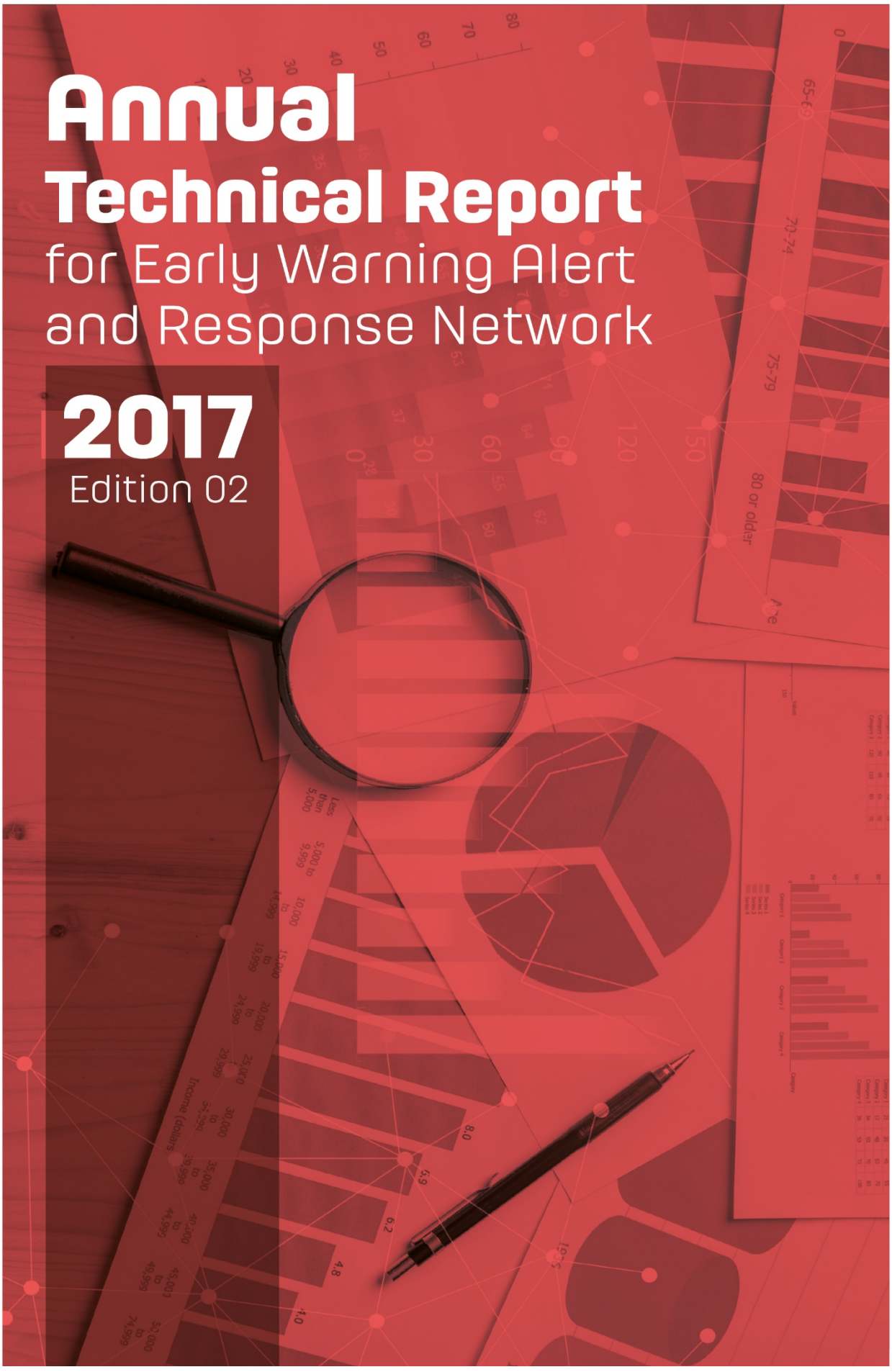
وحدة تنسيق الدعم
ASSISTANCE COORDINATION UNIT

Annual Technical Report

for Early Warning Alert and Response Network

2017

Edition 02



Contents

Figure

Table

Map

Acronyms

ABD	Acute Bloody Diarrhea	**Meas**	Measles
ACS	Area Coverage Survey	**Men**	Meningitis
ACU	Assistance Coordination Unit	**MR**	Measles – Rubella
AD	Acute Diarrhea	**MUAC**	Mid Upper Arm Circumference
AEFI	Adverse Event Following Immunization	**NGO**	Non-Governmental Organization
AFB	Acid Fast Bacillus	**NP-AFP**	Non- Polio Acute Flaccid Paralysis
AFP	Acute Flaccid Paralysis	**NPEV**	Non- Polio Enterovirus
AIRI	Accelerated Implementation of Routine Immunization	**OAD**	Other Acute Diarrhea
AJS	Acute Jaundice Syndrome	**OCHA**	Office for the Coordination of Humanitarian Affairs
aVDPV	ambiguous Vaccine-Derived Poliovirus	**ODK**	Open Data Kit
AWD	Acute Watery Diarrhea	**PAC**	Physician Across Continents
bOPV	bivalent Oral Polio Vaccine	**PCR**	Polymerase Chain Reaction
BMGF	Bill & Melinda Gates Foundation	**QGIS**	Quantum Geographic Information System
CLO	Central Level Officer	**QRC**	Qatar Red Crescent
CMAM	Community Management of Acute Malnutrition	**RDTs**	Rapid Diagnostic Tests
DLO	District Level Officer	**RRT**	Rapid Response Team
DMT	Data Management Team	**SAMS**	Syrian American Medical Society
DNO	District Nutrition Officer	**SARI**	Severe Acute Respiratory Illness
EPI	Expanded Program on Immunizations	**SEMA**	Syrian Expatriate Medical Association
ENA	Emergency Nutrition Assessment Software	**SIG**	Syrian Immunization Group
FLO	Field Level Officer	**SL**	Sabin Like
FNO	Field Nutrition Officer	**SQL**	Structured Query Language
GIZ	German Society for International Cooperation	**STF**	Suspected Typhoid Fever
HAV	Hepatitis A Virus	**SAMS**	Syrian American Medical Society
HBsAg	Surface Antigen of the Hepatitis B virus	**TB**	Tuberculosis
HCV	Hepatitis C Virus	**tOPV**	**trivalent Oral Polio Vaccine**
HEV	Hepatitis E Virus	**TOT**	Training of Trainer
HIV	Human Immunodeficiency Virus	**UNICEF**	United Nations international Children's Emergency Fund
HNO	Humanitarian Needs Overview	**UCE**	Unusual Cluster of Event
IDA	Independent Doctors Association	**UCD**	Unusual Cluster of Death
IDDKs	Interagency Diarrheal Disease Kits	**UOSSM**	Union of Medical Care and Relief Organizations
IEC	Information Education Communication	**VAPP**	Vaccine-associated paralytic polio
IFA	Information for Action Software	**VBDs**	Vector Borne Diseases
IgM	Immunoglobulin M	**VPDs**	Vaccine Preventable Diseases
ILI	Influenza Like Illness	**VDPV**	Vaccine Derived Poliovirus
IMC	International Medical Corps	**WASH**	Water-Sanitation- Hygiene
IMCI	Integrated Management for child illness	**WBDs**	Water Borne Diseases
IYCF	Infant and Young Child Feeding	**WHO**	World Health Organization
Leish	Leishmaniasis	**WPV2**	Wild Polio Virus Type 2

Section 01: Introduction

EWARN was launched on 10th June 2013 as nonprofit national health information surveillance system, its main mission is collecting epidemiological data from sentinel sites, analysis, then sharing the results with health institutes and stakeholders to guide proper decisions and needed actions for supporting and further improving health services in Syria.

- The network started in 61 sub- districts in 7 governorates
- In September 2014 the system expanded in Rural Damascus (east Ghouta) and Dar'a governorates
- In March 2015, west part of Dar'a and Quneitra, besieged rural north of Homs and northern of Al-Hasakeh.
- In 2016 many areas witnessed a switch in the controlling forces, thus a new team was trained and assigned in the field (South Al-Hasakeh–Menbij), in addition, new areas were added to the network coverage: eastern Homs (Al Badiya) and western Rural Damascus (western Ghouta).
- During 2017 the field team has been re-assigned in many areas due to switching control in multiple governorates (Ar Raqqa and Deir ez zor). Scaling up the coverage in rural Damascus Sabe Byar sub district (Ar Rukban Camp) at the end of 2017.

At the end of 2017 EWARN covered 260 communities in 123 sub districts, 35 districts for 11 governorates, and the total population is **52% (9,788,070).**

Map 1: Coverage map for EWARN end of 2017

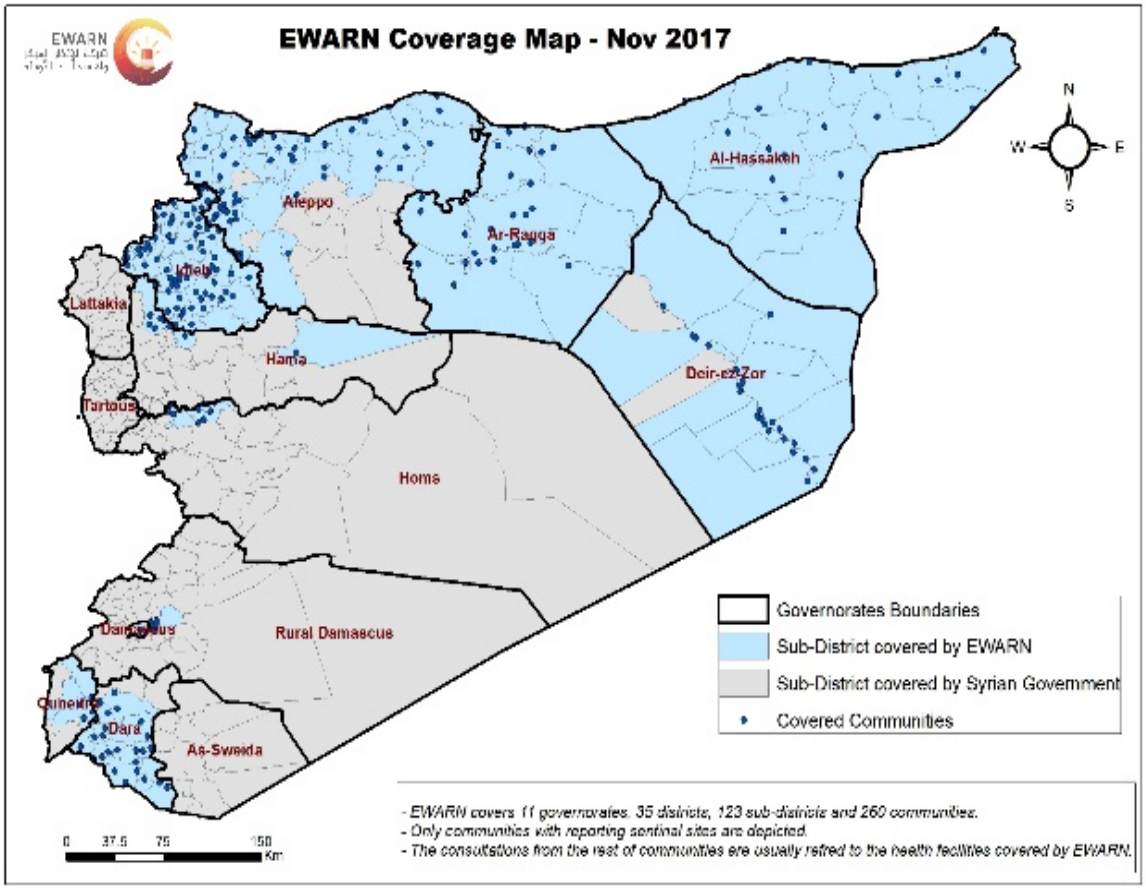


Table 1. The population percentage and Area percentage that covered by EWARN -2017

GOVERNORATE	Syria Population_ HNO	EWARN Population	Population%	Area %
Aleppo	2,496,394	1,855,737	74%	63%
Al-Hasakeh	1,054,164	900,859	85%	59%
Ar-Raqqa	1,427,707	1,427,707	100%	100%
As-Sweida	320,690	-	0%	0%
Damascus	1,759,800	105,000	6%	0%
Dar'a	939,872	828,602	88%	71%
Deir-ez-Zor	1,839,452	1,686,772	92%	84%
Hama	1,337,108	94,428	7%	31%
Homs	1,496,803	243,243	16%	33%
Idleb	1,818,712	1,818,712	100%	100%
Lattakia	909,746	-	0%	0%
Quneitra	50,550	48,130	95%	76%
Rural Damascus	2,636,585	540,925	21%	5%
Tartous	753,256	-	0%	0%
All of Syria	18,840,839	9,550,115	51%	50%

*The population percentage is calculated based on the census-2016 provided by HNO – OCHA and SIG

The area percentage is calculated based on the national areas of Syria sub-districts

1.1 Review of EWARN team:

Table 2. EWARN team review per year

Time period	CLOs	Manager	Surveillance	Response	Data	DLOs	DNOs	Response team in field	WASH team in field	Lab team in field	FLOs	FNOs	Vaccinators	Total
2013	5	1	1	3	-	16	-	-	-	-	-	-		21
Mid of 2014	6	1	1	3	1	22	-	-	-	-		-		28
Start of 2015	8	1	2	3	2	24	-	-	-	--	181	-		213
October 2015	12	1	3	4 + 1 WASH	3	29	-	4	10	2	214	-		271
December 2016	15	1	3	5 + 2 WASH	4	30	-	6	20	7	212	-		290
December 2017	22	1	5 including nutrition	7 + 2 WASH	7	30	11	12	24	12	211	135	84	541

1.2 Review of diseases in Surveillance list:

EWARN and WHO reviewed case definition for the diseases during 2017, thus many of them were updated in alert threshold.

Table 3. Alert threshold modifications in 2017

Disease or Syndrome	Alert Threshold - 2016	Alert Threshold -2017
Other Acute diarrhea (OAD)	Double the average of the last 3 weeks in a given location	No change
Acute watery diarrhea (AWD)	One case	No change
Acute bloody diarrhea (suspected shigellosis)	≥ 5 cases in 1 location in 1 week	Double the average of the last 3 weeks in a given location
Acute jaundice syndrome (Hepatitis A & E)	≥ 5 cases in 1 location in 1 week	Double the average of the last 3 weeks in a given location
Influenza Like Illness (ILI)	Double the average of the last 3 weeks in health facility	No change
Severe Acute Respiratory Illness (SARI)	≥ 5 cases in 1 health facility or hospital in 1 week **OR** 1 death due to influenza like illness	No change
Suspected Meningitis (Men)	1 case in a crowded camp setting **OR** Population ≤ 30.000: 2 cases per week in the same community OR Population ≥30,000: 5 cases per week in the same community	No change
Unusual cluster of health events (UCE)	3 or more cases in same week in the same community or health facility	No change
Unusual cluster of death (UCD)	3 or more deaths in same week in the same community or health facility	No change
Suspected Typhoid Fever (STF)	≥ 5 cases in 1 location in 1 week	Double the average of the last 3 weeks in a given location
Cutaneous Leishmaniasis (Leish)	≥ 50 of new case in one area or health facility.	No change

Table 4. Diseases / Syndromes in surveillance list review per year

Time	*The highlighted cells refer to added diseases to the surveillance list *The highlighted codes refer to modification in case definition or / and alert threshold													
2013	ABD	AWD	AJS	AFP	Mea	Men	SARI	FUO	UCE	UXD				
2014	ABD	AWD	AJS	AFP	Mea	Men	SARI	FUO	UCE	UXD	**STF**	**Leish**		
2015	ABD	AWD	AJS	**AFP**	Mea	Men	SARI	FUO	UCE	UXD	STF	Leish	**AD**	**ILI**
2016	ABD	**AWD**	**AJS**	AFP	Mea	**Men**	**SARI**	-	**UCE**	**UCD**	**STF**	**Leish**	**OAD**	**ILI**
2017	**ABD**	AWD	**AJS**	AFP	Mea	Men	SARI	-	UCE	UCD	**STF**	Leish	OAD	ILI

Section 2: Surveillance Updates in 2017

2.1 Acute Flaccid Paralysis (AFP) Surveillance

2.1.1 Background

The volatile situation and destruction of the health care infrastructure led to vast reduction or even absence of some health services in Syria.

Among the heavily affected health care services are EPI and other vaccination activities, which resulted in a significant immunity gap in the areas under control of non-state armed groups, which in turn served as a driver for the WPV outbreak in 2013 and cVDPV2 outbreak in 2017.

In the 2013 polio outbreak, a few rounds of OPV vaccination succeeded to interrupt circulation, with the last confirmed polio case detected in January 2014. In 2015, one more case was reported from Deir-Ez-Zor governorate that had VDPV isolated in the viral culture and was thus classified as ambiguous.

Since January 2014, the north-eastern areas of Syria were fully under ISIS control and, with its restrictive laws against NGOs operations, the vaccination activities were disrupted again, aggravating the already fragile community immunity. In addition, utilization of bOPV in most of the campaigns faced some issues, and the protocols for switch from tOPV to bOPV could not be fully executed because vaccination round using last tOPV could not be implemented in all areas.

The above-mentioned factors established a favourable ground for the cVDPV2 outbreak in north-eastern Syria in 2017.

2.1.2 Overview of AFP surveillance program

AFP surveillance, together with vaccination are the main pillars of the response to polio outbreak and is a cornerstone of contingency planning. The overall objective of AFP surveillance is to increase sensitivity of the system to detect any circulation of poliovirus or VDPV.

AFP surveillance team is composed of two technical officers based at the central level and supported by the data team. Under the supervision of the central team the EWARN field team is conducting AFP surveillance on the ground, in addition to the surveillance for water-borne diseases, measles, VPDs, supervision of the response activities and other miscellaneous tasks.

Table 5: AFP Network and Case Profile- Governorate Level – 2017

Governorate	POPL15	Expected 2 /100,000	# of AFP cases	Non-Polio AFP Rate	Adequacy%	NPEV%	SL%	Early Detection%	Median OPV	Median AGE	Min. AGE	Max. AGE	DLOsNumber	FLOsNumber	SentinelSite	Covered Area (50 %)	Covered Population (51%)
Al-Hasakeh	405,389	8	59	14.6	89.8	20.3	1.7	89.8	4.0	59	5	135	3	19	88	59%	85%
Aleppo	852,302	17	94	10.9	85.1	17.0	2.1	83.0	4.0	43	3	180	7	50	117	63%	74%
Ar-Raqqa	642,469	13	23	3.4	78.3	26.1	4.3	91.3	3.0	48	11	155	4	27	61	100%	100%
Dar'a	372,872	7	27	7.2	92.6	0.0	7.4	81.5	7.0	26	5	139	1	13	26	71%	88%
Deir-ez-Zor	808,708	16	128	7.2	91.4	15.6	2.3	92.2	2.0	17	4	121	4	23	21	84%	92%
Hama	42,493	1	7	16.5	85.7	14.3	0.0	71.4	4.0	29	6	169	1	9	14	31%	7%
Homs	109,459	2	24	21.0	100.0	25.0	0.0	95.8	4.0	27	2	151	1	4	12	33%	16%
Idleb	818,422	16	99	12.1	92.9	28.3	7.1	86.9	5.0	25	3	174	7	60	127	100%	100%
Quneitra	21,658	0	4	18.5	100.0	0.0	0.0	75.0	1.0	11	2	20	1	3	5	76%	95%
Rural Damascus	350,917	7	4	1.1	0.0	0.0	0.0	75.0	3.0	72	48	125	1	9	16	5%	21%
Grand Total	**4,424,689**	**88**	**469**	**8.9**	**89.3**	**19.0**	**3.4**	**87.8**	**4.0**	**29**	**2**	**180**	**30**	**217**	**487**		

2.1.3 Main features of AFP surveillance in 2016

The detection of the aVDPV case at the end of 2015 stressed the importance of early detection and investigation of all AFP cases to verify or refute viral circulation.

Many steps were taken to enhance AFP surveillance. These include (1) increasing NP-AFP rate to 3/100,000<15 yrs.; (2) collecting contacts' specimens for all AFP cases; (3) conducting Area Coverage Survey around the index cases; (4) regular meetings with WHO focal point to review the surveillance indicators; (5) refreshing training sessions for EWARN staff and the health care providers.

During the second quarter of 2016, specimens of 13 AFP cases from Deir-Ez-Zor governorate were destroyed at one of the stations on the route to the borders. In compensation for that incident, the EWARN team conducted a desk review and presented all cases to the Expert Review Committee (ERC). Although no cases were classified as compatible, EWARN field staff conducted sensitization visits to the health care providers in that area (with precautions as the area was under ISIS control). In addition, a proposal to conduct healthy children stool surveys in the area was prepared and shared with the WHO.

Table 6: Indicators Comparison- Governorate Level – 2015 & 2016

	Expected 2 /100,000		# of AFP cases		NPAFP		Adequacy%		Early Detection%		Median OPV		Median AGE		Min. AGE		Max. AGE		NPEV%		SL%	
Governorate	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
Al-Hasakeh	3	10	5	21	2.9	4.3	60.0	85.7	40	81	6	8	49	45	33	14	105	141	0.0	19.0	0.0	9.5
Aleppo	38	41	100	89	5.3	4.3	82.0	83.1	79	75	4	4	41	42	0	5	179	179	19.0	14.6	1.0	5.6
Ar-Raqqa	14	15	27	22	4.0	2.8	96.3	81.8	85	86	4	4	44	34	13	6	167	97	3.7	22.7	0.0	4.5
Dar'a	4	9	10	29	5.0	6.7	70.0	82.8	90	79	4	6	24	49	8	13	88	139	10.0	17.2	0.0	0.0
Deir-ez-Zor	19	20	43	43	4.6	4.3	88.4	60.5	79	86	5	4	20	24	3	2	115	157	23.3	20.9	4.7	4.7
Hama	3	3	10	9	7.4	6.5	80.0	77.8	90	78	5.5	6	26	59	9	5	136	168	30.0	11.1	0.0	0.0
Homs	3	3	10	24	5.8	13.7	90.0	95.8	90	100	5	4	48.5	46.5	15	11	107	179	0.0	20.8	0.0	0.0
Idleb	16	19	57	101	7.0	10.3	63.2	84.2	67	79	5	4	25	41	2	2	150	172	10.5	28.7	1.8	3.0
Quneitra	1	0	1	4	2.8	29.4	100.0	100.0	100	75	6	7.5	49	34	49	17	49	47	0.0	0.0	0.0	0.0
Rural Damascus	2	7	3	2	2.9	0.5	0.0	0.0	67	100	2		93	138	48	97	159	179	0.0	0.0	0.0	0.0
Grand Total	**103**	**127**	**266**	**344**	**5.2**	**5.3**	**78.9**	**81.1**	**77**	**81**	**4**	**4**	**32.5**	**39.5**	**0**	**2**	**179**	**179**	**15.0**	**20.6**	**1.5**	**3.8**

2.1.4 Main features of AFP surveillance in 2017

Several factors had affected the epidemiological situation in N. Syria, e.g 469 new AFP cases detected in 2017 with high NP-AFP rate, an outbreak of cVDPV2 in northern Syria, and massive population displacement, rapid changes in the controlling forces all contributed to the increasing need in keeping AFP surveillance indicators at the highest level of global standards.

Table 7. Performance and quality indicators of AFP surveillance

Indicator	2014	2015	2016	2017
Reported Cases	106	267	344	469
NPAFP Rate	2.5	5.1	5.3	8.9
Adequacy Rate	62.3	79	81.1	89
NPEV	33	15	20.6	19
SL	3.8	1.5	3.8	3

Figure 1: Cases Trends: line Comparison – 2015, 2016, 2017

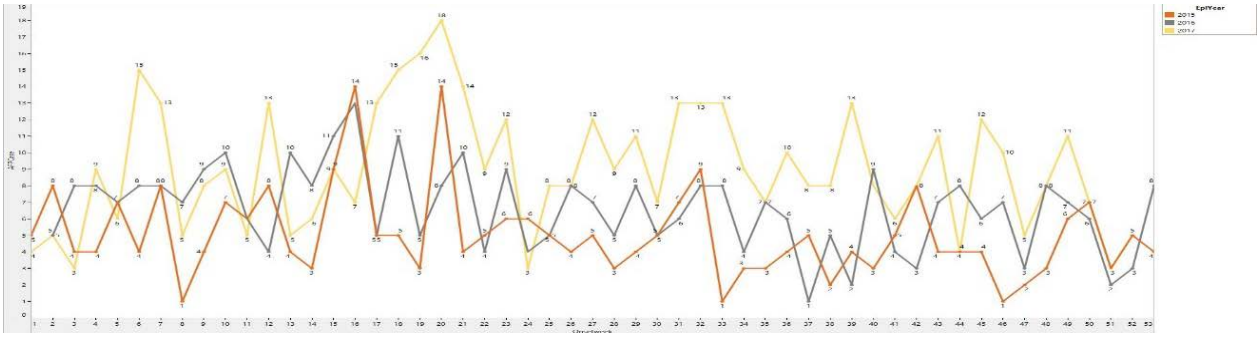
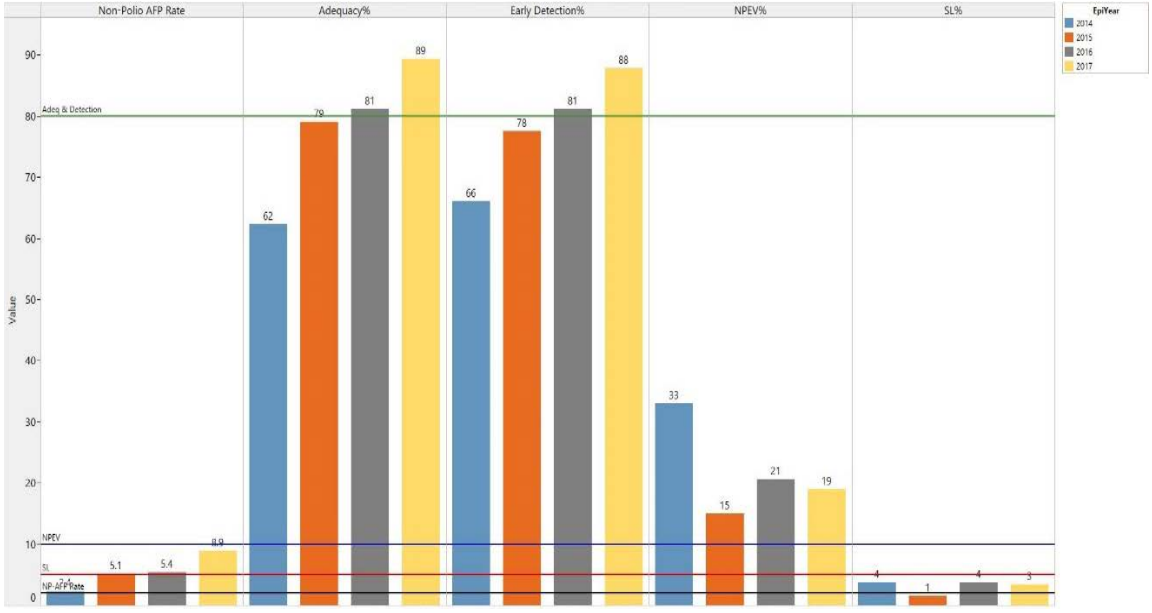


Figure 2: Adequacy, Detection, NPEV and SL – National Level

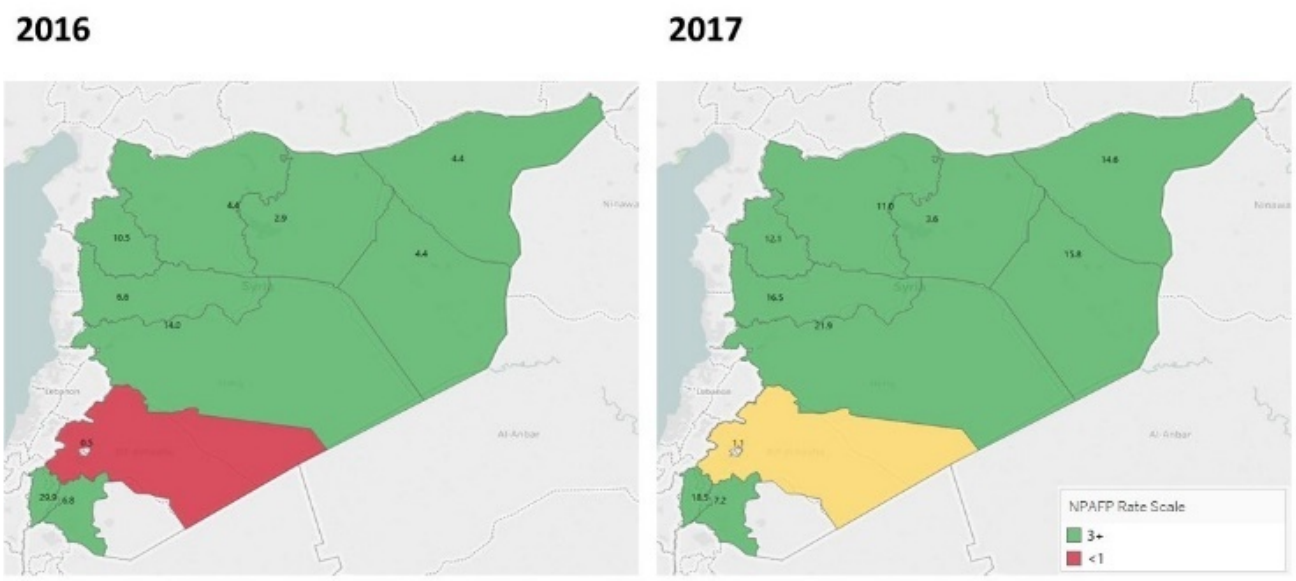


In 2017, the NP-AFP rate increased at the national level from 5.3 to 8.9; in addition, the stool adequacy was nearly 90% (only Rural Damascus has an adequacy of 0% after the loss of the stool specimens through the military operation in the area).

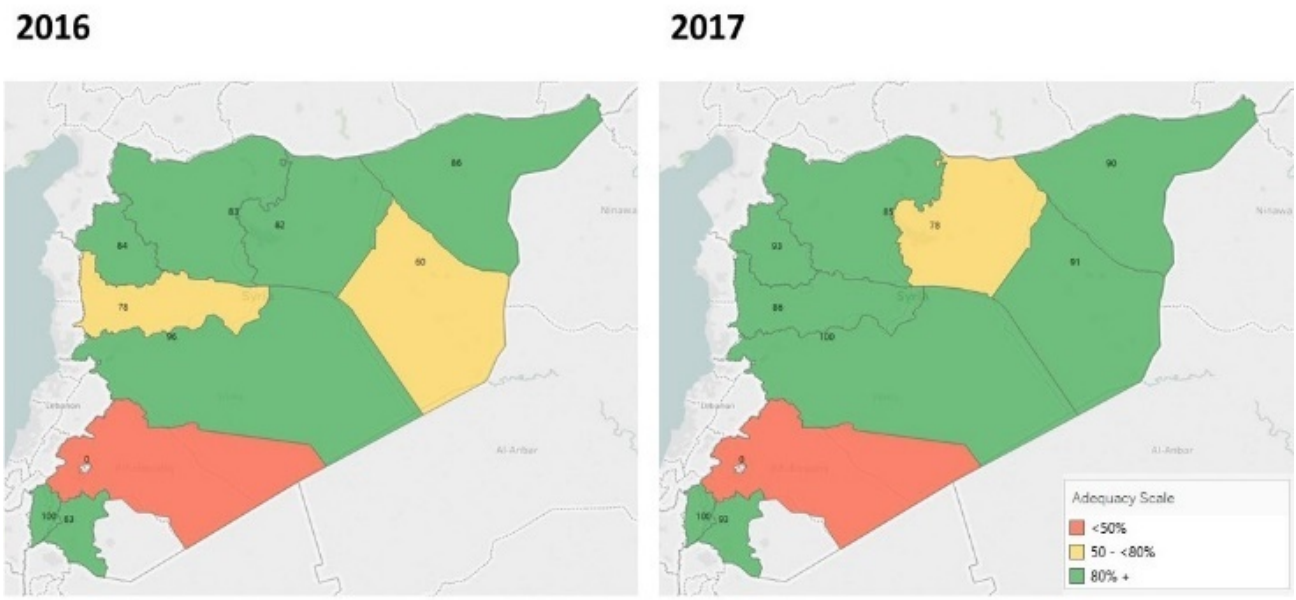
The peak of the reported AFP cases corresponds mainly to the cVDPV2 outbreak in Deir-Ez-Zor. In comparison to 2016, the indicators improved both at the national and governorate level. However, the AFP surveillance system should always remain on alert.

Collecting specimens from contacts of all AFP cases continued in order to enhance the sensitivity of the program. Although a case-to-contact ratio of 1:2 at the national level based is the global standard in conflict affected areas, the new target will be set to 1:3

Map 2: Non-Polio AFP Rate 2016 and 2017



Map 3: Stool Adequacy rate 2016 and 2017



As the reverse cold chain needs to be always addressed and analysed, the NPEV isolation percentage with the SL was constantly monitored to detect gaps and address any rising issues. EWARN started utilizing a monitoring tool for specimens' transportation to identify any gaps in reverse cold chain in the different stages of specimen transport. In the near future a special temperature monitoring device (fridge-log) will be used for the same purpose.

Table 8: Lab results for AFP cases - Index cases - 2017

Index Cases - Lab Information (#)

Governorate	DISPATCHED TO LAB	ENROUTE	NEGATIVE	NO SAMPLE	NPEV	SL	VDPV2	Grand Total
Al-Hasakeh			46		12	1		59
Aleppo			73	3	16	2		94
Ar-Raqqa			14	2	6	1		23
Dar'a			25			2		27
Deir-ez-Zor	3		37	4	20	3	61	128
Hama			6		1			7
Homs		4	13		6		1	24
Idleb			63	1	28	7		99
Quneitra			4					4
Rural Damascus				4				4
Grand Total	**3**	**4**	**281**	**14**	**89**	**16**	**62**	**469**

Index cases - Lab Information (%)

Governorate	DISPATCHED TO LAB	ENROUTE	NEGATIVE	NO SAMPLE	NPEV	SL	VDPV2	Grand Total
Al-Hasakeh			78%		20%	2%		100%
Aleppo			78%	3%	17%	2%		100%
Ar-Raqqa			61%	9%	26%	4%		100%
Dar'a			93%			7%		100%
Deir-ez-Zor	2%		29%	3%	16%	2%	48%	100%
Hama			86%		14%			100%
Homs		17%	54%		25%		4%	100%
Idleb			64%	1%	28%	7%		100%
Quneitra			100%					100%
Rural Damascus				100%				100%
Grand Total	**1%**	**1%**	**60%**	**3%**	**19%**	**3%**	**13%**	**100%**

Table 9: Lab results for AFP cases -Contacts - 2017

Contacts - Lab Information (#)

Governorate	DISPATCHED TO LAB	ENROUTE	NEGATIVE	NO SAMPLE	NPEV	PV2 (SLPT2)	SL	VDPV2	Grand Total
Al-Hasakeh			88		22		6		116
Aleppo			156		42		6		204
Ar-Raqqa			21		7		2	1	31
Dar'a	3		70		1		4		78
Deir-ez-Zor	7		124		56	1	22	66	276
Hama			13		4				17
Homs		12	41		16				69
Idleb			127		28		4		157
Quneitra			9				2		11
Rural Damascus				8					8
Grand Total	**10**	**12**	**649**	**8**	**174**	**1**	**46**	**67**	**967**

Contacts - Lab Information (%)

Governorate	DISPATCHED TO LAB	ENROUTE	NEGATIVE	NO SAMPLE	NPEV	PV2 (SLPT2)	SL	VDPV2	Grand Total
Al-Hasakeh			76%		19%		5%		100%
Aleppo			76%		21%		3%		100%
Ar-Raqqa			68%		23%		6%	3%	100%
Dar'a	4%		90%		1%		5%		100%
Deir-ez-Zor	3%		45%		20%	0%	8%	24%	100%
Hama			76%		24%				100%
Homs		17%	59%		23%				100%
Idleb			81%		17%		3%		100%
Quneitra			82%				18%		100%
Rural Damascus				100%					100%
Grand Total	**1%**	**1%**	**67%**	**1%**	**18%**	**0%**	**5%**	**7%**	**100%**

2.1.5 cVDPV2 outbreak

In March 2017, an unexpected increase in the number of the reported AFP cases from Al Mayadeen district in Deir-Ez-Zor governorate triggered deeper analysis and follow-up of the situation in the field. The AFP surveillance team conducted cluster investigation and revealed that the characteristics of the reported cases were not ruling out the possibility of WPV/VDPV outbreak.

Unfortunately, due to insecurity and the ongoing military operation hampering access to Turkey through the roads from Deir-Ez-Zor, the specimens were kept frozen until late April of 2017.

Figure 3: AFP Epi Curve Year -2017

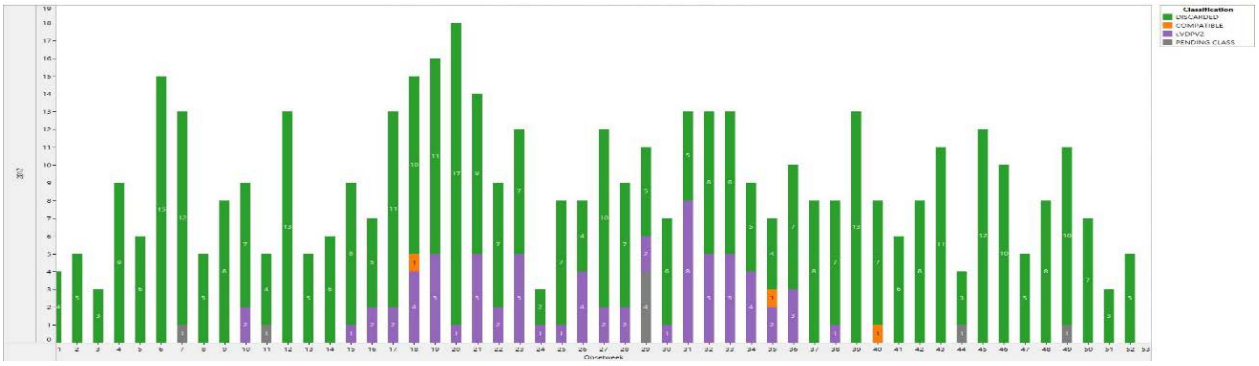
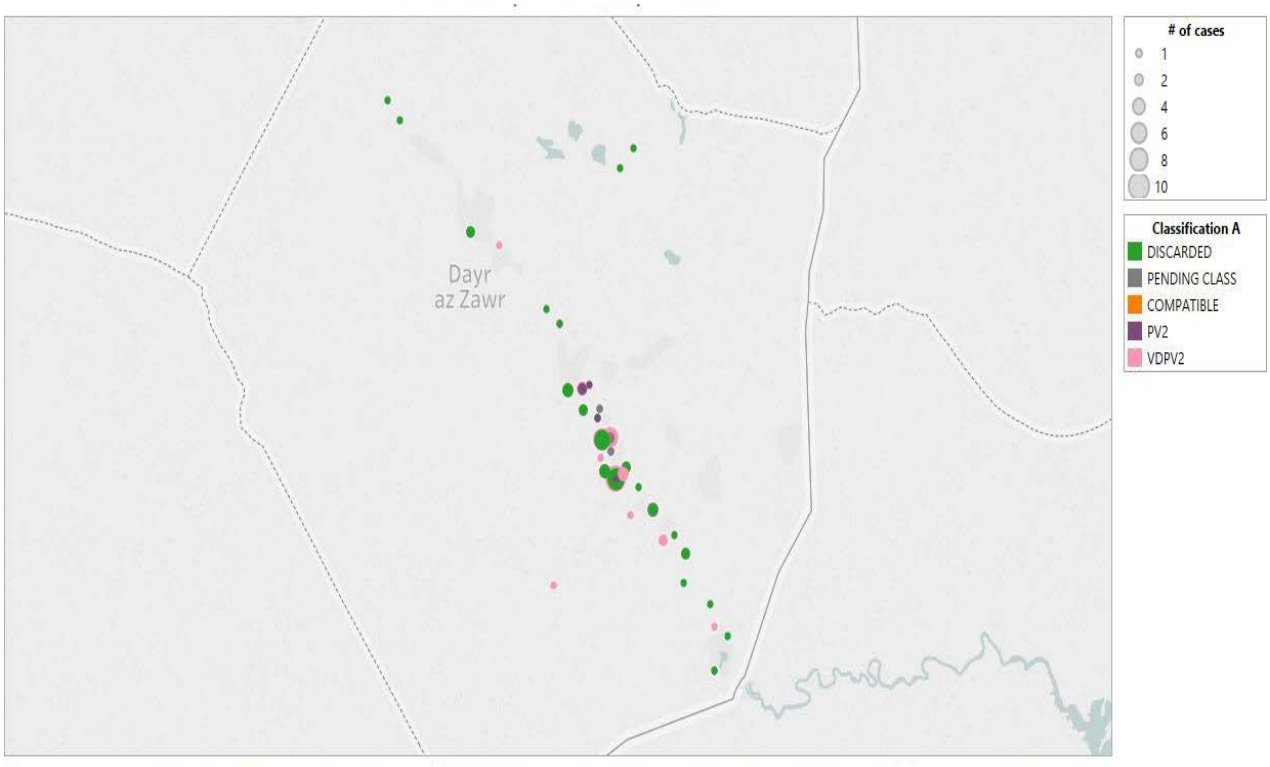


Figure 4: Classification Map – Deir Ez-Zor - Community Level -2017



The initial laboratory isolates of one of the cases presenting with VDPV2 were 22 nucleotides divergent (indicating the long-term circulation of the virus). To coordinate the response activities, an Emergency Operation Centre (EOC) was established in Gaziantep, with EWARN AFP surveillance coordinator nominated as the Incident Coordination Officer (ICO) and conducting weekly meetings to discuss the outbreak development.

Central and field EWARN staff played a pivotal role in the outbreak response, facilitating the detection of the AFP cluster, re-evaluation of the cases, continuous detection and investigation of the AFP cases, sensitizing the physicians and health care providers about the role of early notification in getting the optimal outcomes.

With district AFP surveillance indicators at the optimal level1, the efforts were made to ensure continuous detection of any new AFP case in a timely manner. Throughout the outbreak, EWARN team managed to identify 118 AFP cases (up-to Epi-week 46/2017), out of which 60 cases were either confirmed to be cVDPV2 cases or are pending sequencing with one compatible case. This comprises nearly 50% of all reported AFP cases which is an indicator of the high communicability and transmission of the outbreak.

Table 10: Indicators Comparison – District Level of Deir ez Zor – 2016 & 2017

	Expected 2 /10C,000		# of AFP cases		# of Non-Polio AFP Case		Non-Polio AFP Rate		Adequacy%		Early Detection%		Median CPV		Median AGE		Min. AGE		Max. AGE		NPEV%		SL%	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
District																								
Abu Kamal	5	4	15	25	15	12	6.1	6.3	40	92	80	84	5	1	24	30	9	4	83	98	13	8	7	0
Al Mayadin	5	4	17	86	17	30	6.4	14.3	65	90	88	95	3	1	16	16	2	4	157	121	29	9	0	2
Deir-ez-Zor	9	8	11	17	11	16	2.3	3.9	82	100	91	88	4	3	24	27	4	10	98	71	18	59	9	6
Grand Total	20	16	43	128	43	58	4.4	7.2	60	91	86	92	4	2	24	17	2	4	157	121	21	16	5	2

Coordination between different DLOs was also critical during the outbreak investigation and follow-up because some cases were tracked between different governorates.

One particular example illustrating benefits of the inter-district coordination was when a case, initially reported and investigated in Deir-Ez-Zor (DZ), was eventually referred to health care in Damascus before the collection of the stool specimens of the index case and the contacts were collected in DZ accordingly. The case was notified while located in Al Hasakeh governorate (northern governorate) before travelling to Damascus where the specimens were finally collected for the index case while the family was waiting for an available flight at the airport.

Another cVDPV2 case was detected in Idleb governorate in western Syria after the family fled Al Mayadeen city in Deir-Ez-Zor nearly 10 days prior to the onset of paralysis in the case (cVDPV2 isolated in the index case and three healthy direct contacts). In response to that, the team conducted extended area coverage survey, active case search and 19 specimens from healthy children were collected.

One other cVDPV2 case was confirmed in Tell Abyad district from Ar-Raqqa governorate. And one case confirmed from Sukhna Sub-District in Homs governorate.

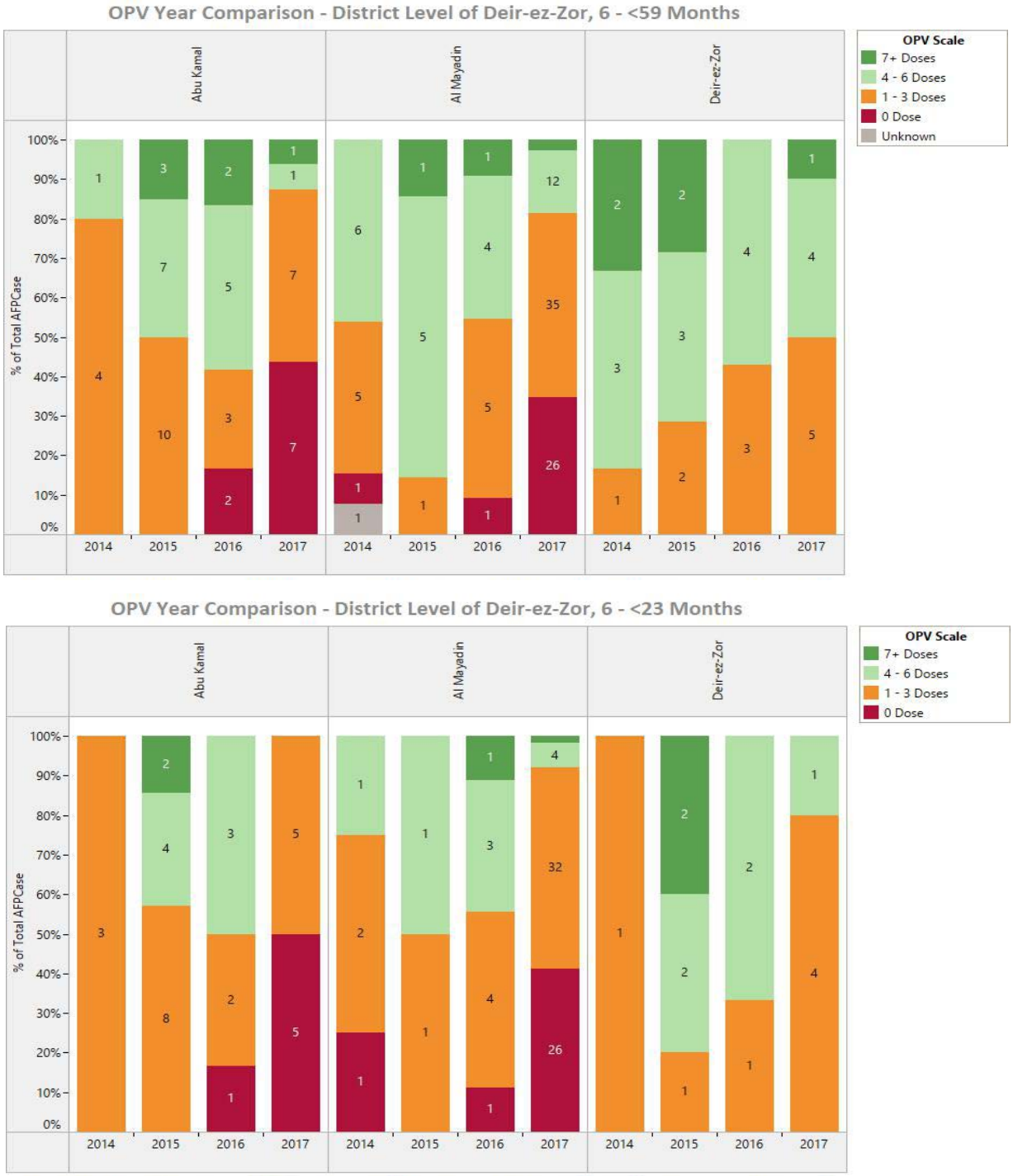
Two confirmed cases from the first peak were later reported from A'zaz district (north-west Syria at the Syrian-Turkish borders).

Analysis of the vaccination status of the AFP cases show worrying results, as 33 cases under five years old - that comprise 33% of the AFP cases in this age group - received zero OPV doses. Even more concerning is vaccination status of children under two years - 42 out of all confirmed cases are from this age group - children of these age group were especially affected with the deprivation of the vaccines observed during the last three years.

[1]More than 90% for the stool adequacy in all three districts.

It is important to emphasize that two mOPV2 vaccination rounds conducted in Deir-Ez-Zor and Ar-Raqqa were non-complaint in coverage between the administrative and the independent monitoring data. Another campaign using IPV was conducted in western governorates (Idleb, Aleppo and Hama) in October 2017. IPV coverages showed satisfactory results.

Figure 5: OPV Year Comparison- District Level of Deir ez Zor by Age group



The major concern now is the massive displacement of the population from hot spots to other uninfected areas in northern Syria. Some reports suggest that nearly 120,000 people moved from their original residency in Deir-Ez-Zor governorate to other areas in Al-Hasakeh, Ar-Raqqa, Menbij and A'zaz in Aleppo governorate and Idleb. This may cause missing or delayed notification of AFP cases due to the absence of health care providers or, in some cases, the reluctance by the parents to seek health care for their children before settling in some area; community-based surveillance could overcome this problem.

2.1.6 Coordination with WHO and other partners

Weekly meeting with the WHO focal point and SIG team were conducted in order to review AFP surveillance indicators and notify of any vaccination related issues (such as zero OPV doses) to inform the planners of the vaccination activities. In addition, regular feedback was provided to EMRO through sharing the IFA's rec file on a weekly basis.

Since the initial report of the VDPV2 case, an EOC was established (including WHO, SIG, QRC in addition to EWARN), where EWARN has a leading role in providing the regular update on the field situation, continuous analysis of the situation in Deir-Ez-Zor and feedback from the field staff to reflect the actual situation on the ground. EWARN assisted in developing the contingency plan to address the scenarios of cVDPV potentially spreading to previously uninfected areas.

As a part of the efforts to strengthen laboratory capacity, the EWARN team visited the reference laboratory in Ankara to inform them of the outbreak situation and express EWARN's gratitude of their crucial role in the efforts to interrupt circulation of the virus.

Advocacy meetings were also held with different national and international organization to inform them about the epidemiological situation of cVDPV outbreak and AFP surveillance status and coordinate the necessary training sessions needed for their staff in the field to ensure the regular flow of data and timely notification.

2.1.7 Challenges

The major and most difficult to overcome challenges are insecurity and the operational environment imposed by the controlling forces in the field. Time required to transport samples collected in the eastern and southern governorates to the borders with Turkey is much longer than desired. Furthermore, internet connection is inconsistent, especially in eastern governorates.

Figure 6: Stool Transport Duration – 2016 & 2017

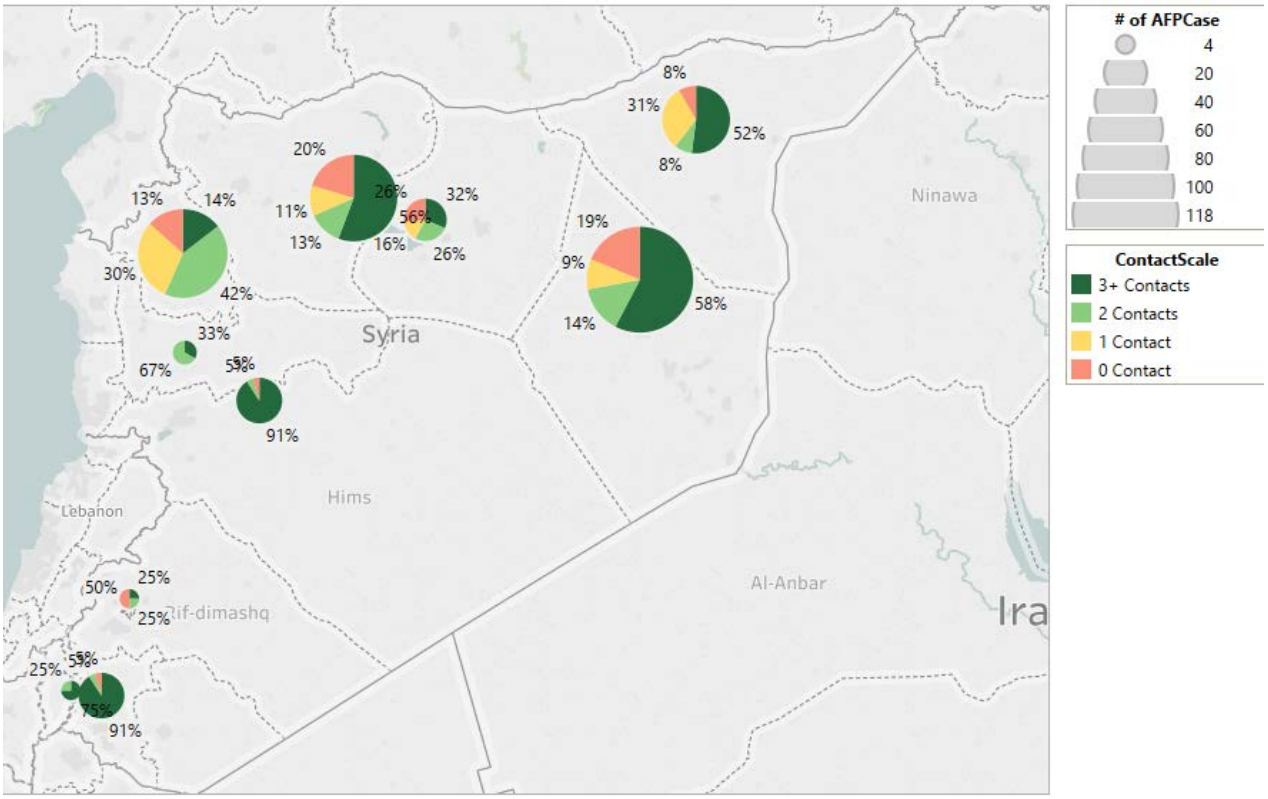
Capacity of the EWARN workforce remains a challenge as well. Despite the extensive experience and knowledge in epidemiology accumulated through field work and sporadic training sessions, the staff did not receive any certified training program except for the CDC training in 2017 and a planned bio-statistics training course from Gaziantep University. In addition, lack of external exposure through participation in conferences and international meetings also limits potential professional growth of the EWARN team.

The VDPV outbreak also placed additional workload on the staff at all levels. Some physicians, especially with purely clinical background, have difficulties in cooperating. Despite the improvement in the notification of cases within 7 days of the onset of paralysis, more work is needed to be done to maintain the alertness of the health care providers.

It is particularly challenging to attain specimens from the contacts of index cases, as relatives might argue the necessity of sampling a healthy child. The map below demonstrates the distribution of contacts sampling showing the reluctance in areas with relatively better access and security, such as Idleb. That said, it is recommended to open channels of communication with the community about polio and the role of AFP surveillance in polio eradication.

Lastly, the vaccination status of the AFP cases shows low coverage in general in all governorates, which is a risk factor for WPV/VDPV outbreak that may happen in any spot. Despite the number of campaigns implemented in western governorates, the immunity to Type 2 is very low as only one tOPV campaign was conducted and infrequent IPV use (one IPV campaign was conducted recently in Idleb, Hama and parts of Aleppo).

Map 4: Contact Sampling Map 2017



Map 5: OPV Map – Community Level, All age groups – 2017

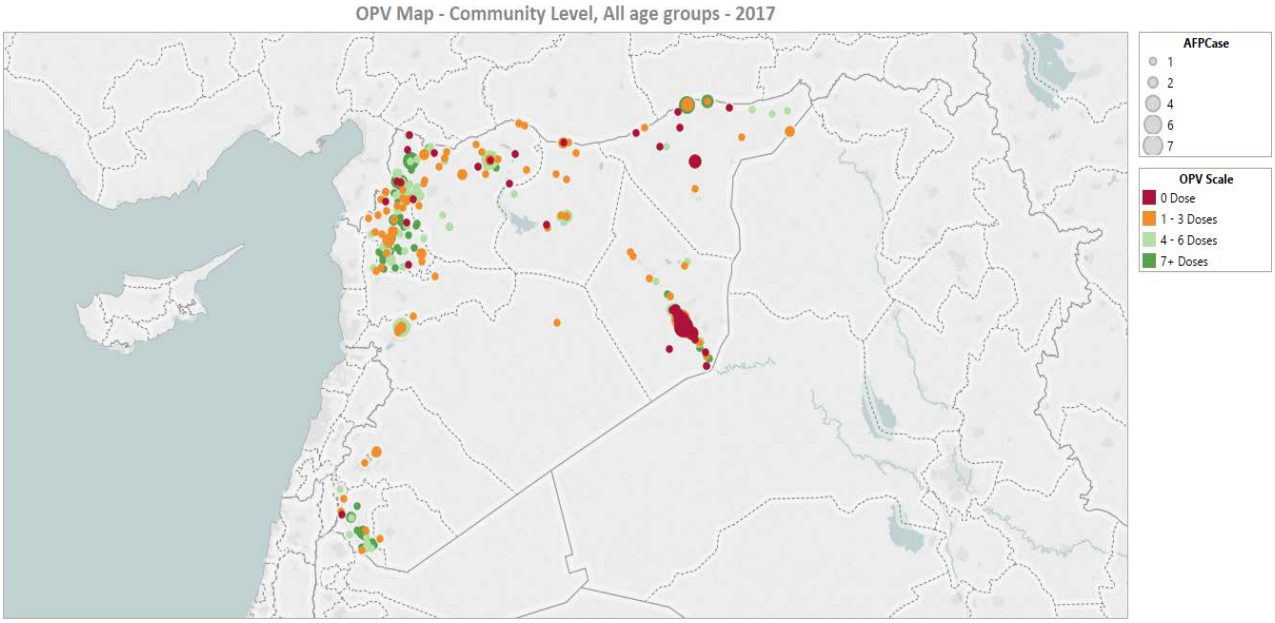
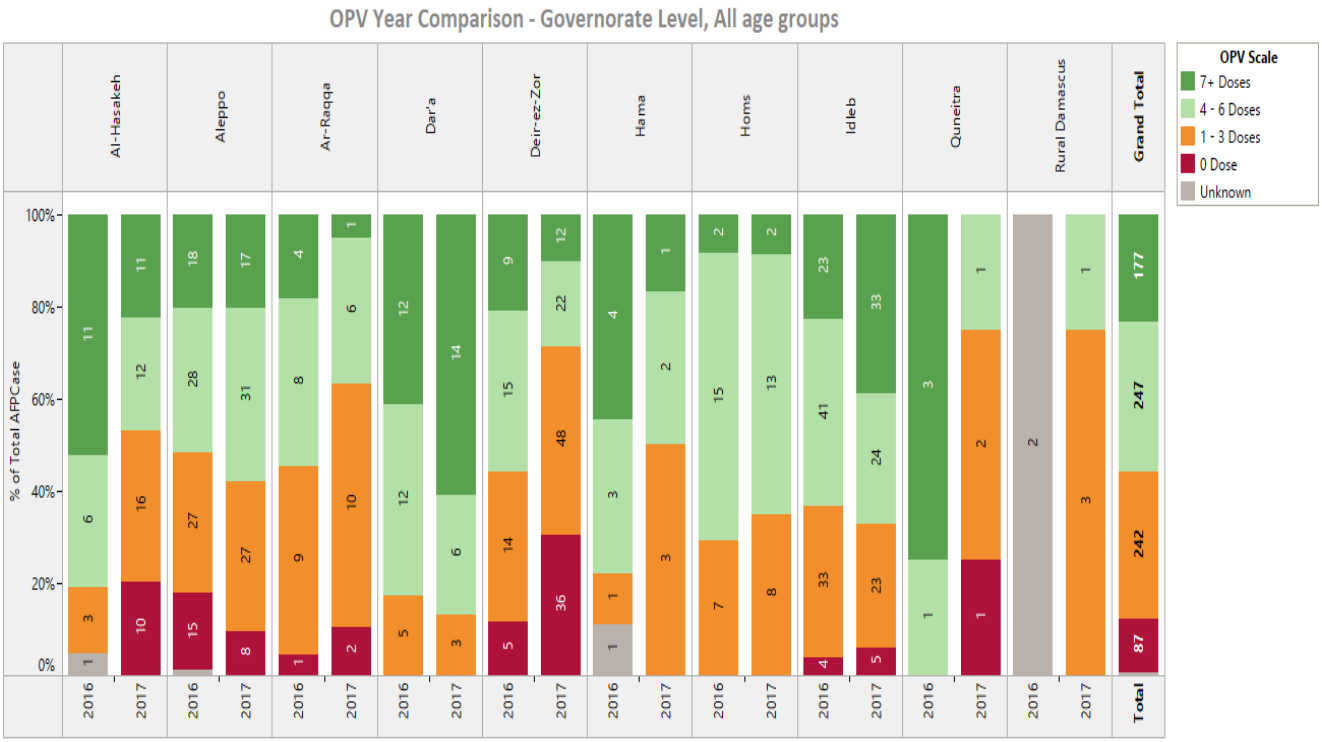
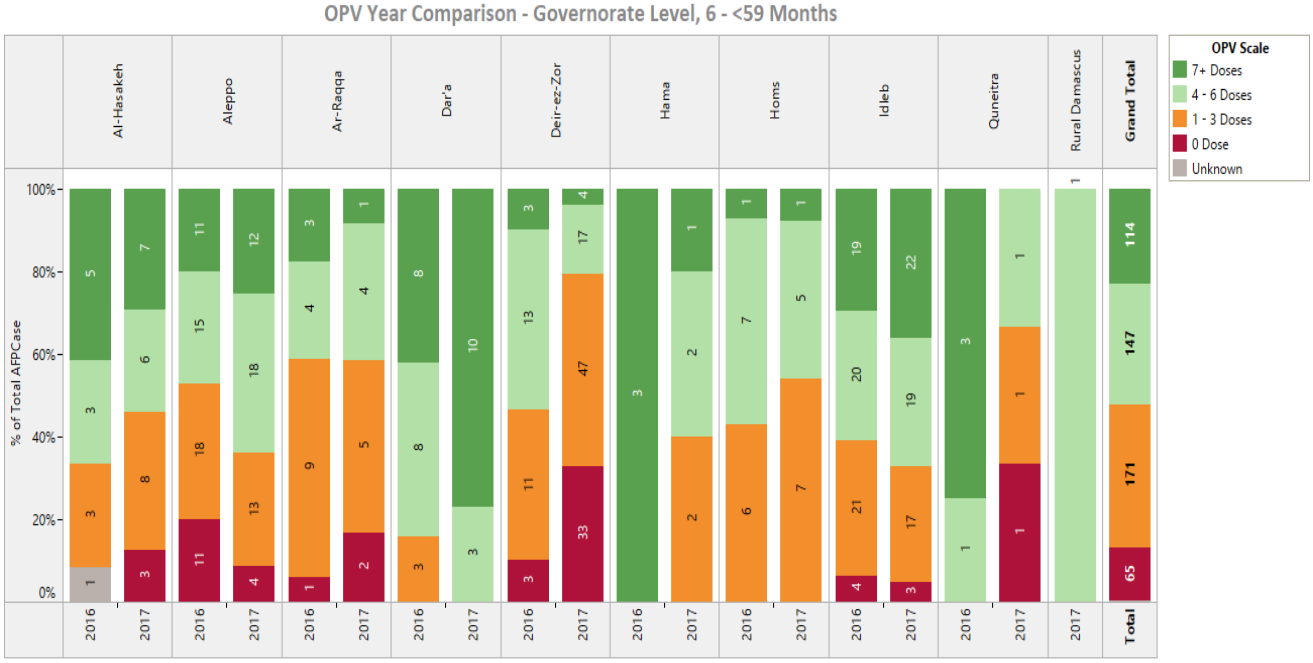
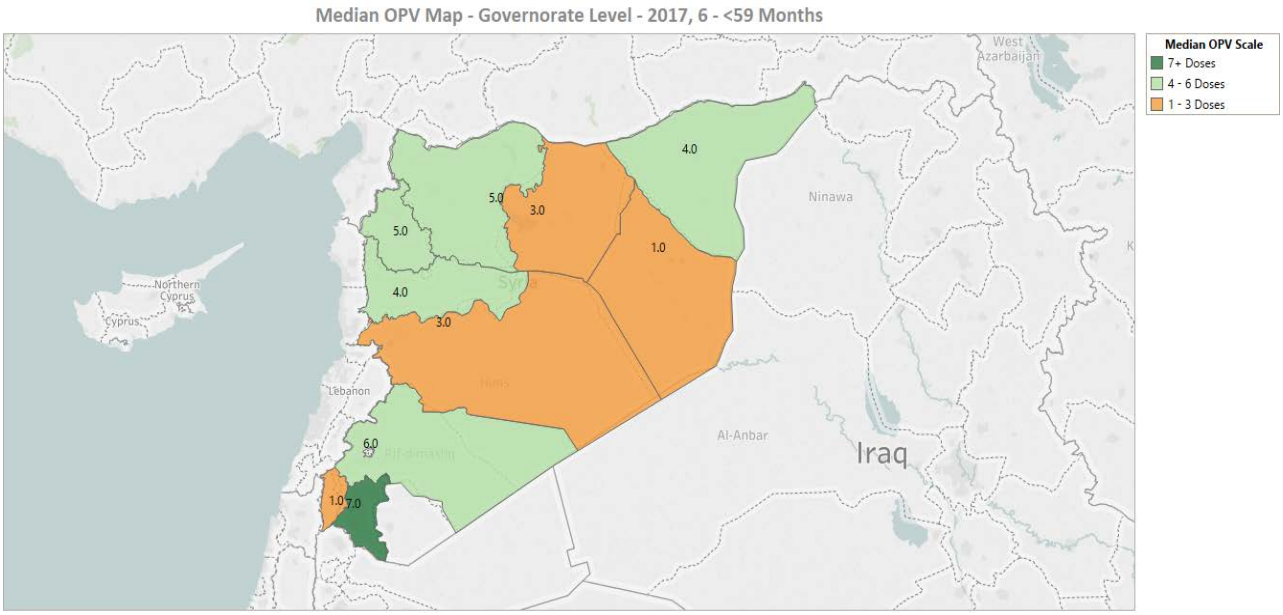


Figure 7: OPV Year Comparison- Governorate Level by Age group





Map 6: Median OPV Map - Governorate Level 2017, 6 – < 59 Months



2.1.8 Lessons learnt and measures to enhance surveillance

E-Surveillance

In 2017 it was initially planned to utilize the electronic means –other than MS Office – for data collection and analysis, mainly using Open Data Kit (ODK) for data collection. So far, Tableau was used for data visualization of AFP surveillance indicators, while ODK is planned to be used for active surveillance data collection starting 1 December 2017, after piloting the tool with two DLOs from A'zaz district in Aleppo governorate and Harim district in Idleb governorate.

Community based surveillance

In order to enhance the AFP surveillance, a number of innovative steps were taken including the community-based surveillance. The mapping of the 500 focal points was completed by the end of November 2017. Training of the focal points is planned to start by the beginning of December 2017 and the actual roll-out of the community-based surveillance is to be commenced by January 2018.

Environmental surveillance

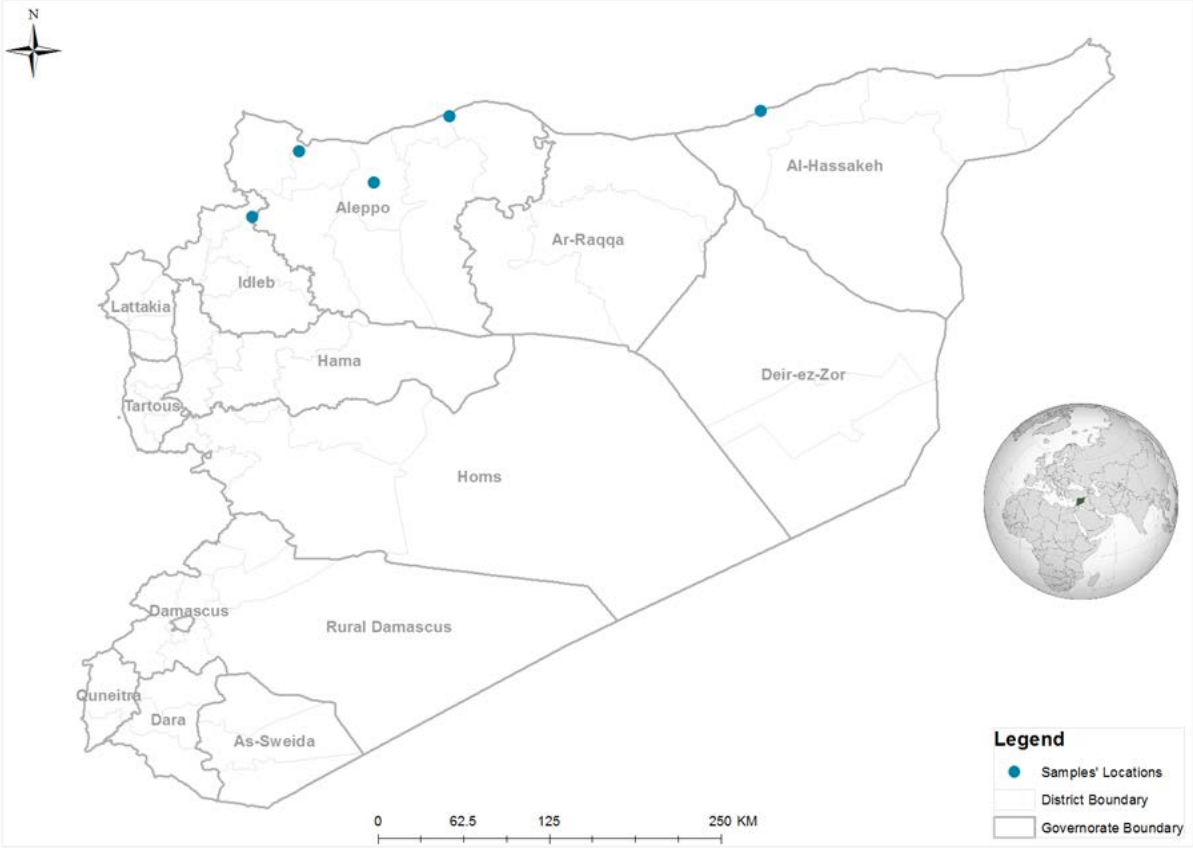
There are two distinct, but related components of environmental surveillance aimed to investigate sewage or wastewater in support of the Global Polio Eradication Initiative (GPEI). The first is targeted directly at detecting circulating polioviruses (PV) as a supplementary method in support of disease-based acute flaccid paralysis (AFP) surveillance for suspected polio cases. Environmental surveillance can assist in identifying residual wild poliovirus (WPV) transmission in endemic areas, particularly where WPV circulates among infected individuals not showing signs of paralysis. Environmental surveillance can be a valuable tool to provide an early indication of new PV importations into polio-free areas or of vaccine-derived polioviruses (VDPV) transmission, and to confirm the presence of vaccine-related virus following a vaccination campaign using oral polio vaccine (OPV).

Selection criteria of environmental sampling sites are the following:

1- Areas with high-risk population (migrants, nomads, seasonal workers and refugees)
2- Areas with extensive population movement to and from poliovirus reservoir or endemic areas (population size in drained areas must be considered, optimally => 100,000 pop)
3- Locations with suboptimal levels of routine and supplementary vaccine coverage, including known or suspected population immunity gaps and communities refusing vaccination
4- Areas where the quality of AFP (Acute Flaccid Paralysis) surveillance is suboptimal and the risk of undetected poliovirus transmission is high.

The above-mentioned criteria are applicable to high number of sites in northern Syria. Hence, after discussing the situation with the WASH officers an initial agreement was reached to start the project on two phases after selecting 4-5 sites with the highest priority (the sites marked in the map below).

Figures 8,9: Suggested Locations for Environmental Surveillance



Following the initial assessment, the next phase will complete the training of the staff and be implemented in the 1st quarter of 2018.

If the environmental sampling program is initiated, it will allow review of the findings and modify the collection points according to the primary findings of the first phase, in order to either cancel or chose different points.

Healthy children stool survey

After the loss of stool specimens from 13 AFP cases from Deir-Ez-Zor in 2016, the AFP team suggested measures to compensate the harm by presenting all the cases to ERC and sampling healthy children from the communities at which the index AFP cases reside. The latter was not approved at that time. Recently after isolating cVDPV2 from a case that was originally from Deir-Ez-Zor but detected in Idleb governorate (western parts of Syria), 19 specimens were collected from healthy children in the community of the index case. The rationale for this is to assess if the virus is circulating in the area to trigger any necessary response.

2.1.9 Future plans for surveillance

AFP surveillance is one of the most matured parts of EWARN. However, a lot of improvement is still needed in order to overcome the challenges encountered in the field.

Firstly, further capacity building is needed, namely expansion of the training for the health workers of all specialties and keeping the level of sensitization with regard to the importance of early detection and reporting of AFP cases.

Gradually, the scope for AFP training will also include the lowest levels of the health workers and finally will target the community itself to establish the community-based surveillance. Enhancing the capacity of the FLOs will be aimed to have more involvement of FLOs into AFP surveillance, other than only receiving the notifications and assisting in the specimen collection. Also, increasing the number of the field staff will allow to overcome the obstacles related to access and security. Measures to strengthen the active surveillance needs to be elaborated.

Secondly, tuning the tools which are used for the surveillance will benefit the timeliness and quality of data collection and analysis. This includes but not limited to: (1) utilization of the e-surveillance tools like ODK; and using it in60-days follow-up and for excluded cases; (2) using of Epi-Info for data collection;(3) using SPSS or R programming for data analysis; (4) using temperature monitoring devices for the stool carriers to document and verify the status of the reverse cold chain. Lastly, deteriorating economic status of the population inside Syria is affecting access to health care and rehabilitation for children affected by AFP. In the past as well as in 2017, some expenses for physiotherapy and medication (Immunoglobulin) for AFP cases were covered by the EWARN programme, including purchases of physiotherapy devices. The provided aid is planned to be expanded in 2018.

2.2 Vaccine preventable diseases (VPDs) surveillance

Early Warning and Response Network was established in 2013 to cover the diseases with high potential to cause epidemics. One of the corner stones in EWARN is Vaccine Preventable Disease (VPD) surveillance, which focuses on measles surveillance.

VPDs surveillance managed to detect number of outbreaks in the last few years despite the difficult circumstances. EWARN was the first to detect the measles outbreak in rural Damascus at the beginning of February 2017, then monitored the spread of the outbreak in other governorates, ringing the alarm and advocating about the importance of proper response through vaccination campaigns and revitalization of routine immunization activities.

In addition to measles, the program is monitoring: German measles (Rubella), diphtheria, whooping cough (pertussis), neonatal tetanus, Neisseria meningitis, and epidemic diphtheria.

The importance of surveillance of vaccine preventable diseases lies in the early detection, identification, and reporting of outbreaks and cooperation with Syria Immunization Group (SIG) and MSF to increase activation of vaccination activities where the implementation of the first multi-antigen AIRI campaign1 (MCV) in the northern governorates in Syria in March of the year 2017 and carried out by the MSF organization, followed by a campaign in the month of May 2017 and by a SIG and MSF in addition, both of whom activate routine expanded vaccination program.

In addition, EWARN cooperates with SIG and MSF in all vaccination activities, including surveillance of adverse event following immunization (AEFI) in both the vaccine campaigns or in the routine vaccination centers.

2.2.1 Measles surveillance

Since mid-2016, EWARN moved from the aggregated data collection of the suspected measles to case-based surveillance. But due to the high numbers of the suspected cases only specimens of some suspected cases were collected, and the other cases were linked epidemiologically or clinically.

The year 2017 witnessed one of the biggest measles outbreaks in recent years in EWARN covered areas, which was expected based on the deterioration of the immunity status due to the low number of vaccination campaigns, the nascence of the routine immunization centers, the continuous population displacement and the attacks on health care.

Since the start of 2017, more than 9000 suspected measles cases were reported, including more than 1900 suspected measles case in rural Damascus.

The outbreak was not limited to rural Damascus, as Deir ez-Zor reported the highest number of suspected cases, where 4047 suspected measles cases were reported. But, due to the security difficulties, only 8 cases were lab confirmed by the levels of measles-IgM and the remaining cases were epidemiologically linked.

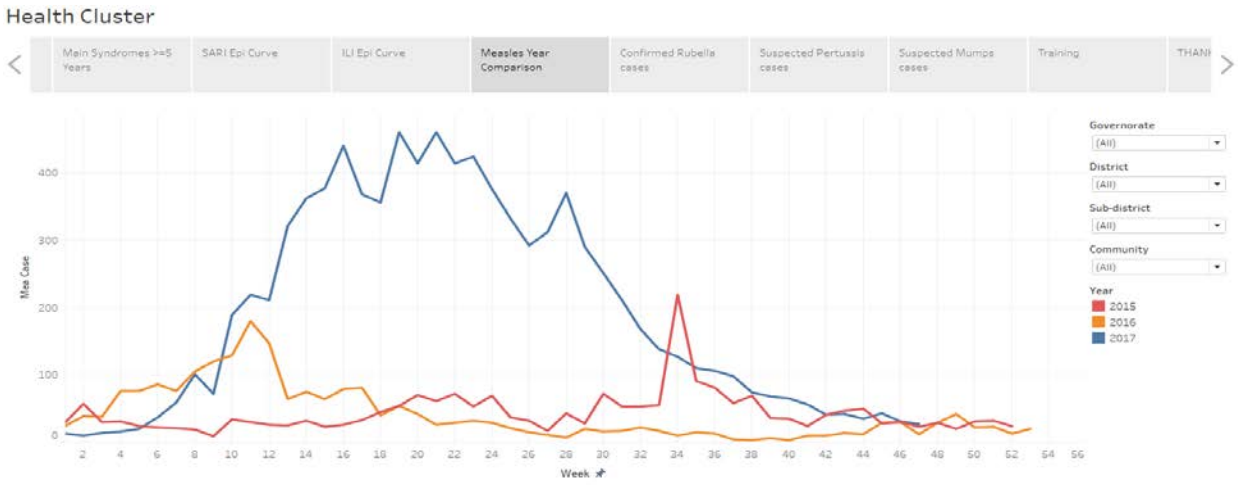
1857 suspected measles were reported from Aleppo, out of which 327 were lab confirmed. And in the Euphrates shield area 1184 suspected cases were reported (207 lab confirmed).

551 suspected measles cases were reported in Idleb Governorate and 187 of them were confirmed by lab.

Table 11: Suspected measles cases by week and governorates

Governorate	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
Aleppo	3	4	5	6	12	5	11	13	7	13	24	37	28	38	43	57	106	114	147	109	114	95	118	95	48	56	82	87	59	59	59	39	32	24	10	22	17	7	5	8	2	7	10	4	14	2
Al-Hasakeh	0	0	0	2	0	0	0	1	0	1	1	0	0	1	1	3	2	3	2	1	0	1	5	1	2	0	0	0	0	0	0	1	0	0	2	0	1	0	0	0	1	1	0	2	0	0
Ar-Raqqa	0	0	0	0	0	0	1	0	0	0	9	18	32	36	34	24	14	21	6	3	5	0	4	1	12	3	3	25	9	10	3	6	3	0	1	2	2	8	4	2	4	1	2	3	3	2
Damascus	0	0	0	0	0	3	0	0	0	6	4	6	4	6	6	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dar'a	0	0	0	0	3	0	0	1	0	0	0	4	17	7	3	9	8	1	6	14	8	3	9	6	1	2	3	5	1	2	4	2	1	4	3	3	2	2	3	4	1	2	4	6	1	2
Deir-ez-Zor	4	1	2	5	0	2	6	2	3	17	17	36	39	39	46	82	120	153	160	163	224	246	238	233	238	215	204	234	198	168	141	109	96	92	90	77	71	54	55	47	39	24	19	17	15	6
Hama	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Homs	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idleb	6	5	7	3	4	2	5	11	7	11	14	18	15	22	16	32	15	27	26	33	30	24	24	29	19	6	14	18	20	9	4	7	5	5	4	2	5	2	1	4	6	6	7	2	9	10
Quneitra	0	0	0	0	0	0	0	0	2	1	0	3	5	1	1	2	3	0	5	4	2	0	0	0	3	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Rural Damascus	0	0	0	0	0	22	36	76	53	134	146	82	175	205	221	228	93	37	108	87	76	45	26	10	8	7	6	7	1	3	0	4	1	2	0	0	0	1	0	0	3	0	0	0	1	7
Total	13	10	14	16	20	34	59	104	72	183	215	205	317	356	371	440	365	356	460	414	460	414	424	376	332	292	312	376	290	251	211	168	138	127	110	106	98	74	68	65	56	41	42	35	43	31

Figure 10: Comparison of outbreak and measles in the year 2017 with the previous two



The following curves and epidemiological schemes that illustrate the magnitude of the measles outbreak in various Syrian provinces of the year 2017:

Figure 11: Comparison of measles outbreaks in Rural Damascus, Dar'a and Quneitra (note the different values of the Vertical Axis for 2015-2016-2017)

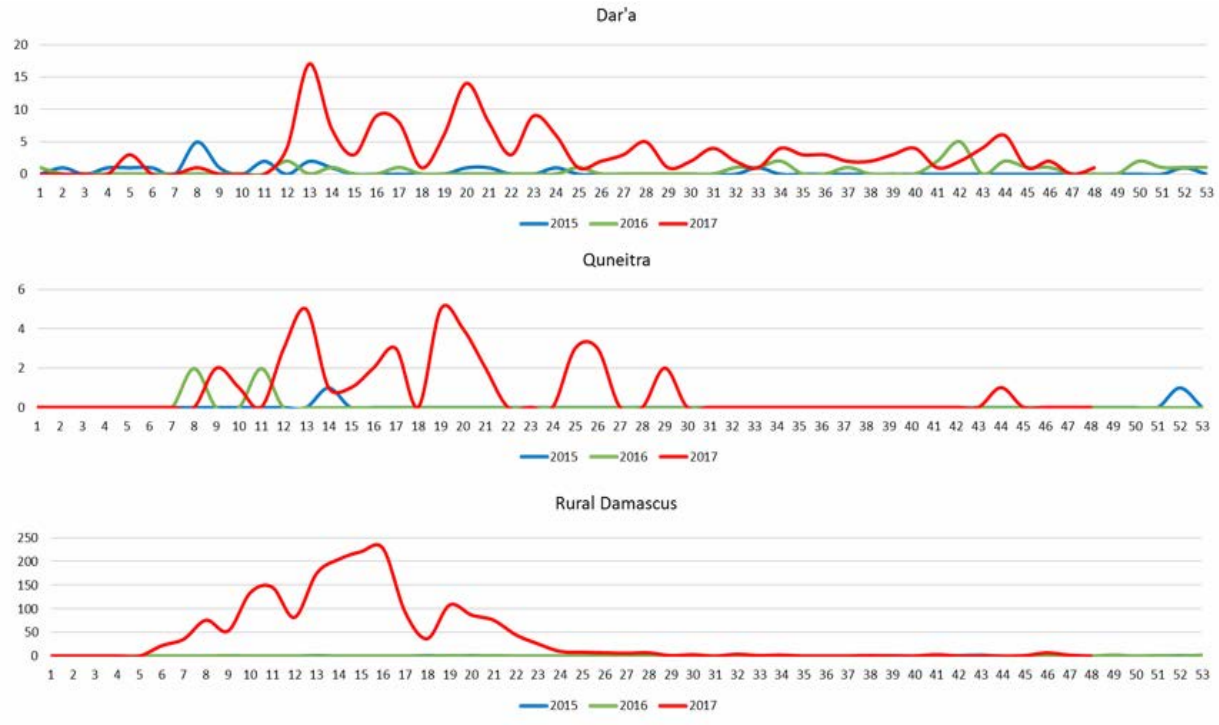


Figure 12: Comparison of measles outbreaks in Aleppo, Idleb & Hama (note the different values of the Vertical Axis for 2015-2016-2017)

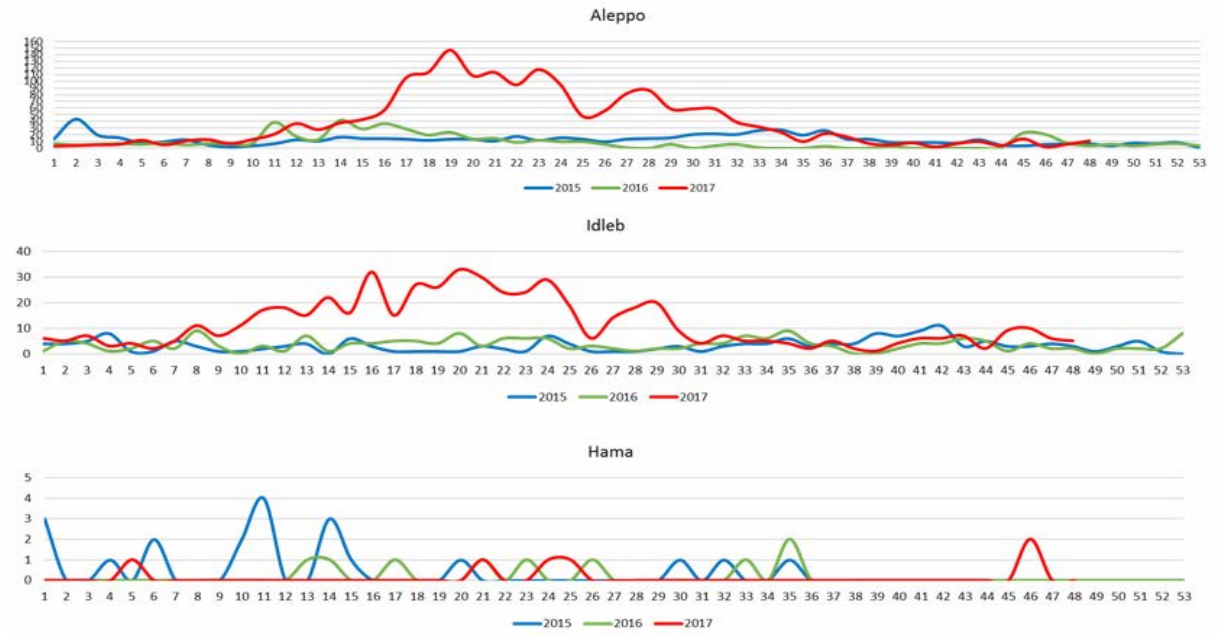
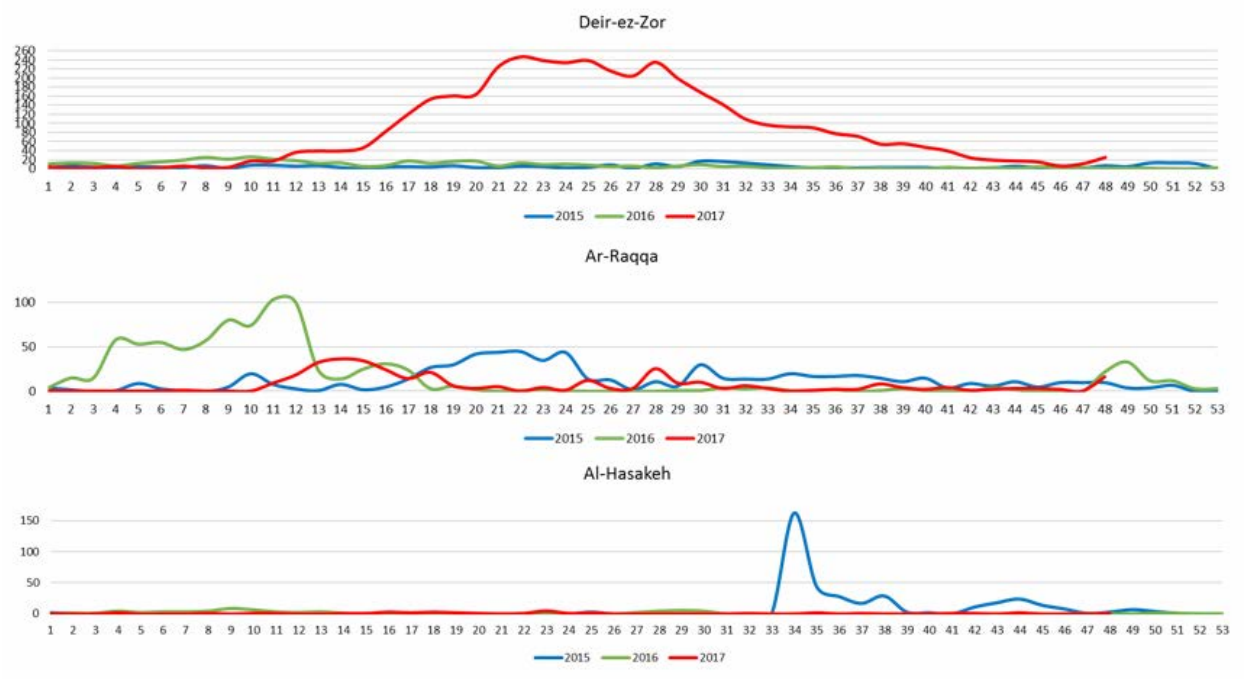


Figure 13: Comparison of measles outbreaks in Deir ez Zor , Ar Raqqa and Al Hasakeh (note the different values of the Vertical Axis for 2015-2016-2017).



More than 1230 suspected measles cases were investigated, with 86% of them notified within 7 days of the onset of the rash, 94% were sampled between the 4th and 28th day of the onset.

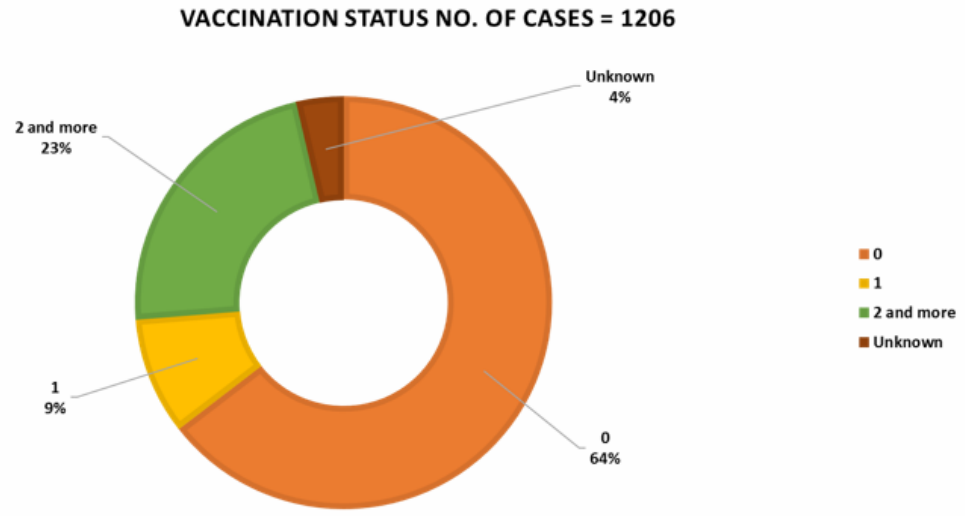
Table 12: Indicators for Investigated Cases in 2017

Governorate	Investigated cases	Notified within 7 days form rash date target≥80%		Investigated within 48 h from notification date target≥80%		Sampled Cases	Sampled within 4-28 days from rash date target≥80%		Samples sent to lab	Samples sent to lab within 3 days (maximum 7 days) target=> 80%		Lab results sent	Lab result within 7 days (target≥80%)	
	number	number	%	number	%	number	number	%	number	number	%	number	number	%
Aleppo	566	473	84%	491	87%	395	362	92%	376	369	98%	373	333	89%
Idleb	307	261	85%	198	64%	239	230	96%	233	205	88%	231	203	88%
Hama	5	3	60%	5	100%	5	5	100%	5	2	40%	1	1	100%
Ar-Raqqa	56	42	75%	50	89%	42	35	83%	42	41	98%	42	31	74%
Deir-ez-Zor	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Al-Hasakeh	43	40	93%	43	100%	37	36	97%	35	31	89%	31	23	74%
Homs	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rural Damascus	35	30	86%	25	71%	9	9	100%	9	7	78%	9	9	100%
Damascus	4	3	75%	1	25%	2	2	100%	2	2	100%	2	2	100%
Dar'a	141	135	96%	105	74%	104	99	95%	99	79	80%	104	54	52%
Quneitra	49	48	98%	33	67%	46	46	100%	46	34	74%	46	32	70%
Total	**1206**	**1035**	**86%**	**951**	**79%**	**879**	**824**	**94%**	**847**	**770**	**88%**	**839**	**688**	**78%**

The size of the outbreak reflects the deteriorated vaccination status in the past few years, as 64% of the investigated suspected measles cases had no vaccination history against measles which shows the importance of the revitalization of the routine and supplementary vaccination activities

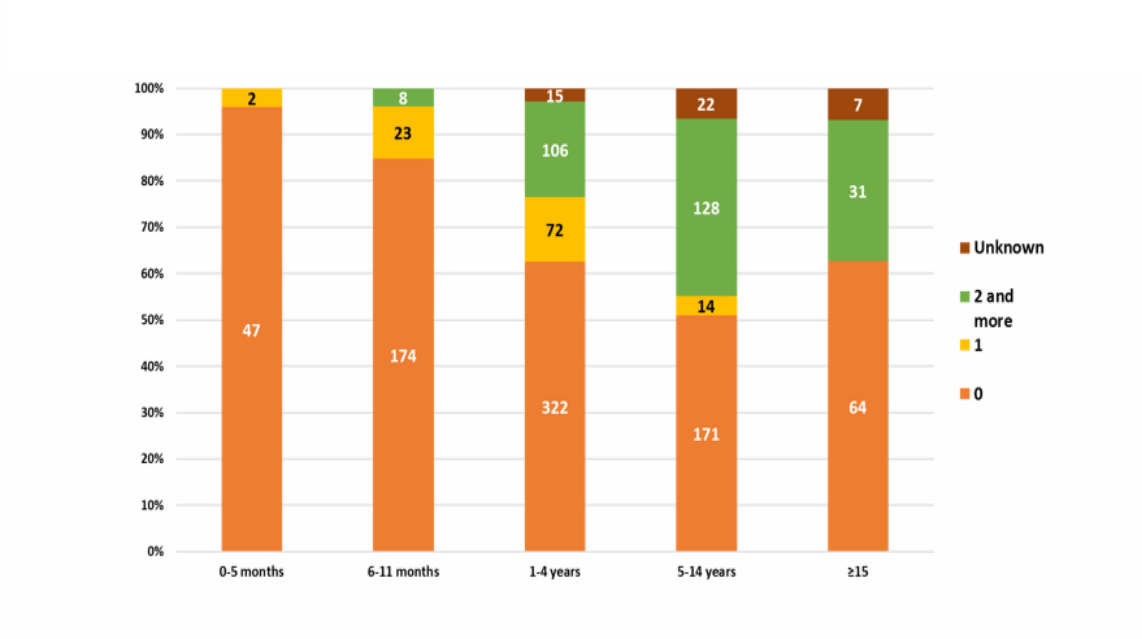
Distribution of investigated cases in 2017 up to W48 according to vaccination status

Figure 14: Vaccination Status in the Investigated Cases - 2017



The chart below demonstrates that the age group 6-12 months should be targeted in the vaccination activities (Supplementary immunization), the second age group to be targeted should be 1-4 years.

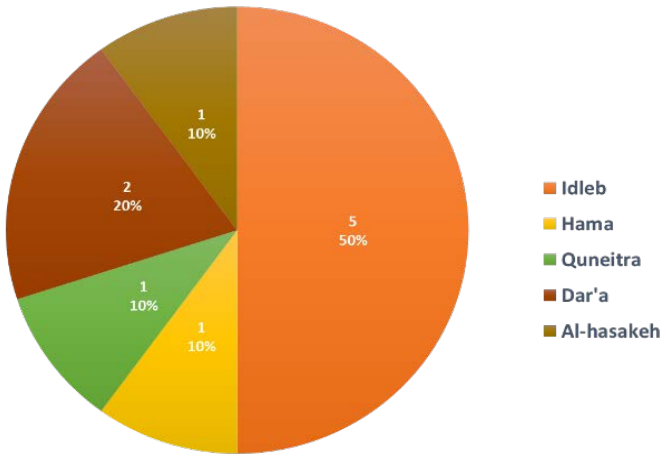
Figure 15: Vaccination Doses of Investigated Cases by Age



2.2.2 Rubella Surveillance

- The same investigation form that is used for measles is utilized for rubella surveillance.
- In 2017, 10 rubella cases were lab confirmed. Including two pregnant women, the first was diagnosed in Dar'a countryside in the 20th gestational week and was followed up throughout the pregnancy until after the birth of the fully pregnancy medical reports indicate that natural born without the appearance of any effects of congenital Rubella Syndrome (CRS) defects, we continue the follow-up to monitor subsequent complications. The second case was recorded in the northern Idleb countryside in Atmeh sub-district, the pregnant women was diagnosed in the first trimester of pregnancy and still pregnant, so we have followed her health and her fetus.

Figure 16*:* Distribution of confirmed cases of Rubella- Governorates Level



2.2.3 Tuberculosis Surveillance

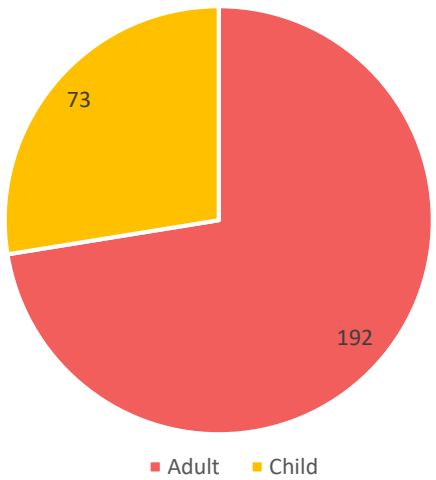
- 1011 suspected tuberculosis cases have been reported in the various provinces covered by the program in 2017. Laboratory and radiological confirmation for 26 cases in the rural Damascus and 72 cases in Afrin.
- A report about T.B cases from rural Damascus for 30 months (2015-2017) was prepared and included 265 patients, 118 patients stopped the treatment due to lack of medications, 17 relapse cases and two deaths were reported. The children constitute 28% of the reported cases.
- Another report on the TB patients through 2015 to 2017 in Afrin, in the northern countryside of Aleppo, where the number of patients was 308 patients, 243 patients were cured, and 23 patients stopped the treatment ,20 patients died, and the rest are continuing in treatment.
- Many TB patients in the areas covered by EWARN are suffering from a shortage in the amount of appropriate medicines for treatment and lack of X-RAY and laboratory supplies.

Table 13: TB outcome for treatment duration 30 months

Case	Number	Ratio
Stop treatment (lack of medication)	118	44.5%
Relapsed	17	6.4%
Completed	86	32.4%
Still on treatment	44	16.6%

Children consist 28% of tuberculosis cases. There are two age groups, the first one is younger than 15 years (child) and the second one is equal or bigger than 15 years(adult).

Figure 17: T.B cases Age groups



The pulmonary TB consists **19.6%** and Extra- thoracic lymph nodes TB consists of **45%** of all cases.

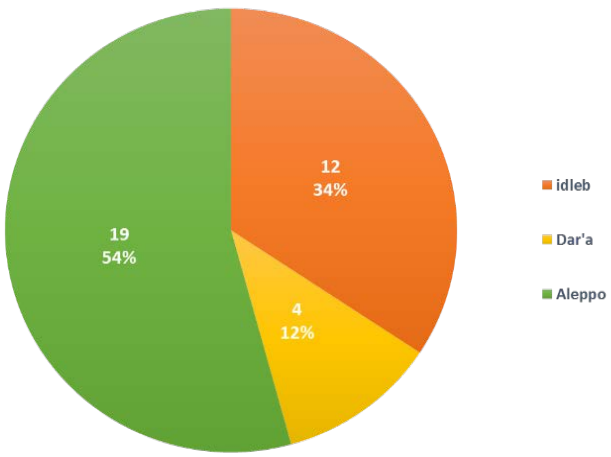
Table 14: Distribution TB cases according to lesion location

PLACE	NUMBER	RATIO
Pulmonary	52	19.6%
Extra- thoracic lymph node	119	45%
Intra- thoracic lymph node	2	0.7%
Pleura	2	0.7%
Gastrointestinal	81	30.5%
Bone-spinal column	1	0.37%
Bone-lower limb	1	0.37%
CNS – meningitis	3	1%
Genitourinary	3	1%
Laryngeal	1	0.37%

2.2.4 The rest of vaccine preventable diseases

2320 suspected mumps cases were reported, out of which 1022, 396 suspected mumps cases were reported from Aleppo and Deir-Ez-Zor respectively. 37 cases were confirmed in laboratory until the epidemiological Week 46.

Figure 18: Distribution of confirmed cases of Mumps (+ Mumps IgM) - Governorates Level



2.2.5 Vaccine Preventable Diseases Mortality in 2017

1. Three cases of death were registered after measles infection:
    - 8-year-old girl in the countryside of Damascus in February 2017 died because of measles encephalitis.
    - 1.5-year-old baby girl died in A'zaz in the countryside north of Aleppo in July because of acute measles encephalitis.
    - 2-year-old child died in A'zaz in the countryside north of Aleppo in the July because of measles pneumonia.
2. Two cases of pertussis died in A'zaz district in the north of Aleppo.
3. Seven cases of tuberculosis died, two of them in Rural Damascus and five in Afrin.

2.2.6 Adverse Events Following Immunization (AEFI)

EWARN conducts the surveillance of adverse events following immunization (AEFI), the data is collected from 50 routine vaccination centers, in addition to the vaccination campaigns. The reporting mechanism is through communication between the center's supervisors and the adverse events doctors, whom in turn share a daily zero report with the DLOs. Then the same zero report is shared with the central level by the DLOs. The cleaned data is analyzed and processed by EWARN then discussed in the daily meeting with SIG.

Additionally, a report about the AEFI is disseminated after every campaign. A monthly report of AEFI is shared from the routine Immunization centers for mild and moderate events. As for the severe events and clusters, they are reported immediately.

EWARN followed up the AEFI for AIRI campaign the was conducted in March by MSF and the campaign that was conducted by SIG in May. No severe cases were reported in both of them.

The table below shows the results from the AIRI MCV campaign that was conducted in rural Aleppo

Table 15: Final results of AIRI MCV campaign - May 2017

Rural Aleppo	Age group					Gender		
	Less than 6 months	**6-23 months**	**24-59 months**	**More than 59**	**Unknown**	**Male**	**Female**	**Unknown**
No.	11	82	174	3	0	173	97	0

216 zero reports were received from the team support centers (TSC) with a timeliness of 94.7%, 270 cases of adverse events were reported, most of them were minor. 5 moderate cases were reported, and they needed only monitoring without hospital admission, the manifested as seizures with fever and classified as febrile seizures.

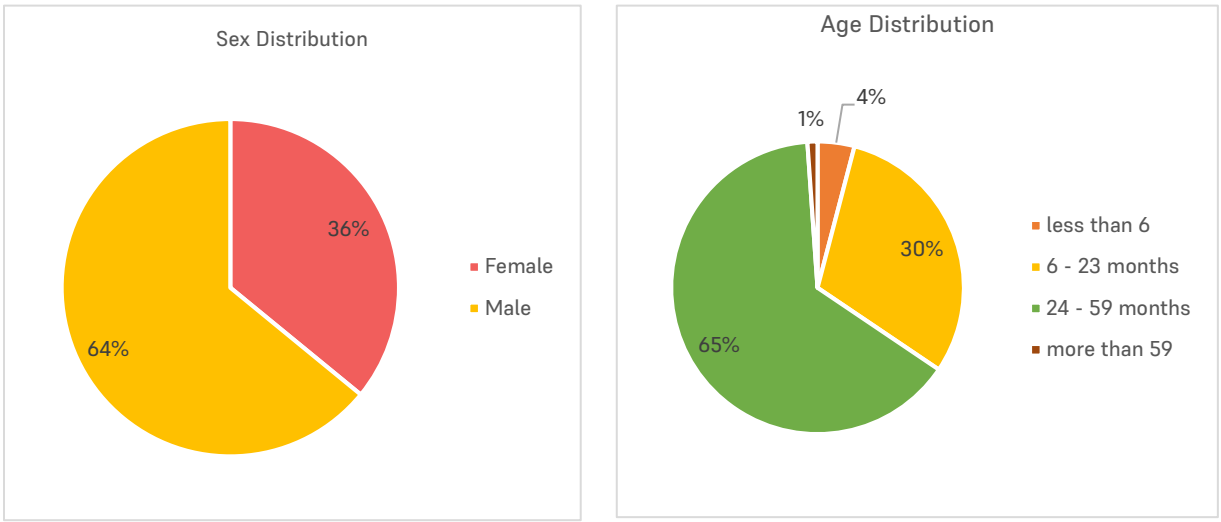
Table 16: The classification of MODIRATE AEFI cases

Moderate AEFI	Sever local reaction Lameness	Abscess	Septicemia	Septic shock	Anaphylactic shock	convulsions	Encephalopathy	Thrombocytopenia	Others	Total
Rural Aleppo	0	0	0	0	0	5	0	0	0	**5**

Table 17: The classification of MILD AEFI cases

Governorate	Difficult of walking	Local reaction	Skin Rash-Allergy	Fever	Measles following vaccine	Total
Rural Aleppo	20	94	3	146	2	265

Figure 19: Sex and Age groups of AEFI



2.2.7 Adverse Events Following Immunization in Routine Vaccine Centers:

- A monthly zero report is received from the routine vaccination centers, the total number of the reporting centers is 50 distributed in Idleb, norther and western rural Aleppo, northern and eastern rural Hama.
- No severe cases were reported, 3 moderate cases (allergic reaction after Penta) and the rest of the reported cases were minor.

Table 18: Zero monthly report of AEFI from routine vaccination

												Idleb	2
												Areha	3
												Areha	4
												UOSSOM	5
												Octobe	6
Death	Hospital addmision	Cured	Expiration date	Number of vaccine	Nationality of the company	Industry company	Name of vaccine	Date of last vaccine	Center of vaccine	Notifying center	Date of oncet	AEFI describe	Address	7
														8
														9
														10
														11
														12
														13
														14
														15
														16
														17
														18
														19

2.2.8 Challenges and Difficulties:

The program faces many difficulties, the most important is the deterioration of the security situation:

1. The hesitation of some doctors to send reports of vaccine preventable diseases.
2. Overload on the medical workers in Syria because of low numbers of health care providers.
3. The difficulty to receive reports from the eastern provinces because of restrictions on communication and Internet networks.
4. The difficulty of direct training face to face with DLO in distant areas such as the southern governorates, al-Hasakeh, Rural Damascus, Homs, where Skype is used instead.
5. Security concerns in some areas, make it difficult for the field staff to collect the needed specimens so they just collect the data.
6. Absence of lab confirmation in some besieged areas.

2.2.9 Plan of 2018:

1. Further enhancement of measles case-based surveillance activities.
2. Enhancing the surveillance indicators to meet the global standards.
3. Continuing the cooperation with the SIG to achieve a clear strategy to respond to VPDs outbreaks and surveillance of AEFI at the level of routine vaccination centers.
4. Increase the capacity of medical cadres by conducting more training
5. Introduction of modern electronic technologies and strengthening electronic surveillance especially on Tableau program and Epi info.

2.3 Water Borne Diseases (WBDs)

Since the launch of EWARN in 2013, three water borne diseases were included in the list (AJS – ABD and AWD) as they are diseases with high morbidity diseases and have epidemic potential. This group of diseases strongly reflects the quality of WASH services provided.

1. In April 2015, Acute Diarrhea was added to the surveillance list as an important indicator of the high-risk areas for possible cholera outbreak.
2. In March 2017, the Health Cluster (Turkey Hub) called again for revitalization of the task force under the name of Cholera Task Force. The EWARN team is involved providing the following to the group:
    - Needs assessment: Identify gaps, needs and capacities (coordination and technical) using appropriate tools for gap/need analysis.
    - Resource mapping including logistics, supplies, and human resources.
    - Risk assessment related to cholera prevention, preparedness and response.
    - Provide technical support to cluster partners to build response capacity during outbreaks.
3. Currently, WBDs surveillance has a strong and high-level coordination with: Lab team, WASH team and health workers in order to monitor the trends and evaluate the implemented activities.
4. The main priority in this part of disease surveillance is to focus on: the rapid detection of suspected cholera cases, the early investigation of suspect cases, to get the proper sampling and to hold the sufficient education and awareness about the disease and case management.

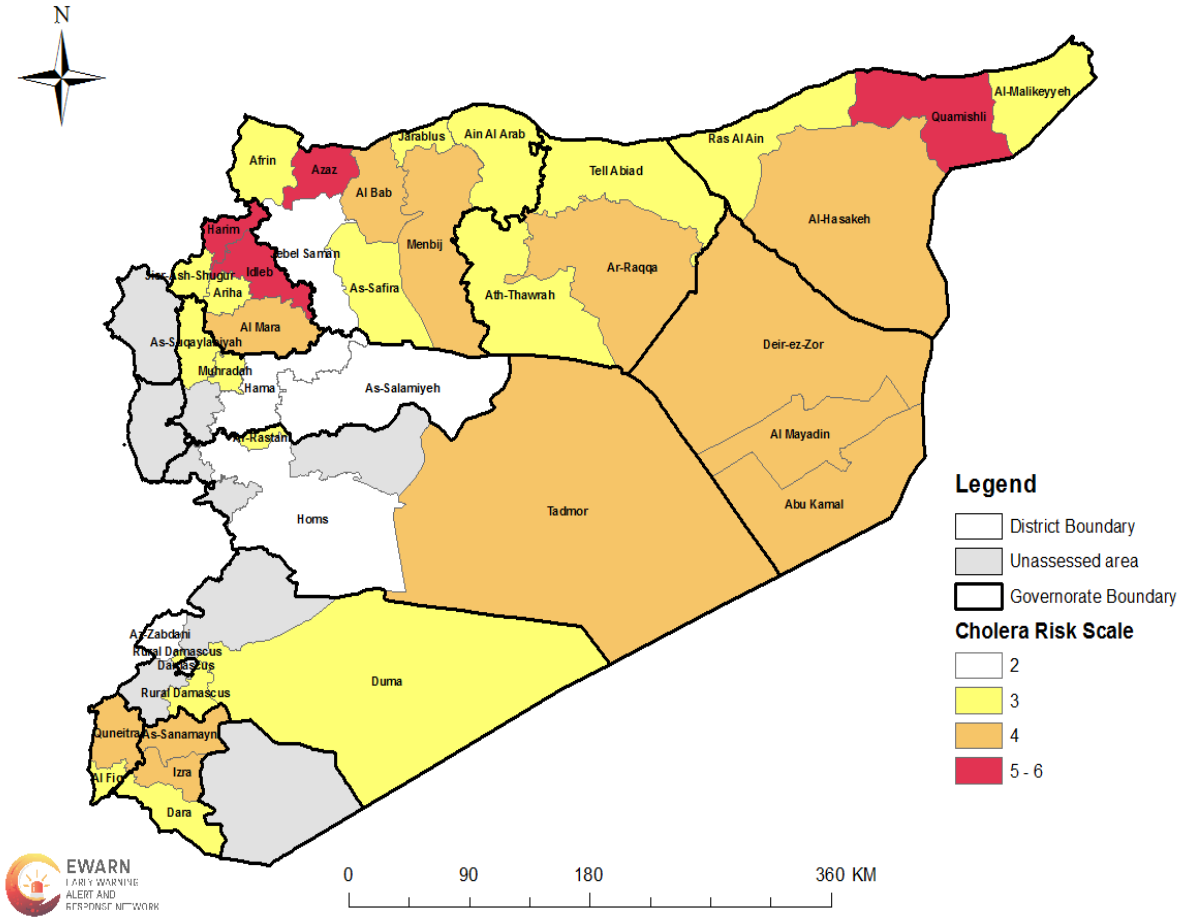
2.3.1 Related Activities:

1. Verified and investigated more than 22 WBDs alerts in 7 governorates (Aleppo, Idleb, Ar Raqqa, Deir-Ez-Zor, Al Hasakeh, Homs and Rural Damascus), with the adequate sampling (stool or blood culture, serum), testing of water sources and disseminating IEC materials. The details of the response actions are mentioned in the logistic and response activities.

Figure 20: IEC materials dissemination during the investigation of suspected cholera case _ Quneitra

2. Secured and provided the needed logistic for suspected cholera cases investigation (RDTs) and sampling media (Carry Blair) to DLOs in all the areas except Homs and Rural Damascus (besieged).
3. Received and shipped 9 IDDKs to preposition them in the main warehouses in A'zaz, Idleb and Dar`a so they are available if the need arises. Those IDDKs are provided from WHO.
4. Actively participated in Cholera Task Force meetings, to presenting diarrheal diseases updates and trends cooperating with the partners to finalize the cholera preparedness plan.
5. Generated the Cholera risk map in northern Syria on weekly basis, and share it with both Health and WASH clusters, in addition to cholera task force.

Map 7: Cholera Risk Maps for the diarrheal disease season_2017



6. Detected 18 suspected cases of cholera up to during 2017, RDTs were used for 7 cases and stool culture for 7as well, all the results were negative.

Figure 21: Stool culture results for suspected cholera cases in Dar`a_2018

Figure 22: Negative RDT for one suspected Cholera case with stool culture specimens

7. Participation in the training of: control of cholera and other epidemic prone diarrheal diseases in humanitarian emergencies facilitated by WHO and CDC in Gaziantep 23rd to 26th October including one-day stimulation training. 15 members from EWARN participated in the training (8 from the field).

Figure 23,24: Cholera training facilitated by WHO and CDC_2017

2.3.2 Challenges:

1. Control procedures need a strong coordination between all partners and sectors, which is very challenging and high cost implications.
2. Inability to have full and strong preparedness plan for Cholera outbreak in besieged areas because of security (difficulty of provision of IDDKs and sampling tools). However, there is proper early detection of suspected cases due to good understanding of case definition of suspect cholera suspected cholera.

2.3.3 2018 Plan:

1. In-depth analysis for the water borne diseases data to have better interpretation, thus feasible decisions and interventions.
2. Replace the equipment set to expire in 2018 – for both IDDKs and RDTs – with a new valid set.
3. Conduct refresher-training concerning cholera preparedness for the health workers, to prepare for any possible outbreak.

2.4 Nutrition Surveillance

2.4.1 Introduction

The importance of establishing a well-built nutrition surveillance system came from the need for comprehensive system of data collection and analysis, the importance of clear defining of the malnutrition prevalence and detecting any undiscovered pockets.

According to the accessibility, availability of integration with both health (diarrheal diseases) and WASH, in addition to the experience of ACU in surveillance, ACU team start working on the needed preparations through defining the areas of gaps, thus planning to implement the NSS there.

The main goal of this system is to monitor the trends and to identify key areas for immediate response

The nutrition surveillance system objectives are:

1. Assess acute malnutrition both Moderate and severe malnutrition in children between 0-59 months old and PLWs.
2. Reducing the under-five mortality rate due to acute malnutrition.
3. Follow up the detected cases after 2 weeks of the referral, to evaluate the feasibility, accessibility and adequacy of the provided case management.

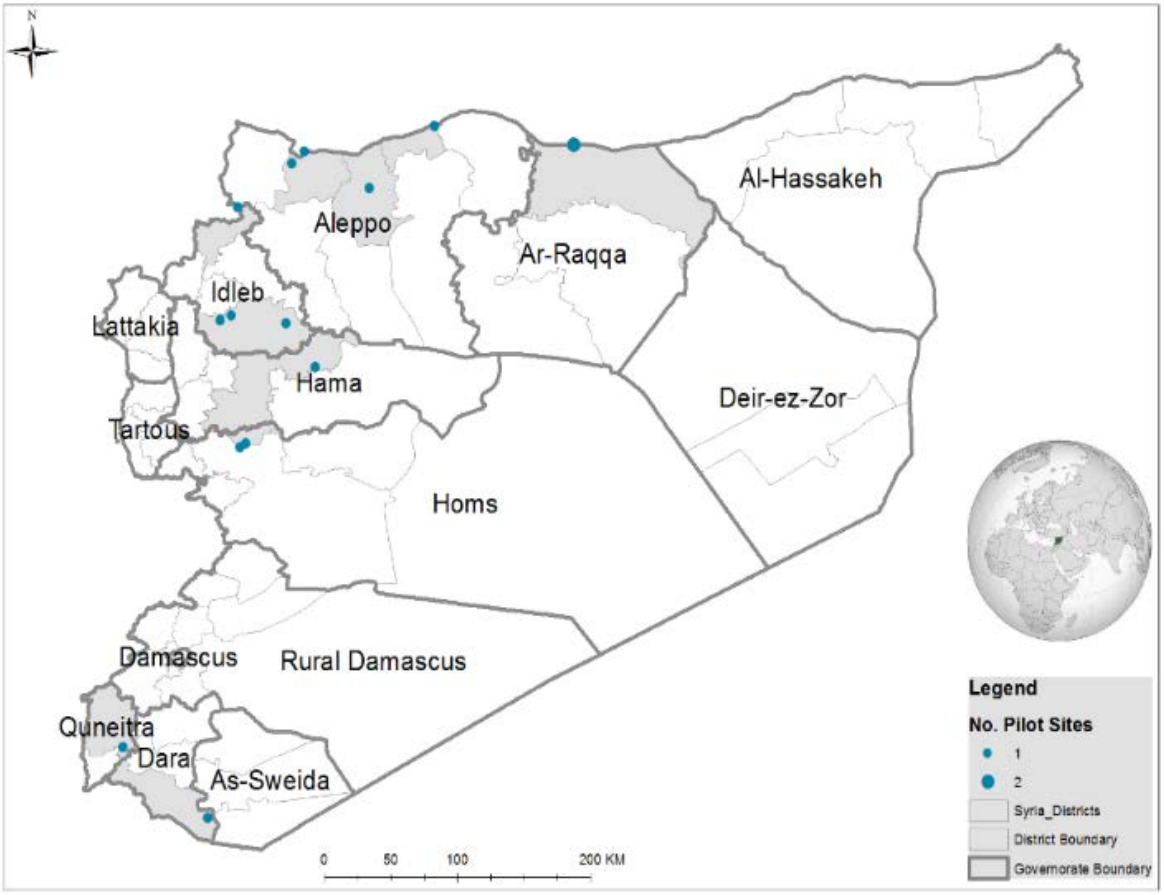
2.4.2 Implementation

The NSS was launched on June 2017 as a part of early warning network.

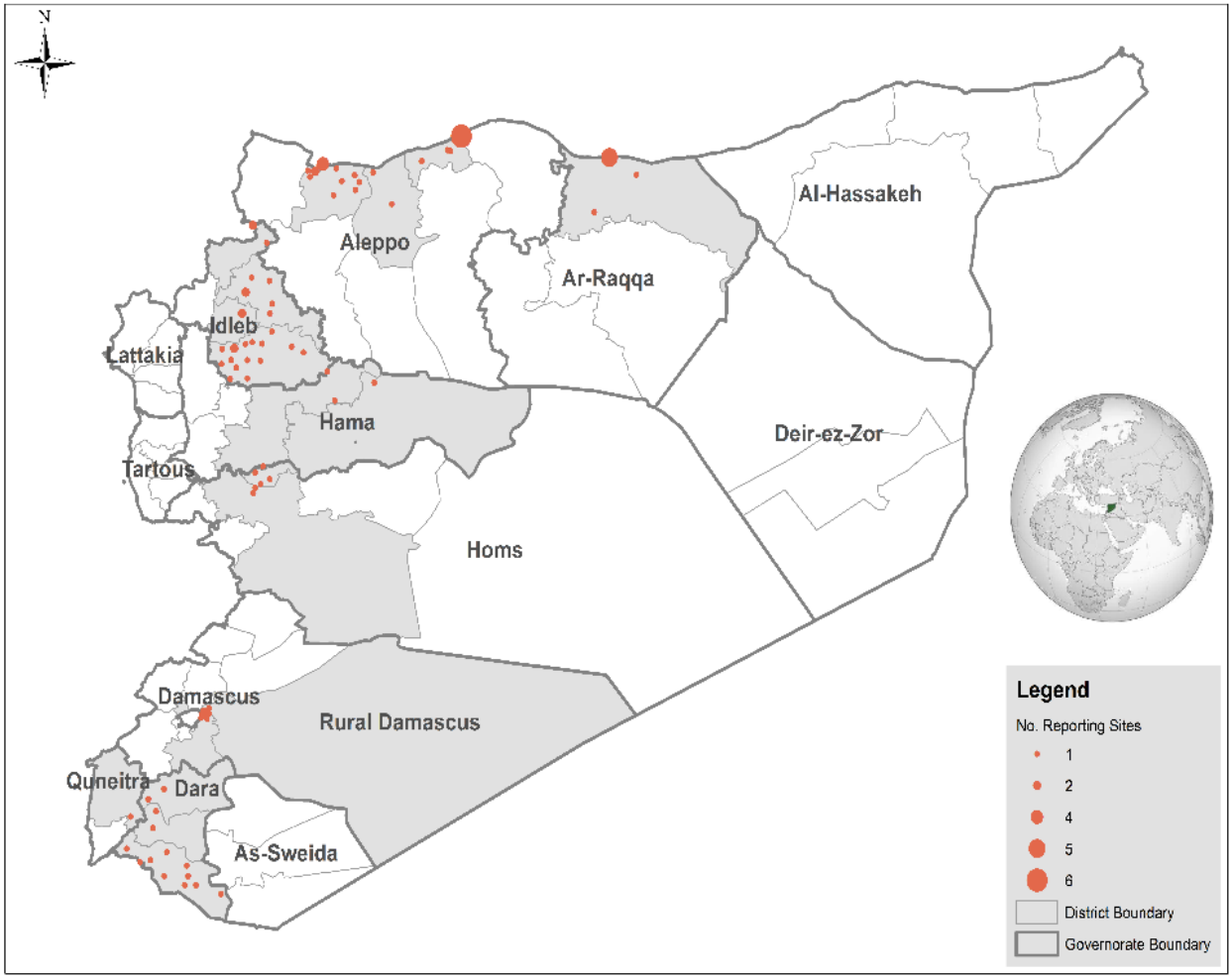
The implementation was done through the following phases:

1. **Pilot phase:** 14 health facilities in 7 governorates and will last only for 2 weeks.
2. **Routine Phase I :** Facility based screening of children between 6 – 59 months 5 years of age visited 107 health facilities on monthly basis using MUAC and edema.
3. **Routine Phase II:** In this phase both weight and height will be included as additional indicators with the continuances of facility-based data collection.

Map 8: Pilot Phase HFs



Map 9: NSS coverage _Dec 2017



2.4.3 Training the team of Nutrition Surveillance System

Table 19: Training the team of Nutrition Surveillance System

Trainer	Trainees	Trainees No.	Place	Date	Topics
Central technical team	DNOs	9	Gaziantep office & Skype	19th to 21st June	Surveillance overview MUAC measurement and Edema detection Standardization test
DNOs	FNOs	14	Aleppo – Idleb – Hama- Ar Raqqa- Dar'a - Quneitra	19th to 24th June	
DNOs	FNOs	25		July	
DNOs	FNOs	44		July	
DNOs	FNOs	11	Rural Damascus	December	
Central technical team	DNOs	9	Gaziantep office & Skype	December	Surveillance overview Z-Score Indicator& weight and height Standardization test
DNOs	FNOs	29	Aleppo – Idleb – Hama- Ar Raqqa- Dar'a - Quneitra	December	

Figure 25: FNOs training in Aleppo and Idleb

2.4.4 The results of 2017

The reporting HFS reached up to 107 health facility during 2017.

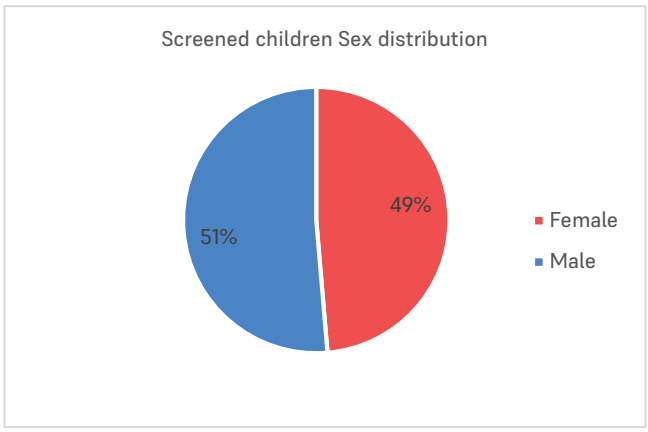
The results up to the end of 2017:

More than **227,138** children were screened, **8,554** of them were detected as malnourished (children under 5 years GAM was 4%).

The sex distribution for the screened children was: 51% male and 49% female.

The age distribution for the screened children was: 55% < 2 years and 45% ≥2 years.

Figure 26: Screened children Sex - Age distribution



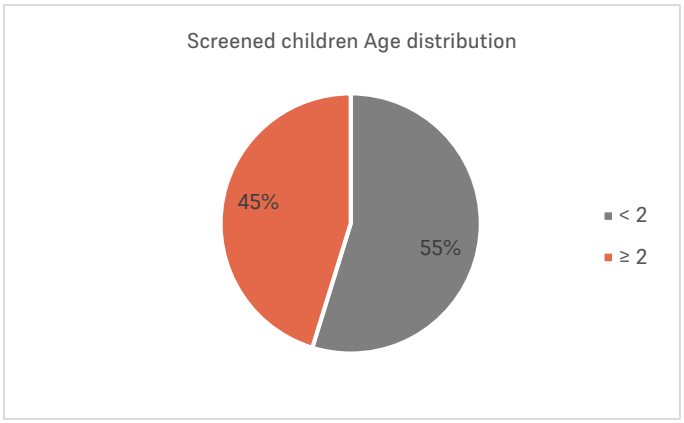
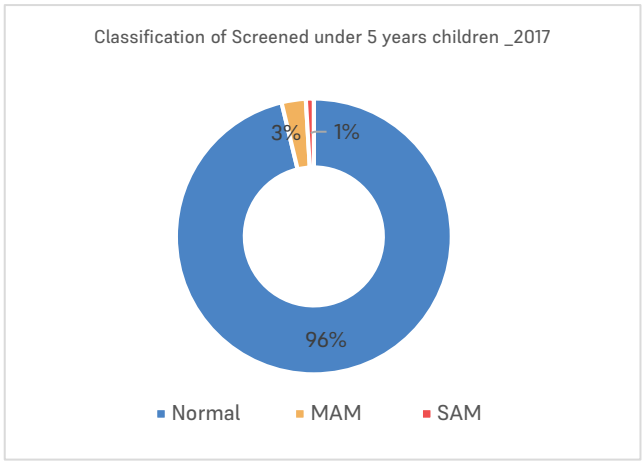


Figure 27: Classification of Screened under 5 years children / per month vs reporting HFs 2017



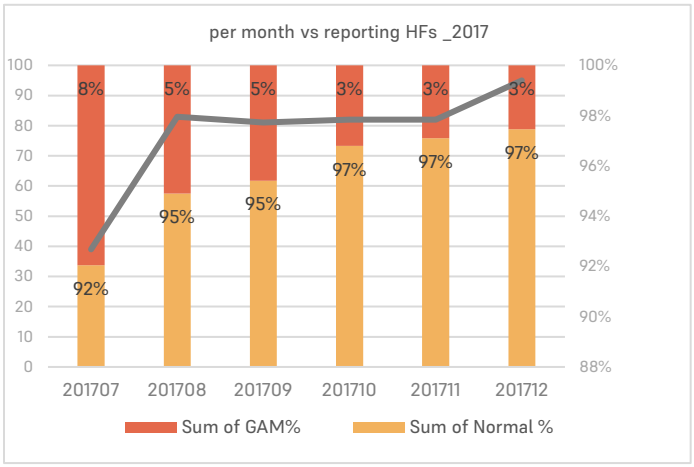
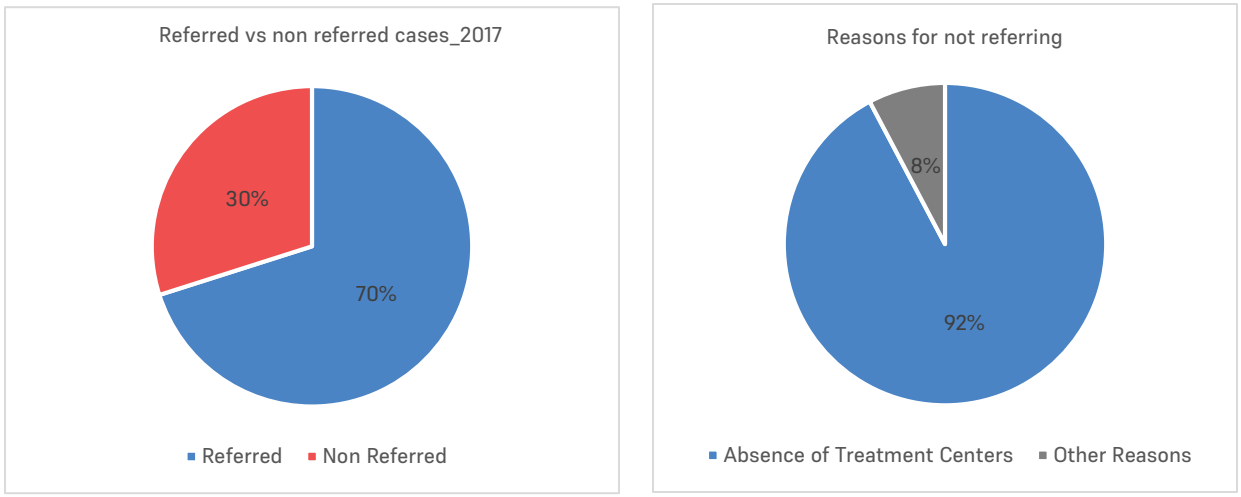


Table 20: Classification of Screened under 5 years children 2017

Month	HFs No.	Measured children	Normal	MAM	SAM
201707	39	9,528	8,770	575	183
201708	83	40,123	38,078	1,542	503
201709	81	37,021	35,322	1,263	436
201710	82	47,261	45,744	1,102	415
201711	82	45,547	44,225	1,019	303
201712	95	47,658	46,445	946	267
Total		**227,138**	**218,584**	**6,447**	**2,107**

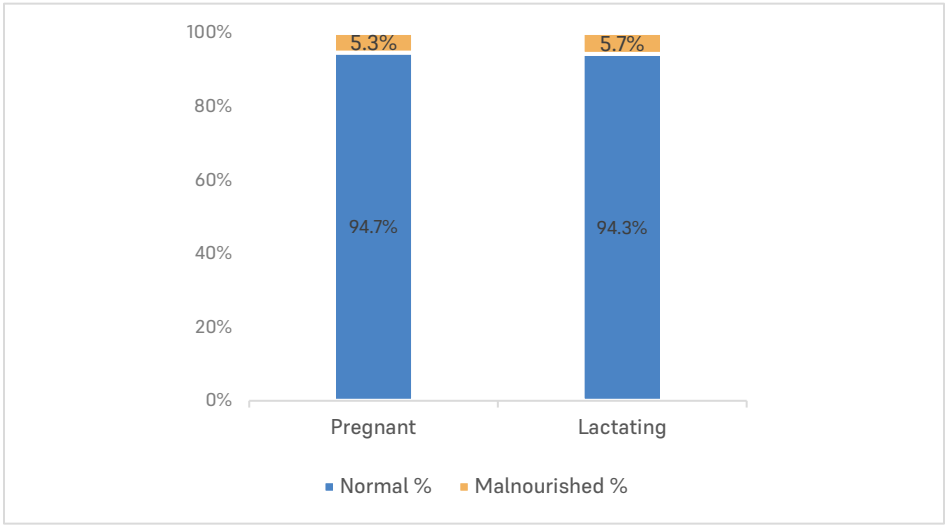
2,547 malnourished cases (30% from the total GAM cases) were not referred to the treatment centers, because of the absence of the management services 92% of the total referred cases (in some areas there are no CMAM services, specially Tell Abiad- Ar Raqqa governorate).

Figure 28: Referred vs non-referred cases/ Reasons for not referring 2017



More than 10,383 pregnant and lactating women were screened, 569 out of them were detected as malnourished (PLWs under 5 years MAM was 5.5%).

Figure 29: PLWs screening results _2017

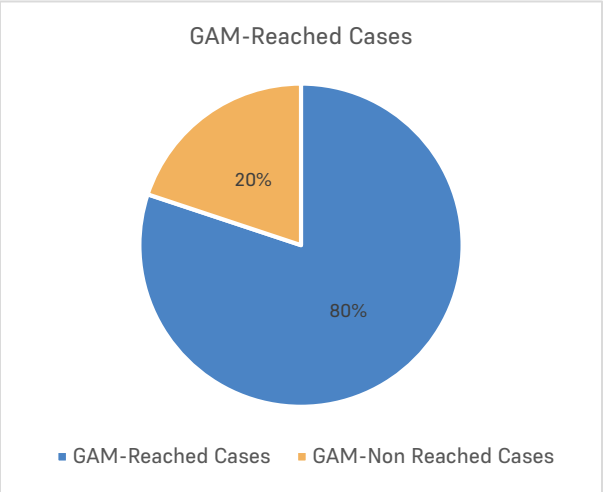


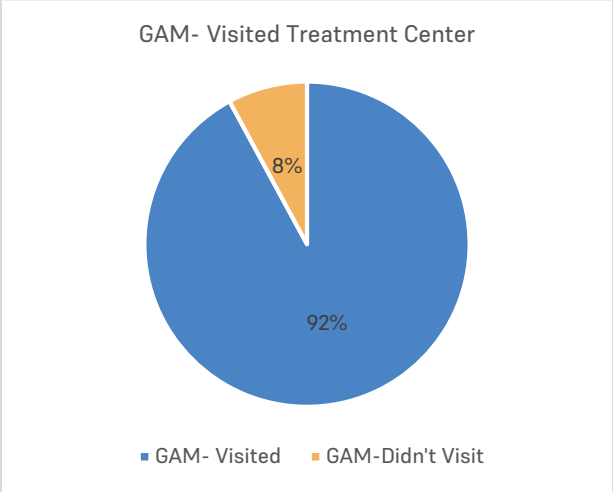
For follow up the detected cases after 15 days of detection, the field team could reach for 80% from the referred cases after 15 days, and it showed 92% from the reached cases were visited the treatment centers, whereas 8% of them didn't due to 2 major reasons:

Far distances to reach the treatment centers.

The misconception of the parents about the importance of the treatment.

Figure 30: GAM-Reached Cases / GAM- Visited Treatment Center





2.4.5 Challenges

- Parents' misconceptions about the purpose of measurement, such as taking food basket or other benefits.
- Sustainability of financial resources.
- Communication with team and detected cases
- Lack / far treatment Centers (e.g: Tall abiad)
- The non-availability of a proper place for FNO work and measurement in camps during winter.
- The agreement with some supporting NGOs for some facilities is complicated.

2.4.5 Plan of 2018

- Scale up the coverage to include Ar-Raqqa- eastern of Aleppo (Menbij)- and Deir ez zor
- Implementation 2 SMART survey in Tell Abiad and Euphrates shield area
- Distribution of preventive micronutrition for PLWs as a grant from Vitamin Angles organization
- Advocacy activities and campaign to enroll the partners HFs in the system.
- More engagement in the displacement response

Section 3: Response Updates in 2016

3.1 Vaccination Activities:

Immunization program in EWARN is a part of SIG (Syrian Immunization Group) co-chaired by WHO &UNICEF and supports it with technical staff at central and field levels.

This program has effective role in coordinating and implementing all vaccination activities (supplementary immunization activities (SIAs) and routine immunization (RI)) in all accessible areas of Syria.

3.1.1 Main Tasks

- Establish the central vaccination rooms in governorates and districts in coordination with local partners.
- Plan for all vaccination activities in coordination with SIG / WHO.
- Receive required vaccines & logistics in coordination with UNICEF and deliver them to central warehouses in governorates.
- Design and print IEC materials for social mobilization activities in coordination with UNICEF.
- Conduct TOT training for staff at central and peripheral levels according to WHO criteria.
- Monitor the implementation of activities and follow up outputs.
- Prepare and publish final reports.

3.1.2 Activities implemented

Participation with SIG in supervision on the following vaccination campaigns:

- Participate with SIG since the beginning of 2014 in planning, supervision and coordination on the following activities:
- Four rounds of polio campaign (OPV)
- One round of Accelerated Implementation of Routine Immunization (AIRI) with 3 antigens (OPV – MR – Penta) in cooperation with MSF organization.
- First round of Inactivated Polio Vaccine (IPV) targeted children (2 – 23 moth).
- Response campaign on measles outbreak in Shamarekh Camp (A'zaz district).
- Re-activating the Expanded Program Immunization (EPI).
- Conducting vaccine coverage survey (VCS).

Routine Immunization (RI) Centers

Fourteen routine vaccination centres were rehabilitated in northern Syria (12 centres in Idleb governorate and 2 centres in Aleppo governorate) according to micro plan in table:

Map 10: EPI Activities accessibility map

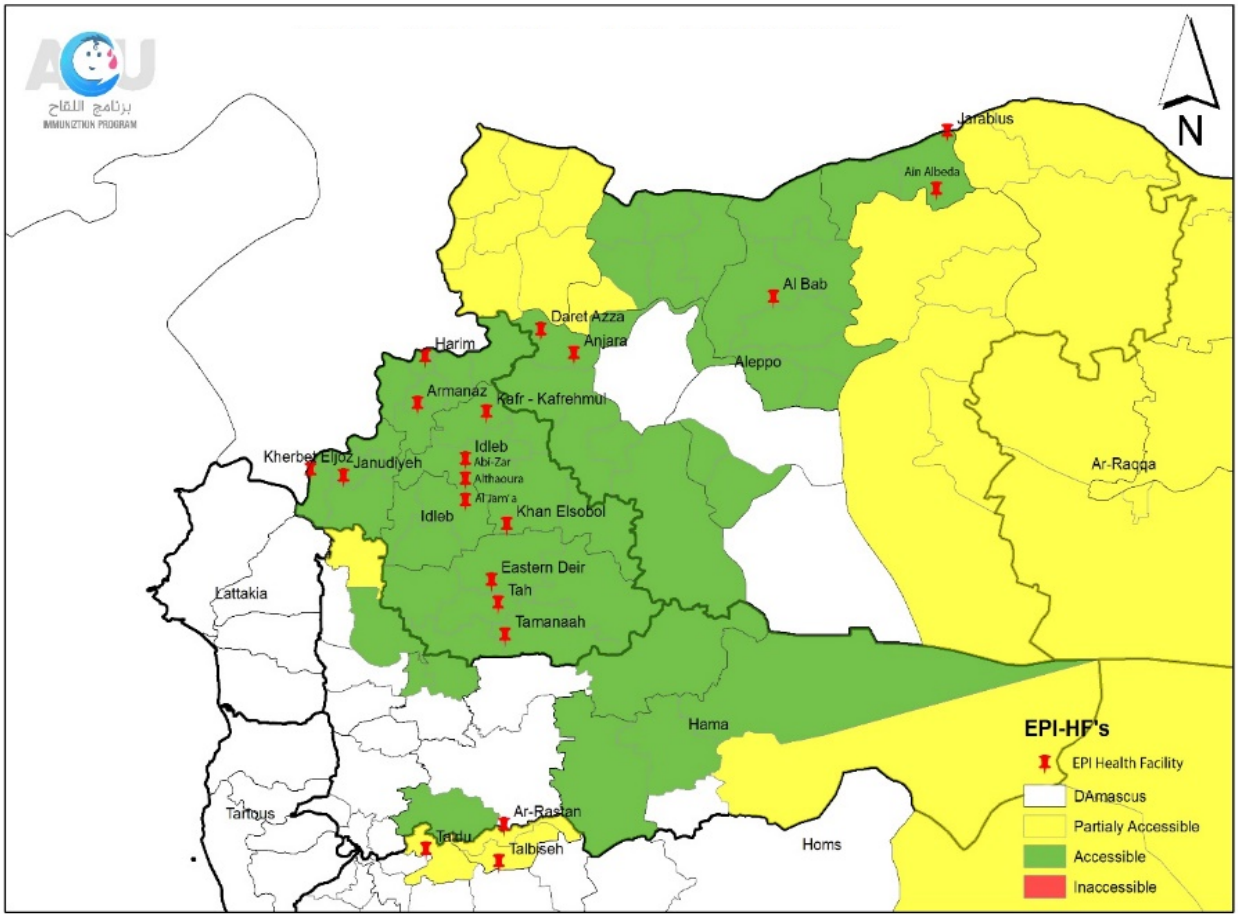


Table 21: RI Centers supported by EWARN

No	centers	No.Team	Gov	District	Sub District	No.Comm	Vaccinated Polio (U5Y)	Target 2017	Target / Month	No.Sessions/ Month *
1	Althaoura PHC	2	Idleb	Idleb	Idleb city	5	7,493	3,148	262	33
2	Abi-zar PHC	1	Idleb	Idleb	Idleb city	4	4,648	1,953	163	20
3	Aljam'a PHC	1	Idleb	Idleb	Idleb city	10	6,779	2,848	237	24
4	Kafar yahmool	2	Idleb	Idleb	Maaret msrin	12	6,899	2,898	241	30
5	Khan Alsebel	1	Idleb	Idleb	Saraqab	7	6,839	2,873	239	25
6	Alteh	1	Idleb	Al Ma'ra	Heish	9	3,105	1,305	109	14
7	Tamana'a	2	Idleb	Al Ma'ra	Tamanaa	43	7,201	3,025	252	32
8	Der Sharqe	2	Idleb	Al Ma'ra	Al Ma'ra	10	9,455	3,972	331	42
9	Harem	1	Idleb	Harim	Harim	17	6,198	2,604	217	24
10	Armanaz	1	Idleb	Harim	Armanaz	9	3,014	1,266	106	13
11	Al Janodia	1	Idleb	Jisr-Ahugur	Al Janodia	19	4,960	2,084	174	22
12	Zof	2	Lattakia	Jisr-Ashugur	Badama	44	8,359	3,511	293	37
13	Jarablus	2	Aleppo	Jarablus	Jarablus	25	8,900	3,738	312	50
14	Ain albeda	1	Aleppo	Jarablus	Ghandura	47	5,588	2,347	196	25
Total		20				261	89,438	37,572	3,131	391

EWARN team coordinates work, supervision, follow-up the achievements and publishes monthly technical reports.

Table 22: RI Activities in September/ 2017

Vaccine	U1Y	(1-2) Y	(0-2) Y	Coverage	Greater than 2 Y	Total Vaccinated
BCG	2017	-	2017	98%	-	2017
Hep (B)	832	-	832	40%	-	832
OPV1	1896	170	2066	100%	102	2168
OPV2	1406	366	1772	86%	148	1920
OPV3	959	709	1668	81%	280	1948
OPV4		465	465	23%	782	1247
Penta1	1892	171	2063	100%	101	2164
Penta2	1409	365	1774	86%	150	1924
Penta3	959	710	1669	81%	288	1957
Penta4	-	464	464	23%	785	1249
MMR1	-	1387	1387	67%	325	1712
MMR2	-	459	459	22%	706	1165

SIAs (Supplementary Immunization Activities)

Table 23: SIAs activities in 2017

Campaigns - 2017															
OPV										IPV		AIRI			
Governorate	District	Feb		Apr		Nov		Dec				Penta		MR	
		Target	Coverage	Target	Coverage	Target	Coverage	Target	Coverage	Target	Coverage	Target	Coverage	Target	Coverage
Homs	Northern Homs	30,500	110%	33,560	100%	33,700	108%	36,445	Ongoing						
Aleppo	Jarablus	15,000	130%	20,059	104%	20,605	133%		Ongoing	15,245	98%	16,430	92%	13,550	88%
Aleppo	Albab			38,620	107%	40,150	134%		Ongoing	5,717	112%	38,920	46%	32,100	46%

Map 11: Vaccination activities accessibility map - overall 2017

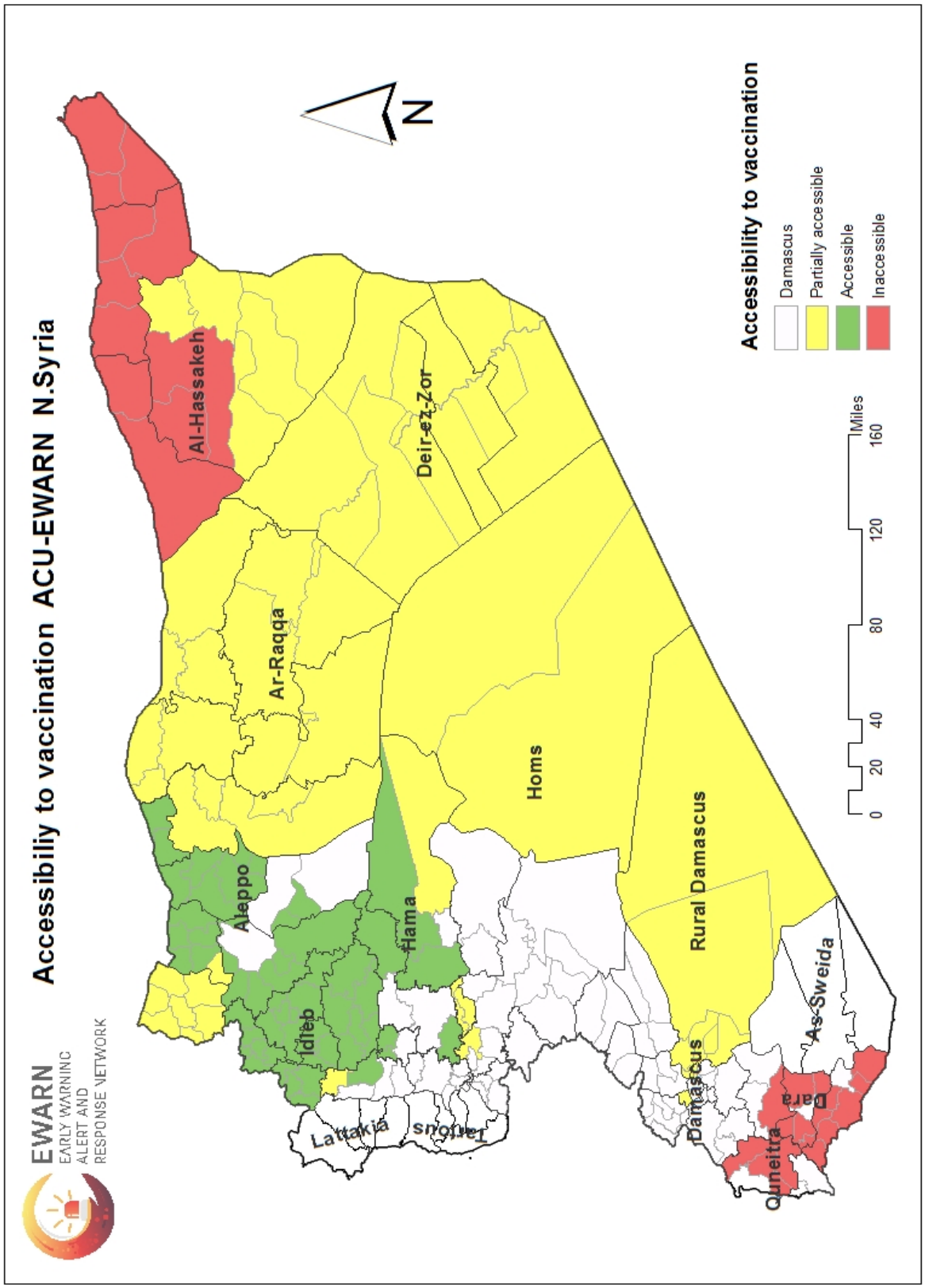
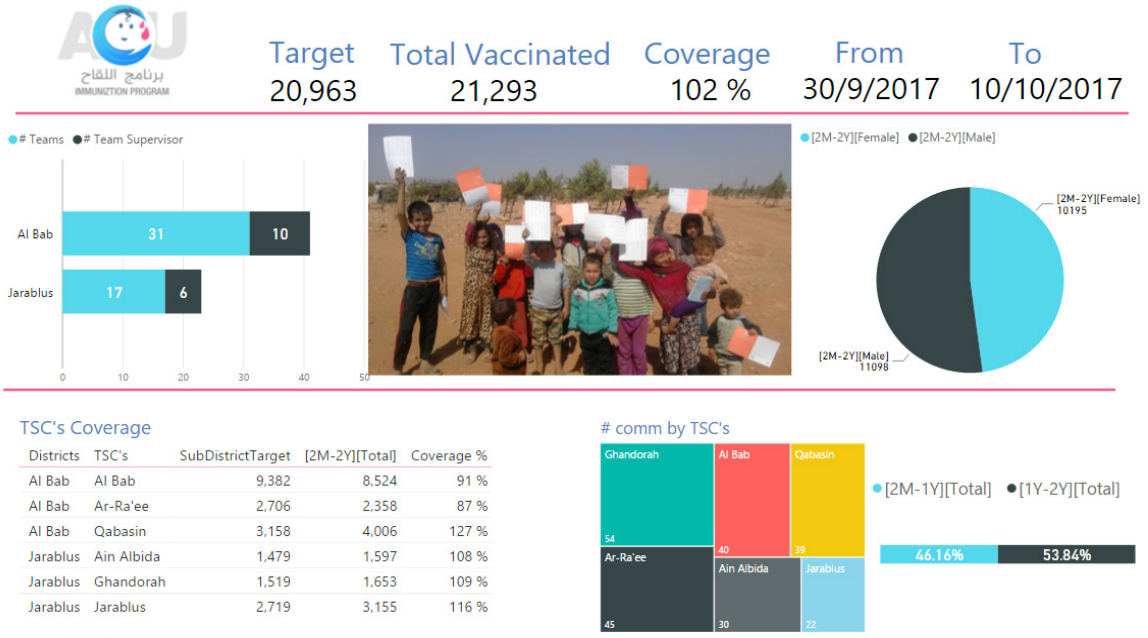


Figure 31: IPV Campaign report



Response Campaign

Based on the role of the surveillance program, the response team carried out two response campaigns:

- MR campaign after measles outbreak in Shamarakh camp in A'zaz district
- Multi- antigen campaign in Alzogra camp in Jarablus district to vaccinated IDPs from Homs with (OPV – MR-Penta) vaccines

- Polio outbreak response

Immediately after reporting of first case of PV2 in 6/5/2017; establishment of EOC was done

EOC comprises of the main partners concerned for immunization mainly SIG, WHO, UNICEF, ACU/EWARN and QRC

EWARN team Participates in:

The development of cVDPV2 outbreak response plan with mOPV in Deir Al-Zour and Raqqa governorates.

The development contingency plan for Idleb, Aleppo and Hama because of elevated risk of continued polio transmission due to the low herd immunity level and large displacement towards the Governorate from Deir Ez-zor and Raqqa governorate.

Table 24: Response Campaigns

Governorate	Aleppo				
District	A'zaz		Jarablus		
Community	Shmarekh Camp		Zoghra Camp		
Vaccine used	MR	Vit A	OPV	Penta	MMR
Vaccinated children	5,365	1,413	890	54	54

Vaccination Coverage Survey (VCS)

Vaccination coverage surveys are useful in providing the opportunity for health workers to understand where they are standing and enables health planners to develop necessary plans for establishing a routine immunization program in all governorates and implements supplementary immunization activities (SIAs) to build up satisfactory and protective .immune response

The most important reason for an immunization survey is to provide information on the delivery and impact of current particularly in areas accessible and served by EWARN which covers more than 50% of total immunization services population of Syria.

The survey was carried out by EWARN team in partnership with (QRC) Qatar Red Crescent team and according to WHO protocols in all accessible areas as follow:

Table 25*:* Vaccination Survey collection levels

#Governorate	#District	#Sub-District	#Cluster	#Core team	Gov. Coordinator	Dis. Coordinator	No. interviewer
9	38	110	271	9	10	38	284

The data were collected at the central level. Now they are under analysis.

Supervision and training

EWARN team has effectively contributed to vaccination activities (SIAs, RI) through staff trainings:
Trainings conducted at central and peripheral level.

- TOT master training in Gaziantep targeting members of the governorate rooms including disease and AEFI surveillance and reporting mechanism to central level.
- TOT inside Syria, the training targeted members of district, TSCs rooms and field staff were held by EWARN DLOs on:
    - AEFI surveillance during campaigns
    - Design special AEFI forms: zero reporting, investigation form
    - Communicate with AFEI doctors, TSCs supervisor and monitor the AEFI surveillance system
- Service Providers training for teams and supervisors to be conducted by TSCs supervisor in the week before campaign.
- Attend daily meetings with SIG, WHO and QRC to discuss campaign results and team performance.
- EWARN team participated in routine immunization RI training at central and service provider's level and in all aspects technical, logistics, social mobilization and AEFI surveillance.

Communication for Development (C4D)

Before the start of each campaign, several activities of social mobilization are carried out in order to inform the people about the campaign and to raise community awareness on importance of vaccination for children.

Many activities were planned to promote vaccination campaigns via advocacy meetings, lectures, school activities and distribution IEC materials with key messages.

Figure 32: Social Mobilization Activities

3.1.3 Challenges

- Continuing displacement movements from conflict zones.
- The security situation: due to aerial bombardment and clashes, which led to the suspension of some vaccination activities and departure of number of the qualified vaccinators.
- Logistics aspect: inability to deliver vaccines into Eastern Region as well as the inability of EWARN Central Team to pass through the Syrian-Turkish borders to Syria for training and monitoring.

3.1.4 Plans 2018

- Four OPV campaigns in Aleppo including Albab & Jarablus - Idleb - Hama and northern rural Homs. In order to improve immunity levels in the community.
- Conduct measles campaign (catch up & follow up campaigns) OR regular anti-measles campaigns in 1st quarter 2018 to combat measles outbreaks and eliminate rubella congenital syndrome
- Establish extra-number of vaccination centres (6 in Aleppo and Northern Rural Homs)
- Conduct training for teams and supervisors in the 1st quarter of 2018 (Basic) and in 3rd quarter 2018 (refresh).
- Develop comprehensive C4D plan to improve social mobilization activities for RI and campaigns.

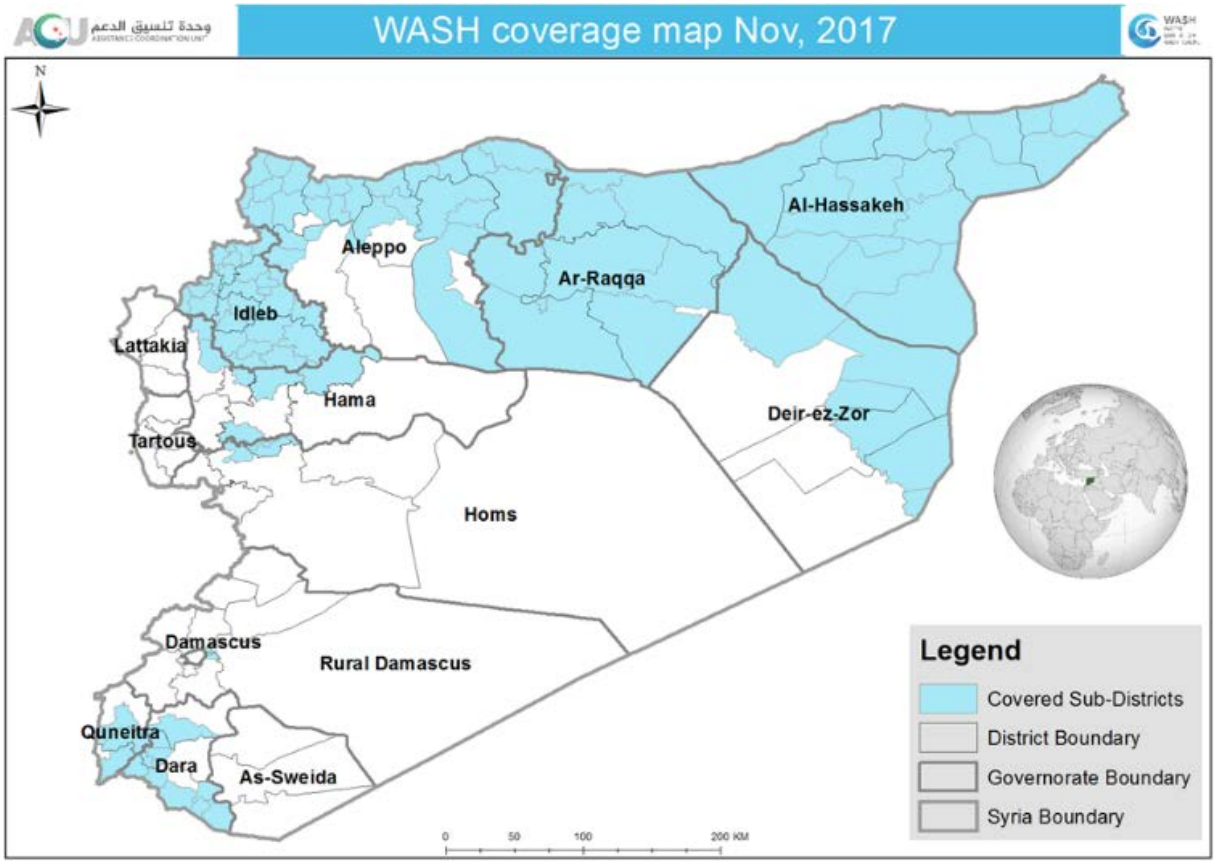
3.2 WASH (Water, Sanitation and Hygiene)

3.2.1 Introduction

The WASH team was established in June 2013. The program focused on the training of staff working inside Syria within the sector of drinking water quality. Training courses were conducted on how to do chemical and biological analyses of water using portable analysis devices inside of Syria.

The team has 27 staff members, 3 at the central level and 24 at the field level, covering 10 governorates in line with the expansion of EWARN and has a clear and strategic work plan coordinated with other network programs.

Map 12: WASH activities accessibility



3.2.2 General activities of WASH Program:

1. **Water quality monitoring.**
2. **Participation in water-borne disease response missions.**
3. **Training and capacity-building**
4. **Coordination with organizations working in the field of WASH**
5. **Implementation of activities in WASH sector**

1. Water quality monitoring

This activity will ensure the implementation of the water safety plan (WSP) adopted by the World Health Organization (WHO) and the International Water Association (IWA) and it be at three levels:

- Monitoring of drinking water sources:

WASH staff monitor the functionality of the water stations that feed the communities with potable water. If the stations stop, WASH officer warns about the alternative sources used (tanks, agricultural wells ...), Then these sources are tested through mobile laboratory (Total coliforms – e-coli) to investigate of sewage pollution.

The number of stations monitored during the year 2017 was 1300 water stations perm month in 10 provinces, and WASH program issue semi-monthly bulletin on a regular basis.

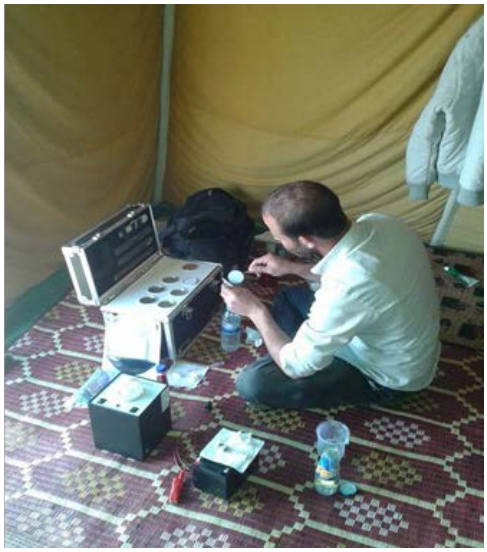
The program participated in the survey of water stations in collaboration with UNICEF during the months of August-September 2017.

WASH staff are doing laboratory analyses of the new water resources that local organizations and local councils are using in supplying of drinking water, water quality reports for each water source are done.

The activities of 2017 were:

- Investigation of the quality of water in the area of Aazaz - Alsalama hospital -MSF
- Investigation of the quality of water in the town of Ghandoura - Jarabuls District - Aleppo province
- Evaluation of water quality - Well of the Elderly House - Al-Saen village – Talbisseh district - Homs province

Figure 33: Portable Lab field activity



- Monitoring the sterilization of drinking water:

The free residuals chlorine (FRC) test is carried out to evaluate the effectiveness of the sterilization process at the three levels (water source, transporter, container) means (station - household and network) to reduce the spread of waterborne diseases

During the year 2017, the water plants in Aleppo, Idlib and Hama governorates were supplied with calcium hypochlorite. The houses and camps in the governorates of Aleppo, Idlib, Raqqa and Alhasaka were supplied with tablets.

- Monitoring of water transporter to homes:

Determination of the method of delivery of water (regular network - tanks), the transport using tankers is more susceptible to bacterial contamination than transport using regular networks.

Through the testing of samples of drinking water in the network and houses, the mixing of wastewater with drinking water was discovered in:

- Ram El Hamdan Village, Idlib province.
- Souran city - Azzaz district - Aleppo province.

and local councils were directed to replace the damaged part of the sewage network and the local councils were provided with a quantity of calcium hypochlorite to sterilize drinking water after the doing maintenance.

Figure 34: Portable Laboratories

2. Participation in water-borne disease response missions:

WASH staff participate in water pollution investigation and response tasks. During this year:

- Participate in the task of responding to an awareness campaign on AJS- Tafas health center - Daraa
- Participate in the investigation of the alert of AJS in the camp of the message in Aazaz.
- Participate in the investigation of the alert of STF in the village of Al-Ghunamiya - Al-Darbasiyya district- Al-Hasakeh governorate and carrying out a response campaign in the village.
- Participate in the investigation of the alert of AJS Daoudiyah – Ras Alaein district - Al-Hasaka governorate.
- Participate in the task of investigating the alert of STF in the city of Harim- Idleb governorate.
- Participate in the task of investigating the alert of diarrhea in the camp Akda – Azaz district - Aleppo governorate.
- Participate in the task of investigating the alert of diarrhea in the city of Souran- Azaz district- Aleppo governorate.
- Participate in the task of investigating the alert of STF in the village of Abyan-Atareb -Aleppo governorate
- Participate in the task of investigating the alert STF in the village of Hitt - Daraa governorate
- Participate in the task of investigating the alert of diarrhea in Ain Issa camp - Al-Raqqa governorate
- Participate in the task of investigating the alert of STF in Talbessa - Homs governorate
- Participating in the task of investigating the alert of diarrhea in Al-Qamishli - Al-Hassakeh governorate
- Participate in the task of investigating the alert of diarrhea in Nawa – Daraa governorate
- Participating in the investigation the alert of diarrhea in Jassem - Daraa governorate
- Participating in the investigation the alert of STF in Kafar Batna -Ghouta -Rural Damascus governorate.
- Participate in the task of investigating the alert of diarrhea in Al-Nour camp - Aleppo governorate.
- Participating in the investigation of cases of poisoning in Alhekma hospital - the city of Bab - Aleppo governorate
- Mission of response of AD cases - Joseph Village in Idleb governorate
- Mission of the response of AD cases - Al-Sahl village in Raqqa governorate
- Mission of response to the suspected cholera - Breqa village in Quneitra governorate
- Mission of response of AD cases- Azzouf camps in Idlib governorate
- Mission of response of AD - the village of Quneah in Idleb governorate
- Mission of response of AJS - the village of Tal-dahb in Homs governorate
- Investigation of the alert of suspected cholera in Zougara camp - Jarabuls - Aleppo governorate
- Investigation of the alert of AJS - Zougara camp - Jarabuls - Aleppo governorate
- Investigation of the alert of AJS - eastern rural Raqqa - Raqqa governorate
- Investigation of the alert of ABD - eastern rural Raqqa - Raqqa governorate
- Investigation of the alert of AD - Tabqa city - Raqqa governorate
- Investigation of the alert of AJS in Al-Jarnea - Al-Raqqa governorate

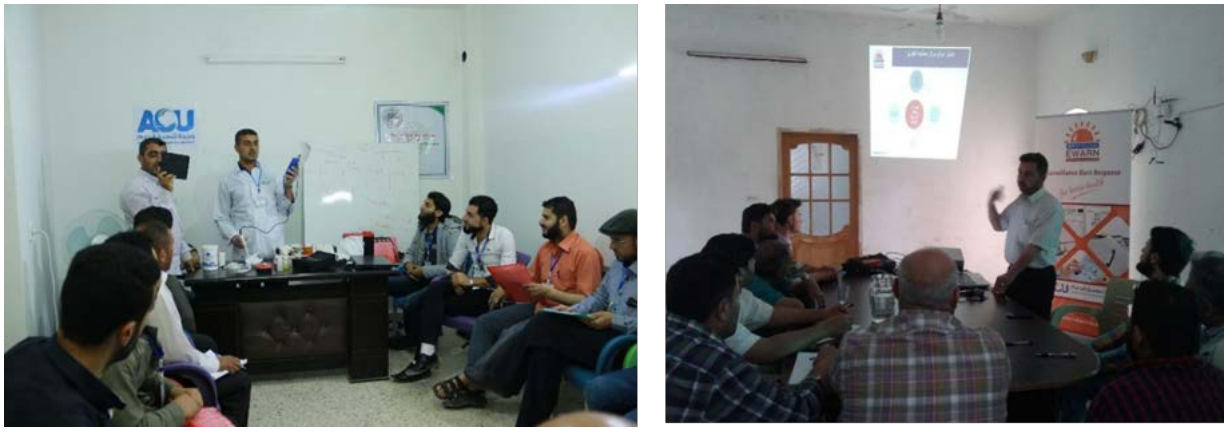
During the response missions, chlorine tablets are distributed in household to reduce the cases of water-borne diseases due to the random water sources used by people.

3. Training and capacity-building:

WASH Program is conducting training and raising the capacity of the public health workers. During 2017, many training courses were implemented.

- Implementing five trainings for NGOs working in the WASH sector.
- Implementation of twenty training of local councils on water quality control procedures
- Twelve training of staff at the field level is conducted at a rate of training per month
- Implementation of ten trainings for organizations on cholera treatment.
- Attending seven training sessions for staff at the central level

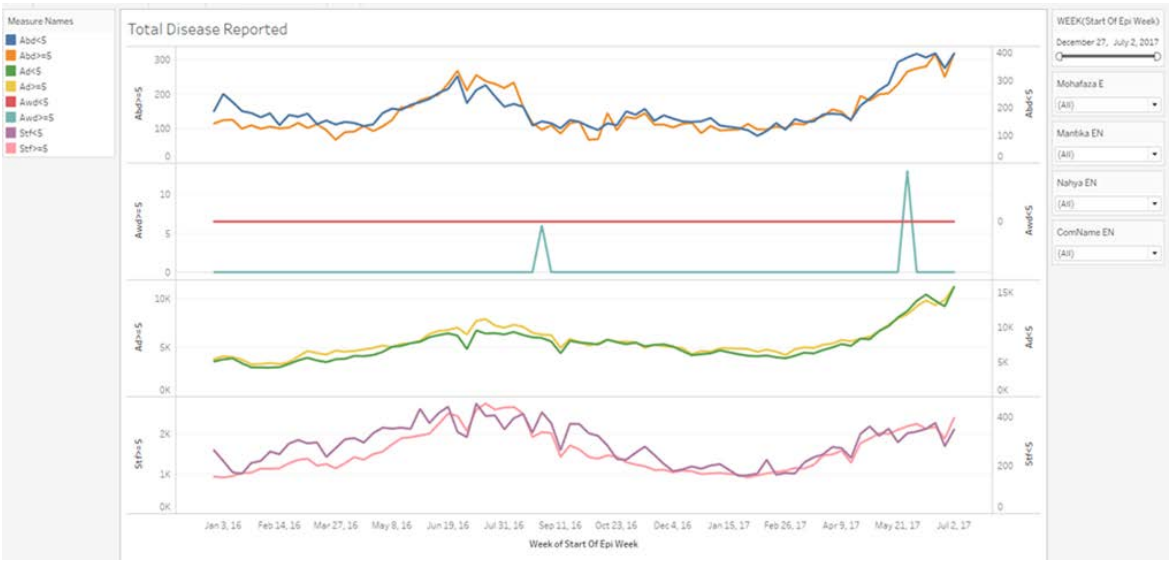
Figure 35: Field Staff Training



4. IV. Coordination with organizations working in WASH sector and sharing data:

In WASH-cluster meeting - held monthly - WASH team present the numbers and cases of waterborne diseases with their locations. Then the coordination with the organizations operating in these areas to increase water sterilization procedures, promote hygiene and distribute hygiene kits.

Figure 36: Utilizing Tableau for Data visualization



5. Implementation of activities in WASH sector

WASH Program implements some activities that support public health measures, such as hygiene campaigns, supporting the repair of some water stations, distribution of health awareness brochures.

During this year:

- Repair of Arshaf water station - Aazaz district - Aleppo governorate
- Implementation of a hygiene campaign in al-Baidar camp - Harim district - Idleb governorate
- Distribution of brochures in the camps of Azaz - Aleppo province

Figure 37: Filed Missions

3.2.3 Planning for 2018

Table 26: Staff distribution 2017 and Planned 2018

Place of work	Employees 2017	Planning 2018
Gaziantep	3	0
Aleppo	6	0
Idleb	4	0
Lattakia	1	0
Hama	1	0
Deir-ez-Zor	1	2
Ar-Raqqa	4	0
Dar'a & Quneitra	1	0
Homs	1	0
Eastern Ghota	1	0
Al-Hasakeh	4	0
Total	**27**	**2**

3.3 EWARN Surveillance Laboratory Network:

This network plays a crucial role in outbreak detection, investigation, confirmation and response.

It plays a role also in researches and surveys being conducted in the field.

Laboratory guidelines have been published and distributed to staff showing how to collect, store and transport samples.

Since EWARN has started in 2013, the progress achieved has been great and continue to improve over time. The basic simple functions of EWARN is regularly and efficiently practices and now the program is shifting towards stability. As the epidemiological laboratory is a corner stone in any surveillance program, the idea is to have a national laboratory system with reasonable diagnostic capacity, as well as improving the quality of surveillance by timely confirmation of any outbreak to allow rapid response and limiting its spread.

The first referral laboratory was established in western rural Aleppo- Al ATareb at the beginning of 2015 with a grant from the Italian government, in 2016, WHO provided equipment and material for three other laboratories, one in Idleb city and the other in Jarablus, and the third in Dar'a. The four laboratories are located in different parts of Syria to facilitate accessibility.

The four EWARN laboratories in Syria perform tests for outbreak-prone diseases and some labs are helping with blood transfusion, screening of health care workers, and hemodialysis patients screening tests.

The labs assist in certain clinical diagnoses of some diseases as per the request from clinicians. They work as a dispatching point for the rapid diagnostic tests for Cholera, Malaria, Typhoid fever and Visceral Leishmaniosis.

These labs are properly equipped and supplied and operated by a medical doctor specialized in laboratories and assisted by trained lab technician.

Through cooperation with field NGOs, EWARN referral labs receive samples (blood, serum, stool, ...) collected by the DLOs and dispatched to the lab by a trained logistician. After the samples are received by the lab, quality is ensured, and testing is started according to a set time frame so that the results are shared in a timely manner for the weekly

bulletin. The laboratory working hours are from 10:00-16-00, Saturday through Thursday. he labs work for the morning shift only and closed on Fridays.

All the tests with the investigation forms and lab requests are documented with the results in both hard and soft copies.

In case of a need for laboratory confirmation, the DLOs collect the samples from the reporting doctor and send it to the lab by a logistic officer who has the equipment and trained on sample transportation.

All samples are labelled and accompanied by case investigation sheet, which might be sent as paper or electronic copy.

days. When samples are received in the lab, 5Samples arrive in an average of the lab staff make sure the samples have been transported and delivered in proper condition. The samples may be stored to allow for accumulation of an appropriate number of samples to run tests.

All results are documented in the lab registration system and sent via E-mail or WhatsApp™ back to the requesting doctor who will send a copy of it to the DLO, FLO, or CLO.

There is a regular inventory of lab supplies, equipment and maintenance by the central lab coordinator and corrections are made.

Figure 38: PCR Training in Ankara

Table 27*:* Available and needed lab materials

ITEM#	ITEM Name	QUANTITY REQUES
1	Culture media kit for stool culture	Enough amount
2	Sensitivity Discs kit	Enough amount
3	Hot Air sterilizer	1
4	Autoclave	1
5	Co2 incubator	1
6	Laboratory incubator 37 degree	1
7	Refrigerator	1
8	Polymerase Chain Reaction (PCR) (jarablus lab)	*
9	Blood culture device (in Jarablus lab)	*
10	Deep freezer	1
11	Bacterial Bio-Safety cabinet	1
12	tube Centrifuge	2
13	Binocular Microscope	2
14	Water distillation device	1
15	Shaking water path with thermostat	1
16	Vortex mixer	1
17	Electronic balance	1
18	PH meter	1
19	Bunsen burner and its accessories (wire gauge triple stand, loop)	1
20	Hot plate	1
21	Measuring Cylinder kit	1
22	Gimsa, Gram,Tzeil'Nilson Stain	Enough amount

EWARN labs has the capacity to do lab confirmation for Acute jaundice syndrome, Measles, Mumps, Salmonella typhoid fever, Acute watery and bloody diarrheal diseases.

The total tests performed in these labs were about 13000.

As per EWARN data management unit, the Median time for samples to reach one of the EWARN lab from time of collection was 3 Days and the Mean was 5 Days. The results return time is 1-3 Days.

Idleb lab has the capacity to perfume PCR and blood culture, some the staff was trained to perform these tests in Ankara referral laboratory about Influenza surveillance by using PCR technique in July-2017.

Table 28*:* Conducted lab tests in 2017

Type of test	Total analysis	No: positive results	Percentage of positive samples %
Measles IgM	1094	703	64.2
Rubella IgM	391	11	2.8
Mumps IgM	121	43	35.5
HAV IgM	273	164	60
HEV IgM	109	3	2.7
HBS Ag	992	189	19
HCV Abs	824	208	25.2
HIV Abs	408	2	0.4
Salmonella IgM	119	56	47
Stool culture for salmonella	16	0	0
Stool culture for cholera	7	0	0
AFB, for tuberculosis	15	7	46.6
Total	4367	1367	31.3

The laboratory registers are electronic Excel registers for individual diseases. For example, analysis of Measles lab registers in 2017 revealed:

- 703 tests were positive out of 1094 test (64.2 %)
- 19 % of the data on date of sample collection was missing.
- The average time from specimen collection to arrival in laboratory was 5 days.
- The average time from specimen arrival at laboratory to testing was 3Day.
- The average time from testing until result reported to surveillance officer was 3 Day.
- The average time from specimen collection until results reported to surveillance officer was 13 Day.

The EWARN laboratory guidelines covers sample collection, storage and transportation, and Lab staff have SOPs for ELISA on the wall of the lab.
ELISA tests have controls, but there is no external quality assurance system.
There are criteria to reject lab samples, including samples without labels, without investigation sheet, in-adequate samples, and samples with leakage or hemolysis, suboptimal storage conditions or inappropriate transport media.

Figure 39: Stool Culture

3.3.1 Specimens Shipment:

One of the important tasks for the lab network is transportation of AFP, ILI and SARI samples to the Turkish labs.
This process is a complicated process involves a lot of coordination and logistic support from different actors in the field and at the central level.
A trained logistic officer will transport the samples using appropriate transport media and temperature.
According to the pathway, the sample might be stored in a hospital or a clinic on its way to Turkey.
Ice packs would be checked and replaced if needed, but there is a need for digital Thermostats to monitor the temperature of the samples during transportation. AFP samples have special tracking form that should be filled at any point in the pathway. This process might take a long time due to distance and security situation.
As per EWARN data management unit, in 2017 the Mean time for AFP samples to reach Turkey lab from time of collection was 14 days with Average 23 days, this increase in time was caused by worsening of security situation and delays/closure of ground crossing points at the borders.

In order to ensure the transportation of samples, the following steps have been taken:

- AFP Samples tracking sheet was used inside Syria till to arrival Turkish lab
- Training the field staff on the proper methodology of collecting, handling and shipping the specimens. In addition to distributing the related guidelines.
- Equipping the DLOs with the needed means for specimens' collection, preserving and shipping (refrigerators, generators, containers, ice packs, ...), in addition to transporting mediums for cholera and RDTs.
- Recruiting logisticians for samples shipment from the field to the lab and to Turkey for AFP samples.
- Designating specific stoppage points to store the samples – if needed- provided with the proper cold chain equipment.
- Strict follow up on the sample movement by the central level.
- Arrangements were made with the Jordanian ministry of health to receive AFP samples from the southern governorates through WHO office in Amman. Follow up is ongoing.

Figure 40: Specimens transportation

Figure 41: AFP Specimens tracking sheet

استمارة تتبع خط سير نقل عينات الشلل الرخو الحاد AFP Samples tracking sheet			
اسم DLO اسم الحالة		تاريخ بدء الشلل	تاريخ التقصي
اسم الشخص الذي أشرف على جمع العينة الأولى.(DLO,FLO,)		تاريخ	ساعة جمع العينة الأولى
حالة قوالب الجليد عند وضع العينة الأولى	مجمدة وصلبة ☐ مبردة ☐ غير مبردة ☐	مكان وضع الحافظة بعد جمع العينة الأولى	
اسم الشخص الذي أشرف على جمع العينة الثانية (DLO,FLO)		تاريخ	ساعة جمع العينة الثانية
حالة قوالب الجليد عند وضع العينة الثانية	مجمدة وصلبة ☐ مبردة ☐ غير مبردة ☐	مكان وضع الحافظة بعد جمع العينة الثانية	
عدد الأنابيب التي تم جمعها للمخالطين		تاريخ وساعة جمع عينات المخالطين	
مكان حفظ العينات بعد جمعها		تاريخ وضع العينات	
اسم الشخص الذي استلم العينات من DLOالنقطة صفر		تاريخ وساعة استلام العينات من DLO	
طريقة حفظ العينات بعد استلامها من DLO	في الحافظة ☐ تبريد عادي ☐ تجميد بالفريزر ☐	ملاحظات خاصة عن سبب التجميد	
اسم الشخص الذي استلم العينات لنقلها للنقطة 1		تاريخ وساعة استلام العينات	
مكان تسليم الحافظة في المرحلة الثانية واسم الشخص الذي تم التسليم اليه في النقطة 1		تاريخ وساعة استلام الحافظة في النقطة 1	
طريقة حفظ العينات في النقطة 1	في الحافظة ☐ تبريد عادي ☐ تجميد بالفريزر ☐	ملاحظات خاصة عن سبب التجميد	
اسم الشخص الذي استلم العينات لنقلها الى الحدود		تاريخ الاستلام	ساعة الاستلام
طريقة حفظ العينات بآخر نقطة على الحدود التركية	في الحافظة ☐ تبريد عادي ☐ تجميد بالفريزر ☐	ملاحظات	
اسم الشخص الذي استلم العينات لادخالها لتركيا		تاريخ استلام العينة	ساعة الاستلام
مستلم العينات في المستوى المركزي		تاريخ الاستلام	ساعة الاستلام
طريقة حفظ العينات في مكتب EWARN	تبريد عادي ☐ تجميد بالفريزر ☐	تاريخ وساعة تسليم العينات الى مديرية صحة عنتاب	

3.3.2 Challenges:

- Lack of funding and logistical support for laboratory issues in general
- Poor infrastructure, electricity problems and lack of basic equipment and consumables.
- Scarcity of the qualified trainers and training activities in the lab field and qualified technicians for maintenance of lab?
- Unavailability of Universal control
- Border problems (documentation or security or both?) that leads to delay or inability to ship the materials
- Lack of fund to upgrade the available equipment.

3.3.3 Future Plans:

- Equip the labs in besieged areas with the basic package for outbreak confirmation in order to take the needed steps for response.
- Activate Real Time- PCR and the blood culture.
- Explore financial support for continuous training in immunology and macro-biology field to include this field in our scope of tests.
- Increasing the capacity of EWARN lab staff inside Syria.
- Provide refresher t safety procedures training.
- Continue to provide regular maintenance of current lab equipment and ensure back-up equipment is available to continue functionality of the lab Response and related Logistic activities.

3.4 Response and related Logistic activities:

3.4.1 Preparedness:

Many resources are needed in order to survey outbreaks and response to epidemics such as transportations and specimen collection materials.
Rapid response teams are designated to implement tasks, set up response plans, utilize standard protocols of case management and identify isolation sites of infected cases as well as to specify the stores that contain basic treatment kits.
The aforementioned procedures have been done by organizing logistics and trained outbreak control team (OCT).

3.4.2 Logistics:

1. Warehouses:

- Warehouses were prepared for potential outbreaks response. The number of warehouses has increased from five in 2016 to nine in 2017 over eight governorates. They were provided with medicines, consumables, personal protection means, some medical devices, and awareness leaflets.
- 15 Cholera kits are also included.

Warehouses distribution centres in governorates as follows:

Table 29: Warehouses Distribution

Aleppo	Aleppo/Kubani	Idleb	Ar-Rakka/ Tell Abiad	Al-Hasakeh	Rural Damascus	Homs	Dar'a	Quneitra
1	1	1	1	1	1	1	1	1

Cholera kits distribution in governorates as follows:

Table 30: IDDKs Distribution and condition

No. Kits	Expiration Date of the Kit	Condition of the Kit (*complete, incomplete)	LOCATION				
			northern Syria or southern Syria	Governorate	District	Sub-district	Name of Health Facility or Warehouse
DDK 3	Drugs: Aug 2017 ORS:2020	incomplete	northern Syria	Idleb	Harim	Dana	Sarmada
DDK 4	Drugs: Aug 2017 ORS:2020	incomplete	northern Syria	Idleb	Harim	Dana	Sarmada
DDK 5	Drugs: Aug 2017 ORS:2020	incomplete	northern Syria	Idleb	Harim	Dana	Sarmada
DDK	Drugs: Aug 2019 ORS: 2021	complete	northern Syria	Idleb	Harim	Dana	Sarmada
DDK 6	Drugs: Aug 2018 ORS:2020	incomplete	northern Syria	Aleppo	A'zaz	Afrin	Bahar
DDK 7	Drugs: Aug 2017 ORS:2020	incomplete	northern Syria	Aleppo	A'zaz	Afrin	Bahar
DDK 8	Drugs: Aug 2017 ORS:2020	incomplete	northern Syria	Aleppo	A'zaz	A'zaz	Azaz
DDK 9	Drugs: Aug 2017 ORS:2020	incomplete	northern Syria	Aleppo	A'zaz	A'zaz	Azaz
DDK	Drugs: Aug 2018 ORS:2020	complete	northern Syria	Aleppo	A'zaz	A'zaz	Azaz
DDK	Drugs: Aug 2018 ORS:2020	complete	northern Syria	Aleppo	A'zaz	A'zaz	Azaz
DDK 10	Drugs: Aug 2017 ORS:2021	complete	Southern Syria	Dar'a	Dar'a	Dar'a	Kahil
DDK 11	Drugs: Aug 2017 ORS:2021	complete	Southern Syria	Dar'a	Dar'a	Dar'a	Kahil
DDK 12	Drugs: Aug 2017 ORS:2021	complete	Southern Syria	Dar'a	Izra'	Nawa	Nasriyeh
DDK 13	Drugs: Aug 2017 ORS:2021	complete	Southern Syria	Dar'a	Izra'	Nawa	Nasriyeh
DDK 14	Drugs: Aug 2017 ORS:2021	complete	Southern Syria	Dar'a	Izra'	Nawa	Nasriyeh
DDK 15	Drugs: Aug 2017 ORS:2021	complete	Southern Syria	Dar'a	Izra'	Nawa	Nasriyeh

2. Organize other logistics:

- Support teams inside Syria with logistical supplies. DLO is equipped with a laptop, internet connection, a mobile phone, reverse cold chain equipment (refrigerator, cold box, ice molds and generators), and other logistics (printer, projectors ...).
- Recruit logistics officers for shipping samples and logistics materials internally in Aleppo, Al Hasakeh, Idleb, Hama and Lattakia.
- Recruit logistics officer to ship samples across borders with Turkey.
- Provide vehicles for shipping samples and logistics services in Idleb.
- Reserve a training hall for trainings in A'zaz, Aleppo.

3.4.3 Response:

1- Response team:

- Increase the number of rapid response teams inside Syria from five teams in 2016 to twelve teams at the end of 2017.
- Identify the structure of outbreak control teams (OCT).
- Identify regular update tasks and responsibilities of teams for a rapid and effective response to any outbreak.

Distribution of response teams inside Syria:

Table 31*:* RRT members distribution

Aleppo	Idleb	Hama	Lattakia	Al-Hasakeh	Ar-Raqqa	Quneitra	Rural Damascus
2	4	1	1	1	1	1	1

2- Response tasks:

- Discuss issues related to alerts with the CLOs and implement the required investigation in coordination with the DLOs on a weekly basis.
- Set up and update response plans for potential epidemics.
- Set up standard treatment plans of potential disease outbreaks.
- Implement field procedures (collect cases and water samples from different sources, identify infection sources, chlorinate water and implement hygiene practices, increase sensitization of medical staff, raise health awareness of the population and provide needed medicine).

The following table summarizes the major response tasks implemented during 2017:

Table 32: Main Response Activities in 2017

Outbreak/alert	Epi-Week	Governorate	District	Health Facility	Lab samples	Water samples	Response			
							drugs	wash	health education/ IEC	Coordination: NGOs/ partners
Other acute diarrhea	1	Aleppo	A'zaz	Shmarekh	No	Yes	No	No	Yes	Mercy corps/ Local Council
Measles	1	Aleppo	A'zaz	Salama	Yes	No	Yes	No	Yes	SIG
Lice	2	Idleb	Idleb	Haranbush	No	Yes	Yes	No	Yes	SIMA Organization
Leishmania	3	Idleb	Al Ma'ra	Tah	No	No	No	No	Yes	Mentor Organization
Lice	3	Idleb	Al Ma'ra		No	No	Yes	Yes	Yes	SIMA Organization
ILI	3	Dar'a	Dar'a	Jizeh	No	No	Yes	No	Yes	
ILI	3	Dar'a	Dar'a	Mzeireb	No	No	Yes	No	Yes	
ILI	3	Quneitra	Quneitra	Quneitra	No	No	Yes	No	Yes	
ILI	3	Homs	Ar-Rastan		No	No	Yes	No	Yes	
ILI	3	Rural Damascus	Rural Damascus		No	No	Yes	No	Yes	
Typhoid fever	4	Al-Hasakeh	Ras Al Ain		Yes	Yes	Yes	Yes	Yes	
Acute jaundice syndrome	4	Dar'a	Dar'a	Tafs	No	Yes	No	No	Yes	Aafaq Organization/ Local Council
Lice	5	Idleb	Idleb		No	No	No	No	Yes	Education Directorate
ILI, SARI	5	Idleb	Harim	IHH	Yes	No	Yes	No	Yes	
Acute jaundice syndrome	6	Al-Hasakeh	Ras Al Ain		Yes	Yes	Yes	Yes	Yes	
SARI	7	Al-Hasakeh	Quamishli		No	No	Yes	No	Yes	
ILI, SARI	8	Dar'a	Izra'	Hrak	No	Yes	Yes	No	Yes	
Other acute diarrhea	10	Dar'a	Dar'a	Jizeh	No	No	Yes	Yes	Yes	
Typhoid fever	12	Aleppo	Jebel Saman	Abin	Yes	Yes	Yes	Yes	Yes	
Typhoid fever	14	Idleb	Harim	Harim	Yes	Yes	Yes	Yes	Yes	
Other acute diarrhea	14	Aleppo	A'zaz		No	Yes	No	Yes	Yes	Local Council
Chekenpox	14	Al-Hasakeh	Al-Malikeyyeh		No	No	Yes	No	Yes	
Other acute diarrhea	16	Aleppo	A'zaz	Suran	No	Yes	Yes	Yes	Yes	Local Council

Chekenpox	16	Aleppo	A'zaz	Suran	No	No	Yes	No	Yes	Local Council
Other acute diarrhea	17	Ar-Raqqa	Tell Abiad		No	Yes	Yes	Yes	Yes	Concern Organization
Other acute diarrhea	18	Dar'a	Dar'a		No	Yes	Yes	Yes	Yes	
Typhoid fever	18	Dar'a	Izra'	Jasim	Yes	Yes	Yes	Yes	Yes	Local Council
Chekenpox	18	Ar-Raqqa	Tell Abiad		No	No	Yes	No	Yes	
Other acute diarrhea	18	Idleb	Harim		No	Yes	Yes	Yes	Yes	
Typhoid fever	18	Idleb	Al Ma'ra	Al Salam	No	Yes	No	Yes	Yes	
Typhoid fever	20	Rural Damascus	Rural Damascus		No	Yes	Yes	Yes	Yes	Local Council/Nawa Organization
Other acute diarrhea	23	Al-Hasakeh	Quamishli		No	No	No	Yes	Yes	
Typhoid fever	23	Homs	Ar-Rastan		No	Yes	Yes	Yes	Yes	
Other acute diarrhea	26	Aleppo	Al Bab	Al Hekma	No	Yes	No	Yes	Yes	
Other acute diarrhea	27	Idleb	Jisr-Ash-Shugur		No	Yes	No	Yes	Yes	Local Council
Lice	30	Ar-Raqqa	Tell Abiad		No	No	Yes	No	No	
Other acute diarrhea	30	Idleb	Ariha	QRC	No	Yes	No	Yes	Yes	QRC Organization
Acute jaundice syndrome	36	Ar-Raqqa	Ar-Raqqa		Yes	Yes	No	Yes	Yes	
Dermatitis	37	Aleppo	Afrin		No	No	No	Yes	Yes	

3.4.4 Challenges:

- Bad security conditions.
- Hard to reach areas because of heavy shelling, clashes or siege.

3.4.5 Future goals:

- Expand response teams, especially in the eastern side of Syria (Deir Ez Zor -Raqqa).
- Designate sites for isolating infected cases and treat them when possible.
- Expand pharmaceutical warehouses to store larger quantities of medicine.

3.5 Building capacity and Advocacy:

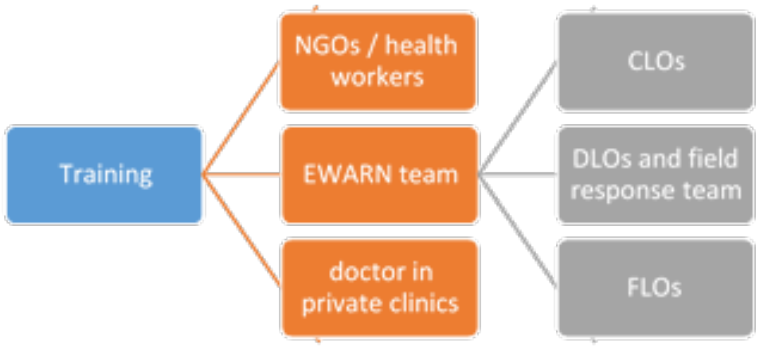
3.5.1 Building capacity:

Training is an essential cornerstone in EWARN, with a vital objective in order to strengthen the surveillance and response system (EWARN) for communicable disease in Syria through capacity building of EWARN and NGO staff, and include raising awareness for both local communities and health workers about communicable disease prevention. The training coordinator keeps al the scientific materials updated and provides the trained staff with the power point presentations; the training materials and tools are reviewed to suit the targeted trainees.

3.5.1.1 Donors funded the training during 2017:

- BMGF
- WHO: funded relevant activities from 5th July to 4th October.

Figure 42: AFP Specimens tracking sheet



3.5.1.2 NGOs / Health workers training:

Table 33: NGOs / Health workers training Agenda in 2017:

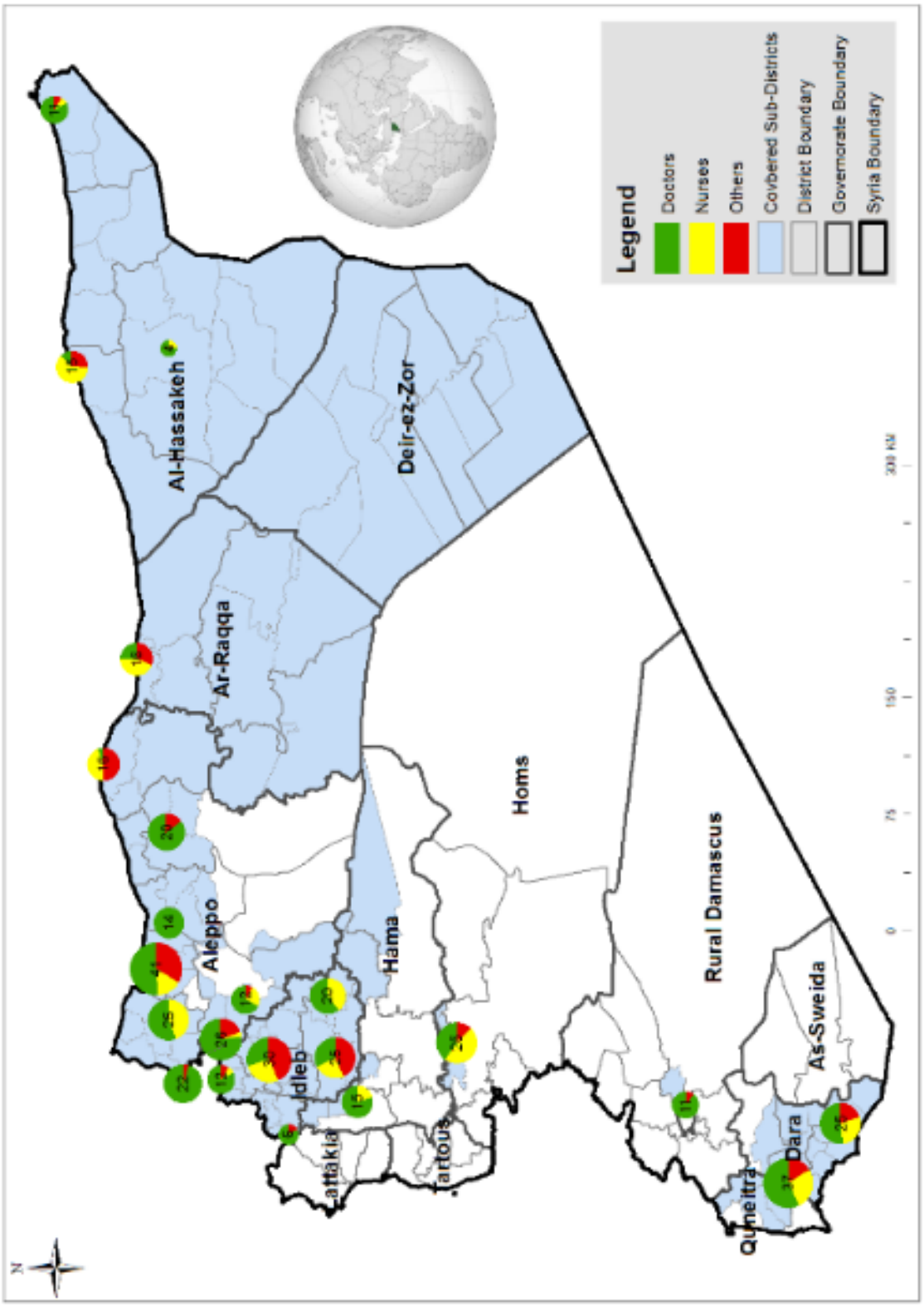
#	Goal	Titles	Trainees No	Date	Facilitator	Sessions No
1st	to increase the capacity of health service providers for case definition and surveillance of acute flaccid paralysis and identify their roles in early detection of such cases	1- Case definition. 2- Acute flaccid paralysis surveillance 3- VDPV– event and outbreak	428	August-September	DLOs	22
2nd	to increase the capacity of health service providers for cholera Surveillance and Cholera Outbreak Response	1- Introduction to cholera - global Cholera situation. 2- Cholera Surveillance. 3- Laboratory diagnosis and samples collection. 4- Cholera outbreak Response 5- Cholera case management 6- health education 7- Cholera vaccine 8- WASH guidelines in cholera treatment centers 9- CTC - CTU Establishment - Hands-on training	287	November-December	DLOs	21

Table 34: Trained NGOs/ Health workers distribution by District

GOVERNORATE	DISTRICT	NO of health workers with NGOs who present the training	THE DATE
Idleb	Idleb	30	22/8/2017
Idleb	Harim	12	19/8/2017
Idleb	Jisr-Ash- Shugur	6	18/8/2017
Idleb	Harim	22	21/8/2017
Idleb	Al Ma'ra	20	29/8/2017
Idleb	Al Ma'ra	25	20/8/2017
Idleb	Harim	26	15/8/2017
Hama	As Suqaylabi yah	15	14/8/2017
Aleppo	Jebel Saman	12	14/8/2017
Aleppo	A'zaz	41	17/8/2017
Aleppo	Afrin	25	16/8/2017
Aleppo	A'zaz	14	15/8/2017
Aleppo	Menbij	20	18/8/2017
Aleppo	Ain Al Arab	16	21/8/2017
Al- Hasakeh	Al- Hasakeh	4	20/8/2017
Al- Hasakeh	Ras Al Ain	15	19/8/2017
Al- Hasakeh	Al Malika	11	17/8/2017
Rural Damascus	Rural Damascus	11	12/9/2017
Dar'a	Dar'a	25	20/8/2017
Quneitra	Quneitra	37	24/8/2017
Homs	Ar Rastan	25	17/8/2017
Ar-Raqqa	Tell Abiad	16	18/8/2017

Figure 44: NGOs / Health works training in Idleb and Dar'a

Map 13: Trained Staff backgrounds



3.5.1.3 EWARN staff training sessions in 2017:

1- Central Level officers training:

Table 35: CLOs training agenda in 2016

#	Goal	Titles	Facilitator	Trainees No.	Date	Place
1st	Understand steps needed in designing research methods, recognize different types of research design, demonstrate the appropriate choice of design, know how to develop and test research tools, understand the basic principles of medical statistics and its uses and demonstrate the ability to present and interpret research results.	-Clinical Research -How can study design affect our judgment? Observational studies. -Cross sectional, Case Control and Cohort study. -Interventional studies: Clinical trials and drug. Vulnerability in Research-Un-Ethical Research. -Designing Questionnaires and Interviews. -Reliability and Validity of research tools. Sampling in Clinical Research. -Types of Variables. Descriptive and Inferential Biostatistics. - Population and samples Normal distribution -Test of hypothesis. -One-way analysis of variances. -Chi square distribution -Two-Independent Samples tests -Mann-Whitney U -Kruskal-Wallis H -Two-related (Paired) Samples tests -Wilcoxon matched test	Tamer Hifnawy MD. Dr.PH Professor of Public Health & Community Medicine	**20**	**22nd -27th September**	**Istanbul - Turkey**
2nd	The training aims to be a practical and relevant course on field epidemiology. At the completion of the training, students will be able to: -Identify and describe appropriate epidemiological methods used in emergencies. -Be familiar with tools used in emergencies -Link data collection and analysis with complex humanitarian emergency response interventions. -Become familiar with Epi info and understand how to analyze data collected in emergencies	- Introductions to humanitarian emergencies - Major actors in humanitarian emergencies, including Cluster Approach - Epidemiology in Emergencies - Essential indicators in emergencies. - Camps in emergency settings - Water, Sanitation, and hygiene promotion (WASH) - Household water treatment-Water quality monitoring - Rapid assessments - Surveillance (EWARN, IDSR, HIS) - Evaluating a surveillance system - Mortality surveillance and population estimates - Surveys and sampling. - Outbreak investigation. - Data Analysis Using EPI INFO	CDC team	**22**	**16th -21st October**	**Ankara - Turkey**

Figure 43: CLO Training in Ankara

Figure 44: CLO Training in Istanbul

2- District Level officers and field response team training:

Table 36: Quarterly Meetings Agenda in 2017

#	Titles	Facilitators	Trainees No.	Place	Date
1st	- Rationale and objectives of vaccine coverage. - Role of core team; central/governorate/district coordinators. - Role of supervisors and data collectors. - Cluster selection and identification (Using Maps) - Identification of first house and first household. - Data collection forms. - Supervisors' forms - Quick overview on AFP surveillance indicators. - VAPP and VDPV - Summary of response activities to VDPV. - Quick overview on measles indicators & current situation (recent outbreak) - Data collection by ODK. - Refresh training on Microsoft Excel - Recommendation on archiving (filing system)	CLOs /BMGF consultant	7DLOs 3 RRT	**Turkey Syria**	**14th – 18th Mar**
2nd	- General AFP surveillance indicators review -60 Days Follow-up - Neurological examination - Cluster and VDPV outbreak exercise - Data collection by ODK - VPD Case definitions - Measles surveillance update - Nutrition Surveillance System - General Overview and methodology - Notification of acute watery diarrhea: response protocol - Vaccination update - Refresh training on Microsoft Excel - Refresh training on Microsoft PowerPoint	CLOs /BMGF consultant	9 DLOs 2 RRT 1lab physician	**Turkey Syria**	**18th - 22nd July**
3rd	- Work plan of training in 2017-2018 - Water quality monitoring - VPD Case definitions - Measles surveillance update - AEFI & Mortality surveillance - Cold chain management - Temperature monitoring equipment - Update on AFP surveillance - Update on VDPV outbreak - Active and passive surveillance - community-based surveillance - Environmental health surveillance - Healthy children stool survey and Contact stool specimens - Smart Overview and Survey Teams - Questionnaire - Event Calendar - Sampling Methods - Simple Random - Sampling Methods - Systematic Random - Sampling Methods – Segmentation - Anthropometry and Malnutrition - Interpretation of Measurements - Quality check and standardization test - Brief on Epi Info	CLOs /BMGF consultant	8 DLOs 1 RRT 1lab physician	**Turkey Syria**	**27th – 30th October**

Figure 45: Quarterly Training

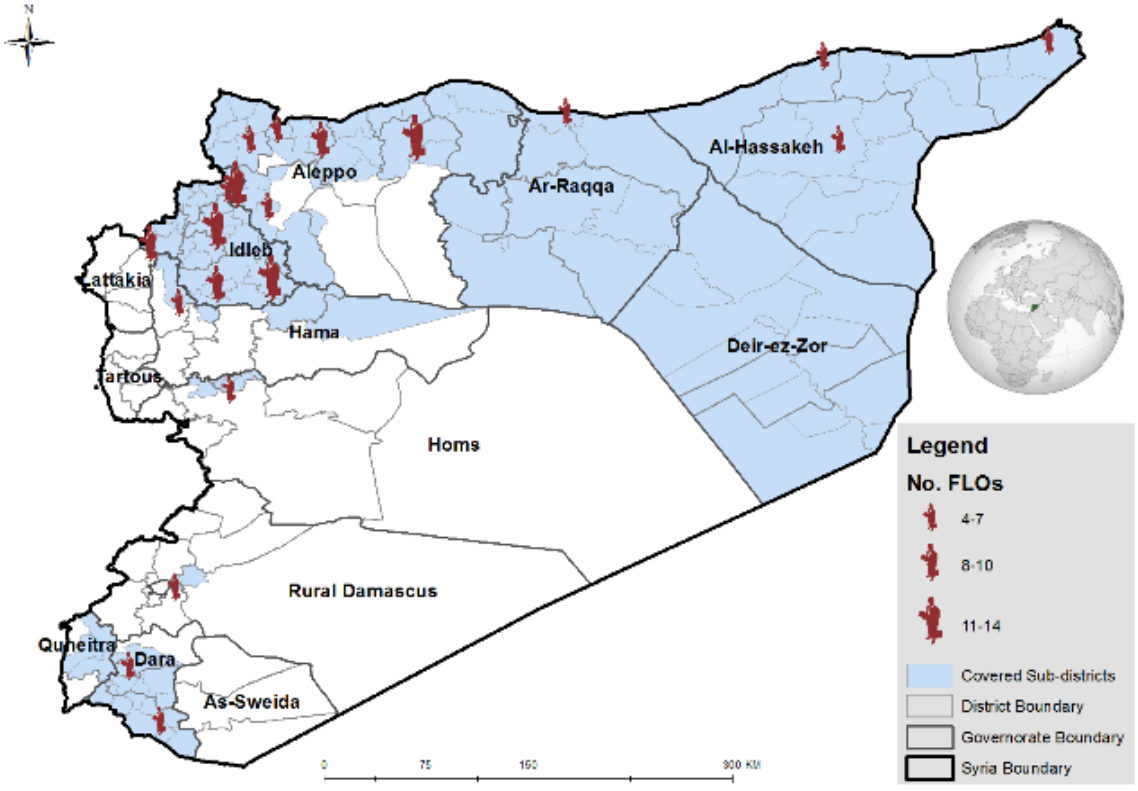
3- Field Level officers training:

Table 37: FLOs trainings Agenda in 2017

#	Titles	Facilitators	Trainees No.	Sessions No.	Place	Date
1st	- Case definition - Measles and Rubella - Surveillance of Measles	DLOs	164	22	**Syria**	**5th – 22th May**
2nd	- Case definition - Acute flaccid paralysis surveillance - VDPV– event and outbreak	DLOs	150	21	**Syria**	**24th September – 4th October**
3rd	- Introduction to cholera - global Cholera situation. -Cholera Surveillance. -Laboratory diagnosis and samples collection. -Cholera Outbreak Response -Cholera case management -health education -Cholera vaccine -WASH guidelines in cholera treatment centers - CTC - CTU Establishment - Hands-on training	DLOs	168	21	**Syria**	**19th – 26th November**

Figure 46: FLO Training- Hama

Map 14: Second Field Level Officers Training

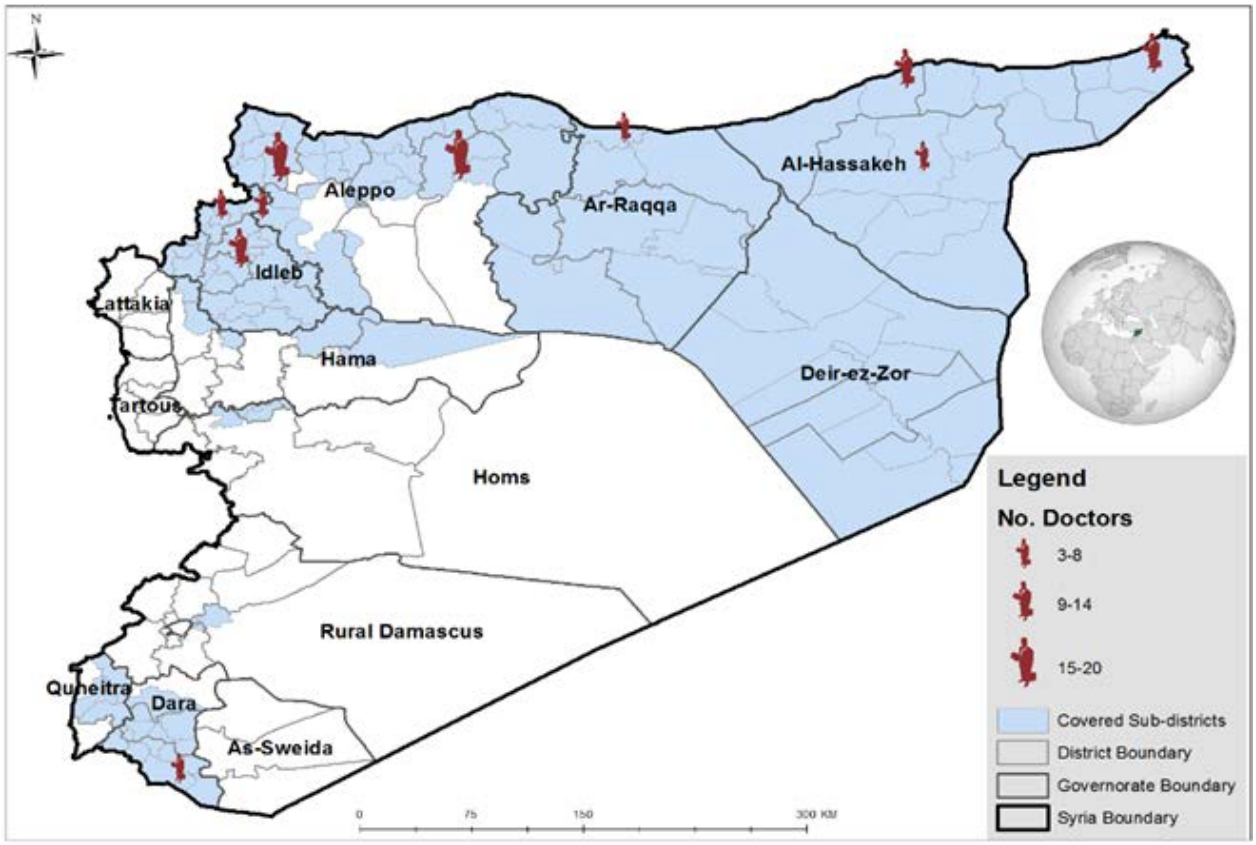


3.5.5 Training for doctors in private clinics

Table 47: Training Agenda for doctors in private clinics in 2017

#	Titles	Facilitators	Trainees No.	Sessions No.	Place	Date
1st	- EWARN in brief - Acute flaccid paralysis surveillance - VDPV– event and outbreak	DLOs	92	10	Syria	18th August– 11th September
2nd	-Introduction to cholera - global Cholera situation. -Cholera Surveillance. -Laboratory diagnosis and samples collection. -Cholera Outbreak Response -Cholera case management -health education -Cholera vaccine -WASH guidelines in cholera treatment centers	DLOs	59	7	Syria	16th – 26th November

Map 15: Training for doctors in private clinics in 2017



3.5.1.4 Community Based Surveillance focal points' training

Goal	Titles	Facilitator	Trainees No.	Date	Place
Increase the capacity of focal point of community base surveillance for case definition and surveillance of acute flaccid paralysis and identify their roles in notifying such cases	**AFP surveillance**	**DLOs and FLOs**	**286**	**14th – 19th December**	**Syria**

3.5.1.5 Challenges

- Borders closure obstructs training sustainability.
- Serious security situation impedes moving between targeted areas.

3.5.1.6 2018 Plan

- CLOs training: very important and required to improve skills of central level officers especially in bio statistics, and mapping.
- Continue capacity building for health workers through the implementation of quarterly meeting training in Syria as well as EWARN team and NGOs workers.
- Quarterly meetings and FLOs and NGOs training should be conducted four times within the next year.
- Health workers in private clinics training: important to increase the sensitivity of EWARN in the detection of cases of acute flaccid paralysis and other communicable diseases that health centres and hospitals are not reporting.

3.5.2 Advocacy:

Good relationship with NGOs and local authorities is essential for the success work of EWARN and facilitate the staff work. Therefore, several advocacy meetings were conducted in Syria to strengthen the relationship between EWARN and other organizations.

Advocacy activities details _ Syria

#	Place	Targeted NGO / Partner	Goal	Attendees No.	Related activities	Date
1	**Idleb-Harim**	IRC	-Introduce EWARN, and case definition, -Strengthening relationship	9	Presentations on EWARN and case definition. Reporting mechanism Cooperation mechanisms	16th October
2	**Quneitra**	Health Directorate, Relief International Organization	-Introduce EWARN, and case definition. -Strengthening relationship.	20		24th April

FLO Training- Hama

Advocacy activities details _ Turkey

Place	Targeted NGO / Partner	Goal	Attendees No.	Related activities	Date
Urfa	Private physicians acting inside Syria	-Introduce EWARN, and case definition. -Strengthening relationship	65	Presentations about EWARN and EWARN diseases, acute flaccid paralysis surveillance, Surveillance laboratory, vaccination situation inside Syria, Wash situation inside Syria, Nutrition surveillance inside Syria.	3rd December

3.5.2.1 Future plan

Continue to organize more advocacy activities especially in Syria, with focusing on organizations that are not currently part of the network, in order to strengthen the relationship and improve EWARN reporting.

3.6 Data Management Team:

3.6.1 Background

The Data Management team supports the programs of EWARN by providing efficient data collection systems and the safe storage and release of study and project data. To achieve this, the team has expertise in database development, software programming, mobile data collection systems and handling of scientific data.
The data team works across all EWARN programs and has been responsible for developing and implementing the data systems that support the collection of data for all studies. It also carries out and manages all of the processes that are linked to data management and ensures that the quality of many thousands of records is accurate. Working alongside the core Data Management team are Technical Coordinators who are embedded within the scientific programs. The Technical Coordinators have a specific focus on technical and health-related issues whilst the core Data Management team provides wider support for strategic studies and generic data systems that are used in EWARN.

3.6.2 Highlights

2015

- The data team was consisted of 3 members.
- MS Excel forms were adopted instead of MS Word forms in terms of data entry forms.
- Information for Action (IFA) software, provided by WHO, was utilized to manage the data of Acute Flaccid Paralysis.
- Use of GIS software for mapping.
- Disseminate our products through uploading them on the ACU's website.

2016

- The data team was consisted of 5 members.
- Different functionalities and automated bulletins were developed to easily monitor health events and outbreaks.
- Focused on strengthening the electronic filing system at the CLO level.
- Start developing electronic forms using Open Data Kit (ODK) for mobile data collection.
- Assign identification codes to our reporting sites in order to improve data quality.
- Generate interactive maps using ArcGIS online.
- Develop a MS Access system to store and manage the data of implemented vaccine campaigns.

2017

- The data team is consisted of 7 members.
- Adopt ODK in mobile data collection in different activities.
- Emergency Nutrition Assessment (ENA) software is used for nutrition surveillance.
- Generate interactive data visualizations based on business intelligence.
- Find innovative approaches to calculate the alert thresholds of diseases.
- Vaccine coverage survey was conducted in 9 governorates of Syria. Findings and data are to be used for further studies in EWARN.
- Plans were sorted to deploy EWARS system which is developed by WHO to make disease control in emergencies easier and more effective.
- A training and plans were implemented to utilize Epi Info, a statistical software for epidemiology developed by Centers for Disease Control and Prevention (CDC)
- Trainings of SPSS software is to be conducted, in order to utilize it in further researches.
- EWARN data staff has participated in building capacity of other organizations' staff by conducting different trainings.

3.6.3 Structure

Same functionalities and approaches of data management are adopted by the data team members. The data members are used to share knowledge and experience among them. The data members are collaborating with each other in order to support all EWARN's departments. However, every data member is designated to deals mainly with one task of the following:

- Manage the data of AFP surveillance.
- Support both nutrition surveillance and WASH.
- Manage the data of syndromic weekly reporting and active surveillance.
- Manage the data of Vaccine-Preventable diseases.
- Support the vaccine campaigns and manage the related data.
- Develop electronic data entry forms using mobile data collection tools.
- Maintain the data of EWARN's labs as well as the administrative work.

3.6.4 Implementation

Software

Microsoft Word and PowerPoint provide us functionalities to run a business office. Whilst Microsoft Excel and Access are used to design surveys, store and manage data, generate calculations and summaries, and produce reports.
Three mobile phone applications, Epi Info, ODK, and Kobo are used to build mobile data collection surveys. These tools allow us to customize the survey to collect specific data as required, such as photographs, numbers, texts, voice recordings, GPS coordinates, etc.
Two business intelligence software, MS Power BI and Tableau are used to help us visualize and understand our data. We generate interactive dashboards using them, in order to easily monitor and follow-up surveillance indicators.
Special programs are used for certain purposes, for instance, the data management system of AFP surveillance which is called Information for Action (IFA), Emergency Nutrition Assessment (ENA) is used for SMART survey.
In terms of GIS, two software, ArcGIS and QGIS are used to capture, store, manipulate, analyze, manage, and present all types of geographical data.
The 4th quarter of 2017, we started to utilize high-level programming languages such as R Programming and Python, in order to overcome the shortages of used software and to find innovative IT solutions as needed.

Dataflow

Dataflow is the movement of data through employees through the staff levels of EWARN. The path is taken by data within EWARN, as it moves from its source to a data repository or a data user.

In EWARN, data can be transmitted through Google Mail, WhatsApp, Skype, phone calls and mobile data collection tools.
Data is transmitted from the field level to the central level using two approaches of reporting:

1- **Frequent reporting:** it includes two different methods of receiving data

- The field level officer submits data to the district level officer to be reviewed and shared with the central level on a weekly, semi-monthly or monthly basis.
- Case-based reporting: the district level officer investigates infected cases and shares the findings with the responsible technical coordinator at the central level.

2- **Immediate reporting:**

when a sudden increase of disease cases occurs in a given area or the number of cases is doubled, an immediate report is submitted to the central level; in order to increase sensitization in the area and to implement the required response.

Data Elements

Many surveillance tools are adopted at EWARN as per need, such as, zero reporting, line listing, case-based data, and surveys, active surveillance, and alerts.

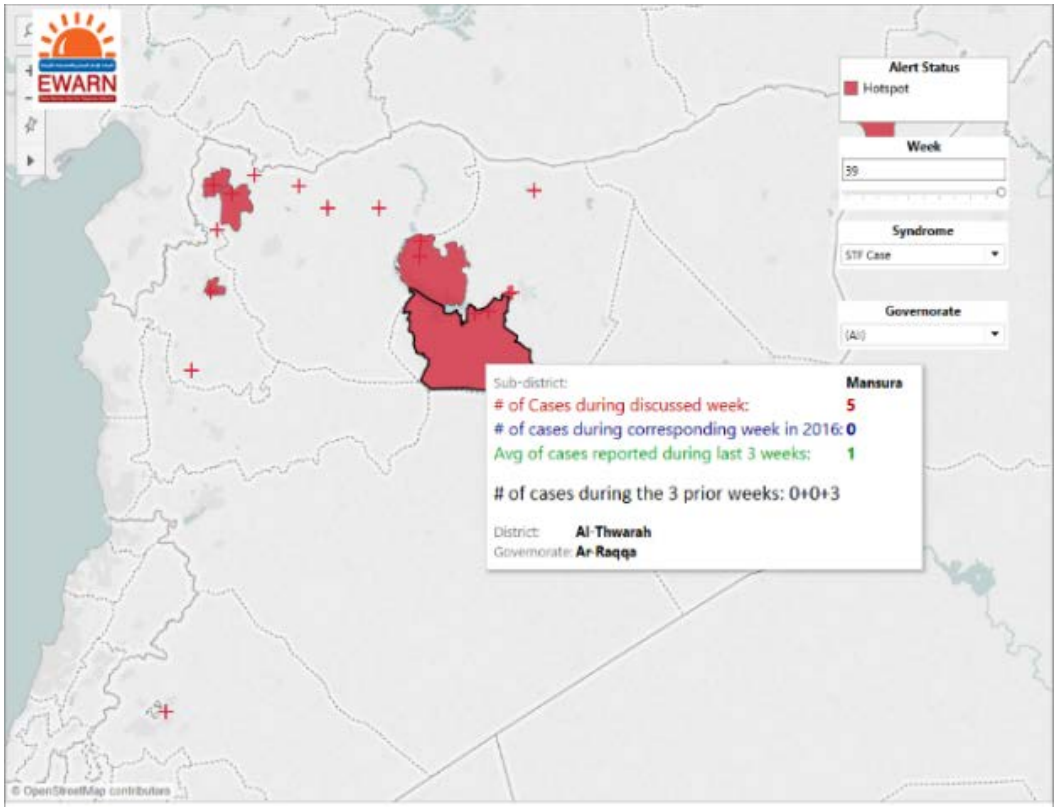
Alert Raising

During 2016, we adopted an alerting threshold for each surveyed syndrome based on WHO guidelines. When the disease cases exceed the corresponding threshold in an area, an alert to the central level is raised. Afterwards, the response team carries out the required investigations and follow-ups.
Through 2017, we managed to set a new functionality of raising alerts through utilizing our data of previous years. An alert of a given syndrome is raised if two criteria are met:

- On a given week of an in-question year, if the syndrome cases are greater than twice the average of cases reported over the 3 prior weeks of the same year. This rule gives us an indication of a sudden increment of cases.
- The syndrome cases on a given week of an in-question year are greater than the number of cases of the corresponding week of the previous year. This rule gives us an indication of seasonal increments.

We often discuss the alerts at the sub-district level then we go through the community level, eventually, we can specify the health facilities where the alerts are originated from (Figure 1). This approach provides a better way of detecting alerts. However, it sometimes gives us false alerts, so we had to think of a better approach of alert raising. On November 2017, we generated a new approach of raising alerts, by benefiting from the experience of other EWARS systems. We include the data of three past years in calculating the normal range during a certain week in which the number of cases can range in.

Map 16: Alerts at a sub-district and a community level



On a specific week of the in-question year, for a given syndrome, we calculate the average of cases reported during the current week and the prior 2 weeks of the same year. For each year of the two prior years, we calculate the average of cases reported during the corresponding week, the next 2 weeks and the prior 2 weeks.
The standard deviation of the mentioned weeks is calculated; accordingly, the minimum acceptable limit of disease cases is defined by the average minus the standard deviation; whereas the maximum limit is defined by the average plus the standard deviation.
Consequently, any increment of disease cases higher than the maximum limit of the allowed cases triggers an alert, so the response team carries out the required investigations and responses.

Zero Reporting

Our reporting sites submit reports to the central level at a specified frequency (e.g. weekly or monthly) even if there are zero cases.
Three data entry forms were designed to collect data of zero reporting as follows:

- The weekly syndromic data reported from the health facilities (Figure 2)
- The semi-monthly data of the water stations.
- The monthly data from the nutrition health facilities.
- The daily data of the routine vaccination centres.

Figure 49: Zero report form of the syndromic data

Weekly Zero Report From
استمارة التقرير الأسبوعي الصفري

Basic Information معلومات أساسية					
Epi Week الأسبوع الوبائي		Month الشهر			
Governorate المحافظة		District المنطقة		Subdistrict الناحية	
Community قرية / بلدة / حي		Select village/town/neighborhood if it were not in the drop-down menu حدد قرية / بلدة / حي اذا لم تكن في القائمة			
Health Center Name اسم المرفق الصحي		Catchment Population عدد السكان المستفيدين			
Report Period From/فترة الإبلاغ من		Report Period To/فترة الإبلاغ الى			
Name of reporter اسم المبلغ		Job title المسمى الوظيفي			
Date Received by DLO* تاريخ التسليم الى منسق المنطقة		Entered to system by DLO on تاريخ ادخال المعلومات من قبل منسق المنطقة			

Reporting of cases الحالات المبلغة								
DISEASE المرض	Code رمز	Alert threshold عتبة الإنذار	0 - 4 years		≥ 5 years		Alerts الانذارات	TOTAL المجموع الكلي
			Male ذكر	Female انثى	Male ذكر	Female انثى		
Acute bloody diarrhea (suspected shigellosis) الإسهال الدموي الحاد (الاشتباه بداء الشغيلات)	ABD	5					0	0
Acute watery diarrhea (suspected cholera) الإسهال المائي الحاد(الاشتباه الكوليرا)	AWD	1					0	0
Acute jaundice syndrome متلازمة اليرقان الحاد	AJS	5					0	0
Severe Acute Respiratory Illness المرض التنفسي الحاد الوخيم	SARI	5					0	0
Acute flaccid paralysis (suspected poliomyelitis) الشلل الرخو الحاد (التهاب سنجابية النخاع)	AFP	1					0	0
Suspected Measles الاشتباه بمرض الحصبة	MEA	1					0	0
Suspected Meningitis الاشتباه بمرض التهاب السحايا	MEN	5					0	0
Unusual cluster of health events حالات أخرى - مجموعة عنقودية من الأحداث الصحية غير العادية	UCE	1					0	0
Unexplained death حالات أخرى - حالات وفاة غير مفسرة	UXD	1					0	0
Suspected Typhoid Fever الحمى التيفية	STF	5					0	0
Fever of Unknown Origin حمى غير مفسرة	FUO	5					0	0
Cutaneuos Leishmaniasis الليشمانيا الجلدية	LEISH	50					0	0
Acute diarrhea اسهال حاد	AD	-					-	0
Influenza Like Illness مرض الشبيه بانفلونزا	ILI	-					-	0
Other Diseases أمراض أخرى	OTHERS	-					-	0
Total consultations مجموع الاستشارات	TOTAL		0	0	0	0	0	0

In zero reporting, two performance indicators are monitored. Firstly, the timeliness which indicates that reports are received by the planned time of each frequency. Secondly, the completeness, which means the reports are received regardless the submission date.

The data team compiles these data in consolidated databases after cleaning and processing. They also manage the data based on identification codes given to the reporting sites.

Finally, they generate the analytical and narrative summaries to be included in the regular bulletins.

Health Map

The health map includes comprehensive information about the reporting health facilities, such as detailed address, manpower, available services, sponsoring, functioning status and contact information.

During 2016, we started coding the health facilities, based on the geographical location and the district level officer of the location. The common operating datasets (CODs), which are the administrative levels of countries used in the humanitarian aids, are taken into account in coding the health facilities.

We gave codes to the reporting health facilities of 2016 and 2015, this helps in detecting duplicates, filling information gaps and calculating indicators.

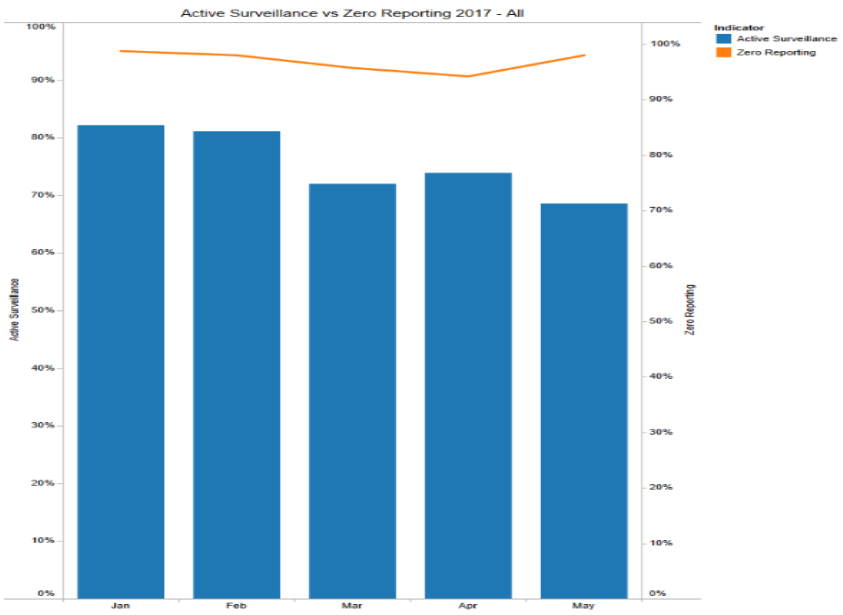
In 2018, we have plans to go back through the zero report datasets of 2014 and 2013, in order to give the reporting health facilities codes using the same mechanism. Consequently, we can utilize the zero-report data of the 5 past years in planning and decision making.

Active Surveillance

A list of the health facilities which have a potential to report AFP cases, are visited regularly (at least monthly) to identify missing AFP cases. The visits are carried out by the district level officers who are not related to the health facilities concerned.

The collected data during these visits is analyzed and mapped out against the passive surveillance data (Figure 3).

Figure 50: Zero report vs active surveillance - 2017



At the beginning of 2017, we piloted collecting the active surveillance data using electronic forms on mobile phones. In fact, the results were under expectations due to different factors. One of the main reasons, there was no in-office training.

In 2018, we have a concrete plan to apply e-surveillance on active surveillance, since it's a top priority in most of the surveillance systems applied across countries. Besides, we had lessons learned from 2017 to make use of, so we look forward to overcoming former barriers and getting electronic active surveillance implemented well.

Line listing Data

A line listing is a surveillance tool used to collect information about person, time, and place in order to assess an outbreak (Figure 4). If an area is experiencing an outbreak, a daily line listing from the associated health facilities 46 be sent to the central level.

Figure 60: Line list of some AFP cases of 2017

IDCODE	EpiYear	EPIWEEK	SERIALS	DONSET	DOINVES	ONSETWEEK	SAMPLE1	SAMPLE2	SPECNUM	OPV	OPVR	OPVSIAs	IPV	FEVER	ASYM	PROGRESS	ADEQ	Inadequacy reason	DFUP	FUP
NSY/HAS/MAL/2017/054	2017	43	425	27/Oct/2017	28/Oct/2017	43	28/Oct/2017	29/Oct/2017	2	6	3	3	2	YES	YES	YES	YES			-
NSY/DEI/DIE/2017/120	2017	48	426	27/Nov/2017	29/Nov/2017	48	1/Dec/2017	2/Dec/2017	2	4	2	2	1	YES	YES	YES	YES			-
NSY/DEI/DIE/2017/121	2017	48	427	28/Nov/2017	28/Nov/2017	48	28/Nov/2017	29/Nov/2017	2	5	2	3	1	YES	YES	YES	YES			-
NSY/DEI/DIE/2017/122	2017	47	428	25/Nov/2017	26/Nov/2017	47	29/Nov/2017	30/Nov/2017	2	2	1	1	1	YES	YES	YES	YES			-
NSY/DEI/DIE/2017/123	2017	47	429	23/Nov/2017	25/Nov/2017	47	26/Nov/2017	27/Nov/2017	2	2	1	1	1	YES	YES	YES	YES			-
NSY/DEI/DIE/2017/124	2017	48	430	26/Nov/2017	27/Nov/2017	48	28/Nov/2017	29/Nov/2017	2	3	1	2	1	YES	YES	YES	YES			-
NSY/EDL/JES/2017/087	2017	48	431	26/Nov/2017	27/Nov/2017	48	27/Nov/2017	28/Nov/2017	2	7	1	6	2	YES	NO	YES	YES			-
NSY/HAS/HAS/2017/055	2017	48	432	28/Oct/2017	28/Nov/2017	43	28/Nov/2017	29/Nov/2017	2	6	3	3	1	YES	NO	YES	NO	Security reasons		-
NSY/DEI/MAY/2017/125	2017	47	433	14/Nov/2017	2/Dec/2017	46	2/Dec/2017	3/Dec/2017	2	3	3	0	2	NO	NO	YES	NO	Lack of awareness		-
NSY/EDL/ADL/2017/088	2017	48	434	29/Nov/2017	1/Dec/2017	48	1/Dec/2017	2/Dec/2017	2	7	0	7	1	NO	NO	YES	YES			-
NSY/DAR/DAR/2017/024	2017	49	435	26/Nov/2017	4/Dec/2017	48	5/Dec/2017	6/Dec/2017	2	8	3	5	2	NO	YES	NO	YES			-
NSY/EDL/ADL/2017/089	2017	49	436	3/Dec/2017	5/Dec/2017	49	6/Dec/2017	8/Dec/2017	2	2	0	2	0	NO	YES	YES	YES			-
NSY/EDL/HAR/2017/090	2017	49	437	4/Dec/2017	4/Dec/2017	49	6/Dec/2017	7/Dec/2017	2	0	0	0	0	YES	YES	YES	YES			-
NSY/RAQ/TAL/2017/020	2017	49	438	20/Sep/2017	5/Dec/2017	38			0	4	3	1	2	YES	YES	YES	NO	Delayed reporting	5/Dec/2017	Residual
NSY/ALE/MAN/2017/088	2017	48	439	30/Nov/2017	2/Dec/2017	48	4/Dec/2017	5/Dec/2017	2	6	2	4	3	NO	NO	YES	YES			-
NSY/ALE/JAR/2017/089	2017	48	440	17/Nov/2017	27/Nov/2017	46	2/Dec/2017	3/Dec/2017	2	0	0	0	0	NO	YES	YES	NO	Delayed reporting		-

The line list of cases is crossed-checked with the lab results when available. A regular analysis is produced to give guidance, information, insight, and structure to the decision-making process in order to make better, more rational decisions.

Surveys

During 2017, a vaccine coverage survey was implemented by EWARN to assess the vaccination status of children under five years inside Syria.

The survey involved 3 age groups: under 1 year, from 1 year to less than 2 years, and lastly, from 2 years to less than 5 years.

The survey was conducted in 9 governorates of Syria. Where each governorate included 30 clusters, each of them was consisted of 3 groups; whereas each group included 7 children.

MS Excel was used in collecting the data. Afterwards, the data was reviewed, processed, and shared with our partners.

A plan is set to utilize the acquired data of the survey in a scientific study during 2018.

Case-based Data

The case-based surveillance system in EWARN is put in place to detect cases and outbreaks of AFP, measles, and SARI (Figure 5).

It involves immediate reporting and investigating any suspected case of the concerned diseases.

The related data is intended to support the unique identification and characterization of persons newly diagnosed and tracking them over time.

The related data entry forms are designed to capture information about case-investigation, follow-up, and contacts.

The collected data is reviewed by the surveillance coordinator in order to address missing information or discrepancies.

Afterwards, the data is double-checked and compiled by the data team. The data is cleaned and transformed into new forms and line lists in order to be easily used in calculating indicators and summaries. The cases' files are archived along with the related administered tests, snapshots, videos, and any other documents.

Figure 61: Measles investigation form

Suspected Measles & Rubella Investigation Form

استمارة تقصي حالة اشتباه الحصبة والحصبة الألمانية

1- Reporting site Information بيانات مركز الإبلاغ **EPID # الرقم الوبائي**

Health Facility (HF) المركز الصحي | Health Facility type نوع المركزالصحي

Governorate المحافظة: Aleppo | District المنطقة: Menbij | Subdistrict الناحية: Menbij

HF Address عنوان المركز الصحي: منبج -شارع السندس - مقابل الجامع العلائي

Detection date تاريخ الاكتشاف: 28/Feb/2017 | Notification date تاريخ الإبلاغ: 28/Feb/2017 | Inves. Date تاريخ التقصي: 28/Feb/2017

Initial clinical diagnosis التشخيص السريري المبدئي: ☑Clinical measles حصبة | ☐Clinical rubella حصبة ألمانية | ☐Others أخرى | ☐Unknown غير معروف

2- Personal information & immunization status البيانات الشخصية والحالة التلقيحية

Patient Name اسم المريض: محمد | Father name اسم الأب: سامر | mother name اسم الأم: سهى

Birth date تاريخ الميلاد: 1/Sep/2016 | Age (Months) العمر (بالأشهر): 6 | Sex الجنس: MALE ذكر

Job المهنة: لا يعمل | Marital Status الحالة الاجتماعية: SINGLE عازب

Residency Place مكان الإقامة: منبج- قرية الماشي

Governorate المحافظة: Aleppo | District المنطقة: Menbij | Subdistrict الناحية: Menbij

IDP or Resident نازح أم مقيم؟: RESIDENT مقيم | If IDP OR nomad, from where? إذا كان نازح/بدو، من أين؟ | And since when (m) منذ متى بالأشهر؟

In Case of Rubella, Is case pregnant? في حالة الحصبة الألمانية هل الحالة حامل ؟ | If yes gestation age weeks? اذا نعم كم العمر الحملي بالاسابيع ؟

Measles (MR/MMR) Vaccination status الحالة التلقيحية للحصبة: NO | No. of doses عدد الجرعات: 0 | Last Vaccination Date تاريخ آخر لقاح

Source of vaccination status | **If not vaccinated what is the cause**

Weekly presentations and bulletins are generated using this data. The findings are shared with WHO and other partners on a regular basis.

Regular Bulletins

The EWARN produces many regular bulletins that show the updates related to different projects in EWARN. The products are developed in both Arabic and English language using the data collected on a regular basis.

MS Excel is mainly used to store the captured data, to create the required components such as graphs, tables, and paragraphs. The products as follows:

- The weekly bulletin of the syndromic data

- It includes permanent charts and figures show the fluctuation of the syndromes surveyed constantly. In addition, occasionally there are ad-hoc charts or figures as per needs to show the seasonal changes of diseases. It also involves a narrative summary highlighting events, emergencies and activities occurred (Figure 6).
- The weekly bulletin of acute flaccid paralysis (AFP)
- A set of visuals are involved in order to show the performance indicators and the quality of surveillance at a governorate level. Highlights are involved to describe the major historical events of AFP surveillance.
- The semi-monthly WASH bulletins
- It contains several maps, visuals, and narrative summary show information about the assessed water stations, functioning status, and chlorination.
- The monthly nutrition bulletins
- It displays information about the malnutrition cases, such as nutritional status, sex and age distribution. In addition, it includes the allocation of the reporting sites along with the related measurement results (Figure 7).

Bulletins and reports are uploaded to ACU's website for sharing purposes in a timely manner.

Figure 62: Epi bulletin - week 47 of 2017

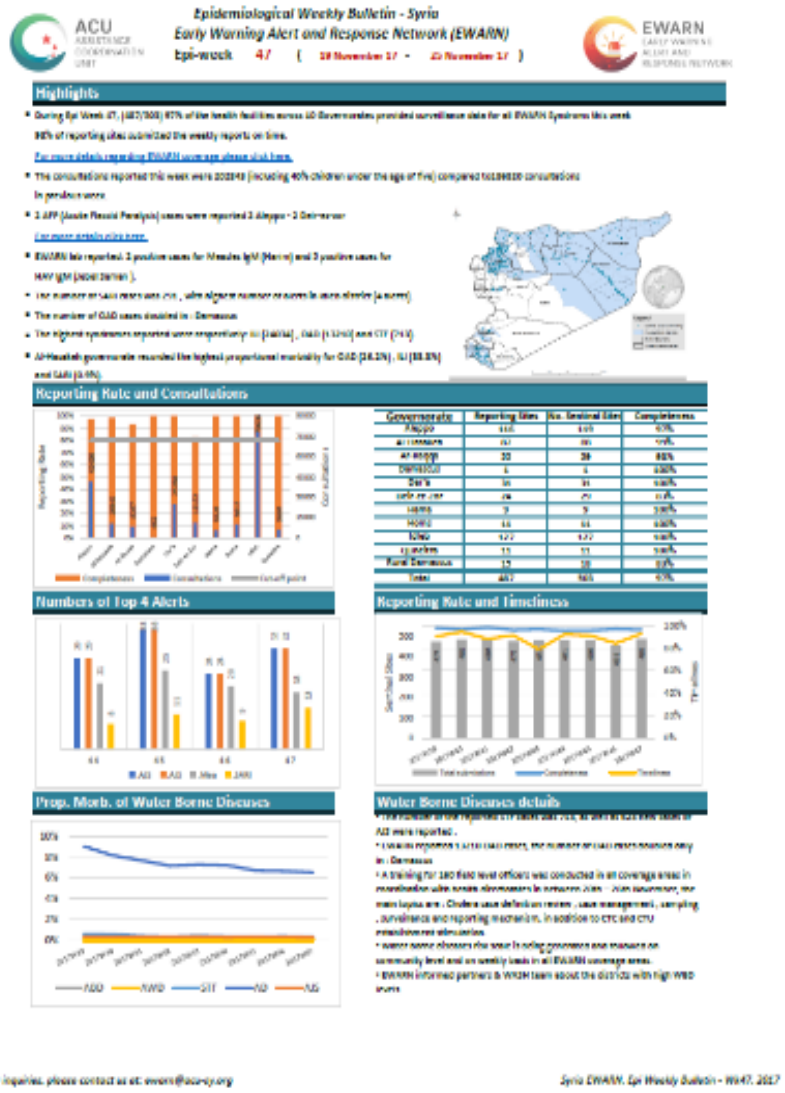
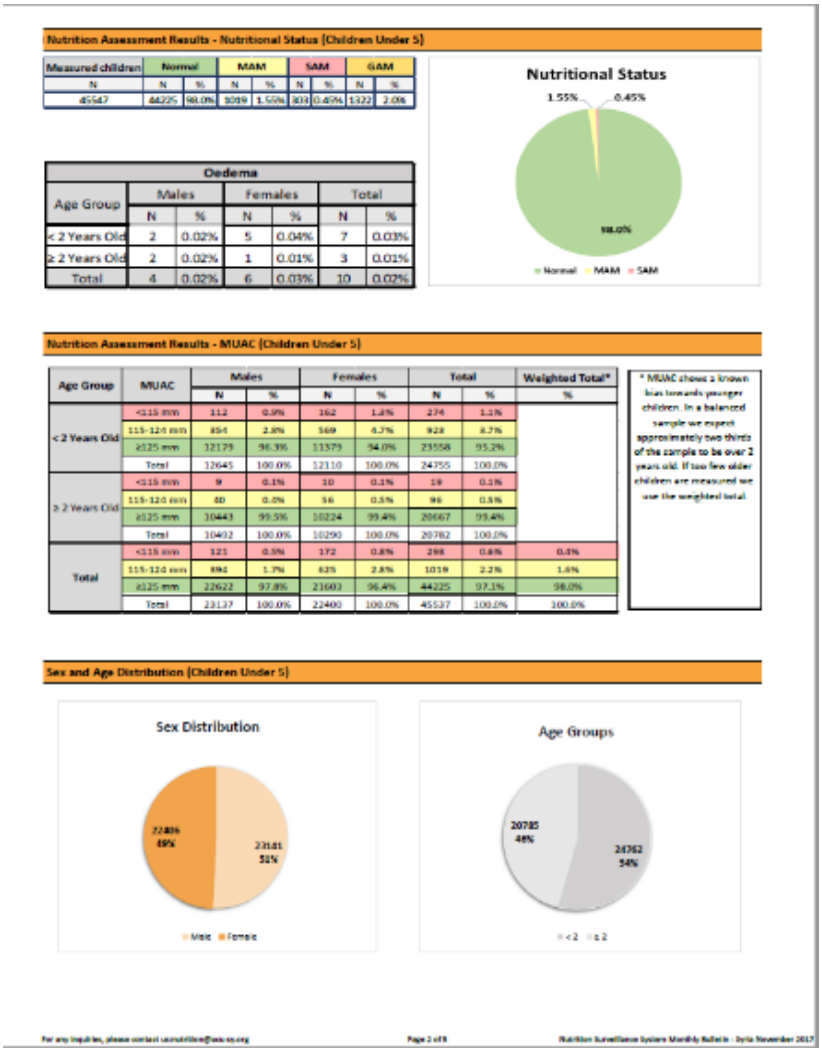


Figure 63: Nutrition bulletin - Nov 2017



Routine and campaigns Immunization Reports

In terms of routine immunization, the data is collected using electronic data entry forms designed using Open Data Kit (ODK). On a monthly basis, the data is refined in order to correct errors and fill gaps. Afterwards, several reports are generated to cover the activities of the vaccination teams and centers.

As for vaccine campaigns, micro and macro plans are set for every campaign. Hence, the data team is used to spend great efforts to update the data related to the targeted communities and camps in order to estimate the targeted children and population. The data team builds required forms and conducts training in regards with entering the data of campaigns and supervision forms. Finally, they generate a campaign report along with different presentations and dashboards to be reviewed with our partners in WHO.

Ad hoc Software

1- Information for Action (IFA) For AFP surveillance

On March 2015, WHO provided EWARN with a data management system called Information for Action for AFP surveillance (Figure 8).

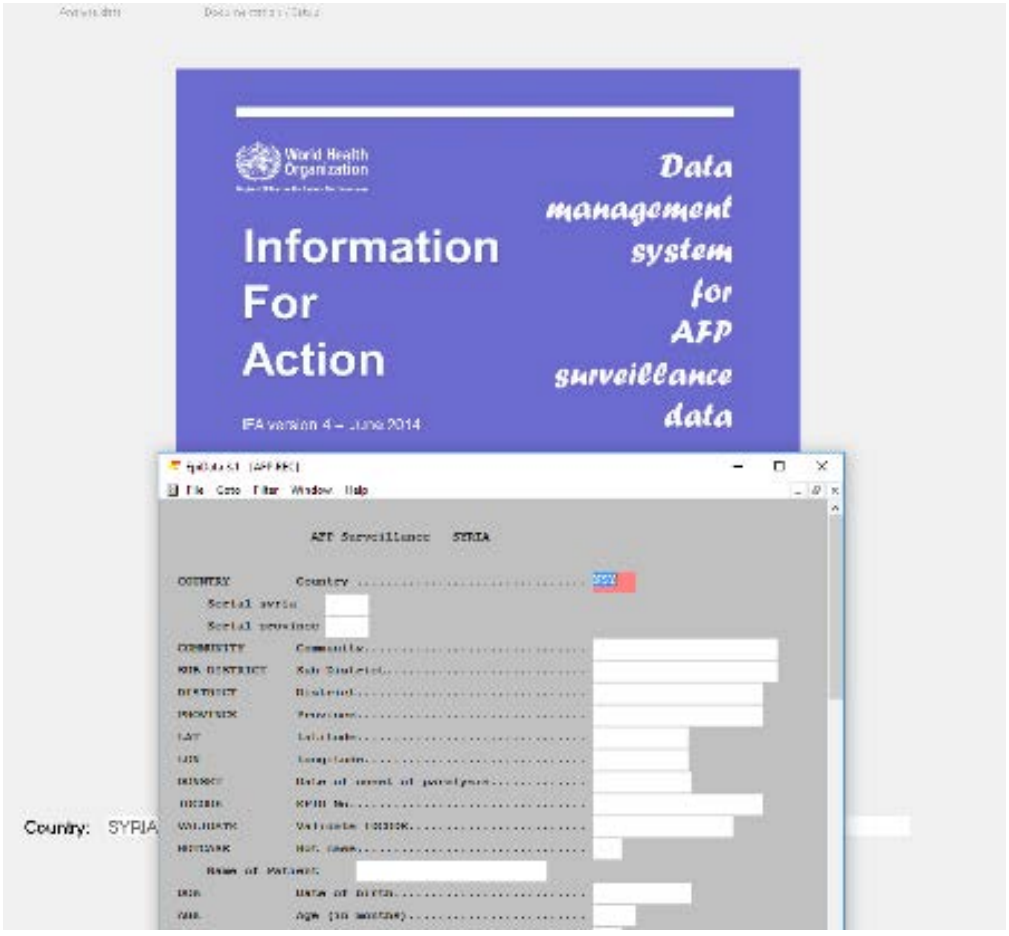
This system is adopted in WHO, EMRO and it's built based on MS Excel, Epi Data Entry, and Epi Data Analysis software.

The system provides three key data entry forms, the first form is used to record the investigation data related to the AFP index case, whilst the second one is used to record the data related to the contacts of the AFP index; eventually, the third form is used to record the population data.

The system displays the AFP indicators and variables using MS Excel, with ability to create customized dashboards and summaries.

It also provides data sharing through a set of shareable files called *.rec files which include the up-to-date data associated with the AFP index cases and contacts. Hence, the AFP data is easily shared on a weekly basis with WHO office in Jordan.

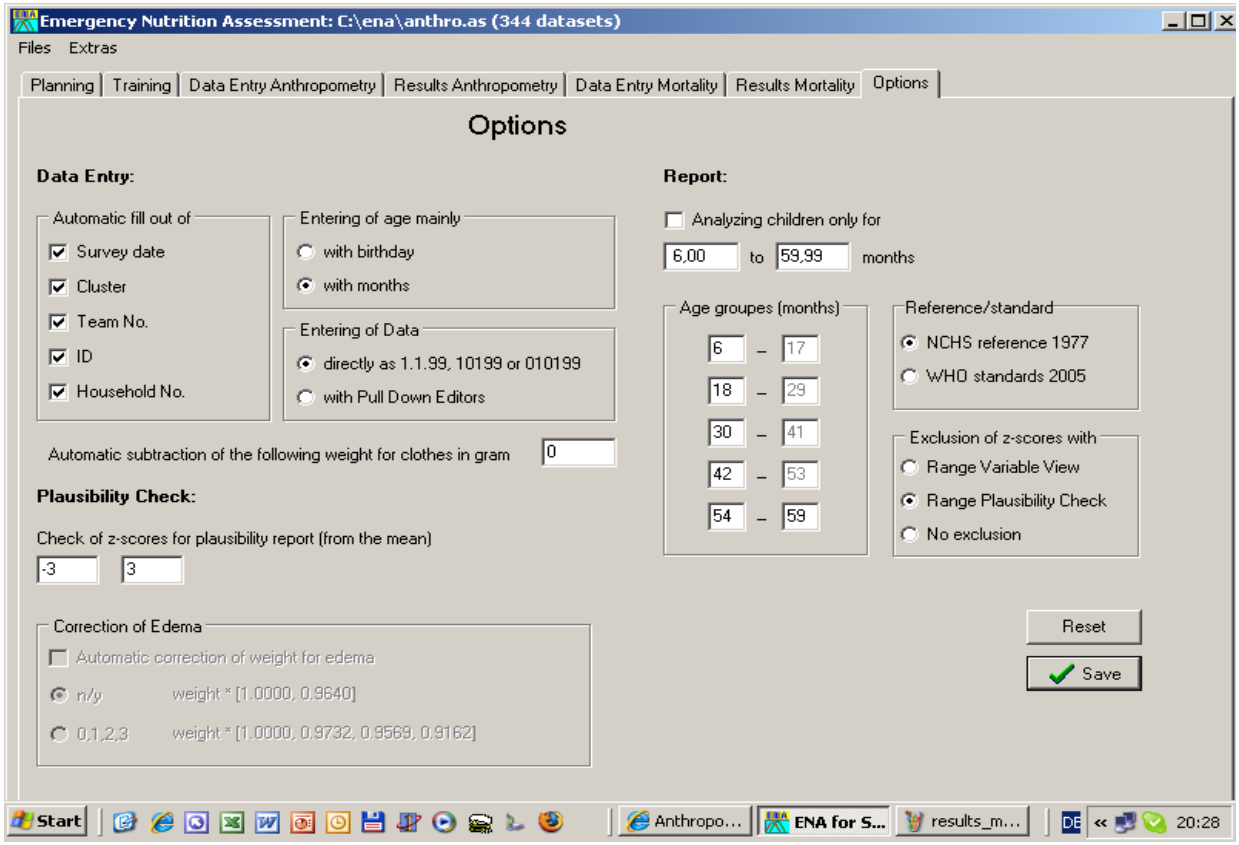
Figure 64: IFA's main window



2- Emergency Nutrition Assessment (ENA)

ENA is a software developed by CDC; this tool is adopted by EWARN for nutrition surveillance at the beginning of 2017. ENA is a user-friendly analytical program recommended by SMART (Figure 9). It has automated functions for sample size calculations, sample selection, quality checks, standardization for anthropometry measurements, and report generation with automatic analyses. ENA is highly favored by field practitioners; it facilitates survey planning, data collection, analysis and reporting with the ability to generate automatic standard tables and graphs for anthropometric indices and plausibility check reports.

Figure 65: IFA's main



Data Visualization

Interactive dashboards enable us to visualize our data, filter on demand, and simply click to dig deeper into the underlying data.

Through 2017, we started using two Business Intelligence solutions, Tableau and Power BI, in order to generate dynamic reports that can be used for in-depth data analysis or to present information to non-data specialists.

Two dynamic products were designed regarding AFP surveillance as follows:

- The comprehensive AFP surveillance analysis (Figure 10).
- The AFP dynamic bulletin.

Figure 66: Vaccine status of some AFP cases reported during 2017

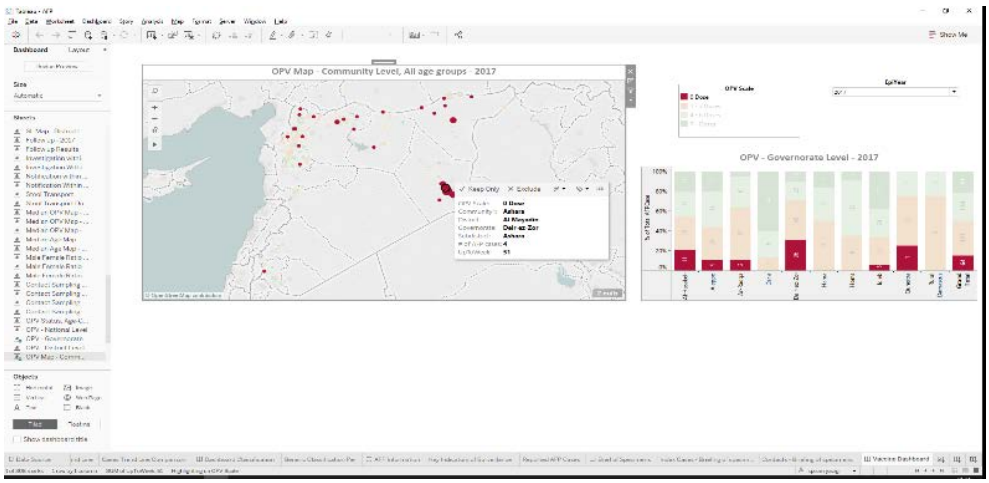
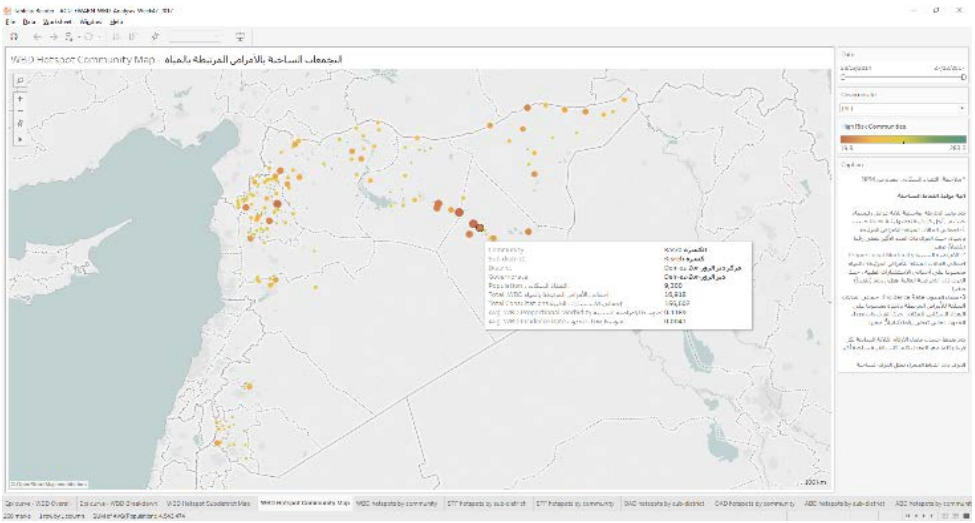


Figure 67: WBD hotspot communities throughout the 3 past years



Regarding Water-Borne Diseases (WBD), an interactive presentation was designed to present the epidemiological situation of WBD (Figure 11). This is monthly presented and shared with the WASH cluster of Gaziantep hub, in order to

highlight the hotspot areas and to address the correlated WASH factors. Accordingly, appropriate response measures can be taken in coordination between the health and WASH clusters.

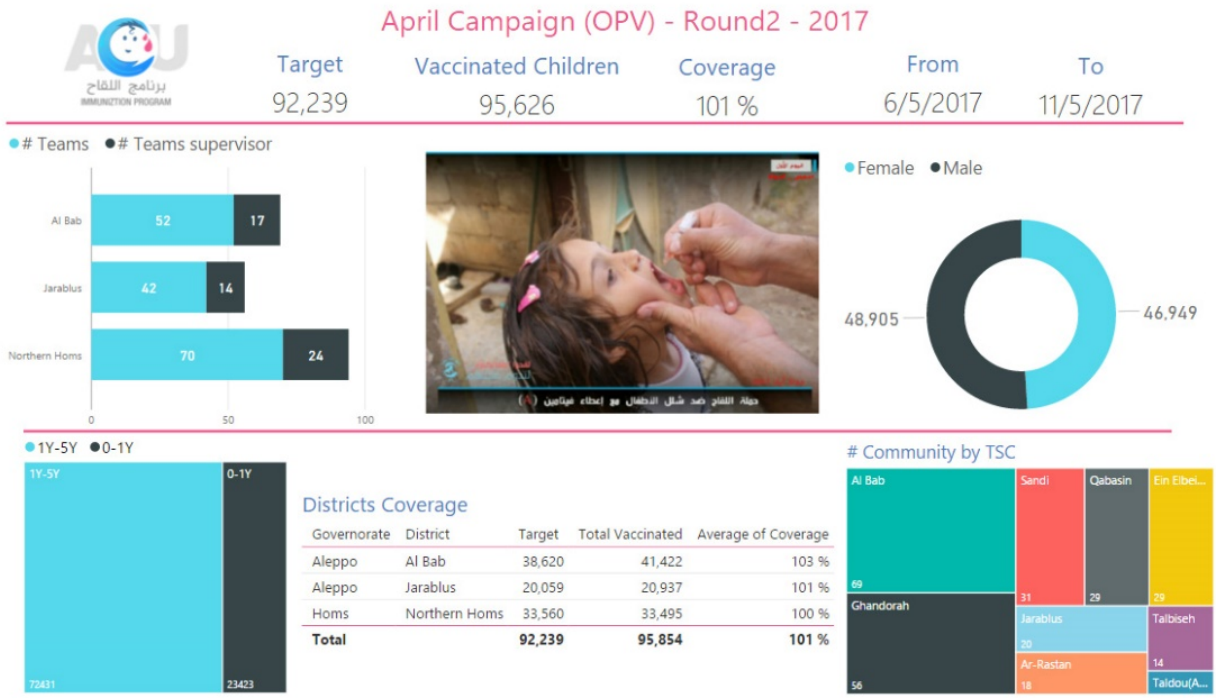
As for nutrition surveillance, a Tableau report has been created to present the nutrition indicators and to show the linkage between the diarrheal diseases and malnutrition cases.

In terms of the syndromic data, an interactive presentation was created and presented in the health cluster on a semi-monthly basis. In the presentation, the key health events and sudden alerts or outbreaks are addressed; so that the health actors can perform required responses.

Different dynamic reports were developed to visualize the achievements and performance of the implemented vaccine campaigns. These reports are reviewed and discussed in Syria Immunization Group (SIG) which is the committee (Figure 12).

Interactive maps of coverage and influence were created and updated regularly. They help us provide guidance and information for the activities we implement in our coverage.

Figure 68: OPV campaign 2017



Electronic Surveillance

- **Mobile Data Collection Tools**

Open Data Kit (ODK)

Through 2017, we implemented a pilot of electronic surveillance in two areas, Aleppo and Idleb. We were collecting data regarding zero reporting and active surveillance from nearly 20 health facilities (Figure 13).

The forms of zero report and active surveillance were developed using a mobile data collection tool called Open Data Kit (ODK).

The data team along with the technical coordinators were pushing to get this pilot succeeded, yet the results were not satisfying. Therefore, a well-prepared plan is set to capture active surveillance data from our health facilities as the start of December 2017.

ODK is also used to collect the daily data of the routine vaccination centers as well.

Figure 69: Active surveillance form on ODK

Epi Info

On end of October 2017, the central level team received a training conducted by the CDC on how to use Epi Info. Epi Info is a software developed by CDC and it is used to:

- Check the survey data for outliers and inconsistent data.
- Conduct a descriptive analysis of survey data.
- Easily generate output files from the analysis.

On December 2017, we started deploying Epi Info in collecting the investigation data of potential disease outbreaks using mobile phones (Figure 14). Moreover, it is planned to be used to generate the related analysis and show the statistical correlations of different exposures to identify risk factors.

Epi Info cascading training is to be delivered to the district and field level officers during 2018.

Figure 70: Epi Info shows demo analysis of measles

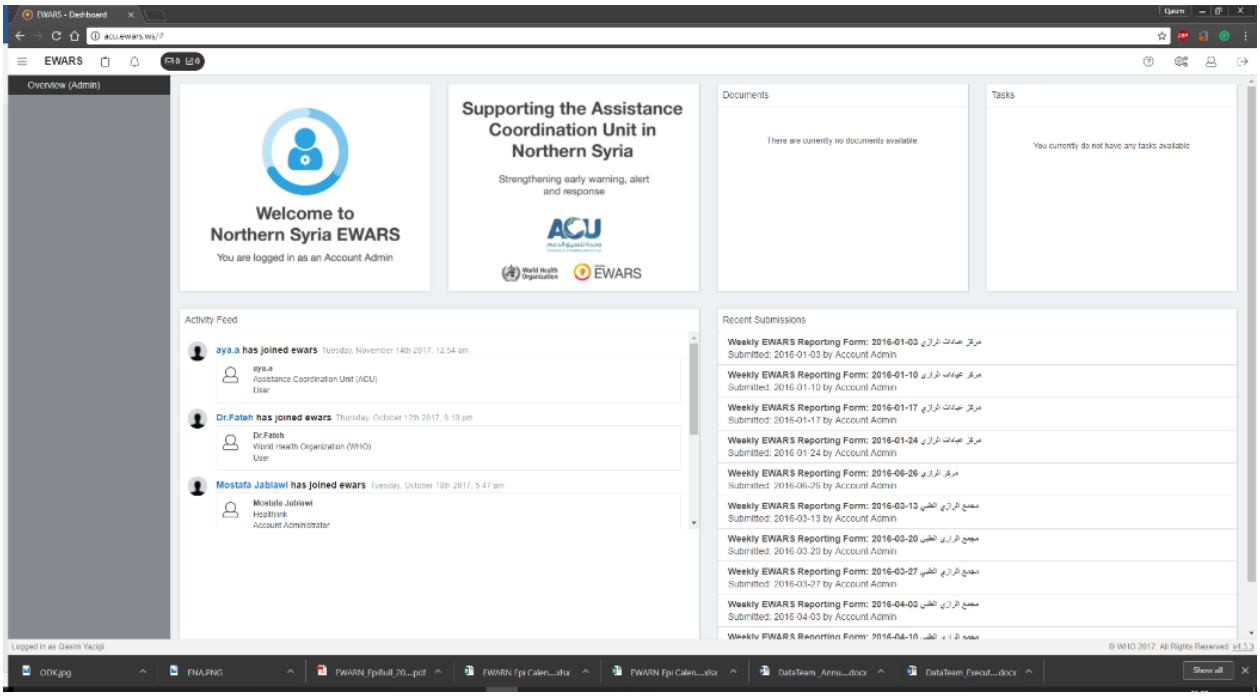
- **EWARS Application**

The Early Warning, Alert and Response System (EWARS) system is designed by WHO to make disease control in emergencies easier and more effective (Figure 15).

The system provides a variety of functionalities as follows:

- Design forms to collect data, control how frequently the forms should be submitted and from which locations, and track completeness and timeliness across locations and users
- Create reporting sites at health facility or community-level as per needs, and easily update and edit map boundaries to map our data as soon as it is collected.
- Assign users with accounts that match their profile. For example, as a frontline health worker, laboratory technician, or rapid response member.
- Set up dashboards to graph or map data in real-time as it is received, and design professional bulletins that can be automatically published and shared with a click of a button.
- Raise alerts to potential disease outbreaks in order to promote a rapid response, configure alerts to determine how and when they will be triggered, and configure alerts to determine how and when they will be triggered.
- In terms of mobile application, create reports and enter data immediately, save drafts offline to complete later, and sync any queued reports when a connection is ready.
- Add integrations to ensure all data collected is interoperable with other systems within a country or internationally.
- Control how external users access data, and approve external user access to specific indicators and timeframes.
- Remain part of the EWARS community by receiving updates when available.

Figure 71: EWARS portal of Northern Syria



The data team performed tests and trails on the system, where the geographical locations of Syria and some demo data of zero reporting 2016 were populated into the system. Maps and graphs were generated to interpret the demo data.

Plans are set in coordination with WHO to deploy EWARS all over our coverage through the first quarter of 2018.

10 EWARS kits are planned to be used to cover nearly 550 reporting sites; where the one kit includes 60 mobile phones along with other accessories.

In terms of training, cascading training in different aspects were sorted and to be delivered prior to April 2017.

3.6.5 Data Archiving and Backup

Data backup and data archiving are business processes designed to protect corporate digital assets.

Data backup focuses on preserving multiple copies of data, so it can be recovered promptly in the event of loss due to disaster, outage, system corruption, human error, or other unforeseen interruption.

Data archiving focuses on retaining a single provably correct copy of non-changing data that may be required for historical, legal, or external compliance reasons.

Bill and Melinda Gates Foundation has donated us with Office 365. Therefore, OneDrive for Business is used to store files from our computers into the cloud, and access them from any device, or share them with others. In addition, a SharePoint team site is used, so we can collaborate on files, documents, and ideas. It is set up to facilitate two-way communication between team members.

Copies of archives and backups are often kept on the server of ACU. There are also multiple shared drives designated for different departments, to enable them to store and share their files internally.

Naming conventions of files and folders are set and followed to enable users to browse file names more effectively and efficiently and distinguish similar records from one another at a glance.

The data team keeps mentoring the other colleagues in order to follow the naming conventions and ensure archives and backups are well-maintained.

3.6.6 Coordination with Partners

Regular and occasional meetings are conducted with the health, the WASH, and the nutrition clusters in order to share information regarding the health events, water-borne diseases updates, and malnutrition situation respectively.

Regular reviews and sessions are conducted with WHO and UNICEF in order to share information with them and to receive required technical support and guidance.

A lot of coordination with Ministry of Health of Turkey, a few organizations, and researchers were carried out in order to promote health benefits and rapid responses.

Data is shared with clusters and other NGOs in different forms such as dynamic reports, summarizations, maps, and data sets.

During 2017, ACU participated in developing capacity in terms of data science in the non-profit sectors. A preparatory training was conducted by the data team of ACU to train the WASH cluster's members. A mobile data collection training for NGOs' staff was conducted by OCHA along with the support of ACU.

3.6.7 Sharing Policy

Open data and data sharing are essential for maximizing the benefits that can be obtained from institutional and research datasets.

Since EWARN is considered a part of the health department of ACU, it follows ACU's data sharing policy. It commits to share and disseminate health data from its programs and studies in an open, timely, and transparent manner in order to promote health benefits for populations while respecting ethical and legal obligations towards patients, participants, and their communities.

Principles Underlying Data Sharing in EWARN

Ethics:

EWARN data sharing will abide by the following ethical principles:

- Medical confidentiality is fully respected.
- The privacy and dignity of individuals and communities are not jeopardized.
- Collaborative partnerships are undertaken in line with EWARN's Ethical Framework for Medical Research and emergencies response; recipients of EWARN datasets will engage, wherever possible, with the local community where the EWARN dataset originates.

Equity:

EWARN data sharing will recognize and balance the needs of researchers who use health data, other organizations which may want to reuse such data, and communities and funders who expect health benefits to arise from surveillance and response.

Efficiency:

EWARN data sharing will improve the quality and value of the delivery of health care and increase its contribution to improving public health and hygiene promotion. Approaches should be proportionate and build on existing practice and reduce unnecessary duplication and competition.

Non-maleficence:

Data sharing shall not put at risk, or be used against, the interests of EWRAN investigated cases, EWARN research participants, EWARN employees, or EWARN partners.

Social benefit:

To promote health benefits and rapid responses to the greater population, data sharing should bring health benefits to individuals and communities outside of those in which the data were collected.

Open access:

Recipients of EWARN datasets shall strive to avoid prohibitively costly approaches, restrictive intellectual property strategies, or other approaches that may inhibit or delay the use of the results of their research to the benefit of the Syrian society. Recipients shall not seek any intellectual property rights of any kind with respect to results generated by or arising out of the use of EWARN datasets without prior written consent.

3.6.8 Challenges

- Develop an approach to raise alerts is very challenging. Many methods were developed and tested taking into consideration the data of the past 3 years. The aim is to calculate the alert thresholds through monitoring epi curves and deviations from the norm.
- Deploy ODK in e-surveillance is one of the big challenges due to lack of in-office training.
- Maintain and give codes to the reporting sites of zero reports needs constant monitoring and checking of the submitted zero reports
- We were not able to conduct the required training inside Syria, because of the difficulty of getting the required clearances from the Turkish authorities in order to travel to Syria.
- Lack of technical support for mentoring our network. The technical support is often provided to field staff over phone calls, Skype, e-mail or WhatsApp.
- Lack of training for data staff makes us search for better IT solutions and learn them ourselves, which is a very good thing to expand our capacity; yet, very time consuming.
- Integrate innovative IT solutions to provide smart data interpretation and to overcome other software shortages requires us to work overtime frequently and excessively due to everyday work.
- The non-technical employees hate using SharePoint or refuse to use it, because it feels clunky and complicated.

3.6.9 Plans

- EWARS system is to be deployed after conducting the required cascading trainings at the first quarter of 2018.
- Maintain the integration between the EWARS system and the other tools used currently.
- Generate more interactive interpretations of EWARN's data using Tableau and Power BI to cover measles surveillance, WASH, nutrition, and vaccination data.
- Epi Info is to be deployed in collecting the data of alerts and analysing the outcomes.
- 10 data officers are to be recruited in the field, in order to provide technical support for capacity building.
- Utilize the information bank of EWARN in further researches through 2018.
- Take advantage of the available purchased accounts of e-Learning Platforms in terms of furthering knowledge and building capacity.
- Conduct regular data training either in-office or online to increase knowledge and skills of the team at all EWARN levels.
- Utilize high-level programming languages (R Programming and Python) in data processing and overcoming the limitations of used software.
- Utilize SPSS in the coming researches of EWARN in regard with the bio-statistical analysis of data.
- Develop the team's skills regarding SharePoint in order to utilize it well.

3.6.10 Recommendations

- Data sharing policy needs to be reviewed and amended in order to wisely select the parties who make a remarkable impact; because being open to every single party lays a heavy burden on the Data Management Team's shoulders.
- Acquire clearances of the data team from the Turkish authorities in order to facilitate the border crossing for regular field visits.
- Seek certified and accredited training and courses regarding data science and analytics, in order to sharpen the skills of data team.
- Find scholarships, grants, fellowships and other student funding in order to develop and build our knowledge, skills, and values.
- Build strong trust bounds with all partners and working group clusters and for the sake of knowledge exchange.
- Networking with other management teams across local and international organizations to share experiences and ideas and to improve in-house knowledge.

Section 4: Coordination and participations

Table 39: Review of participation details for EWARN team in different sectors

Cluster / Group	Frequency	Place
Health cluster -Turkey`s Hub	Biweekly	Gaziantep
AFP Indicators Surveillance review	Weekly	Gaziantep
WASH cluster-Turkey`s Hub	monthly	Gaziantep
Nutrition cluster - Turkey`s Hub	Biweekly	Gaziantep
Health cluster- Jordan`s Hub	1 Per 6 weeks	Via Skype
Cholera Technical Group	monthly	Gaziantep

Table 40: Review of coordination details for EWARN team with different partners:

Coordinating Partner	Area of coordination
BMGF	Planning and implementation for E- **Surveillance** Technical support (Epidemiological expert recruitment) in the 2nd half of 2016
WHO	Technical support (Epidemiological expert recruitment) in the 1st half of 2016 AFP surveillance and indicators supervision Vaccination activities supervision and related trainings Funding the training activities and guidelines printing in the 1st half of 2016 (through SAMS) Funding the vaccination campaigns (through UOSSM) Donation for 2 Laboratories in Idleb and A'zaz Donation for 4 IDDKs
UNICEF	Vaccination activities supervision and related trainings Supervising the switch process for polio vaccine (tOPV to bOPV) Funding social mobilization materials for AIRI (1,2 and 3) campaigns Providing cholera RDTs for both north and south of Syria Planning for the Nutrition surveillance program
Health Directorate _ Gaziantep	Receiving samples of: AFP- suspected cholera – SARI
Health Directorate _ Amman	Receiving samples of: AFP Planning to receive other kinds of samples (measles – rubella – cholera and SARI)
SIG	Tracking AEFI during the campaigns Guiding SIG plan for reactivating EPI program
SAMS	Third party in funding the training activities and guidelines printing in the 1st half of 2016
SEMA	FLOs and health workers training on WBDs in Idleb
PAC	Train the District Nutrition Officers in Aleppo and Idleb Train the vaccination team about vaccine cold chain management
UOSSM	Third party in funding the vaccination campaigns
IDA and Shafak	Third parties in the delivery process of Idleb and A'zaz laboratories
Gazi _ Lab	PCR and blood culture techniques training for Lab staff
Idleb Health directorate	Provide a secured place for the laboratory in Idleb city
Local authorities in: Al-Hasakeh, Jarablus, Menbij.	Reactivation of EWARN and facilitating the related activities
Coordination to support partners	**Area of coordination**
UNICEF	Evaluation of drinking water sources in 10 governorates
SEMA	Biological examination of drinking water sources in Idleb and Hama
IMC	Evaluating the needs of epidemiological laboratory in Harim
UOSSM	Performing sero-survey for HBV for 250 health workers in Bab Alhawa Hospital – Idleb.
Ihsan	Evaluation the water quality in Idleb and Hama
Idleb Health directorate	Support their statistics for communicable disease
Local authorities in besieged and hard to reach areas	Implementation for many vaccination campaigns (Polio R12 –MR- AIRI1 - AIRI 2 and AIRI3)
NGOs health workers in Syria	Training 739 health workers of the NGOs in Syria within 2016 on the principles of EWARN and the prioritized diseases (the details are in building capacity section).

Section 5: Other Departments involvement:

5.1 Media aspect in EWARN:

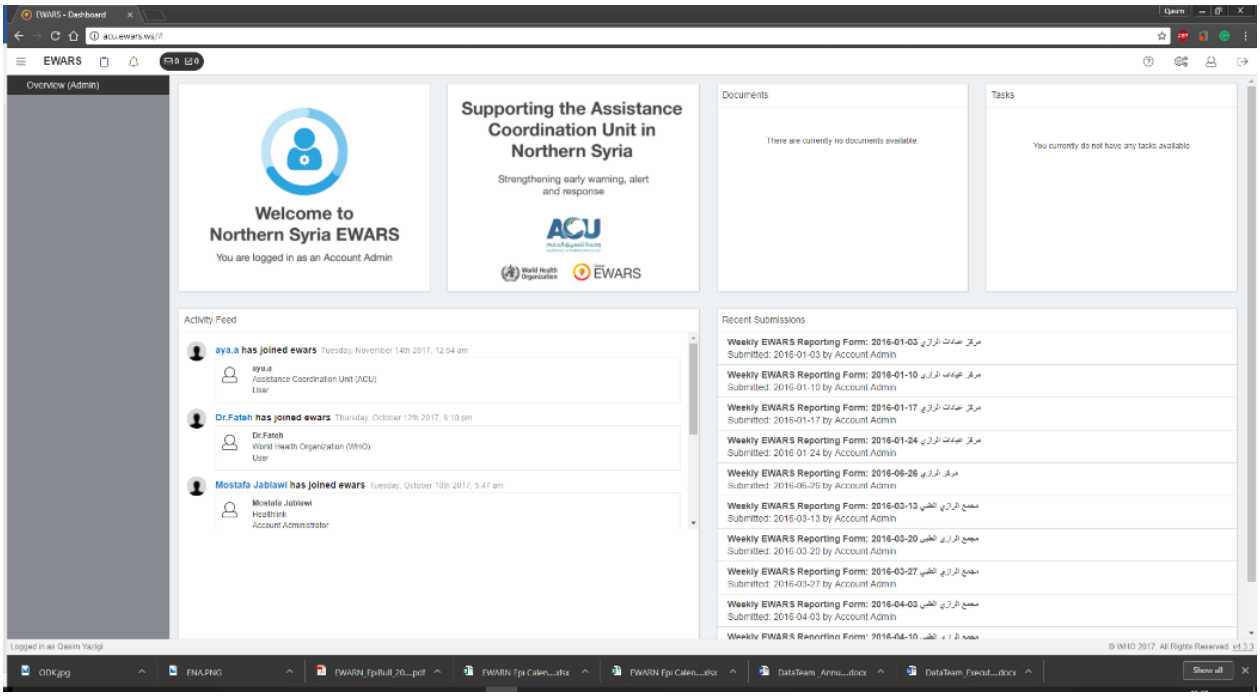
At the end of 2015, and with more focus on both response and prevention, the importance of having a clear media plan was raised, in order to access to the largest recipients, spread the benefits to the target group, create an active and attractive channel with stakeholders, partners, beneficiaries and public.

That could be briefed in the following items:

1- Website

continue to improve the EWARN page on the ACU website (http://www.acu-sy.org/en/early-warning-alert-and-response-network/) , and upload all the related materials (Reports – Guideline –Infographics – IEC materials). This has resulted in making EWARN page the most viewed on the web site **by 9,163** out of **32,558** views per month.

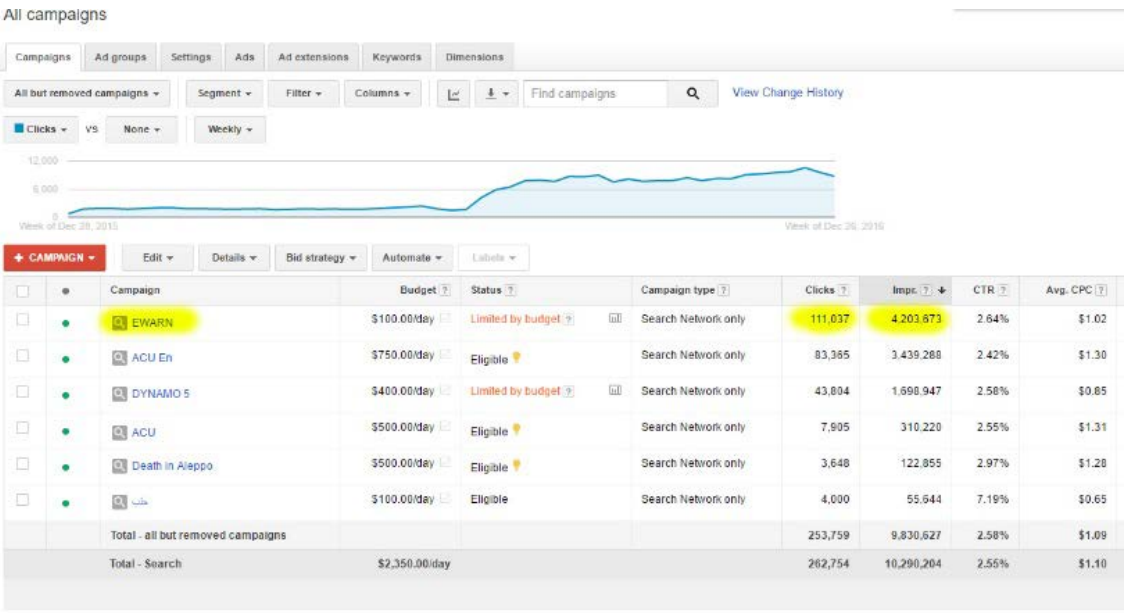
Figure 72: EWARS portal of Northern Syria



2- **Google Ad Words sponsored advertisements,** through awareness campaigns about the diseases transmission and ways of preventions, and the visual reports for EWARN activities (training, vaccination campaigns, social mobilization, etc.). These resulted in the following statistics:

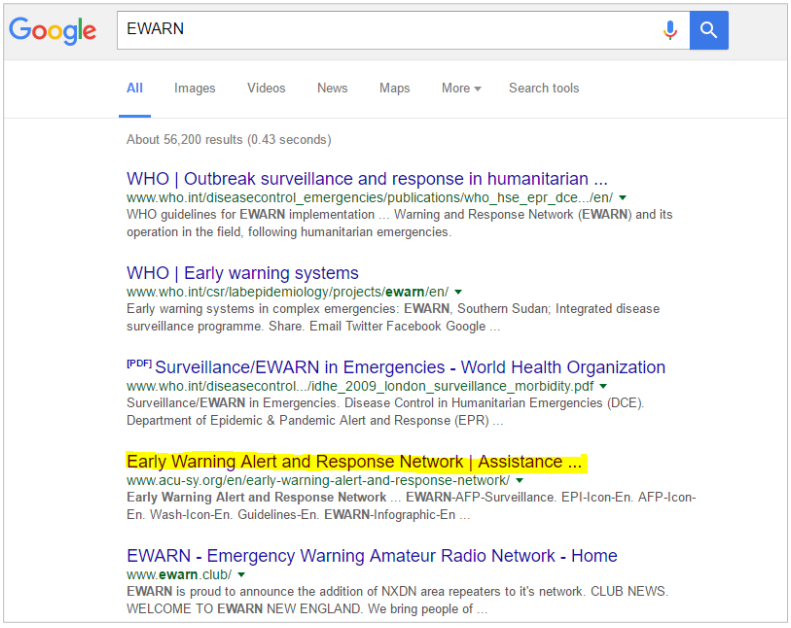
- 4,203,673 people have seen the campaign`s advertisements on Google with 111,037 clicks per month during 2016.
- The search results for EWARN on Google comes in the fourth position.

Figure 73: Google AdWords sponsored advertisements review



Campaign	Budget	Status	Campaign type	Clicks	Impr.	CTR	Avg. CPC
EWARN	$100.00/day	Limited by budget	Search Network only	111,037	4,203,673	2.64%	$1.02
ACU En	$750.00/day	Eligible	Search Network only	83,365	3,439,288	2.42%	$1.30
DYNAMO 5	$400.00/day	Limited by budget	Search Network only	43,804	1,698,947	2.58%	$0.85
ACU	$500.00/day	Eligible	Search Network only	7,905	310,220	2.55%	$1.31
Death in Aleppo	$500.00/day	Eligible	Search Network only	3,648	122,855	2.97%	$1.28
[illegible]	$100.00/day	Eligible	Search Network only	4,000	55,644	7.19%	$0.65
Total - all but removed campaigns				253,759	9,830,627	2.58%	$1.09
Total - Search	$2,350.00/day			262,754	10,290,204	2.55%	$1.10

Figure 74: EWARN position on Google search



3- **Social media:** upload all the related activities and materials on social media.

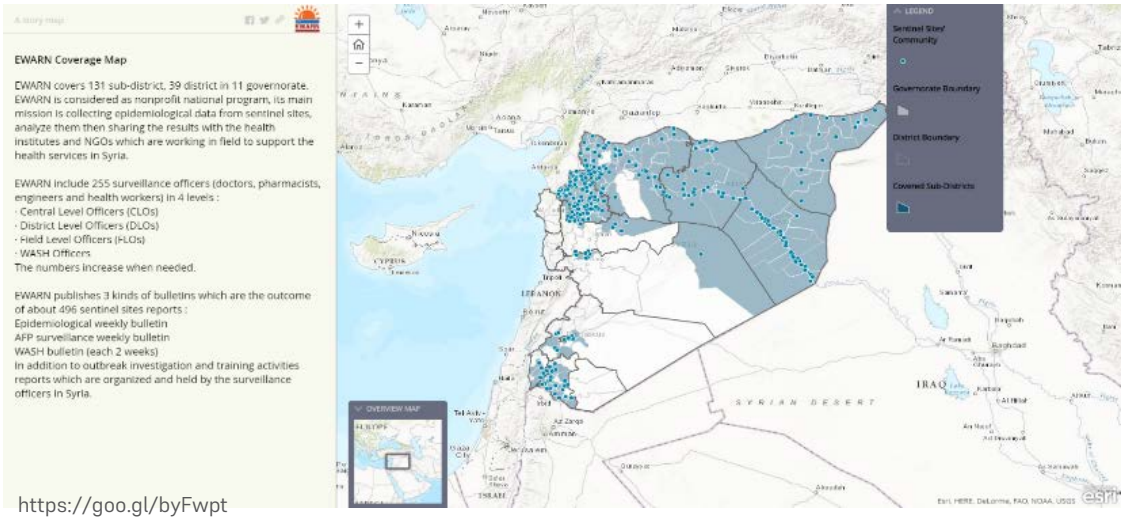
Figure 75,76,78: Examples for EWARN activities that published on Facebook.

Figure 79: Influenza awareness animation film.

https://www.youtube.com/watch?v=o7vVhVstxPQ

4- **Interactive map:** designing an interactive map in coordination with IMU and DMT and set a time frame to finalize it.

Figure 80: EWARN coverage on the interactive map.



https://goo.gl/byFwpt

5- **Animation film:** the production of the first cartoon film about poliomyelitis awareness as a first film of a series of animation films, followed by another film about Influenza, both aimed to increase the awareness about the communicable diseases, with a future plan to benefit the Syrians in particular and the Middle East in general.

Figure 81: Polio awareness animation film .

https://www.youtube.com/watch?v=XQ0zwo33fzk

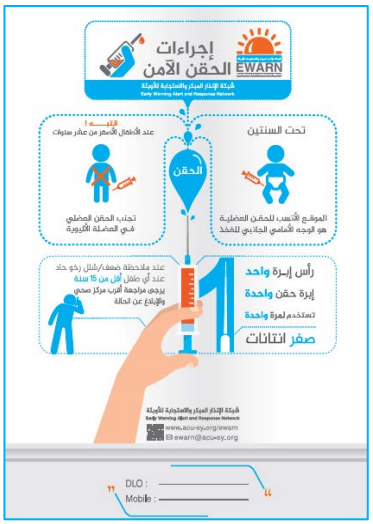
6- IEC materials:

Table 40: The main IEC material which have been designed in 2017:

Brochures	EWARN definition	Cholera awareness	Water treatment at home and safe storage	Typhoid fever awareness	Pertussis awareness	Influenza awareness for public
Posters	Case definition	Influenza awareness for health workers	Rules of safe injection	Rules of prevention of water contamination with sanitation	Hepatitis A awareness	Vaccination campaigns materials
Guidelines	AFP surveillance	Measles and Rubella surveillance	Laboratory Guidelines	AEFI Surveillance	EWARN guidelines – English version	
Others	2016 colanders and diaries	Annual report	Prevention of water contamination with unclean ice – street banner	Aman hygiene campaign in Rural Damascus –banners, cards, posters	Prescription for clinician	

Figure 82: Examples of awareness brochures _ designed for EWARN

Figure 82.1: Examples of awareness brochures _ designed for EWARN

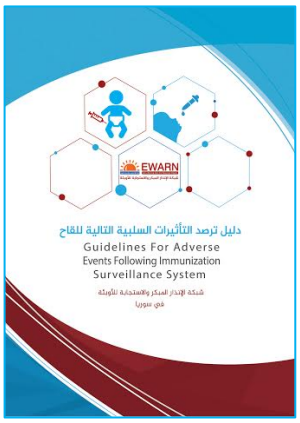


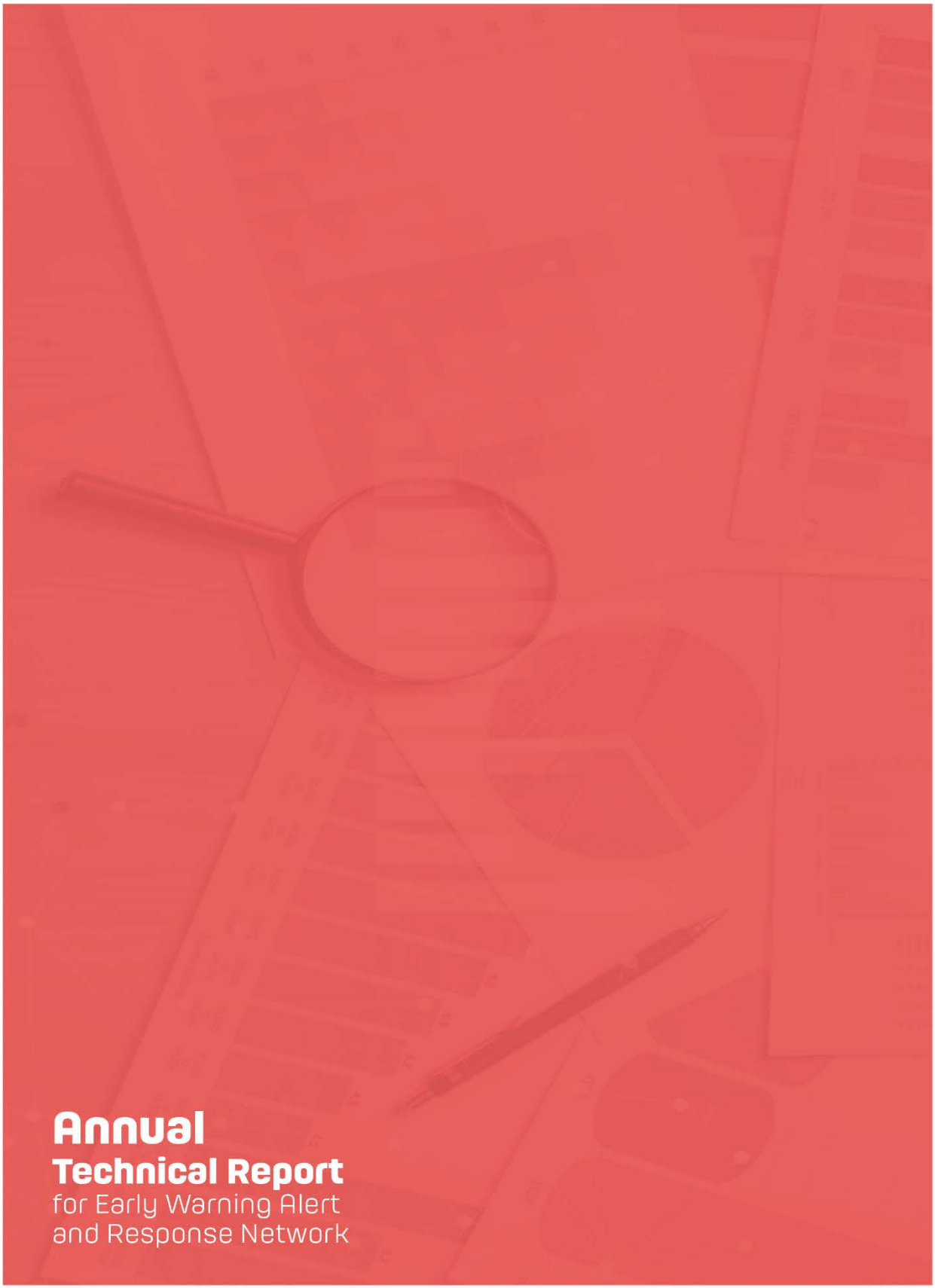
7- **Videos** (producing – photo – montaging):

Table 41: The main activities which have been covered in 2017

Launch the campaign of" Lets finish polio in Homs "	https://www.youtube.com/watch?v=YBFNekANg8w&index=2&list=PLrf2x-zVov4CwaK_TUZDiJi8HbBl3y_vS
Workshop of CLOs with WHO expert about outbreaks response in emergencies	https://goo.gl/1NvtyV
Homs vaccine campaign R1 polio coverage" Lets finish polio in Homs "	https://www.youtube.com/watch?v=xVvpuGLuVNA https://www.youtube.com/watch?v=YBFNekANg8w
AIRI 1 vaccination campaign in Homs	https://www.youtube.com/watch?v=j-scKoNH8is
First quarterly meeting coverage	https://www.youtube.com/watch?v=30mz2VXLjfk
Second quarterly meeting coverage	https://www.youtube.com/watch?v=RxWl2DGnhcg
Third quarterly meeting coverage	https://goo.gl/mMCYzr

Figure 77: Guidelines for AFP, Measles and Rubella, AEFI Surveillance and Laboratory – designed for EWARN





Annual
Technical Report
for Early Warning Alert
and Response Network

EWARN
EARLY WARNING
ALERT AND
RESPONSE NETWORK

Incilipinar Mah.3 No lu Cd.
Akinalan is Mrk. Kat 5
Sehitk amil/Gaziant ep. Turkey

+90 (34) 2220 10 77
info@acu-sy. org
www.acu-sy.org

وحدة تنسيق الدعم
ASSISTANCE COORDIN ATION UNI T