MediPIET Summary report of work activities

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Libya, Cohort 6 (2023)

Background

About MediPIET

The Mediterranean and Black Sea Programme for Intervention Epidemiology Training (MediPIET) aims to enhance health security in the Mediterranean and the Black Sea region by supporting capacity-building for prevention and control of natural or man-made threats to health posed by communicable diseases. It is a competency-based **in-service 2-year fellowship** during which selected fellows conduct projects and field investigations at a MediPIET Training Site in their home country and attend MediPIET modules.

Since mid-2021, MediPIET is implemented by ECDC as a part of the EU Initiative on Health Security. You can find more information about the programme at: https://www.ecdc.europa.eu/en/training-and-tools/training-programmes/fellowships/medipiet

Pre-fellowship short biography

Ahmed is a Medical Doctor from Libya with extensive experience in public health and epidemiology, based at the National Center for Disease Control (NCDC) since 2019. He centred his work on disease surveillance, data management, and outbreak response. Prior to the fellowship, he led the pilot for influenza-like illness sentinel surveillance, managed national COVID-19 and Adverse Events Following Immunization (AEFI) data, and served as a data quality and analysis lead for the national STEPwise survey, working closely with the World Health Organization (WHO) and the International Rescue Committee (IRC).

Fellowship

In September 2023, Ahmed started his MediPIET fellowship at the National Center for Disease Control, Libya. This report summarises the work performed during the fellowship.

National supervisor(s): Zeinab Saleh, Taher Emahbes

Scientific coordinator: Pawel Stefanoff

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Fellowship projects

1. Surveillance

Setting up the Consolidated, Integrated Electronic Disease Surveillance System for Libya

Background: Historically, communicable disease surveillance in Libya has been fragmented, relying on disease-specific programs and the Early Warning, Alert, and Response Network (EWARN) to maintain essential reporting amidst instability. This resulted in an uncoordinated, largely paper-based notifications, providing an incomplete and delayed picture for public health action. We aimed to design and implement a modern, consolidated, and integrated electronic disease surveillance system in order to streamline the disease notification processes.

Steps in designing the system: Following a disease prioritisation exercise in January 2024, involving key stakeholders, we agreed on the list of notifiable diseases. Based on the list, we developed an 'offline-first' digital platform accessible via web and mobile interfaces. The system featured dynamic, disease-specific data entry modules for both case-based and aggregate reporting, tailored to Libya's infrastructure. We defined key actors, their roles, and data flows, from notification at the health facility to analysis at the national level.

Key system features: The primary output was a multi-level system architecture designed for a dynamic data flow from the periphery to the central level. We kept the case reporting form concise, including only key variables required for applying case definitions and generating reports. Key functionalities available both at the national and regional levels included: automated generation of weekly epidemiological reports, GIS mapping, a hybrid outbreak detection module (using fixed-value, statistical, and event-based thresholds), and an automated feedback loop with data providers via SMS/email alerts. Initial implementation steps included the nomination and training of surveillance officers at health facilities and the deployment of the system in a pilot phase.

Conclusion: The electronic surveillance system was designed to overcome the limitations of the previous fragmented approach by creating a single, coordinated source of timely and reliable data for public health action in Libya. Successful implementation and nationwide scaling of this system will be critical next steps to strengthen national capacity for early detection, rapid response, and evidence-based decision-making.

Role and outputs: Principal Investigator. Ahmed wrote the project protocol and led the design and development of the new surveillance system. He designed the system architecture and data flow, developed the specifications for the digital platform, defined the data entry modules for case-based and aggregate reporting, and planned the pilot phase implementation and training strategy. He prepared an implementation report and presented the new system to surveillance experts of the Norwegian Public Health Institute (FHI) during his international exchange visit.

Supervisor(s): Abir Elbukhari, Zeinab Saleh.

Status: Completed

Updating Libya's Notifiable Disease List for the new digitalised surveillance

Background: A robust public health surveillance system, guided by a relevant Notifiable Disease List (NDL), is crucial for timely disease control. Libya's national disease list, established in 1975 with 47 diseases, was outdated and did not reflect current epidemiological or health security priorities. Thus, the Libyan Ministry of Health initiated an urgent update to inform the development of a new electronic surveillance system. We described the structured process used to revise the Libyan NDL.

Methods: From 15–17 January 2024, we surveyed 60 decision-makers, academics, and health professionals representing district, municipality, and hospital levels across all three regions at an inter-sectoral workshop in Tripoli coordinated by the Libyan National Centre for Disease Control. We applied a modified Delphi technique combining quantitative scoring and qualitative discussions based on six pre-defined criteria derived from WHO guidelines: Burden of Disease (rated on a five-step scale for incidence, prevalence, or mortality), Case Fatality Rate (5-step scale from <1% to ≥20%), Epidemic Potential (5-step scale from Never to International Spread), Potential threat/emergence (5-step scale from Absent to Almost Certain Risk), Health Gain Opportunity (5-step scale from <1% to ≥50% preventable), and Social and Economic Impact (5-step scale from No Impact to High Impact). Each criterion was scored from 1 (lowest priority) to 5 (highest priority), yielding a total possible score per disease ranging from 6 to 30. He analysed data collected via Kobo toolbox using descriptive statistics (medians and interquartile ranges) using R software.

Results: From 62 diseases initially assessed, stakeholders selected 46 for inclusion in the updated Libyan NDL. Median prioritisation scores ranged from 12.0 (Rheumatic Fever) to 22.0 (COVID-19). Diseases consistently prioritised with high median scores included COVID-19, haemorrhagic fever, influenza, pulmonary tuberculosis, and HIV, reflecting current major public health concerns in Libya.

Conclusions: This structured prioritisation process yielded an evidence-based, updated NDL for Libya. This revised list now forms the foundation for the national surveillance guidelines and the development of the new surveillance system, significantly strengthening Libya's capacity for timely and targeted disease surveillance and response

Role and outputs: Principal Investigator. Ahmed's responsibilities included organising and facilitating the inter-sectoral workshop with 60 key stakeholders, developing the survey based on a modified Delphi technique, and managing data collection via Kobo toolbox. He performed the descriptive statistical analysis using R software. He prepared a report that became part of Libya's evidence-based national surveillance guidelines. He also submitted an abstract for ESCAIDE 2025, but it was not selected for presentation.

Supervisor(s): Abir Elbukhari, Zeinab Saleh.

Status: Completed

2. Outbreaks

Malaria cluster near Benina international airport, Libya: a re-emerging threat in a malaria-free country

Background: Although malaria was eliminated in Libya in 1973, the country remains at risk of imported cases due to increased migration from malaria-endemic countries. In November 2024, we identified a cluster of four confirmed Plasmodium falciparum cases, including one death, 450m from Benina Airport, Benghazi, a non-endemic area. Our investigation aimed to determine if there was potential autochthonous transmission.

Methods: We conducted an inter-sectoral investigation around Benina Airport. We defined suspected cases as residents of the residential area surrounding the airport within a radius of 1.5 kilometres, who developed fever, chills, sweats, headaches, nausea, vomiting during the period from November 15th to December 15th. We searched for cases by contacting healthcare facilities and through door-to-door community outreach. We interviewed suspected cases for clinical, demographic, travel, and exposure history. The Benghazi medical centre laboratory tested blood samples for Plasmodium spp. The National Centre for Disease Control carried out entomological surveillance using CDC light traps and morphologic identification of mosquitoes.

Results: Four of 24 suspected cases tested positive for *Plasmodium falciparum*. All were members of the same family residing in one household in proximity of the airport, with no recent travel to endemic areas. Entomological surveys found *Culex* mosquitoes, but no *Anopheles* species known as competent vectors for *Plasmodium* protozoa, ruling out local vector borne transmission.

Conclusions: The investigations suggested likely transmission from infected mosquitoes introduced via air travel or cargo. Despite the lack of evidence of local transmission, future introductions via travels and changes in vector distributions can increase malaria transmission risk. Therefore, we recommended enhancing surveillance and introducing stricter vector control at entry points.

Role and outputs: Principal Investigator. Ahmed developed the case definition and analyzed the epidemiological data from patient interviews and community outreach, and liaised with the laboratory and entomology teams. His prepared the final outbreak investigation report, successfully submitted an abstract for ESCAIDE 2025 conference, and drafted a manuscript for a peer reviewed journal.

Supervisor(s): Zeinab Saleh

Status: Completed

3. Research

Libya 2023 National Stepwise Survey (STEPS) For Noncommunicable Disease Risk Factors

Background: The non-communicable diseases (NCD) control represents a real challenge for the healthcare system due to its negative health and social implications on the Libyan society. It imposes an exhausting economic burden that will inevitably hinder any expected progress towards achieving the desired development goals. We aimed to survey a representative sample of Libya's general population to provide policy-makers with comprehensive national and regional data on the prevalence of major NCD risk factors.

Methods: We conducted a national cross-sectional household survey between November 2022 and March 2023, using the WHO STEPwise approach. We employed the multi-stage cluster sampling design to select a representative sample of adults aged 18-69 years. In the first step, trained field workers interviewed consenting individuals using standardised questionnaires, collecting data on behavioural risk factors. In the second step, field workers took physical measurements in respondents, including blood pressure and anthropometry. In the third step, field workers collected biochemical measurements, including fasting blood glucose and cholesterol, via finger-prick. We applied statistical weighting to the results to reflect the national population distribution, and calculated prevalence estimates with 95% confidence intervals (CI).

Results: Of 6318 selected, we recruited 4 982 individuals, achieving an overall response rate of 79%. A high prevalence of multiple risk factors was found. Current tobacco smoking was 21.5% (95% CI: 19.4-23.5), driven by a stark gender disparity (42.2% in men and 0.2% in women). Unhealthy diet was pervasive, with 93.9% of adults consuming <5 servings of fruit/vegetables daily and mean sodium intake in grams per day was 10.3 gm (95% CI:

10.2–10.5). Fifty-five percent (95% CI: 52.2–57.5) of the population had low levels of physical activity. Consequently, metabolic risks were prevalent: 56.8% of adults were overweight or obese (BMI ≥25 kg/m ²). The prevalence of hypertension was 25.3% (95% CI: 23.2–27.4), with low awareness (35.8%). The prevalence of increased blood glucose (or diabetes) was 9.0% (95% CI: 7.1–10.9), while increased total cholesterol was 14.6% (95% CI: 12.7–16.5). Among 17% adults aged 40–69, we estimated a 10-year cardiovascular risk of ≥ 20%.

Conclusion: The 2023 Libya STEPS survey revealed a critical public health landscape dominated by a high burden of interconnected NCD risk factors, including alarmingly high rates of male smoking, poor diet, and prevalent obesity and hypertension. The significant gap between disease prevalence and public awareness highlighted weaknesses in primary prevention and screening. These findings underscored the urgent need for comprehensive, multi-sectoral public health interventions that will simultaneously address behavioural risks and strengthen health system capacity for early detection and management of NCDs.

Role and outputs: Co-Investigator, Data Analyst. Ahmed was an integral part of the project team. He participated in the writing of the study protocol. He led the data management process, including quality assurance, cleaning, and merging of all STEPS datasets. He conducted the complex statistical weighting and performed the primary data analysis to generate the report's core findings. Finally, he drafted the final report, which involved the literature review, writing the narrative, and creating all tables and figures using R scripts.

Supervisor(s): Taher Emahbes

Status: Completed

A Community-Based 'Educate, Test, and Treat' Model for Hepatitis C Elimination in Ghodwa, Southern Libya: Study Protocol

Background: Libya has no well-established evidence-based strategies for hepatitis C virus (HCV) prevention. Epidemiological data are especially scarce in underserved rural areas of the south where the healthcare infrastructure is weak. The Ghodwa community, a remote agricultural hub, has reported an increase in HCV cases, making it a priority for a targeted public health intervention. We aimed to assess the feasibility and effectiveness of a community-based program for HCV elimination, adapted from a successful Egyptian model 'Educate, Test and Treat', in the pilot community of Ghodwa, Southern Libya.

Methods: We will conduct a prospective, interventional study, aiming to enrol approximately 1,204 Ghodwa residents aged 12-80 years. The intervention will comprise three phases. In the first 'Educate' phase, we will roll-up community engagement and awareness campaigns led by trained local Community Health Workers (CHWs). Second, during the 'Test' phase, we will implement household-based screening using rapid diagnostic tests for HCV, HBV, and HIV, followed by GeneXpert-based HCV RNA confirmatory testing for positive cases. In the third 'Treat' phase, will provide linkage to care, using non-invasive liver fibrosis staging (FIB-4), and provide free, pan-genotypic Direct-Acting Antivirals (DAAs). We will assess the effectiveness of our intervention by measuring Sustained Virological Response 12 weeks post-treatment (SVR12).

Expected outcomes: This pilot study is expected to establish reliable baseline prevalence data for HCV, HBV, and HIV in Ghodwa. It will also assess the feasibility of HCV elimination in a challenging, resource-limited setting. The findings of this pilot investigation will inform the future national HCV elimination strategies in Libya.

Role and outputs: Principal Investigator. Ahmed wrote the study protocol and submitted to the national ethical committee for approval. If funding is secured, the team will implement the study in the pilot community in Q4, 2025 and will extend it to other communities with adjustments after the pilot study.

Supervisor(s): Zeinab Saleh, Taher Emahbes.

Status: Completed

4. Scientific communication

Conference presentations

Alarbi AM. Malaria cluster near Benina international airport, Libya: a re-emerging threat in a malaria-free country. Poster presented at: European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE); 19-21 November 2025; Warsaw, Poland.

Publications and outputs

Alarbi AM, Elhaddad AB, Almehdawi NM, Saadawi WK, Aqeehal H, Elalem M. Airport malaria cluster near Benina international airport, Libya, November 2024. Submitted to Emerging Infectious Diseases in October 2025.

5. Teaching activities

Workshop on Public Health surveillance and data management

From 17 to 21 August 2025, Ahmed facilitated a five-day bilingual (English and Arabic) workshop on Public Health surveillance and data management at the National Centre for Disease Control (NCDC) in Tripoli, Libya. Ahmed developed the training for 25 healthcare professionals, including epidemiologists, public health officers, and data managers, who had strong public health backgrounds but limited experience in digital data collection or protocol development.

Ahmed's role involved leading the practical data management sessions during the final three days. He developed several training materials, including PowerPoint slides, a sample Hepatitis C dataset for exercises, PDF guides for technical tasks, and an R command 'cheat sheet.' The training was highly interactive and based on a 'learning by doing' principle. Using a Hepatitis C case study, Ahmed guided participants through hands-on exercises on their own laptops, covering project planning (SMART objectives), building digital surveys with Kobo Toolbox, data quality checking, and basic data analysis using R.

He conducted an evaluation using a pre- and post-training questionnaire to measure changes in knowledge and confidence. The results showed significant improvement: the mean knowledge score increased from 4.5 to 6.3 out of 9, and participants reported a dramatic increase in confidence across all skills taught. The hands-on sessions with Kobo Toolbox and R were highlighted as the most effective parts of the training.

6. International assignments

Strengthening the Libyan infectious disease surveillance system based on examples of good practices and solutions used in Norway

From 15 to 19 September 2025, Ahmed visited the Norwegian Institute of Public Health (FHI) to study its comprehensive surveillance systems and inform the enhancement of Libya's national system. Through intensive meetings with Norwegian experts and deep dives into key national registries like MSIS and the VESUV outbreak system, the visit provided critical insights into the importance of an enforced legal framework and integrated data systems. A collaborative SWOT analysis identified key challenges for Libya, such as unenforced legislation, alongside strategic opportunities, including leveraging the national Field Epidemiology Training Program (FETP). The mission concluded that Libya must adopt a stepwise, evidence-based approach, prioritising the activation of existing laws, building capacity via the FETP, and using a pilot-based strategy to modernise its surveillance infrastructure.

Hosting country and institute: Oslo, Norway, at the Norwegian Institute of Public Health (FHI/NIPH).

Supervisor/s: Astrid Louise Løvlie, Zeinab Saleh

7. Other activities

- **Field Epidemiology Training Program (FETP)**: Served as the Focal Point for the national FETP starting in 2025 and provided mentorship for the three-month FETP-Frontline program.
- **Emergency Response**: Acted as a planning team member within the Incident Management System for the Zliten Groundwater Uprising Emergency, where he focused on establishing surveillance for potential water-borne diseases.
- **Community Health Worker (CHW) Program**: Coordinated the training and Monitoring & Evaluation (M&E) for Community Health Workers across multiple regions including Alkufra, Sabha, Benghazi, and Tripoli.
- **Public Health Risk Assessment**: Led a comprehensive Risk Assessment in Alkufra city to identify and prioritise local public health threats and inform targeted interventions.
- **National Health Security**: Contributed to key national workshops and initiatives, including the Joint External Evaluation (JEE) internal review, the National Bridging Workshop Capitalizing on IHR and PVS, and the national Risk Profiling Initiative.

8. MediPIET modules attended

1. Introductory Course, 25 September – 13 October 2023, Spetses, Greece (face-to-face)
2. Study Protocol and Scientific Writing, 26 October – 8 November 2023 (online)
3. Multivariable Analysis module, 19–23 February 2024, Berlin, Germany (online)
4. Qualitative Research module, 19 and 22 March 2024 (online)
5. Vaccinology inject day, 2 April 2024 (online)
6. Rapid Assessment and Survey Methods + Mass Gatherings module, 15–19 April 2024, Dublin, Ireland (online)
7. One Health and VBD module, 3–7 June 2024, Belgrade, Serbia (online)
8. Project Review 2024, 26–30 August 2024, Lisbon, Portugal (face-to-face)
9. Ethics inject day, 6 November 2024 (online)
10. Time Series Analysis module, 9–13 December 2024, Bilthoven, the Netherlands (face-to-face)
11. Project Review 2025, 25–29 August 2025, Lisbon, Portugal (face-to-face)

9. Personal conclusions of fellow

The MediPIET fellowship has been a transformative professional journey. It provided me with a robust framework of advanced epidemiological methods and practical tools, which I was immediately able to apply to address critical public health challenges in Libya. The experience of leading key national projects, from designing a new surveillance system to investigating outbreaks, has fundamentally strengthened my skills in leadership, scientific communication, and evidence-based decision-making. I conclude this fellowship not just with new knowledge, but with the confidence and competence to continue contributing to the strengthening of my country's health security.

10. Acknowledgements

I would like to express my sincere gratitude to the European Centre for Disease Prevention and Control (ECDC) and the MediPIET programme for this invaluable fellowship opportunity. My deepest thanks go to my national supervisor, Dr. Zeinab Saleh, and my research supervisor, Dr. Taher Mahbas, for their unwavering guidance and mentorship. I want to extend a special thanks to Dr. Abir for believing in me and insisting that I should be in this fellowship.

I am also grateful to my scientific coordinator, Pawel Stefanoff, and all my colleagues at the National Center for Disease Control (NCDC) in Libya for their constant support and collaboration. Finally, I wish to thank my fellow members of Cohort 2023 for the shared experiences.