Wioleta Kitowska

The European Programme for Intervention Epidemiology Training (EPIET), Cohort 2022

Finnish Institute for Health and Welfare (THL), Finland

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

Wioleta Kitowska holds a bachelor's and a master's degree in public health with specialisation in epidemiology and health promotion from the Medical University of Warsaw, Poland. After graduating, Wioleta was employed for five years at the National Institute of Public Health NIH – National Research Institute (NIPH NIH-NRI) in Poland as a public health specialist. During this time, she performed tasks for the National Focal Point for International Health Regulations/Early Warning and Response System (IHR/EWRS) and the Unit of Zoonoses and Emerging Diseases in the Department of Epidemiology. Additionally, Wioleta worked for two years as a lecturer at the Józef Piłsudski University of Physical Education in Warsaw.

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 Manual[1].

[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

Stockholm, 2024

1. Epidemiological investigations

1.1. Outbreak investigations

1.1.1. Outbreak of Cryptosporidium parvum *in Helsinki, Finland, 2022*

Supervisors: Ruska Rimhanen-Finne (THL), Anni Vainio (THL)

Category: Food- and waterborne diseases

Aim: To characterise the pathogen, identify the source and extent of the outbreak, and enhance control measures.

Methods: An outbreak of cryptosporidiosis occurred among persons attending a business event on the 26 and 27 September 2022 at a hotel in Helsinki, Finland. A retrospective cohort study was conducted using an online questionnaire. A case was defined as any person who participated in event meals and developed at least one of the following symptoms during 28 September–18 October 2022: diarrhoea, stomach pain, or nausea. The survey included questions about demographics, potential exposures during the event, occurrence of symptoms, travel history, laboratory diagnostics, and potential symptomatic contact persons. Food-specific relative risks (RR) and 95% confidence intervals (95% CI) were calculated.

Faecal specimens were collected for PCR and culture. *Cryptosporidium*-positive samples were characterised by species (RT-PCR) and gp60 type (nested-PCR and Sanger Sequencing). No food or environmental samples were available for testing.

Results: Out of 85 participants, 66 (response rate 78%) completed the questionnaire, of whom 35 (53%) met the case definition. Among cases, 97% (34/35) ate a ready-to-eat salad-mix during dinner on 26 September 2022, while among non-cases the proportion was 71% (22/31). A positive significant association was found between consumption of this salad-mix and illness (RR: 6.0, 95%CI: 0.9–39.2, p-value: 0.005).

Of 13 faecal samples collected, seven were tested for *Cryptosporidium* and four were positive. Two were identified as subtype *C. parvum* IIdA21G1, one IIaA15G2R1, and one was not characterised further.

Public health implications: Green salad-mix was the suspected source of this *C. parvum* outbreak. It was recommended that testing for *Cryptosporidium* is emphasised in clinical settings and that routine species determination and subtyping are considered for outbreak detection. Additionally, the existing recommendation of storing frozen food samples at restaurants for later testing should be strengthened. Risk management measures should be developed for producing ready-to-eat salads.

Role: Co-investigator with EUPHEM fellow, Ana Cristina González Pérez (Cohort 2022); developed the analysis plan; wrote the R script and conducted data analysis; planned and led meetings with different members of the team; wrote an outbreak report together with Ana Cristina (see section 4.2, point 1) which was shared with stakeholders; submitted an abstract for an international conference (European Scientific Conference on Applied Infectious Disease Epidemiology – ESCAIDE 2023) as first author (accepted); prepared an e-poster for ESCAIDE 2023 (see section 4.3, point 1).

1.1.2. Outbreak of Salmonella enterica *serotype Mbandaka ST413, multi-country, 2022–2023*

Supervisors: Ruska Rimhanen-Finne (THL), Anni Vainio (THL)

Category: Food- and waterborne diseases

Aim: To investigate a widespread outbreak of *Salmonella* Mbandaka in the European Union and European Economic Area, Israel, and the United Kingdom, to identify the source, assess the extent of the outbreak, and implement control measures.

Methods: Data from trawling interviews, purchase records, and national food consumption were integrated. Traceback investigations and a case-case study were conducted. Whole genome sequencing (WGS) was performed for *S.* Mbandaka isolated throughout the outbreak of human (n=48) and food (n=1) origin, as well as cluster analysis (Ridom SeqSphere+).

Results: Between April 2022 and January 2023, Finland identified 97 cases of *Salmonella* Mbandaka, linking the outbreak to ready-to-eat (RTE) products containing chicken. In December 2022, *S.* Mbandaka was isolated from a suspected product. A case-case study pinpointed RTE containing chicken from EU Company A as the outbreak vehicle. WGS confirmed the link, revealing that the *S.* Mbandaka isolate from the food product shared only one allelic difference with the main outbreak cluster, which included strains from both Estonian and Finnish cases. The contaminated chicken meat was traced to a non-EU country and used by Company A in further processing. Following the discontinuation of the affected product batch and a supplier change by Company A, no new cases were reported.

Public health implications: The findings underscore the need to strengthen surveillance systems for timely outbreak detection and enhance food safety regulations and inspections. Furthermore, the success of cross-border collaboration emphasises the critical role of international cooperation and information sharing to respond to cross-border threats and protect European public health.

Role: Co-investigator, conducted case-case study with EUPHEM fellow, Ana Cristina González Pérez (Cohort 2022) (lead investigator); contributed to development of the questionnaire; contributed to development of the analysis plan, R script, and data analysis; submitted an abstract for the international conference, ESCAIDE 2023 as co-author (accepted); reviewed e-poster for ESCAIDE 2023 (see section 4.3, point 2); contributed and reviewed a manuscript submitted to a peer-reviewed journal (*Eurosurveillance*) as a co-author (see section 4.1, point 1); wrote activity report.

1.1.3. Outbreak of pneumococcal pneumonia in Turku, Finland, 2023

Supervisors: Lotta Siira (THL), Timothée Dub (THL)

Category: Vaccine-preventable diseases

Aim: To identify risk factors associated with the shipyard setting to inform targeted control measures and recommendations for prevention of future outbreaks.

Methods: On 29 August 2023, THL was notified by The wellbeing services county of Southwest Finland (Varha), of a potential cluster of pneumococcal pneumonia among employees from a shipyard in Turku, Western Finland. A case-control study was conducted. Shipyard workers employed at least since 1 August 2023 were included in the analysis. We recruited controls in person, using a convenience sampling strategy during a field visit to the shipyard on 16 November 2023. All identified cases were invited for an interview over telephone. For risk factors of interest, odds ratios (OR) and 95% confidence intervals (95% CI) were calculated. Blood culture isolates were serotyped and whole genome sequenced at THL. Cluster analysis was done using multilocus sequence typing (MLST) and core genome MLST (cgMLST).

Results: Fourteen cases were identified between 19 August–15 October 2023. Eleven cases and 67 controls were included in the study. Compared to controls, cases were more likely to be living in an apartment/studio (OR: 10.3, 95% CI: 1.3–458.94) or in a hotel/hostel (OR: Inf, 95% CI: 1.2 – Inf). Cases were less likely to be living in houses (OR: 0.00, 95%CI: 0.00–0.46), living with family (OR: 0.15, 95% CI: 0.02–0.82), or to be working longer than one year at the shipyard (OR: 0.1, 95% CI: 0.0–0.7).

Two serotypes (4, 9V) representing three sequence types were identified: ST801 (serotype 4, n=5), ST2025 (9V, n=1), ST239 (9V, n=1). cgMLST revealed three distinct clusters, differing by over 900 alleles.

Public health implications: This was the second reported pneumococcal outbreak occurring in this shipyard within five years (last one in 2019). Microbiological typing confirmed a multi-strain outbreak, suggesting that shipyard conditions as well as living conditions could be facilitating transmission and progression from carriage to severe disease. Longer tenure at the shipyard may imply prior vaccination post-2019 outbreak or earlier colonisation, potentially resulting in higher protective immunity. All employees working on ship construction and exposed to fumes, dusts, or smoke merit to be vaccinated against pneumococcal disease.

Role: Lead investigator, supported by EUPHEM fellow, Ana Cristina González Pérez (Cohort 2022) and EPIET fellow, Joana Sequeira Neto (c2023); coordinated and led activities related to the case-control study; planned and led meetings with the outbreak investigation team; prepared study protocol; designed the questionnaire and translated it and other materials as needed; planned and coordinated a field visit to the shipyard to recruit controls; conducted interviews with cases; prepared data entry mask and performed data entry; wrote the R script and analysed the data; coordinated, drafted, and finalised manuscript; submitted an abstract for ESCAIDE 2024 as first author (rejected); submitted manuscript to a peer-reviewed journal as first author (see section 4.1, point 2)(first submitted to *Eurosurveillance* and resubmitted to *Epidemiology & Infection*); invited as a speaker to present outbreak results at a Finnish conference, the 2nd Annual Microbe Cruise, Turku, Finland (see section 4.3, point 4).

1.2. Surveillance

1.2.1. Interrupted time series analysis of chlamydia and gonorrhoea notifications in Finland, 2015–2022

Supervisors: Kirsi Liitsola (THL), Timothée Dub (THL), Lotta Siira (THL), Otto Helve (THL)

Aim: To investigate *Chlamydia trachomatis* and *Neisseria gonorrhoeae* testing and notification trends in Finland, assessing the impact of COVID-19 restrictions.

Methods: Data on 123,537 cases of chlamydia and 4,363 cases of gonorrhoea were extracted from the Finnish Infectious Diseases Register for 2015–2022. Testing volume and positive detections from eight laboratories representing 96% of all notified cases of chlamydia and gonorrhoea were used to calculate annual positivity rates. Interrupted time series analysis was conducted using negative binomial regression on monthly counts. The pre-COVID-19 period was defined as January 2015 to February 2020, and the COVID-19 period as March 2020 to June 2022.

Results: From 2015 to 2022, chlamydia testing volume increased by 48%, gonorrhoea by 71%. Chlamydia positivity rate increased by 8% between 2019–2020 (IRR: 1.08, 95% CI: 1.06–1.1, $p<0.05$), while gonorrhoea decreased by 16% (IRR: 0.84, 95% CI: 0.76–0.93, $p<0.05$).

Pre-COVID-19, chlamydia notifications rose by 0.01% monthly (95% CI: 0.007%–0.02%, $p<0.001$) and gonorrhoea by 0.1% (95% CI: 0.06%–0.15%, $p<0.001$). In March 2020, no significant change was observed in chlamydia (-7%, 95% CI: -15%–2%, $p=0.1$), however cases of gonorrhoea dropped by 41% (95% CI: 21%–56%, $p<0.001$). No significant trend changes were found for either STI comparing the COVID-19 period to pre-COVID-19.

Public health implications: This study provides insights into chlamydia and gonorrhoea epidemiology in Finland, helping target public health campaigns and improve sexual health programmes. Stable testing volumes during the pandemic indicates resilient efforts. The decline in gonorrhoea notifications, however, suggests disruptions in healthcare-seeking behaviour, warranting further investigation. The increase in positivity rates emphasises the need for regular testing and targeted outreach among sexually active individuals.

Role: Developed the analysis plan; developed short questionnaire for laboratories; wrote the R script and performed data analysis; presented the project and findings to various audiences; submitted an abstract for ESCAIDE 2023 as first author (rejected); submitted an abstract for the European Society of Clinical Microbiology and Infectious Diseases (ESCMID) Global 2024 international conference as first author (accepted); prepared and presented poster at ESCMID Global 2024 (see section 4.3, point 3); prepared a manuscript to be submitted to a peer-reviewed journal (end of September 2024) (see section 4.1, point 3).

2. Applied public health research

2.1. Evaluation of Finnish exposure notification application, 'Koronavilkku' according to key indicators, Finland, 2022

Supervisors: Lotta Siira (THL), Timothée Dub (THL)

Aim: To evaluate the Finnish Koronavilkku app according to chosen key performance indicators (KPIs) in order to gain insight into the app's use and performance during the COVID-19 epidemic in Finland, as well as identify strengths and areas for improvement.

Methods: Koronavilkku was launched on 31 August 2020 and discontinued on 1 June 2022. Its aim was to supplement conventional contact tracing (CT) and serve as an early warning system for the individual user in case of potential exposure to a SARS-CoV-2-positive person in order to provide them with behavioural guidance mitigating the chance of further transmission. An evaluation study was conducted using four pre-defined KPIs: extent of app use, enablers/barriers, influence on user behaviour, and overall acceptability. Data were sourced from the Koronavilkku system, the National Population Registry, the National Infectious Disease Registry, and a cross-sectional online survey conducted in April 2022 among 4,061 respondents aged 15–79-years-old. Results of the survey were weighted according to age, sex, and regional distribution of the Finnish population.

Results: Koronavilkku was actively used by 40–50% of the Finnish population at the end of 2020, peaking at 53% in early 2021 before declining to less than 30% in 2022. Despite reduced coverage, the proportion of positive tests uploaded into the app did not fall below 50%, indicating high user engagement. Non-users were more often male, aged 35 or older, less educated, unemployed, or living alone. Reported barriers included perceived lack of usefulness and battery concerns. Over 60% of positive cases did not receive a token. Exposure notifications enhanced adherence to pandemic guidelines among those app users who were already partially compliant, but minimally influenced those not adhering previously. 49% agreed the app was beneficial, and 62% would use it again.

Public health implications: Identifying strengths and shortcomings of digital tools like Koronavilkku is crucial for future pandemic preparedness. This evaluation highlighted areas of under-utilisation and provided insights into barriers and the app's potential impact on pandemic mitigation. Our recommendations focused on three main areas for improvement: 1) communication strategies to target groups with lower app adoption and adherence to guidelines, as well as messages that highlighted the app's aims; 2) technical improvements focusing on less impact of app use in relation to phone battery level and automatic token issuance; 3) early planning of evaluation criteria and regular assessments throughout the app's lifetime.

Role: Developed the analysis plan; wrote the protocol; wrote the R script and performed data analysis; presented the project and findings to various audiences; submitted an abstract for ESCAIDE 2024 as first author (rejected); prepared a final report for stakeholders (see section 4.2, point 2).

2.2. Bacille Calmette-Guérin (BCG) vaccination coverage among neonates at risk for tuberculosis before and after introduction of neonatal Severe Combined Immunodeficiency (SCID) screening in the Hospital District of Helsinki and Uusimaa (HUS) area in Finland, 2018–2022

The project was discontinued after the preparation phase due to administrative issues and will be potentially conducted by another fellow in the future.

Supervisors: Sohvi Kääriäinen (THL)

Aim: To assess whether BCG vaccine coverage (against tuberculosis) in the HUS area is decreasing in at-risk neonates since the introduction of SCID screening and identify potential risk factors associated with non-vaccination in this group.

Methods: Calculating BCG vaccine coverage among at-risk neonates by hospital and year. Data will be sourced from the Medical Birth Register, the National Population Registry, and HUS Helsinki University Hospital records. The study population are all children born in years 2018–2022 in the Helsinki and Uusimaa region and had mothers born in high-TB-incidence countries.

A retrospective cohort study will be performed to identify potential risk factors associated with not receiving the BCG vaccine among at-risk neonates. A multivariable analysis will be performed using variables extracted from the MBR.

Results: Project not finalised due to administrative issues; project will potentially be continued by another fellow.

Public health implications: The analysis is needed for evaluating the effect of SCID screening on BCG vaccination coverage in at-risk neonates in Finland. Currently, the selective BCG vaccination coverage estimates for the years 2020–2022 are unknown. Notably, the recommendation for adding SCID to the ongoing infant screening programme was accepted by the Finnish Service Selection Council with the stipulation that the BCG vaccinations of the tuberculosis risk group be nationally ensured in such a way that vaccination coverage does not deteriorate. A drop in BCG vaccination coverage might result in an increase of TB incidence. Based on the results of this analysis, recommendations and next steps will be formed to maintain high BCG vaccination coverage in this group.

Role: Conducted preparatory work and initial literature review; prepared research plan and administrative documents for research permission; presented the project proposal to stakeholders.

3. Teaching and pedagogy

3.1. Finnish educational programme to host school students at the workplace, 2023

Wioleta, together with Ana Cristina González Pérez, supervised a 15-year-old schoolchild at THL as part of the Finnish educational programme for school students. This included presenting the fellowship, detailing the projects and activities conducted by fellows at THL, introducing outbreak investigations, and facilitating a case study on a gastroenteritis outbreak in Sweden, which served as the final output of the activity.

3.2. Essentials of Infectious Disease Epidemiology, University of Tampere, Finland 2024

EPIET/EUPHEM fellows from THL organised and taught a one-week course on 'Essentials of Infectious Disease Epidemiology' aimed at postgraduate students at Tampere University in Finland. Wioleta was involved in all aspects of the course including planning, designing the curriculum, developing training materials, teaching, facilitating, and conducting morning revision sessions. She prepared and delivered three lectures, as well as facilitated four case studies on outbreaks and surveillance of infectious diseases. Students' feedback was collected via an electronic questionnaire, and an evaluation report and reflective note were prepared.

3.3. Outbreak Investigation Day (OID), Helsinki, Finland, 2024

EPIET/EUPHEM fellows from THL organised and taught a one-day course at THL to enhance staff knowledge on outbreak investigations. The event included lectures on outbreak investigations and study designs, and a case study in smaller groups to promote collaboration between epidemiologists and microbiologists and multidisciplinary thinking. Wioleta was involved in all aspects including organising the course, developing the material, delivering lectures, facilitating the case study, and preparing an evaluation survey. An evaluation report was written and disseminated among participants, and a reflective note was prepared.

3.4. Organisation of the Nordic Mini Project Review Module (NMPRM), Helsinki, Finland, 2024

EPIET/EUPHEM fellows from THL organised a two-day regional project review module. The NMPRM is an annual, fellow-driven event, initiated among Nordic countries to offer a platform for discussion, guidance, idea exchange, and to facilitate collaboration on projects. The event took place at THL and was attended by 12 fellows and facilitated by 15 experts from THL and WHO. Wioleta was involved in all aspects of the module including planning, preparing the programme, arranging facilitators, preparing, and conducting the evaluation survey. An evaluation report was written.

3.5. EU Twinning Project Training implemented by THL and the Public Health Institute of Serbia, Belgrade, Serbia, 2024

See 'International Assignments' section.

4. Communications related to the EPIET/EUPHEM fellowship

4.1. Manuscripts published in peer-reviewed journals

1. **Kitowska W**, Gonzalez-Perez AC, Sequeira Neto J, Kanerva M, Kaukavuori H, Lindström I, et al. A repeated outbreak of pneumococcal pneumonia among shipyard employees in Turku, Finland August – October 2023: a case-control study. Submitted to Eurosurveillance on 19 June 2024 (rejected), resubmitted to Epidemiology & Infection on 11 September 2024.
2. **Kitowska W**, Liitsola K, Siira L, Helve O, Dub T. Evaluating the impact of COVID-19 on chlamydia and gonorrhoea trends in Finland: a time series analysis for years 2015-2022 (tentative title) [*in preparation*].
3. Gonzalez-Perez AC, Landgren H, Vainio A, **Kitowska W**, Pihlajasaari A, Leinonen E, et al. A multi-country outbreak of *Salmonella enterica* serotype Mbandaka sequence type 413 linked to pre-cooked frozen chicken meat in ready-to-eat products, 2022 – 2023. Submitted to Eurosurveillance on 10 September 2024.

4.2. Other reports

1. **Kitowska W**, Gonzalez-Perez AC, Rimhanen-Finne R. Outbreak report: *Cryptosporidium parvum* outbreak after a business event in Hotel X, Helsinki (Finland), September – October 2022. A retrospective cohort study. Helsinki: THL; 2023. Shared with stakeholders.
2. **Kitowska W**, Pihlajamäki M, Puranen K, Helve O, Yrttiaho A, Mykkänen J, Dub T, Siira L. Evaluation of Finnish exposure notification application "Koronavilkku" according to key performance indicators – final report. Helsinki: THL; 2024. Shared with stakeholders.

4.3. Conference presentations

1. **Kitowska W**, Gonzalez-Perez AC, Suominen K, Vainio A, Åberg R, Hokkanen P, et al. Outbreak of cryptosporidiosis among a cohort of business event participants at a Finnish hotel associated with a green salad-mix, September – October 2022 (e-poster). Presented at: European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 22-24 November 2023; Barcelona, Spain.
2. Gonzalez-Perez AC, Landgren H, Vainio A, **Kitowska W**, Pihlajasaari A, Leinonen E, et al. A multi-country outbreak of *Salmonella enterica* serotype Mbandaka ST413 linked to consumption of chicken meat - a case-case study in Finland, 2022 – 2023 (e-poster). Presented at: European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 22-24 November 2023; Barcelona, Spain.
3. **Kitowska W**, Liitsola K, Siira L, Helve O, Dub T. No sustained decrease in chlamydia and gonorrhoea testing and notification trends during the COVID-19 pandemic, Finland, 2015-2022 (poster). Presented at the 34th Congress of the European Society of Clinical Microbiology and Infectious Diseases (ESCMID Global); 28 April 2024; Barcelona, Spain. Presenter: Kitowska W.
4. **Kitowska W**, Gonzalez-Perez AC, Sequeira Neto J, Kanerva M, Kaukavuori H, Lindström I, et al. Pneumococcal pneumonia outbreak at a shipyard in Turku, Finland, August - October 2023 (oral presentation as invited speaker). Presented at 2nd Annual Microbe Cruise; 4 September 2024; Turku, Finland. Presenter: **Kitowska W.**

4.4. Other presentations

4.4.1. Lectures and external presentations

1. Gonzalez-Perez AC and **Kitowska W.** *Cryptosporidium parvum* outbreak at a business event in Hotel X in Helsinki, Finland, September-October 2022. A retrospective cohort study (oral presentation). Presented at: "Klinfektiokokous" meeting at Hospital district of Helsinki and Uusimaa (HUS); 14 December 2022; Virtual.
2. Gonzalez-Perez AC and **Kitowska W**. Microbiology and epidemiology working together: a case – case study of a *Salmonella* Mbandaka outbreak in Finland, September 2022–January 2023 (oral presentation). Presented at: Friday series of clinical microbiology (KLIMP) at Hospital district of Helsinki and Uusimaa (HUS); 12 May 2023; Virtual.
3. **Kitowska W**. Analytic tools for surveillance and surveillance-systems in Europe (lecture). Presented at: 'Essentials of Infectious Disease Epidemiology' course at University of Tampere; 6 February 2024; Tampere, Finland.
4. Gonzalez-Perez AC and **Kitowska W**. An example of a case-case study: the multi-country outbreak of *Salmonella* Mbandaka (lecture). Presented at: 'Essentials of Infectious Disease Epidemiology' course at University of Tampere; 7 February 2024; Tampere, Finland.
5. **Kitowska W** and Sequeira Neto J. Pandemic control, part 2 (lecture). Presented at: 'Essentials of Infectious Disease Epidemiology' course at University of Tampere; 8 February 2024; Tampere, Finland.

6. Gonzalez-Perez AC and **Kitowska W**. Study designs (lecture). Presented at: 'Outbreak Investigation Day' training at THL Tilkanmäki; 18 March 2024; Helsinki, Finland.
7. **Kitowska W**. Basic principles of risk assessment - Rapid Risk Assessment methodology (lecture). Presented at: 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance' – Modules 1 and 2 training at Institute of Public Health in Belgrade; 21 May 2024; Belgrade, Serbia.
8. **Kitowska W**. Time series analysis for outbreak detection (lecture). Presented at: 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance' – Modules 1 and 2 training at Institute of Public Health in Belgrade; 22 May 2024; Belgrade, Serbia.
9. **Kitowska W** and Sequeira Neto J. Study designs (lecture). Presented at: 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance' – Modules 1 and 2 training at Institute of Public Health in Belgrade; 22 May 2024; Belgrade, Serbia.
10. Gonzalez-Perez AC and **Kitowska W**. The interface between epidemiology and microbiology – an example based on a cohort study (lecture). Presented at: 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance' – Modules 1 and 2 training at Institute of Public Health in Belgrade; 22 May 2024; Belgrade, Serbia.
11. **Kitowska W**. Interpretation of lab data (basics) – example from toxoplasmosis case study (lecture). Presented at: 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance' - Module 1 and 2 training at Institute of Public Health in Belgrade; 23 May 2024; Belgrade, Serbia.

4.4.2. Presentations in EPIET/EUPHEM modules

1. Gonzalez-Perez AC and **Kitowska W**. *Cryptosporidium parvum* outbreak at a business event in Hotel X in Helsinki, Finland, September-October 2022. A retrospective cohort study (oral presentation). Presented at: Outbreak Investigation Module; 28 November 2022; Berlin, Germany.
2. **Kitowska W**. Impact of COVID-19 restrictions on STI epidemiology in Finland: preliminary results (oral presentation). Presented at: Nordic Mini Project Review Module; 13 March 2023; Copenhagen, Denmark.
3. **Kitowska W**. Impact of COVID-19 restrictions on chlamydia and gonorrhoea notification trends in Finland, 2015-2022 (oral presentation). Presented at: Project Review Module; 29 August 2023; Lisbon, Portugal.
4. **Kitowska W**. Impact of COVID-19 restrictions on chlamydia and gonorrhoea notification trends in Finland, 2015-2022 (oral presentation). Presented at: Time Series Analysis Module; 11 December 2023; Rome, Italy.
5. **Kitowska W**. Evaluation of Finnish exposure notification application "Koronavilkku" according to key indicators: preliminary results (oral presentation). Presented at: Nordic Mini Project Review Module; 29 February 2024; Helsinki, Finland.
6. **Kitowska W**. SARS-CoV-2 post-exposure notifications influenced more health-conscious users in terms of pandemic behaviours: lessons from Finland's "Koronavilkku" application, 2022 (oral presentation). Presented at: Project Review Module; 26 August 2024; Lisbon, Portugal.

4.4.3. Presentations at internal meetings at THL

1. Gonzalez-Perez AC and **Kitowska W**. *Cryptosporidium parvum* outbreak at a business event in Hotel X in Helsinki, Finland, September-October 2022. A retrospective cohort study (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 2 December 2022; Helsinki, Finland.
2. **Kitowska W**. Impact of COVID-19 restrictions on STI epidemiology in Finland: project proposal (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 15 December 2022; Helsinki, Finland.
3. Gonzalez-Perez AC and **Kitowska W**. Investigations of a multi-country outbreak of *Salmonella enterica* serotype Mbandaka ST413 in the EU/EEA, Israel and the UK – Finnish perspective (oral presentation). Presented at: weekly outbreak meeting; 21 February 2023; Helsinki, Finland.
4. Gonzalez-Perez AC and **Kitowska W**. A case – case study of an outbreak of *Salmonella* Mbandaka in Finland, September 2022 – January 2023 (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 23 February 2023; Helsinki, Finland.
5. **Kitowska W**. Impact of COVID-19 restrictions on STI epidemiology in Finland: preliminary results (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 9 March 2023; Helsinki, Finland.
6. **Kitowska W**. Evaluation of Finnish exposure notification application "Koronavilkku" according to key indicators: project proposal (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 20 April 2023; Helsinki, Finland.
7. **Kitowska W**. BCG vaccination coverage among at-risk neonates before and after introduction of neonatal SCID screening in Finland: project proposal (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 8 June 2023; Helsinki, Finland.

8. **Kitowska W**. Pneumococcal disease outbreak at Turku Shipyard, Finland, August October 2023: situation update (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 30 November 2023; Helsinki, Finland.
9. **Kitowska W**. Pneumococcal disease outbreak at Turku Shipyard, Finland, August October 2023: results – preview (oral presentation). Presented at: weekly outbreak meeting; 30 January 2024; Helsinki, Finland.
10. **Kitowska W**. Pneumococcal disease outbreak at Turku Shipyard, Finland, August October 2023: results (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 1 February 2024; Helsinki, Finland.
11. **Kitowska W**. No sustained decrease in chlamydia and gonorrhoea testing and notification trends during the covid-19 pandemic, Finland, 2015-2022 (poster). Presented at: bi-weekly EPIET/EUPHEM meeting; 25 April 2024; Helsinki, Finland.
12. **Kitowska W**. Evaluation of Finnish exposure notification application "Koronavilkku" according to key indicators: preliminary results (oral presentation). Presented at: bi-weekly EPIET/EUPHEM meeting; 12 June 2024; Helsinki, Finland.

5. EPIET/EUPHEM modules attended

- Introductory Course, 26 September–14 October 2022, Spetses, Greece
- Fundamentals of R for public health (16h), Applied Epi, 28 November–1 December 2022, virtual
- 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
- Writing Abstracts for Scientific Conferences, 20 March 2024, virtual
- Qualitative Research – Elective course, 19 and 22 March 2024, virtual
- European Congress of Clinical Microbiology and Infectious Diseases (ESCMID Global) 2024, 27–30 April 2024, Barcelona, Spain
- Management, Leadership and Communication in Public Health, 24–28 June 2024, Stockholm, Sweden
- Project Review Module 2024, 26–30 August 2024, Lisbon, Portugal
- European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2024, 20–22 November 2024, Stockholm, Sweden

6. Other training

- Risk management in the digital world, eOppiva, 14 September 2022, virtual
- ABC of data protection for public administration personnel, eOppiva, 15 September 2022, virtual
- Digitally secure working life, eOppiva, 15 September 2022, virtual
- EVD-LabNet Webinar on EIDs, European Centre for Disease Prevention and Control, 6 March 2023, virtual
- Nordic Mini Project Review Module, 13–14 March 2023, Copenhagen, Denmark
- Webinar: Cholera outbreaks: The current situation and what are doing to address it, 15 March 2023, virtual
- Webinar: Mobile Laboratories, EPIET/EUPHEM initiative, 4 May 2023, virtual
- BSAFE security awareness training, United Nations Department of Safety and Security, 12 June 2023, virtual

- EPI-WIN Webinar: Strengthening One Health operations in countries to improve preparedness for emerging zoonotic diseases, World Health Organization, 5 July 2023
- ABC of data protection for public administration personnel, eOppiva, 15 September 2023, virtual
- Digitally secure working life, eOppiva, 15 September 2023, virtual
- Webinar: Field Epidemiology information webinar, Medecins Sans Frontieres and EPIET Alumni Network, 2 November 2023, virtual
- Mini-module on Molecular Epidemiology, EPIET Alumni Network, 20–21 November 2023, Barcelona, Spain
- Nordic Mini Project Review Module, 29 February–1 March 2024, Helsinki, Finland
- EPI-WIN webinar: Dengue: current epidemiological situation and response, World Health Organization, 13 June 2024, virtual
- Webinar: EU Health Task Force, European Centre for Disease Prevention and Control, 17 June 2024, virtual
- Webinar: Getting your message across, EPIET Alumni Network, 11 July 2024, virtual

7. International assignments

EU Twinning Project Training implemented by THL and the Public Health Institute of Serbia, Belgrade, Serbia, 2024

Five-day deployment (20–24 May 2024) on mission to the Institute of Public Health of Serbia ('Batut') in Belgrade, Serbia, as part of the THL EU Twinning Project, 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance'. Supported the THL team in activities leading up the mission, including creation of the course programme, development of training materials (lectures, case studies, exercises), and pre-training consultations and preparations with Serbian colleagues. During the mission, conducted two training-of-trainers modules simultaneously (Modules 1 and 2) for epidemiologists and microbiologists from the Serbian network of public health institutions. The trainings took place 21–23 May 2024 at Batut and were accredited by the European Accreditation Council for Continuing Medical Education (EACCME). Took part in post-training discussions, review of evaluation forms, preparation of the mission report, and writing a news piece for the project's webpage. Summarised evaluation results and prepared reflective note.

8. Other activities

- Attendance to weekly internal outbreak meetings, 2022–2024, on-site at THL, Helsinki, Finland
- Attendance to bi-weekly internal EPIET/EUPHEM meetings, 2022–2024, on-site at THL, Helsinki, Finland
- 'Vaccine hesitancy' scientific seminar at THL, 14 September 2022, Helsinki, Finland
- Laboratory visit to the Expert Microbiology Laboratory of THL to observe the routine genotyping of *Cryptosporidium*, October 2022, Helsinki, Finland
- 'Decision making' scientific seminar at THL, 19 October 2022, Helsinki, Finland
- Conference 'From Pasteur to the pandemic', 21 October 2022, Helsinki, Finland
- 'Understanding airborne transmission' scientific seminar at THL, 16 November 2022, Helsinki, Finland
- Co-reviewed manuscript for *Eurosurveillance*, 13 December 2022, virtual
- 'Healthcare associated infections' scientific seminar at THL, 11 January 2023, Helsinki, Finland
- Site visit to the Epidemiology Team at the City of Helsinki, 16 January 2023, Helsinki, Finland
- Site visit to the Research Center Neulanen of THL (i.e. the Environmental Health Unit and the Water Microbiology team), 31 March 2023, Kuopio, Finland
- Site visit to the Epidemiological Operations Unit for the Western Uusimaa Wellbeing Services County, 4 April 2023, Helsinki, Finland
- Site visit to the clinical microbiology laboratory of the Hospital district of Helsinki and Uusimaa (HUS) Diagnostic Centre, 16 May 2023, Helsinki, Finland
- MOOD Scientific Conference / General Assembly meeting, THL, 27–29 June 2023, Helsinki, Finland
- Co-reviewed manuscript for *Eurosurveillance*, 18 October 2023, virtual
- Site visit to Meyer Turku, Turku Shipyard to recruit study participants, 16 November 2023, Turku, Finland

- Laboratory visit to the Expert Microbiology Laboratory of THL to observe the routine serotyping of *Pneumococcus* using Quellung method, 18 October 2023, Helsinki, Finland
- Organiser of the Nordic Mini Project Review Module (NMPRM) 2024, 29 February–1 March 2024, Helsinki, Finland
- Prepared and published a news piece for THL intranet about the Nordic Mini Project Review Module (NMPRM) 2024, 3 April 2024, virtual
- Reviewed news piece for EU project website about the EU Twinning Project 'Strengthening the capacity of Serbia's healthcare for communicable disease surveillance' mission to Belgrade, Serbia, 11 June 2024, virtual
- Support on filling out ECDC survey on mapping available documentation for outbreak investigation and outbreak-related research in EU/EEA countries, 19 June 2024, virtual
- Site visit to the Vantaa Prison, 15 August 2024, Vantaa, Finland

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