PulseNet Lebanon

Annual report 2011-2012

1. **Background**: Since 2009, Lebanon started participating to PulseNet International, a foodborne diseases tracking network, through the collaboration between the Epidemiological Surveillance Program (Esumoh) at the Ministry of Public Health (MoPH), the Faculty of Medicine at the American University of Beirut (AUB), and the Lebanese Agricultural Research Institute (LARI of the Ministry of Agriculture, with the support of WHO and CDC. This type of collaboration was the first of its kind in the Middle East to include both public and private sectors working closely together to strengthen the surveillance of foodborne diseases.
2. **Objectives**: The objectives of PulseNet are to: (1) Confirm the link between human foodborne illness and food source of infection in outbreaks; (2) Determine circulating bacterial etiologies at the species and strain levels nationwide, and the middle east region; and (3) Detect antimicrobial resistance among the causative agents of foodborne illness.
3. **Methods**: Food poisoning cases from both private and public health facilities are reported to the MoPH/Esumoh that investigates the outbreaks. Stools from patients are cultured at local hospital microbiology laboratories and food samples from food premises and/or households are cultured at LARI. Isolates obtained from the laboratories are then delivered to the PulseNet accredited Laboratory at AUB for confirming identification of the infecting bacterial agents phenotypically, performing serotyping, testing antimicrobial susceptibility and performing DNA fingerprinting patterns by Pulsed Field Gel Electrophoresis (PFGE). PFGE patterns are analyzed by the BIONUMERICS software and entered into the database for comparison purposes of endemic and outbreak strains.
4. **Summary results**:

In 2011-2012, 665 cases and 84 episodes of food poisoning were reported to the MoPH.

122 patient stool samples were analyzed at the Pulsenet Laboratory, in addition to 32 food samples. The organisms isolated were mostly *Salmonella* spp. reaching 65% (n=80) of clinical samples and 94% (n=22) of food samples.

The remaining species detected were *E. coli*, *Shigella*, *Proteus vulgaris*, *Citrobacter freundii & Morganella morganii,* which constituted 35% of clinical specimens and 6% of food specimens. Resistance to ampicillin was noticeable among *Salmonella* isolates ; 20.7% of the isolates during 2011 and 32.2% during 2012. As to the PFGE patterns, *Salmonella Enteritidis* JEGX01.001 was the most prominent during both years.

***Editorial note Dr Assaad Khoury – Director of Prevention**: Joining the PulseNet Middle East and International was a step for Lebanon to be part in the molecular surveillance of the circulating bacteriological agents. Thus is enhancing the national capacity in investigating food poisoning and tracks the etiology agents. Next challenges includes to increase the number of participating laboratories in providing isolates. We thank all the actors and participating laboratories in such national work.*

***مقدمة الدكتور اسعد الخوري – مدير الوقاية الصحية:** التحاق لبنان الى شبكة PulseNet الشرق الاوسطية والدولية يمثل خطوة نحو ترصد السلالات الجرثومية. ويساعد ذلك في تقصي حوادث التسمم الغذائي والتأكد من الاسباب. تتضمن الخطوات المقبلة لى توسيع عدد الكختبرات المشاركة في جمع السلالات. ونشكر الفرقاء والمختبرات المشاكرة في هذا العمل الوطني.*

1. **الاطار:** في سنة 2009، انضم لبنان الى شبكة PulseNet الدولية، لمراقبة السلالات الجرثومية المنقولة عبر المواد الغذائية، وذلك عبر التعاون العملي بين وزارة الصحة العامة (برنامج الترصد الوبائي)، الجامعة الأميركية في بيروت (كلية الطب)، ووزارة الزراعة (مختبر الابحاث الزراعية). هذا التعاون هو الاول من نوعه بين القطاعين العام والخاص في الشرق الأوسط، مع الدعم الفني من قبل منظمة الصحة العالمية ومركز مكافحة الأمراض الأميركي.
2. **الأهداف:** تهدف الشبكة الى : 1) تأكيد العلاقة السببية بين عينات المرضى وعينات المواد الغذائية المشتبه بها؛ 2) كشف النميطات الجرثومية المتواجدة على الصعيد الوطني والمنطقة؛ 3) الكشف عن مقاومة ضد المضادات الحيوية للجراثيم المنقولة عبر المواد الغذائية.
3. **المنهجية:** تبلغ المستشفيات الخاصة والعامة وزارة الصحة العامة (برنامج الترصد الوبائي) عن حالات التسمم الغذائي. يتم تقصي التسمم الغذائي وجمع السلالات الجرثومية التي تم عزلها من المرضى او المواد الغذائية من مختبرات مختبرات المستشفيات ومختبر الابحاث الزراعية. تنقل السلالات الى مختبر الأبحاث في الجامعة الأميركية لفحص النمط والنميط والمقاومة ضد المضادات الحيوية.
4. **خلاصة النتائج:** تم الإبلاغ عن 665 حالة تسمم غذائي خلال سنة 2011 (328 حالة) وسنة 2012 (337) و84 حادث تسمم غذائي. وتم تحليل 113 سلالة بشرية و32 سلالة مواد غذائية في مختبر ال PulseNet خلال هاتين السنتين. وكانت أكثر السلالات تواجدا السالمونيلا (64% بشرية و94% مواد غذائية). اما باقي السلالات الايجابية فهي الإشريكية الكولونية، الشيغلا، وغيرها. فيما خص المقاومة ضد المضادات الحيوية، اظهرت سلالات للسالمونيلا مقاومة ضد «امبيسيلين» في 21% في سنة 2011 و32% في سنة 2012. اخيرا، برز النميط *Salmonella enteritidis* JEGX01.001 الPFGE الاكثر شيوعا لهذه السنتين.

PulseNet Lebanon Epidemiology Results, 2011-2012

Results by cases

In 2011 & 2012, 328 & 337 cases of foodborne illnesses were reported to the Ministry of Public Health respectively. In 2011 most of the cases were reported in Mount Lebanon (40%) whereas in 2012 most cases were reported from Northern Lebanon. The event date was mostly in July for both years and the most prominent symptoms were watery diarrhea and vomiting. The most frequent food product identified was raw meat (35% in 2011 & 25% in 2012).

Table 1: Reported cases, Lebanon 2011-2012

	2011	2012
Total number of cases	328	337
Number of episodes	26	58
Number of deaths	2	1
Sporadic cases	81	36

Table 2: Distribution of cases by gender, Lebanon 2011-2012

	2011 (n=328)	2012 (n=337)
Male	144 (44)	155 (46)
Female	180 (55)	180 (53)
Unknown	3 (1)	2 (1)

Table 3: Mean age of cases, Lebanon, 2011-2012

	2011	2012
Mean age (Median)	25 (22)	25 (18)

Figure 1: Distribution of reported cases by Mohafaza, Lebanon, 2011-2012

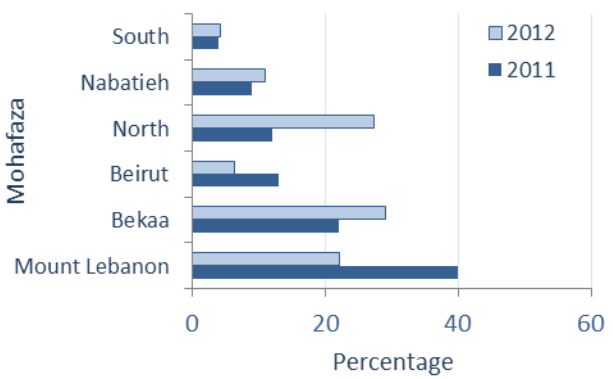
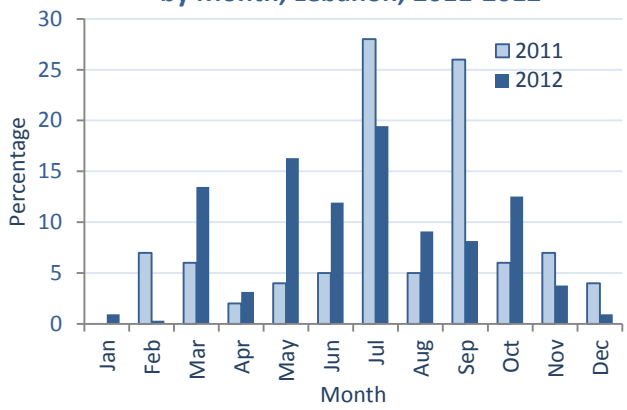


Figure 2: Distribution of reported cases by Month, Lebanon, 2011-2012



Results by Episode

In 2011, 26 episodes of foodborne illnesses took place while in 2012 58 episodes were reported.

Most episodes took place in the month of July and in Mount Lebanon in 2011 and Northern Lebanon in 2012.

Most of the cases in the episodes were tested positive for *Salmonella sp*.

Table 3: Distribution of food items by episodes, Lebanon, 2011-2012

Category	Food item	n
Meat and Chicken items (n=46; 60%)	Raw meat	17
	Chicken	12
	Chicken & rice	2
	Goat meat	1
	Chish tawuk	4
	Hamburger	1
	Canned meat	1
	Meat	8
Fish items (n=2; 3%)	Fish	1
	Canned tuna	1
Vegetables items (n=4; 5%)	Hummos	1
	Green beans	1
	Potato chips	1
	Wild mushroom	1
Diary and sweets items (n=10; 13%)	Kashta	2
	Cheese	3
	Ice cream	3
	Cake	2
Others (n=15; 19%)	Stuffed zucchini	1
	Stuffed vine leaves	1
	Eggs	3
	Mayonnaise	1
	Water	2
	Multiple products	7
Total		77

PulseNet Lebanon Laboratory Results

Table 4: Distribution of isolates among received clinical specimens, Lebanon, 2011-2012

API profile	Serotype	2011 n (%)	2012 n (%)
Salmonella spp.	S. Enteritidis	13(31.7)	21(25.9
	S. Typhimurium	8(19.5)	15(18.5)
	S. Typhi	-	14(17.3)
	S. Braendrup	-	6(7.4)
	S. Newport	-	1(1.2)
	S. London	-	1(1.2)
Escherichia coli	-	14(34.1)	20(24.7)
Shigella	-	3(7.3)	-
Citrobacter freundii	-	1(2.4)	-
Morganella morganii	-	1(2.4)	-
Klebsiella pneumoniae	-	1(2.4)	-
Proteus vulgaris	-	-	2(2.5)
Total		41(100)	81(100)

Table 5: Distribution of isolates among food specimens, Lebanon, 2011-2012

API profile	Serotype	2011 n(%)	2012 n(%)
Salmonella spp.	S. Typhimurium	5(62.5)	9(37.5)
	S. Enteritidis	3(37.5)	-
	S. Typhi	-	2(8.3)
	S. Paratyphi A	-	4(16.7)
	S. Newport	-	4(16.7)
Citrobacter youngae	-	-	2(8.3)
	Total	8(100)	21 (100)

Figure 3: Antimicrobial Susceptibility and Resistiance for received *Salmonella* isolates, Lebanon, 2011 (n=29)

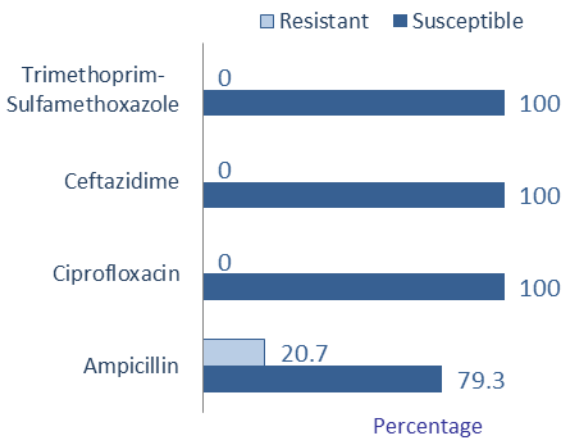
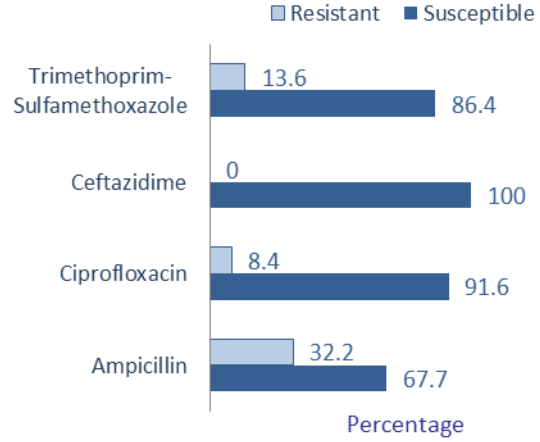


Figure 4: Antimicrobial Susceptibility and Resistance for received *Salmonella* isolates, Lebanon, 2012 (n=59)



PulseNet Lebanon Laboratory Results

Table 6: Distribution of PFGE Patterns For Salmonella spp. isolated from clinical specimens, Lebanon, 2011-2012

Serotype	PFGE Pattern	2011 n(%)	2012 n(%)
S. Enteritidis	JEGX01.001	13(67)	20(33.9)
	JEGX01.004	-	1(1.7)
S. Typhimurium	JPXX01.002	5(23.8)	-
	JPXX01.003	3(14.2)	-
	JPXX01.005	-	7(11.9)
	JPXX01.009	-	1(1.7)
	JPXX01.011	-	1(1.7)
	JPXX01.012	-	4(6.8)
	JPXX01.013	-	1(1.7)
	Unsp.	-	1(1.7)
S. Typhi	JPPX01.001	-	6(10.1)
	JPPX01.002	-	5(8.5)
	JPPX01.003	-	2(3.4)
	JPPX01.004	-	1(1.7)
S. Braendrup	JBPX01.001	-	1(1.7)
	JBPX01.002	-	1(1.7)
	JBPX01.003	-	3(5)
	JBPX01.004	-	1(1.7)
S. Paratyphi	PA2	-	1(1.7)
S. Newport	JJPX01.001	-	1(1.7)
S. London	LO1	-	1(1.7)
Total		21(100)	59(100)

Table 7: Distribution of PFGE Patterns For Salmonella spp. isolated from food specimens, Lebanon, 2011-2012

Serotype	PFGE Pattern	**2011 n(%)**	2012 n(%)
S. Enteritidis	JEGX01.001	2(25)	-
	JEGX01.003	1(12.5)	-
S. Typhi-murium	JPXX01.002	1(12.5)	-
	JPXX01.004	3(37.5)	-
	JPXX01.006	-	3(13.6)
	JPXX01.007	-	2(9.1)
	JPXX01.008	-	2(9.1)
	JPXX01.010	-	1(4.5)
	JPXX01.011	-	1(4.5)
	Unsp.	1(12.5)	-
S. Paratyphi A	PA3	-	1(4.5)
	PA4	-	1(4.5)
	PA5	-	1(4.5)
	PA6	-	1(4.5)
	PA7	-	1(4.5)
	PA8	-	1(4.5)
	PA9	-	1(4.5)
S. Newport	JJPX01.002	-	1(4.5)
	JJPX01.003	-	1(4.5)
	JJPX01.004	-	1(4.5)
	JJPX01.005	-	1(4.5)
S. Typhi	JPPX01.005	-	1(4.5)
	JPPX01.006	-	1(4.5)
Total		8(100)	22(100)

Table 8: Distribution of E. coli serotypes from clinical specimens, Lebanon, 2011-2012

Serotype	n	(%)
O111	3	18
O125	3	18
O26	1	6
O55	1	6
No agglutination	9	52
Total	17	100

Table 8: Distribution of E. coli PFGE pattern from clinical specimens, Lebanon, 2011-2012

Serotype		**n**	(%)
O111	EXDX01.0001	3	18
O26	EVCX01.0001	1	6
Other	NAP	13	76
Total		17	100

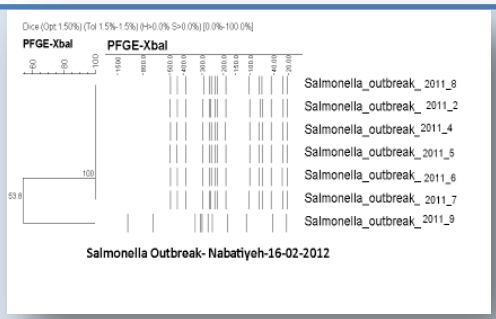
NAP: Not Available in PulseNEt

PulseNet Lebanon Laboratory Results

The figures below are representative examples of food poisoning outbreaks investigated by the MoPH and analyzed at the PulseNet Laboratory at AUB, during 2011, and the respective PFGE Dendogram of the isolates.

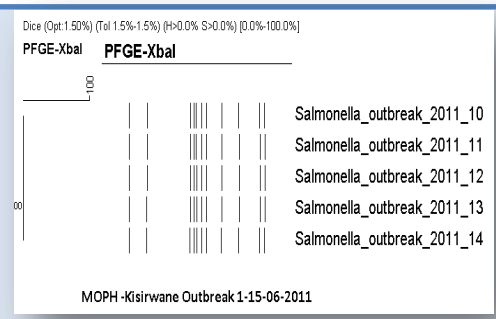
Outbreak in Nabatieh, February 2011	
Patient stool culture	5 Salmonella spp., 1 E. coli, and 1 Citrobacter freundii
Food samples	2 samples of raw meat with Salmonella spp.
Serotyping in PulseNet Lab-AUB	Salmonella Typhimurium in 5 patient samples and 1 raw meat sample Salmonella Typhimurium in 1 raw meat sample
PFGE type in PulseNet Lab-AUB	JPXX01.002 for Salmonella Typhimurium patient and one raw meat sample JEGX01.003 for Salmonella Enteritidis raw meat sample

Figure 5: Dendogram for Nabatieh outbreak, Feb 2011



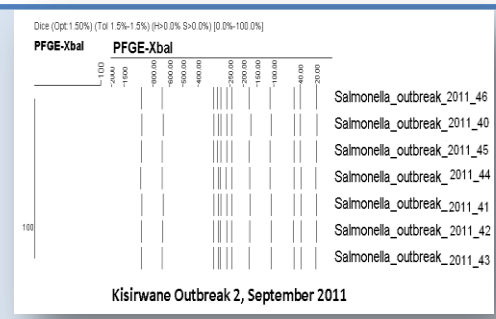
Outbreak in Kesrwan – Mount-Lebanon, June 2011	
Patient stool culture	5 Salmonella spp. and 2 negative
Food samples	None received
Serotyping in PulseNet Lab-AUB	Salmonella Enteritidis in 5 patient samples
PFGE type in PulseNet Lab-AUB	JEGX01.001 for Salmonella Enteritidis

Figure 6: Dendogram for Kesrwan outbreak, Jun 2011



Outbreak in Mount Lebanon, September 2011	
Patient stool culture	Salmonella spp. in 8 patient samples, Morganella morganii in 1 patient sample and 1 negative culture
Food samples	Salmonella spp. in 2 samples of Arabic sweets
Serotyping in PulseNet Lab-AUB:	Salmonella Enteritidis in 8 patient samples and 2 Arabic sweet samples
PFGE type in PulseNet Lab-AUB:	JEGX01.001 for Salmonella Enteritidis in patient samples and Arabic sweet samples

Figure 7: Dendogram for Mount-Lebanon outbreak, Sep 2011



Outbreak in Rashaya and West Bekaa, September 2011	
More than 30 cases after eating raw meat	
Patient stool culture	Salmonella spp. in 3 patient samples, and E. coli in 6 patient samples
Food samples	Salmonella spp. in 3 raw meat samples collected from butcher and households
Serotyping in PulseNet Lab - AUB	Salmonella typhimurium in 3 patient samples and in 3 raw meat samples E. coli 0125 in 3 patient samples E. coli with no agglutination in 2 patient samples
PFGE in PulseNet Lab-AUB	JPXX01.002 for Salmonella typhimurium in 3 patient samples and 3 raw meat samples E. coli EC6 – EC5 – EC7 in 5 patient samples

PulseNet International

PulseNet International is a network of networks dedicated to track foodborne infections worldwide. Implicated laboratories in the network utilize standardized genotyping methods, the Pulsed Field Gel Electrophoresis (PFGE) and share information in real-time to improve surveillance and disseminate early warning of food and waterborne disease outbreaks, and newly emerging foodborne bacterial pathogens.

PulseNet Middle East Region

PulseNet Middle East is one of PulseNet International networks, and was established in December 2006 following a consultation meeting held at WHO Eastern Mediterranean Regional Office (EMRO) in Cairo, Egypt. The network was established as a molecular surveillance network for foodborne infections to support the Food Safety regional plan and promote technical collaboration between countries.

Currently, the network includes public health laboratories, academic and medical institutions from 10 countries in the Eastern Mediterranean Region. A goal of PulseNet Middle East is to promote communication between laboratories and epidemiologists in the region by inviting laboratory staff and epidemiologists from member countries to the network annual meetings in order to enhance collaborative efforts and establish action plans to strengthen national foodborne disease surveillance and response programs.

Training on food-borne diseases investigation for laboratories

Acknowledgments

Beirut	Makassed Hospital Fouad Khoury Hospital	**Bekaa**	Chtoura Hospital Hamed Farhat Hospital Khoury General hospital
Nabatieh	Najdeh Chaabieh Hospital		
Mount Lebanon	Sacre Coeur Hospital Rassoul Azam Hospital Notre Dame du Liban Hospital Ftouh Kesrwan Governmental Hospital Middle East Hospital Bhannes Medical Center Bellevue Medical Center Abou Jaoudeh Hospital Levant Hospital	**North**	Mounla Hospital Nini Hospital Al Hanan Hospital Tripoli Governmental Hospital Dar Al Chifaa Hospital Bchareh Governmental Hospital Koura Hospital Mazloum Hospital Al Salam Hospital Halba Governmental Hospital

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