



MediPIET

Mediterranean and Black Sea Field
Epidemiology Training Programme Network



Funded by the EU

MediPIET Summary report of work activities

Samer Sawalha

Palestine, Cohort 3 2019-2021

Background

About MediPIET

The Mediterranean and Black Sea field epidemiology training programme “MediPIET” is a CBRN CoE Project 74 – 2018/400-697. Within the framework of the EU CBRN Risk Mitigation Centres of Excellence (CoE) initiative, Europe-Aid-DEVCO funds MediPIET to increase security in the EU neighbourhood. Building on the success of the previous MediPIET phase 2014-2017, this project supports capacity building for prevention and control of natural and man-made health threats through a regional training program in intervention epidemiology.

Furthermore, the MediPIET project is aimed at consolidating a competent workforce with the necessary competence in intervention epidemiology to carry out essential public health functions for prevention and control of national and cross-border challenges posed by communicable diseases. In detail, expected results are as follows: (i) Enhanced field epidemiology training capacity in participating countries; (ii) Enhanced capacities in public health institutions to train their workforce and collaborate with regional networks; (iii) Increased capacity of exchange public health knowledge and methodologies between non-EU countries and EU partners; (iv) Sustainable country capacity and regional networking to deal with health security challenges.

The project is implemented by the Consortium Instituto de Salud Carlos III, Madrid, Spain (ISCIII) and the Fundación Estatal Salud, Infancia y Bienestar Social, Madrid, Spain (FCSAI) under the scientific leadership of ECDC in the two-year period 2019-2021. It extends over the non-EU countries covered by the EU Enlargement and European Neighbourhood policies: Albania, Algeria, Armenia, Bosnia and Herzegovina, Egypt, Georgia, Jordan, Kosovo¹, Lebanon, Libya, Moldova, Montenegro, Morocco, Palestine², Serbia, the Republic of North Macedonia, Tunisia, and Ukraine.

¹This designation is without prejudice to positions on status and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

²This designation shall not be construed as recognition of a State of Palestine and is without prejudice to the individual positions of the Member States on this issue.

Pre-fellowship short biography

Samer Sawalha is an environmental health scientist and entomologist with a master's degree in Public Health (2001) and in Environmental Science (2000). Before joining the MediPIET fellowship, Samer has been working as the head of the vector control unit in the Palestinian Ministry of Health. During graduate and undergraduate studies and subsequent work he has gained a broad knowledge on the biology of diseases' vectors and their control, legislations and use of pesticides, environmental awareness and sanitation. Samer has participated in many research studies and projects and has many publications in peer-reviewed journals. His studies and training have taken him outside of Palestine, enabling him to interact with and appreciate different cultures.

Training site

In July 2019, Samer Sawalha started his MediPIET fellowship at the Preventive medicine department, Ministry of Health, Ramallah, Palestine.

The Preventive Medicine Department is implementing the epidemiological monitoring system for communicable diseases in Palestine that is capable of early detection, rapid and effective response to epidemics, providing estimates of morbidity and mortality for these diseases, evaluating the results of prevention and control measures, and maintaining a high level of vaccination coverage to keep Palestine free from epidemics. The department's success in controlling infectious diseases include polio, neonatal tetanus, diphtheria, whooping cough, rubella and leprosy although these exist in neighbouring countries. The main tasks of the Preventive Medicine Department includes surveillance of infectious diseases, development of health policies, strategies and systems in the field of control and prevention of communicable and infectious diseases, technical supervision of the implementation of the national vaccination program, development of detailed work guides necessary for the implementation of communicable disease control programmes, and follow up of the public health situation at the international level on the epidemiology of communicable diseases.

National supervisor(s): Dr Dia Hjaija

Scientific coordinator: Dr Iro Evlampidou

Fellowship projects

Surveillance

1. Epidemiological characteristics of hepatitis A infection in the West Bank, Palestine, 2010-2018

Background: West Bank (WB) (population: 3.1m; 36% <15 years) is endemic to Hepatitis A (HA) where 93% of population has access to piped water. The seroprevalence, epidemiology and risk factors are largely unknown. We aimed to describe HA epidemiology to define preventive measures.

Methods: We conducted a retrospective analysis of HA cases reported in the routine Communicable Diseases Surveillance System. Suspect case was a WB resident with HA onset during 2010-2018 and a clinical diagnosis; laboratory confirmed was a suspect case with positive anti-HAV IgM. Local epidemiologists collected environmental hygiene information during case investigation. We described data and estimated the annual (IR), cumulative incidence rate (CIR) and mortality rate (MR) per 100,000 population using 2007/2017 census data.

Results: In 2010-2018, among 2356 cases, 928 (39%) were laboratory confirmed; 1313 (56%) were males; median age was 9 years (interquartile range (IQR): 5-13); 1950 (83%) aged 0-14 years. Hospitalized were 269 (11%, median age: 10 (IQR: 7-14) years); 7 died (MR: 0.26, mean age: 11 (SD:

4) years). The cumulative, median and mean annual IR were 87, 7.0 (range: 2.8-19) and 9.8 (SD: 6) respectively. The highest IRs were in 2010 (IR: 19) and 2015 (IR: 18), in age groups: 5-14 (IR: 236) and 0-5 years (IR: 99) and in the districts: Jericho (IR: 474) and Bethlehem (IR: 151). Oral-faecal transmission was reported in 99.8% (2247/2252); 42% (947/2267) lived in fair/bad environmental hygiene; 16% (386/2356) had no piped water.

Conclusion: HA presented high incidence in pre-/school-aged children and in specific districts with almost half cases living in inadequate hygienic conditions favouring transmission. Improving hygiene and awareness, targeting schools and high risk areas, and investing in safe water supply is imperative to prevent HA infection.

Role and outputs: Principal investigator

Samer wrote the protocol, cleaned and analysed the surveillance data, prepared a report, wrote an abstract that was peer-reviewed using ESCAIDE's conference abstract evaluation criteria, and presented the study in the MediPIET's online Project Review Module II, 2021.

Supervisor(s): Dr Dia Hjaija

Status: Completed

2. Epidemiology of Visceral Leishmaniasis in West Bank, Palestine: analysis using f surveillance system during 1990-2020

Background: Visceral leishmaniasis (VL) is a notifiable disease in Palestine. It is endemic in the West Bank (WB) with no cases in Gaza strip but no recent epidemiological analysis has been performed. This study aimed to review the epidemiology of VL cases reported in WB during 1990-2020 in order to improve understanding of differences in geographical distribution.

Methods: We conducted a preliminary retrospective descriptive analysis of VL cases routinely reported in the communicable diseases surveillance system for 1990-2020. We collected the case investigation forms, described the case-counts by age and geographical distribution and estimated the cumulative incidence rate (CIR) per 100,000 population.

Results: During 1990-2020, 245 VL cases were reported. The annual average cases during 1990-2000 was 13.5 (n=149, range: 4-32) and during 2001-2020 was 4.8 (n=96, range: 1-9) with a peak in 1995 (n=32; 16%) and a decreasing case-count afterwards. All cases were laboratory confirmed; 238 (98%) were children <10 years and 2 (0.8%) were >62 years. All cases were hospitalized and 3 (1.2%) died: two were females (45 and 64 years), and one was a child (3 years). The CIR (per 100,000) was 11, and by district, in Jenin was 25, Hebron was 18 and in Salfit and Tulkram was 15. Cases were restricted to western West Bank with no cases from the eastern parts in the Jordan valley. During the 1990s, the most affected districts were Jenin (n=55) and Hebron (n=30) with most cases attributed to domestic dogs whereas, since 2001, Jenin reported 7 and Hebron 67 mainly attributed to stray dogs, nearby presence of animals and poultry farms.

Conclusion: The geographical distribution and source of infection of VL cases has changed over the past two decades. Further detailed epidemiological studies identifying risk factors will be very useful to guide preventive and control measures of VL in Palestine.

Role and outputs: Principal investigator

Samer reviewed the VL epidemiology literature, collected paper-based investigation forms, made simple descriptive analysis and wrote an abstract.

Supervisor(s): Dr Dia Hjaija

Status: Completed

3. Revision of “Leishmaniasis Case Investigation Form”

Background: In Palestine, leishmaniasis is endemic representing a public health problem and is a notifiable disease in the communicable diseases surveillance system. Case information is collected using a paper-based case investigation form (CIF). The data fields in the CIF were developed in 2008 and do not include sufficient information on risk factors, housing conditions or control and prevention activities around the residency of reported cases. We updated the CIF in order to improve the collected information and quality by the surveillance system.

Methods: We reviewed the literature of published studies in peer-reviewed journals and investigation forms used in endemic and neighbouring countries. We compared fields in the current CIF with ones in the published literature. We added new and deleted not relevant fields and grouped the variables in different categories.

Results: The new investigation form includes more details on presenting symptoms, laboratory diagnosis, hospitalization and outcome, the place where infection might have occurred e.g. workplace, history of travel, infection in the family, relatives or neighbours, as well as on risk factors and use of insecticides. Thirty seven variables are grouped in eleven sections, the majority categorical, that provide more information on the confirmation of the diagnosis and the possible foci of infection.

Conclusions: The updated CIF is clearer, easy to fill and captures the most important case information that allows documenting the case history, identifying possible place of infection and risk factors and, provide quality data for the epidemiological surveillance of leishmaniasis in Palestine.

Role and outputs: Principal investigator

Samer reviewed the literature and revised the case investigation form.

Supervisor(s): Dr Dia Hjaija

Status: Completed

Outbreaks

1. Visceral Leishmaniasis: A case investigation in an urban area, Nablus, Palestine, August 2019

Background: Visceral leishmaniasis (VL) is endemic in Palestine and sporadic cases are reported annually. In August 2019, the Preventive Medicine Department was notified of a VL case in Nablus, a city in which since 1990 only one case was reported, and initiated a case investigation. The aim was to identify the source of infection and the vehicle of transmission in order to implement control measures.

Methods: We conducted a face-to-face interview with the patient’s relative and neighbours to collect information on travel history, sandfly bites and presence of domestic dogs and foxes in the vicinity. We inspected the patient’s and two neighbouring houses and a bird shed, collected sandflies and assessed the sanitation. We sent the patient’s microscopy slides to the reference laboratory to confirm the diagnosis by Polymerase Chain Reaction (PCR).

Results: The patient was a 62-years-old woman with a kidney transplant in 2015 and under immunosuppressive therapy. In March 2019, she developed symptoms. On 29 July, a bone marrow biopsy microscopic examination was positive and received VL treatment causing kidney complications. The field investigation revealed that, during the previous year, the patient did not travel nor was in endemic foci or exposed to sandfly bites. The patient’s houserooms were well ventilated, the walls painted and the windows screened. We collected one sandfly from eight rooms in three houses and none from bird sheds. Sanitation conditions did not support sandfly breeding. In the house’s surroundings, no suspected reservoir animals, animal burrows, garbage, plant remains or animal droppings were identified. PCR was negative for *Leishmania spp.*

Conclusion: There was no evidence of local VL transmission as no risk factors were identified and PCR did not confirm the diagnosis. We recommend building laboratory capacity in Leishmania diagnosis and reinforcing the importance of confirmation test at a reference or specialized laboratory.

Role and outputs: Principal investigator

Samer performed the case investigation and wrote a report in Arabic and an abstract in English. The final report is being translated to English.

Supervisor(s): Dr Dia Hjaija

Status: Completed

2. Investigation and follow up of returning travellers from Uganda diagnosed with malaria to prevent disease reintroduction in a former endemic area, Palestine, 2020

Background: Since 1972, malaria has been eradicated in Palestine. Travellers visiting malaria-endemic countries could pose a public health problem although, based on the *Anopheles spp.* prevalence, the risk of reintroduction is low. On 5 February 2020, the Preventive medicine Department was notified of imported malaria cases among returning travellers from Uganda. An investigation was initiated to identify any possible secondary transmission and implement control measures.

Methods: We conducted phone interviews with all returning travellers and their family members and followed them up twice in four weeks. We collected information on malaria symptoms, travel history and possible exposures. We carried out a mosquito survey in the cases' residencies and their surroundings to identify any *Anopheles spp.*

Results: Among nine returning travellers, three (attack rate: 33%) reported being diagnosed with malaria, treated and recovered in Uganda where they had travelled on 22 December 2019 and returned to Palestine on 28 January 2020, four days after recovery. All cases were Palestinian males, aged 40-62 years. They took malaria prophylaxis with Mefloquine and completed the course as prescribed. During their stay in Uganda, they used non-insecticide treated mosquito nets but not mosquito repellent and were exposed to mosquito bites. No one of the nine travellers and 38 family members showed any malaria symptoms during the four weeks of follow up. We collected six mosquitoes from inside the houses of the cases and larvae from three containers in the surroundings that all were *Culex spp.*

Conclusion: There was no secondary malaria transmission arising from this imported cluster. Authorities should educate travellers to malaria-endemic countries to avoid mosquito bites using mosquito repellent and insecticide treated nets. There is a need to establish a malaria screening system at points of entry for travellers coming from malaria-affected areas and to implement a surveillance system to monitor *Anopheles* mosquitoes.

Role and outputs: Principal investigator

Samer performed the investigation and mosquito survey and wrote a report and an abstract.

Supervisor(s): Dr Dia Hjaija

Status: Completed

3. An outbreak of Gastroenteritis in the district of Camarma, 2002: a simulated outbreak investigation

Background: On 19th April 2002, the local epidemiology service received an alert regarding an increased number of gastroenteritis cases in Camarma de Esteruelas, Spain and conducted an epidemiological outbreak investigation to identify the cause and source and to implement control measures.

Methods: A case was a Camarma resident or visitor during three days previous to disease onset, who, between 01/03-10/05/2019, presented with vomiting and/or diarrhoea, with or without nausea, fever, malaise, headache, abdominal or muscle pain. We performed a retrospective case-control study including only primary and co-primary cases where controls were selected randomly from the telephone directory. We performed telephone interviews using a structured questionnaire. We calculated odds ratios (ORs) and 95% confidence intervals (95% CIs) using logistic regression. We collected stools from cases and water specimens from the water supply system.

Results: Among 136 (99%) cases, 119 (88%) were primary and co-primary. Symptoms included diarrhoea (85/110; 77%) and vomiting (82/110; 76%) lasting a median of 2 (interquartile range (IQR): 0.5-7) days. In the epicurve, we observed multiple peaks. Among 62 cases and 62 controls, the median age was 13 (IQR: 3-60) and 32 (IQR: 5-60) years respectively (p -value<0.000) with no difference in sex (p -value=0.591) while 55 (89%) cases resided in zone 1 versus 44 (71%) controls (p -value=0.014). In the multivariate analysis, comparing to controls, the odds of developing the disease were higher among cases <15 years (OR: 7.38, 95%CI: 3.09-17.6) and with increasing consumption of tap water (OR: 1.11, 95%CI: 1.03-1.21 per unit increase). All faecal and water specimens were negative for pathogenic microorganisms.

Conclusions: The findings suggest that the cause of this outbreak was viral and the source was the tap water, especially among younger people, however this was not confirmed via laboratory testing. The water supply system disinfection process was reviewed and areas of improvement were identified.

Role and outputs: Principal investigator

Samir performed the simulated outbreak investigation. He developed an outbreak investigation questionnaire (Microsoft Word) and a data entry form using EpiInfo, performed data analysis and wrote the final report.

Supervisor(s): Dr Iro Evlampidou

Status: Completed

Research

Effectiveness of insecticide thermal fogging in hyrax dens in the control of leishmaniasis vectors in rural Palestine, 2019: a prospective controlled interrupted time series study

Background: Zoonotic cutaneous leishmaniasis (ZCL) is endemic in Tubas, Palestine and transmitted by *Phlebotomus* sandflies inhabiting dens of hyraxes, the reservoir animal. Control measures are implemented since 1996 but cases still occur. We estimated the effect of insecticide thermal fogging inside hyrax dens on decreasing sandfly density and leishmania infection.

Methods: During July-September 2019, we conducted a 12-week controlled interrupted time series study in two control and one intervention sites containing three hyrax dens each. We implemented Permethrin thermal fogging in the intervention site at week 6 and measured weekly and 36hrs post-intervention the sandfly abundance inside dens using CDC light traps. We performed Next-Generation Sequencing to identify sandfly *Leishmania spp.* infection. We calculated the abundance reduction (AR) using Mulla's formula and negative binomial regression.

Results: Among 11427 collected sandflies, females were 7339 (64%) and *Phlebotomus spp.* were 1786 (16%) comprising ten species; *P. sergenti* was the dominant (N=773, 43%) with *P. arabicus* (N=6) being reported for the first time in Palestine. After fogging, *Phlebotomus spp.* AR was 93% at 36hrs, 78% at two weeks and 41% overall post-intervention (Mulla's formula). In the regression models, *Phlebotomus spp.* density in intervention site decreased by 74% (IRR: 0.26, 95%CI: 0.12-0.59) overall and at two weeks (IRR: 0.26, 95%CI: 0.11-0.57). Pre-intervention, Leishmania infection in the intervention site was 14% with zero infections until week two post-intervention. At week three the AR was 94% and density decreased by 82% (IRR: 0.18, 95%CI: 0.07-0.42).

Conclusions: Fogging hyrax dens reduced sandfly abundance and leishmania infection during the study period and especially two weeks post-intervention suggesting that it could be an effective source reduction of ZCL vector measure when applied bimonthly. Future randomized controlled trials are needed to confirm the effectiveness of fogging hyrax dens on decreasing ZCL incidence.

Role and outputs: Principal investigator

Samer wrote the protocol, implemented the study and performed the intervention, collected and identified sandflies and entered, cleaned and analysed the data. He presented a poster at ESCAIDE 2020 online conference. He wrote a manuscript and submitted it to a peer-reviewed journal (PLOS Neglected Tropical Diseases).

Supervisor(s): Dr Dia Hjaija

Status: Completed

Scientific communication

1. Sawalha S, Al-Jawabreh A, Hjaija D, Evlampidou I. Insecticide thermal fogging in hyrax dens is effective in the control of leishmaniasis vectors in rural Palestine, 2019. Poster presentation at the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE) 2020; 24-27 November 2020; Online
2. Sawalha S, Al-jawabreh A, Hjaija D, Ereqat S, Nasereddin A, Al-jawabreh H, Evlampidou I. Effectiveness of insecticide thermal fogging in hyrax dens in the control of leishmaniasis vectors in rural Palestine, 2019: a prospective controlled interrupted time series study. PLoS Negl Trop Dis. (*manuscript under editor review*).

Teaching experience

1. Module facilitator: prepared and presented an online lecture (10 minutes) on "Leishmaniasis Epidemiology and Control in Palestine" including an overview of his research project at the MediPIET "Zoonotic and Vector Borne Diseases" training module, taking place online on 19-30 October 2020. The audience was fellows, Epidemiologists and Public health professionals from the MediPIET network countries
2. Module facilitator: prepared and presented an online lecture (22 minutes) on "Leishmaniasis Epidemiology and Control in Palestine" including an overview of his research project at the MediPIET Second Training of Trainers (ToT) on "Strengthening Country capacities on intersectoral preparedness and response to face threats from a One Health perspectives", taking place online on 15 March-15 April 2021. The audience was fellows, Epidemiologists and Public health professionals from the MediPIET and MediLabSecure participating institutions and countries
3. Workshop attendance, preparation and delivery of face-to-face presentation on "Vector Surveillance and Control in Palestine" at the Sixth Singapore International Dengue Workshop, 21-25 October 2019, Singapore, Singapore Cooperation Programme

Miscellaneous

A. COVID-19 related activities

1. Participated in COVID-19 response activities of the General Directorate of Public Health Palestine and in some activities related to the control and prevention of COVID-19 including review of the preparedness plan, preparation of a list with recommended disinfectants and precaution measures in the use of disinfectants
2. Followed up and reviewed with colleagues the publications from WHO, ECDC and Ministries of Health of different developed countries and published research on coronavirus and the recommended preventive measures.

3. Prepared recommendations on the use of disinfection chambers, street disinfection, initiation of wastewater testing as an early-warning surveillance tool and handling of COVID-19 dead bodies as recommended by WHO

B. Other

1. Live radio interview (10 minutes) at the "Coffee Break" programme of Raya FM Radio, on mosquito borne diseases and control measures aim to increase awareness in the audience, on 26 July 2019. The interview is posted on the Raya FM Radio Webpage.
2. Workshop presentation at the "National Accountability Day: Usage of Pesticides in agriculture" organized by the Palestine Technical University that included a Questions and Answers session with the audience on the effect of pesticides on Human Health, the significance of pesticides on health in Palestine, and the role of MoH on the control of misuse of pesticides and testing of pesticides residue in food.
3. Ability to apply the "Roadmap toward the harmonization of entomological surveillance systems in the Mediterranean area regarding the risks of mosquito borne virus transmission" in Palestine in collaboration with MediLabSecure. The vector control unit, Ministry of Health, Palestine, is planning to develop a surveillance system for mosquitoes, and the road map seems to be appropriate. Samer translated parts of the document to distribute and discuss with MoH stakeholders, in order to obtain the commitment of decision-makers and allocate the necessary budgets https://www.medilabsecure.com/documents/site/roadmap_entomo_surveillance.pdf

Next steps

- Estimate the leishmaniasis incidence up to 2021 in Tayasir to see if there was actually any decrease in the number of reported cases as a result of the research project on insecticide thermal fogging of hyrax dens in the surrounding of the village that occurred in 2019, carry out time series analysis and publish a follow up paper/short communication
- Discuss the findings of the research project with health professionals at the ministry of health and local village councils and municipalities in order to apply thermal fogging inside hyrax dens and control leishmaniasis.
- Improve the surveillance system of vector borne diseases
- Perform research studies on control of vectors of neglected tropical diseases
- Carry out survey to study mosquito distribution in Palestine
- Study the effect of different plant species distribution on cutaneous leishmaniasis distribution
- Finalize the translation of the "Roadmap toward the harmonization of entomological surveillance systems in the Mediterranean area regarding the risks of mosquito borne virus transmission" document and explore the possibility of implementation with relevant stakeholders

Supervisor conclusion

During the MediPIET fellowship, Samer was involved in several activities related to vector borne diseases and other communicable disease including: analysis of hepatitis A surveillance data, outbreak investigations, training health professionals and the main research project on the effectiveness of insecticide thermal fogging to control sandfly vectors of cutaneous leishmaniasis. This research project is an important contribution to public health and the Ministry of Health will adopt this new control strategy as one of the main control measures to prevent zoonotic cutaneous leishmaniasis in Palestine. Samer has succeeded in performing his assignments and developed his skills for intervention epidemiology and scientific communication. I am confident that Samer will continue to work on improving public and environmental health in Palestine.

Scientific coordinator conclusion

Samer is a Palestinian entomologist and environmental health scientist, currently the head of the vector control unit in the Palestinian Ministry of Health and has been working on human disease vectors and their control, legislations, pesticides and in population environmental awareness and sanitation. Samer is a generous and patient person with a strong scientific mind and approaches a given topic using evidence-based knowledge. During his fellowship, Samer was hard working and dedicated in producing high quality work, always willing to improve his skills and learn new things. His assignments involved the analysis of hepatitis A surveillance data, investigation of cases and clusters of vector borne diseases while his research project was an intervention study on leishmaniasis vector control and it was the first of its kind that led to generation of new knowledge on novel vector control methods. He also had the opportunity to teach health professionals and communicate the findings of his studies in scientific meetings, training courses and conference. Through working on these assignments, Samer gained knowledge on how to conduct outbreak investigations, analyse surveillance data and perform research studies while he improved his skills on basic and advanced statistical analysis using STATA. Another domain that Samir gained more competencies is in scientific writing and communication through the development of protocols, abstracts and a manuscript. Samir is a devoted health professional, with a genuine interest on the betterment of the health of the Palestinian people and has a lot to offer.

Personal conclusions of fellow

The MediPIET fellowship programme allowed me to gain good skills and expertise in many fields of epidemiology including performing research studies, data analysis of surveillance system, scientific communication, outbreak investigation and teaching. I identified an applied research project that has a public health importance on preventing cutaneous leishmaniasis by using a new and efficient control strategy for sandfly vectors. Moreover, I conducted analysis of Hepatitis A surveillance data during 2010-2018, a first time for me to analyse data comprehensively. The fellowship also gave me the opportunity to interact with experts in different fields of public health and epidemiology from many countries. I'm deeply indebted to the MediPIET team and especially my scientific coordinator Dr Iro Evlampidou for their help, support and guidance during my fellowship.

References

1. Sawalha S, Al-Jawabreh A, Hjaija D, Evlampidou I. Insecticide thermal fogging in hyrax dens is effective in the control of leishmaniasis vectors in rural Palestine, 2019. Poster presentation at the European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 24-27 November 2020; Online.