



**Cohort 2
2015-2017**

MediPIET Report Summary of work activities

**Dr Hind Bouguerra
TUNISIA**



Training site: Observatoire National des Maladies Nouvelles et Émergentes (ONMNE), Tunisia

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Pre-fellowship short biography

Medical Doctor currently finishing my residency in Public Health and Preventive Medicine (expected completion December 2018) in the Faculty of Medicine of Tunis, Tunisia. Since 2015, I have been working at the Epidemiological Department of the National Observatory of New and Emerging Diseases (ONMNE). During my specialization over these years (including a master of Biostatistics, Epidemiology and Clinical research), I have gained skills and experience in infectious disease surveillance, public health preparedness against acute and emerging threats, methods of epidemiological investigation and health planning.

Fellowship projects

Surveillance project

Implementation of Epidemic Telephone Conference –EpiTec-, Tunisia, 2015-2016

Background:

The 2013 WHO Evaluation of IHR capacities and health hazards implementation advised the implementation of Early Warning function and Event Based Surveillance (EBS) in Tunisia. In 2015, the Observatory of New and Emerging Diseases (ONMNE) partnered with the Robert Koch Institute (RKI) to improve surveillance with the establishment of Epidemic Intelligence fed by both Indicator-based surveillance and EBS and based on rapid reporting of events using regular epidemiological conferences – *EpiTec*-. This platform for regular exchange between epidemiologists at regional and central level and healthcare professionals was launched in 2016.

Methods: Numerous workshops in 2015 and 2016 involving surveillance experts from

ONMNE, SHOCROOM, the Primary Healthcare Direction, the Institute Pasteur of Tunis and focal points in different governorates allowed for the development of standardized protocols, SOPs and guides to launch *EpiTec*. In addition, a training curriculum targeted at local, regional and national-level was developed to reinforce *EpiTec's* implementation. Last, a field simulation exercise took place in April 2016 in order to refine the procedures and for all actors to share a real operational experience.

Conclusions: The design and implementation phase of *EpiTec* has already allowed for a convergence of different epidemiological surveillance networks in Tunisia. Currently, the IT tool for systematic monitoring of health risks and real-time electronic transmission of information collected to all participating actors is under development. Once completed, additional simulation exercises and training should inform EpiTEC use and proper management.

Status: Completed. Role: participation in the development of different the different tools (protocols, SOPs, guides) and in the workshops (May 2015) and in the simulation exercise (12-14 April 2016).

Outbreak Investigation

Typhoid outbreak investigation in Gabes, Tunisia 2016

Background:

On 25th July 2016, the authorities of Gabes province alerted the Tunisian Emergency Operating Center –SHOC room- of four cases of typhoid fever from city of Ganouche (28000 inhabitants). Regional and national response Committees were established on the following day. On 29th July, the Regional Rapid Response Team had already identified 40 additional cases. On August 1st, the National Observatory of Emerging and New diseases (ONMNE) initiated an investigation to describe the outbreak by time, person and place and also to identify the possible source of transmission in order to implement control measures.

Methods:

The information on outbreak was collected and described in time, place and person characteristics. A confirmed case was any resident in or visitor of Gannouche with symptoms compatible with typhoid fever (prolonged fever with abatement or torpor, diarrhea or constipation, vomiting and abdominal pain) since early June and positive result for *Salmonella typhi* or *paratyphi* A, B or C. A probable case was any symptomatic person since early June having an epidemiological link with a confirmed case. A suspect case was any person with symptoms compatible with typhoid fever since early June. Data were entered in EpiData and analyzed using SPSS 20.0 software. Food and water samples were also collected for microbiological analysis.

Results:

Among 628 surveyed subjects from July to September 2016, a total of 61 confirmed cases were identified plus 21 probable cases and 100 suspected cases. Therefore, attack rate was estimated as 2.17 per 1000. The main clinical symptoms were fever (99%) and diarrhea (54%). A total of 102 specimens (stool, serum and blood) were cultured and serotyped for *Salmonella typhi*. Out of them, 34 serum samples were positive for Widal agglutination test. *Salmonella typhi* was isolated from 28 blood and 10 stool cultures. Most of the patients were treated with ciprofloxacin

for 7-14 days and no complications were reported. Among confirmed cases, 80% reported softened water as their main choice and only 12% consumed tap water. Of note, out of the 94 water samples tested for *Salmonella typhi* (precisely, 50 from government- operated tanks, 18 from water wells and 26 were softened water), five softened water samples were found positive for faecal contamination.

Conclusions:

Contaminated water from unsafe commercial sources appeared to have caused this outbreak. At our recommendation, authorities sealed off illegal softened water sources and increased control of local distribution system. Community education activities were conducted, also for food handlers. Availability of treatment free of charge was ensured for all of those affected. To prevent recurrent waterborne outbreaks in this region, substantial investment in improving access to potable water and safe sanitation facilitates should be a priority.

Status: Completed. Role: Participation in the outbreak investigation team.

Research projects

Prevalence and risk factors of Hepatitis C Infection in Tunisia, 2015

Background:

Viral Hepatitis C (HCV) is a major public health concern. In 2013, there were worldwide 115 million people infected, 3–4 million new infections and 704 000 deaths occurred. However, HCV treatment has been transformed with the advent of direct-acting antivirals, which offer high cure rates within 12–24 weeks.

In Tunisia, the latest prevalence estimates dated back to the nineties. To guide prevention and management measures, a first national HCV prevalence survey was conducted in 2104-15.

Objectives:

- To estimate the national prevalence of Hepatitis C infection in Tunisia in 2015
- To describe the prevalence by age, sex and region
- To identify risk factors of HCV infection in the general population of Tunisia

Methods:

We conducted a cross-sectional HCV prevalence survey in the general population, using a two-stage cluster sampling design (2014 census). A total of 22 275 participants was required. Once selected households were geo-referenced, every household member was invited to participate and written consent was obtained. Standardized questionnaires were administered and blood samples collected in the nearest healthcare centre. Serological markers for HCV infection (anti-HVC) were searched and if positive, RT-PCR was performed to detect HCV RNA. HCV viremic patients were referred to gastroenterology consultation for appropriate care. Data were entered in EpiData and analysed with SPSS-20. Results were adjusted to the 2015 population.

Results:

Out of 21 448 participants, 19 662 provided a blood sample and results were obtained for 18592, which made a 83.5% response rate. Anti-HVC antibodies prevalence was 0.87%, corresponding to nearly 99000 HCV infected persons in Tunisia. It increased with age ($p < 10^{-3}$) and ranged from 0.1% in the southeast to 2.8% in the northwest region.

In univariate analysis, the risk factors significantly associated with HCV infection were intravenous drug use (OR = 289; 95%CI [12.4-67.9]), intranasal drug use (OR = 4.01 [1.8-

8.7]), hospitalization (OR=2.8 [2.1-3.7]), traditional scarification (OR=2.8 [2.1-3.7]), surgical intervention (OR=2.3 [1.8-3.1]); dental procedures (OR =2 [1.5-2.7]); history of blood transfusions (OR=2 [1.3-3.1]), multiple sexual partners (OR=2 [1.3-3.1]), traditional circumcision (OR=1.8 [1.1-4]) and medical injections (OR=1.7 [1.1-2.4]).

However, haemodialysis as well as needle stick injuries were not significantly associated with HCV infection (respectively OR= 4 [0.7-22.4] and OR= 2.3 [0.7-8.1]. Multivariate analysis is currently ongoing.

Preliminary conclusions:

While overall HCV prevalence can be considered low in Tunisia, there are high risk areas probably related to predominance of some risk factors.

The main risk factors associated with HCV transmission appears to be intravenous and intranasal drug use, followed by healthcare-related factors and other lifestyle-associated factors. Most of these factors are preventable. Thus the urgent need to strengthen harm reduction programmes, education as well as standard precautions of hygiene in healthcare settings. Screening programmes among those at risk populations should be highly efficient.

Status: Review of multivariable statistical model currently ongoing (multiple imputation method). Role: Participation in the data collection, analysis and interpretation. A paper with the above results is under preparation.

Prevalence of hepatitis A in Tunisia, 2015

Background:

Viral Hepatitis A (HAV) is worldwide the most common aetiology of acute viral hepatitis. Severity is age-dependant, young children often have asymptomatic infection. Spread mostly through the faecal-oral route, endemicity level in each countries relates to sanitation conditions.

In Tunisia, a significant decrease of adult HAV seroprevalence was observed comparing 2000 to 2007.

Objectives:

- To estimate the national seroprevalence of Hepatitis A infection in Tunisia in 2015
- To describe the seroprevalence by age, sex and region

Methods:

We conducted a cross-sectional household-based HAV seroprevalence study nationwide, using a stratified sampling design (2014 census). With 80% expected prevalence, an estimated total of 6200 participants were included.

Written consents were obtained in the nearest health care centre. A standardized questionnaire was orally administrated and blood samples were collected from all household members to determine Anti-HAV IgG Data were entered in EpiData and analysed with SPSS-20. Results were adjusted to the 2015 population.

Results:

Overall prevalence of anti-HAV antibodies was 79%, significantly higher among women and in rural areas ($p < 10^{-3}$). Precisely, it ranged from 71% in the center east region to 91% in the center west region ($p < 10^{-3}$).

Anti-HAV prevalence increased significantly with age; from 18% for children under 10 years to 39% for persons aged from 10-to-20 years and 89% for those older than 30 years. This

shows an increasing susceptibility for young adults with less than 50% immunized at the age of 30.

Conclusion:

Tunisia has transitioned to a very low endemicity country, with an increasing aging HAV immuno-naïve population susceptible to potential HAV symptomatic outbreaks and severe outcomes. Food safety measures and sanitation should be further strengthened. Moreover, following these findings, a cost-effectiveness analysis of vaccination of high risk groups as WHO recommends is on the pipeline.

Status: Completed. Role: Participation in the data collection, analysis and interpretation.

International Assignments

Study Mission at *Santé Publique France*, July 2016 – Paris, France

Background:

Working in the National Observatory of New and Emerging Diseases, in the surveillance of Infectious Diseases and since the similarities of some activities with *Santé Publique France* (SPF), the National Institute of Public Health of France, we have carried out a study visit for ten days (from July 3rd to 13th, 2017). It was an opportunity to observe new approaches of surveillance and prevention of infectious diseases, (especially arboviruses, Viral Hepatitis, HIV/STDs), as well as warning and crisis, health prevention and promotion and to exchange our mutual experiences.

Objectives:

- Become familiar with the surveillance and prevention of infectious diseases (especially arboviruses, Viral Hepatitis, HIV/STDs) in the French system
- Be acquainted with the management of alerts and health events received by the regional level

Methods:

The study visit was based on different meetings with directors, head of surveillance units and epidemiologists working in different departments (Department of Infectious Diseases Surveillance, Health Promotion and Prevention Department, Environmental Health Department, Alerts and Crises Department and a Regional Intervention Cell 'Ile de France'). During the meetings, power point presentations about the different units and activities were made and deliverables were given (reports, bulletins, articles...).

Results:**4 & 5th July: Visit and work at the Infectious Diseases Department:**

- Through the meeting with the director of the Infectious Diseases Department, the main health problems raising lately are the Arboviruses, Viral Hepatitis A in MSM, STDs and Antibiotics Resistance.
- Meeting with the head of HIV surveillance: HIV surveillance in France is based on the mandatory notification, virologic surveillance (through a recent infection test and

serotyping by the National HIV Reference Center) and many screening activities (especially by a network of HIV Labs and Centers of Screening and Diagnosis (CEGIDD)).

- Meeting with the head of Viral Hepatitis Surveillance: The surveillance of viral hepatitis B and C is also based on the mandatory reporting (only acute symptomatic infections of viral hepatitis B) and screening mainly by CEGIDD.
- Meeting with the coordinator of the STDs Surveillance: The mandatory reporting of STDs stopped since 2000 and epidemiological surveillance is currently based on several voluntary sentinel networks of clinicians and laboratories (ResIST, Rénago, Rénachla...)
- Meeting with the Arboviruses program coordinator: Presentation of the National anti-disseminating plan of arboviruses: chikungunya, dengue and Zika. This plan combines a system of human and entomological surveillance with preventive and control measures

6 & 7th July: Visit and work with the Regional Intervention Cell; Ile de France: on signal detection and investigation.

Presentation of the staff and fields activities: alert, epidemiological surveillance, different studies, etc. Meeting with the responsible for Syndromic Surveillance, called SurSaUD® (Health Surveillance of Emergencies and Deaths) created in 2004 based on networks of hospital emergencies, SOS doctors, death certificates, etc.

10th July: Visit and work at the Alerts and Crises Department:

We participated to the round table which is held every Monday afternoon to classify the health events received during the week and to update them by contacting the regional directions if necessary. The report of the main alerts will be presented by the General Director Wednesday at the ministry of Health.

11th & 12th July: Visit and work at the Health Promotion and Prevention Department as related with Infectious Diseases and Environmental risks.

Presentation of different aspects of this unit, and the prevention methods available to fight against the different climatic, environmental and infectious risks. Among these methods, vaccination has been an important concern lately. In fact, this department is seeking to increase the use of vaccination by sensitizing professionals and the public and by vaccination websites with simple information, vaccination schedule and other practical advice.

Global Outbreak Alert and Response Network (GOARN) Outbreak Response Training, October 2017 – Manila, Philippines

Interested in outbreak investigations, both at the national and international level, I participated to an Outbreak Response Training organized by GOARN/WHO in Manila, Philippines from 1st to 7th October 2017.

The objectives of this training were to:

- Train public health experts of GOARN partner institutions on pre-deployment procedures for international outbreak response
- Build and assess the vital soft skills for future GOARN deployees, according to the GOARN Competency Model for GOARN team members

- Orient participants on WHO and GOARN's codes of conduct, ethics and guiding principles, and security procedures to be upheld by employees working in the field in response to public health crisis situations

The training was a scenario-based simulation exercise, providing a highly realistic field setting with all the technical, operational and logistics challenges of response to an outbreak of unknown origin.

We worked in teams and were observed throughout the training. We were tasked with realistic and actionable deliverables, in highly challenging and time-pressured environments. This intense training was a unique training experience and an important preparation for possible deployment in the future.

Scientific communication

- Two oral Communications at MediPIET Annual Scientific Conferences 2016 [1,2] and one planned at the ASC 2017 [3].
- One oral communication [4] accepted and planned in the "Fourth Meeting of the Eastern Mediterranean Acute Respiratory Infection Surveillance (EMARIS)", Amman, Jordan, from 11 to 14 December 2017.
- Several poster presentations at national congresses.
- Accepted abstracts at international congresses [5,6].
- One article on preparation about HCV prevalence and risk factors in Tunisia in 2015 [7].

Teaching experience

- Facilitator for the practical part of the University Diploma "*Statistical Methodology Epidemiology and Clinical Research*" using SPSS software organized at the National Observatory of new and emerging diseases for the academic year 2016-2017.
- Teaching of health professionals at the regional level in:
 - Outbreak investigation
 - Introduction to epidemiology, epidemiological studies.
- Presentation of a college course for preventive medicine interns entitled "*Viral hepatitis C in Tunisia*" at the Faculty of Medicine of Sousse, 25 January 2017.

Additional activities

As a former resident at Pasteur Institute, member of WHO Special Program for Research and Training in Tropical Diseases Tunisia:

- **Background:** Pasteur Institute in Tunisia, is the Eastern Mediterranean Regional Training Centre supported by WHO/TDR (the Special Program for Research and Training in Tropical Diseases). It is one of the sixth centers chosen for the TDR

network, which is designed to expand and coordinate training courses across multiple countries, leading to improved use of health interventions.

- In this context, I was the **fellow for developing a training course "Principles of Implementation Research"** in the School of Public Health, Accra, Ghana (*August, September 2015*). I also participated to many workshops in this subject and now among the committee for launching **"Implementation Research MOOC"** by WHO/TDR.

Other training activities:

- Workshop "Event-Based Surveillance and Risk Assessment": Robert Koch Institute and National Observatory of New and Emerging Diseases: **Tunis, Tunisia: November 2015.**
- Training to Media and communication in risk and crises, German Program of partnership in biosafety and health security with the National Observatory of New and Emerging Diseases: **Tunis, April 2016.**
- Workshop "Good Health Research Practice, Capacity Building in Research Methods and Ethics": Regional Training Center (WHO-EMRO-TDR) and Pasteur Institute of Tunis: **Hammamet, Tunisia: July 2016.**
- Workshop "Good Clinical Practice, Good Clinical Laboratory Practice": Regional Training Center (WHO-EMRO-TDR) and Pasteur Institute of Tunis: **Tunis, Tunisia: July 2017.**

Next steps

After finishing my specialization in public health and preventive medicine (specialization exam around February 2018) I'm planning to work in surveillance of infectious diseases at the national level and would like to provide direct support to regional and local levels to promote surveillance activities, outbreak investigation and research projects.

I also would like to be part of international networks of FETP graduates, to train myself as a facilitator and to participate to outbreak investigations both at the national and international level (such as GOARN deployment and others).

Supervisors' and Scientific Coordinator's conclusion

During the two-year MediPIET fellowship, Hind Bouguerra was involved in a large variety of public health projects and activities. As a result of her work, the epidemiology of viral hepatitis in Tunisia is better understood. Hind joined the fellowship with a very solid background in infectious disease epidemiology, which she has used in synergy to become skilful in advance

analytical methods. With an excellent command of the English language, Hind is a quick learner, very efficient and action-oriented.

MediPIET Scientific Coordination concludes Hind Bouguerra has succeeded in performing all her assignments to the highest standard and with a professional attitude. She has demonstrated outstanding interpersonal skills, being at ease working in multidisciplinary and multicultural teams. It has been our pleasure to work with her.

References

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