieke Prins, EPIET fellow in Cohort 2021, Liza designed the study, wrote the study proposal, designed and implemented the questionnaire in RedCap, and cleaned and analysed the data. A late-breaker abstract for ESCAIDE 2023, as well as a technical report and manuscript, are planned (Sections 4.1.2, 5.1.2).

Demonstration of the feasibility of the treatment of chronic hepatitis C in people living with HIV on antiretroviral treatment in the Centre Region of Cameroon (remote with field visit in own time)

Supervisor: Prof. Roel Coutinho (PharmAccess Foundation, Joep Lange Institute)

People with human immunodeficiency virus (HIV) and hepatitis C virus (HCV) co-infection are vulnerable to worse clinical outcomes. However, HCV prevalence among people with HIV in Cameroon is unknown, and HCV diagnosis and treatment is largely inaccessible. Integration of HCV services into routine HIV care provided by general practitioners could improve diagnosis and treatment coverage. To provide evidence for the development of national guidelines for the care and treatment of HCV in people with HIV in Cameroon, and to increase awareness on the benefits of integrating HCV services into existing national infrastructures, the NoCo project aimed to determine HCV prevalence and treatment cure rate among people with HIV attending 11 HIV clinics in the Centre Region of Cameroon. We offered HCV screening (rapid antibody test, and, if positive, RNA test) to all patients attending routine HIV counselling and treatment appointments at the clinics included between 20 April 2021 and 31 May 2022. We treated eligible and willing participants with 12 weeks of the pangenotypic regimen sofosbuvir/velpatasvir (400/100mg). We asked participants to contribute to treatment costs. We calculated the cure rate as the proportion of participants with a sustained virological response 12 weeks after treatment completion (SVR12) of all those who started, and completed treatment. In total, 8 266 (29.9%) of 27 606 patients on ART as of December 2020 were screened, 316 (3.8%, 95% CI: 3.4-4.3%) of whom were anti-HCV positive. Among 316 participants positive for anti-HCV, the median age was 58.6 years (interquartile range: 49.5-65.2), 245 (77.5%) were female, and 251 of 286 sampled for HCV RNA (87.8%) had detectable HCV RNA. Of 173 participants enrolled for treatment, 162 achieved SVR 12 (93.6%, 95% CI: 88.9-96.8%). The cure rate was 98.2% (95% CI: 94.8-99.6%) among 165 who completed treatment. Three people did not achieve SVR12, two of whom achieved SVR12 after second line treatment. Overall, this study demonstrated the viability of integrating HCV screening and treatment into routine HIV care by general practitioners in Cameroon, yielding high cure rates. However, for effective routine implementation, efforts are needed to improve patients' acceptance of screening, access to diagnosis and treatment, and on-site laboratory capacity.

Role: Before EPIET, Liza was involved in a previous study with the same team from PharmAccess Foundation and she was asked to contribute to the current project at the end of 2022. When she joined the project, the study had almost ended and the local coordination team in Cameroon was working to finish patient follow-up and data entry. At the end of May 2023, Liza visited several study sites and the Pasteur Laboratory in Yaoundé, Cameroon to discuss the implementation of the project with the local team, medical supervision team, medical doctors/nurses at the study sites, external monitors and the data manager (including enabling factors, challenges and improvements needed for scale-up). Liza performed data cleaning and data analysis. A late-breaker abstract submission to ESCAIDE 2023, and a manuscript, both written by Liza, are in preparation (Sections 4.1.2, 5.1.2).

8. Other activities

1. Moderated weekly PAE meeting three times.
2. Co-organiser and attendee of Infodemic Management Interest Group, with bi-weekly meetings.
3. Organiser of symposium on 'Future topics and considerations for PrEP research and practice', 12 January 2023.
4. Peer-reviewer for several scientific journals.
5. Opponent for two mock PhD defences on HIV prevention.
6. German (B2.2 Goethe Institute and private through Italki platform) and French conversational classes (private through Italki platform), average 1–2 hours each weekly.

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