Syrian Arab Republic

PAMI REPORT

list of abbreviations/acronyms

- AWD: Acute Watery Diarrhea
- ACU: Assistance and Coordination Unit
- CPHL: Central Public Health Laboratories
- EWARS: Early Warning Alert and Response System
- EWARN: Early Warning Alert and Response Network
- GOS: Government of Syria
- GTFCC: Global Task Forces on Cholera Control
- MoH: Ministry of Health
- NWS: Northwest Syria, include governorates of Idelb and Aleppo
- NES: Northeast Syria, governorates of Al-Hassakeh, Deir Ez-zor, and Ar-Raqqa
- NCP: National cholera Plan
- RDTs: Rapid Diagnostic Tests
- WHO CO: World Health Organization - Country Office

I. B A C K G R O U N D

1.1 **General background/context:**

The Syrian Arab Republic is located in the eastern Mediterranean region, bordered by Turkey to the north, Iraq to the east, Jordan to the south, Palestine to the southwest, and Lebanon and the Mediterranean Sea to the west. The estimated surface area is approximately 185,180 km^2 . The landscape in Syria includes diverse terrain like desert, fertile plains, and mountains. The Euphrates River is one of primary water source, particularly in the northeastern governorates.

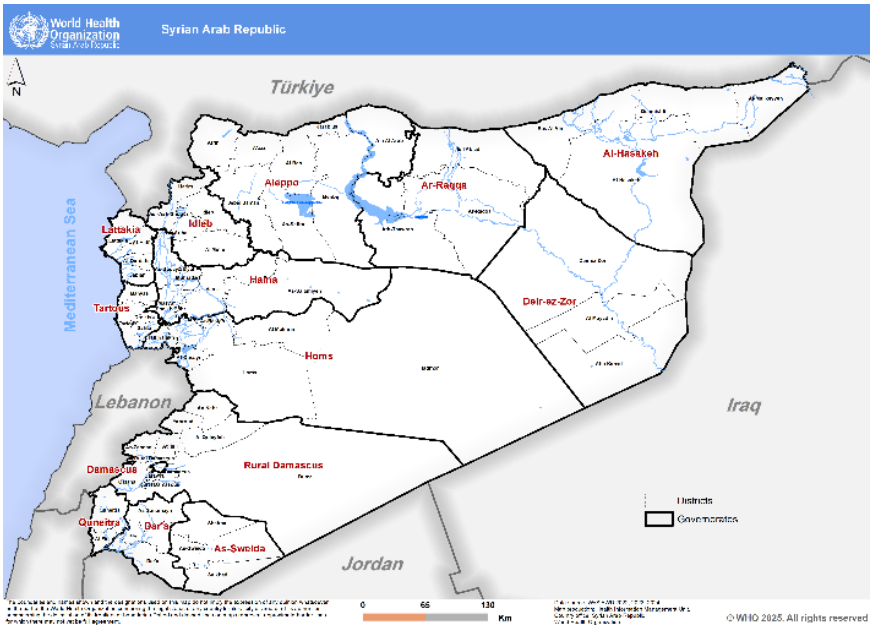
In Syria, two types of geographic division are applied as follows:

- Administrative Division: four levels, used by different sectors: 1st level:14 governorates, 2nd level: 62 districts, 3rd level: 270 sub-districts, and 4th level: community-level units.
- Health Division: two levels, used by only MoH, 1st level: 14 governorates and 2nd level:107 health districts.

The health division is used exclusively by the Ministry of Health, while other sectors use the administrative division for planning and interventions There are discrepancies and mismatches between the health and administrative divisions.

- Given this discrepancy, the administrative division was used as the common geographic unit for PAMI analysis.

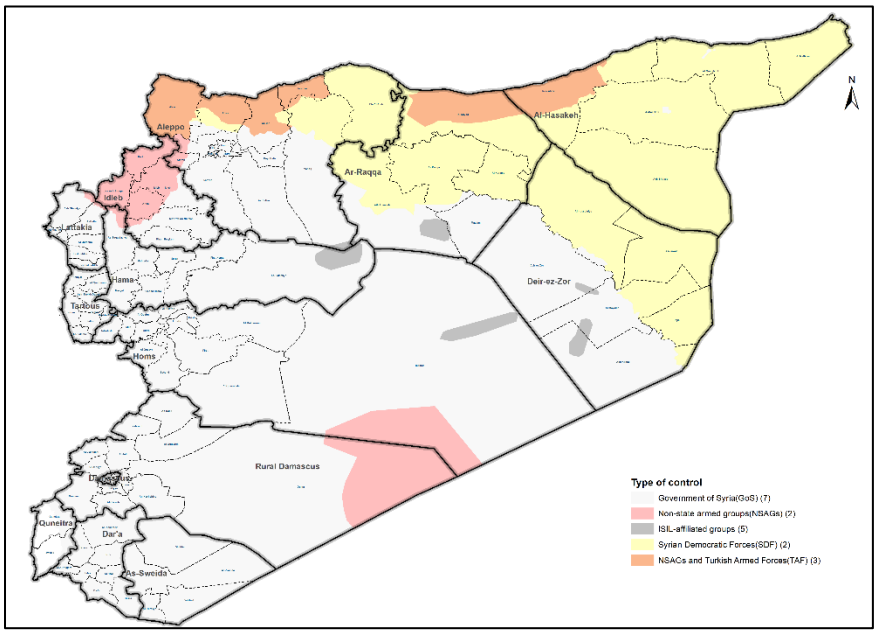
Figure 1: map of Syria Arab Republic



Syria has been suffering from protracted armed conflict since 2011 which created a humanitarian crisis. Prior to the political transition on 8 December 2024. Syria was divided into three main areas of control. The Government of Syria control (GoS) areas included main cities like Damascus,

Homs, Hama, Latakia, and parts of Aleppo, Deir Ezo-zor, Al-Hassakeh, and Ar-Raqqa. In the northeast, the Syrian Democratic Forces (SDF) controlled most of governorates in the NE Syria, including most areas of Al-Hasakeh, Ar-Raqqa, and the western part of Deir-ez-Zor and some parts of Aleppo governorates. In the northwest, including most of Idleb governorate and northern rural Aleppo, areas were under the control of other non-state armed groups. It is important to note that in northeastern and northwestern Syria, the delineation of authority at the district or sub-district level was very difficult to define, and did not follow the administrative boundaries. Control frequently shifted due to local dynamics, and security developments. Therefore, areas of control were shaped more by the evolving on-ground situation than by formal governance structures (district and sub-district).

Figure 2: map of Type of Control in Syria Arab Republic prior to 8 December



As of 2025, Syria's estimated population is approximately 23 million (OCHA updates 2025), though the figure remains uncertain due to the absence of a recent national census (the last official census was conducted in 2004). The demographic landscape is heavily shaped by more than a decade of conflict, which has led to huge internal displacement.

In Syria there are currently estimated 7.4 million IDPs residing in 1,533 camps and collective centers/shelters primarily in northwestern and northeastern governorates (Aleppo, Idleb, Al-Hasakeh, Raqqa, and Deir-ez-Zor). Many families lack access to safe drinking water, adequate sanitation, and essential health services. Key risk factors made worse by population displacement include:

- Inadequate WASH infrastructure.
- Intermittent NGO support in water provision.

- Unsafe water storage practices.
- Poor latrine conditions that fail to meet humanitarian standards.
- Power outages disrupting water systems.

1.2 **Information on any previous identification of PAMIs:** This is the first PAMIs for Syria

1.3 **Information on NCP status and targets (past, current, and future) in the country**: Syria NCP has not been developed, is planned as part of the actions after the PAMIs endorsement.

1.4 **Concise description of cholera surveillance system**

In response to the humanitarian crisis in Syria in 2011, two sentinel-based early warning systems were established to address critical gaps in the country's routine disease surveillance and to ensure timely detection, reporting, and response to outbreaks particularly in remote, conflict affected, and hard-to-reach areas.

These systems, EWARS (Early Warning, Alert, and Response System) and EWARN (Early Warning, alert, and Response Network), have operated in parallel since 2012–2013, providing essential surveillance coverage across both government-controlled and non-government-controlled areas of Syria. Acute Watery Diarrhea (AWD) is one of the priority conditions diseases in both EWARS and EWARN. The alert threshold is one case for immediate notification that requires verification and investigation within 48 hours.

Case definition of AWD/suspected cholera case (EWARS and EWARN)

- Acute diarrhea: Defecation >=(3) times a day, loose stools, lasting for =<(7) days.
- Acute watery diarrhea (AWD): Diarrhea with loose, watery stools that may contain mucus, lasting <7 days.
- Suspected cholera case in the absence of a confirmed outbreak: Any person with acute watery diarrhea (AWD) aged >2 years with severe dehydration or death from AWD.
  Suspected case in a confirmed outbreak: Any person with acute watery diarrhea or death from AWD.
- A confirmed cholera case is any person: infected with Vibrio cholerae O1 or O139, as confirmed by culture (including Sero agglutination) or PCR.

Both surveillance systems, EWARS (MoH) and EWARN (ACU), case definition is aligned with the GTFCC standard case definition for suspected cholera. However, there are differences in how this case definition is operationalized, which affects data comparability between the two systems:

- EWARS (MoH system) applies a more specific interpretation of the case definition. The MoH primarily reports suspected cholera cases presenting with acute watery diarrhea (AWD) and signs of dehydration. This approach may result in underreporting, especially of mild and moderate cases.

- EWARN (ACU system), on the other hand, applies a more sensitive approach, reporting all AWD cases regardless of age or severity. This leads to a broader case capture and potentially higher case counts.

While the textual definition remains consistent with GTFCC guidance, the criteria used in practice and thresholds for reporting differ, resulting in variability in reported case numbers and age distribution between both systems.

This discrepancy emphasized the need for continued coordination and harmonization between EWARS and EWARN, particularly regarding case definition application, reporting thresholds, and data interpretation. These differences should be considered when analyzing trends or comparing data across different administrative areas covered by different systems.

TABLE 1: Description of EWARS and EWARN

FEATURE	EWARS	EWARN
ESTABLISHED	2012	2013
MANAGING ENTITY	Ministry of Health (MoH)	Assistance Coordination Unit (ACU)
COVERAGE	Government-controlled governorates and NE syria (14 governorates, see map 2)	Non-government-controlled areas (mainly NW Syria, in addition NE Syria see map 2)
ESTIMATION OF POPULATION COVERAGE	18 million	5 million
SENTINEL SITES	1,400	400
DATA PLATFORM	Paper forms → digital system at district level	DHIS2
REPORTING FREQUENCY	Weekly bulletins (MoH and DoHs)	Weekly EWARN bulletin (ACU)
WHO SUPPORT	Technical support, lab capacity, logistics	Technical support, training, evaluation
PRIORITY DISEASES /CONDITIONS	9 diseases Acute diarrhea, acute watery diarrhea, bloody diarrhea, acute jaundice syndrome, suspected measles, acute flaccid paralysis, suspected meningitis, severe acute respiratory infection, influenza like illness	12 diseases Acute diarrhea, acute watery diarrhea, bloody diarrhea, acute jaundice syndrome, suspected measles, acute flaccid paralysis, suspected meningitis, severe acute respiratory infection, influenza like illness, suspected typhoid, suspected leishmaniasis, unexplained deaths

LABORATORY	Central Public Health Laboratory, 6 peripheral labs in Homs, Hama, Tartous, Lattakia, Deir Ez-zor and Aleppo	Two laboratories in Idleb and Aleppo

Laboratory testing strategy for acute watery diarrhea/suspected cholera cases

In Syria, cholera RDTs are provided to health facilities, both government and NGO controlled, to enable the speedy testing of AWD/suspected cholera cases. For positive RDT cases, samples are packaged and sent to the Governorate or National Public Health Laboratory in Damascus for further analysis and confirmation, the confirmation of samples in NW Syria is conducted in the ACU laboratories in Idleb and Aleppo. Transportation is by using Cary-Blair transport medium, stored at room temperature or at 2–8°C. The guidelines provided to the Governorate level DoH and RRTs are that samples must be transported within five days of collection.

Once received at the public health lab, the specimen is cultured on TCBS agar, undergoes oxidase reagent testing, and is finally genotyped using antiserum. If the sample tests positive, antibiotic sensitivity testing is also conducted. To ensure quality assurance, positive cultures at sub-national level labs are also referred to the central laboratory in Damascus for final confirmation and for quality control. Currently, cholera confirmatory testing capacity is available at the referral public health laboratory in Damascus and sub-national laboratories located in Aleppo, Homs, Hama, Latakia, Tartous, Rural Damascus, Idlib, and Deir ez-Zor.

At the start of an outbreak, each RDT-positive sample is referred to the lab for confirmatory testing. When cases increase, then the referral of samples for testing is to confirm cases in new locations, to confirm the end of an outbreak in a location/region, or nationally.

Two cholera testing strategies are implemented by EWARS and EWARN (see annex1) The variance in practical application of case definitions and testing strategies between EWARS and EWARN has affected the number of RDT tests conducted and samples collected for laboratory culture. For example, EWARS tests all cases reported by hospitals using RDTs and the positive RDTs are then tested by the culture, while EWARN tests a percentage (5%) of samples of cases in health centers/hospitals.

AWD surveillance challenges and political context

Challenges related to surveillance inconsistencies including:

- Differences in applying case definitions despite using the same case definition (EWARN more sensitive; EWARS more specific, EWARS reported suspected cholera cases with dehydration, EWARN report AWD cases).
- Surveillance unit for AWD/suspected cholera cases (EWARN PHCs, MoH hospitals)
- EWARN revised its case definition in February 2024 after they declared end of outbreak, resulting in a marked decline in reported cases, moved from case definition of suspected

case in a confirmed outbreak to case definition of suspected cholera case in the absence of a confirmed outbreak (see above AWD case definition).

- Surveillance was affected by the post-8 December 2024 political transition, in the first two months after the transition disruption of surveillance resulted in a drop in reporting. in addition, for the NGOs operate in the NW Syria and NE Syria the transition also coincided with the anticipated end of funding for NGOs which are critical for provision of health services and the reporting of suspected cholera and other priority diseases
- Due to fragmentation of data systems, EWARN data (from NW Syria) are available only by administrative divisions, while the EWARS data uses health divisions.
- Under reporting of deaths of AWD/suspected cholera due to political reasons of previous Syrian government.

Following the political transition after the fall of the Assad's regime, the integration of EWARS and EWARN into a unified National Early Warning System led by the MoH has become a top priority. This step aims to streamline surveillance and ensure more efficient outbreak detection and response across Syria.

1.5 CONCISE DESCRIPTION OF THE CHOLERA EPIDEMIOLOGICAL SITUATION IN THE COUNTRY IN RECENT YEARS (UP TO LAST 10 YEARS)

Cholera has historically posed a recurring public health challenge in Syria, with several outbreaks recorded over the past five decades. After almost a decade with no cholera cases, Syria witnessed a re-emergence of cholera in 2022,

Table 2 shows cholera confirmed cases by year, details of number of suspected, deaths, geographic distribution by districts and sub-districts are only available for outbreaks in 2022-2023 and 2024.

Year	Lab-Confirmed Cholera Cases
1970	2,816
1977	8,523
1993	10,917
1996	130
2008	48
2009	342
2022 & 2023	1,582
2024	169
2025 as of June	0

As of end of June 2025, cholera confirmed cases have not been yet detected, however, AWD cases continued to be reported from in 2025 in different governorates like Aleppo, Deir Ez-Zor and Al-Hassaka (Al-Hol camp). The number of AWD cases reported by EWARS and EWARN was

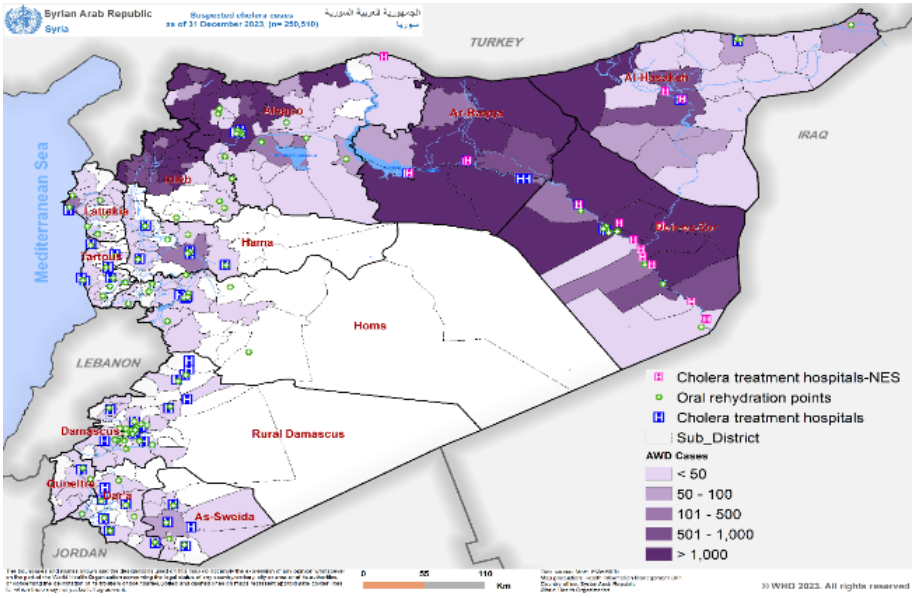
256 cases reported in 10 governorates, the highest number of cases detected in Al-Hassakah governorate, Al-Hole camp (101 cases). Culture tests were conducted for 170 cases, all were negative for cholera, however, resurgence of cholera is expected due to following contributing factors:

- Governance Transition: 8 December 2024 political shift has affected public health functions and surveillance efforts
- Population movement: high number of returnees from IDPS camps and settlements after 8 December to their original villages and areas which were severely damaged with limited water and WASH access.
- Damaged Infrastructure: Extensive damage to water networks due to the protracted conflict.
- Environmental Factors: Droughts, earthquakes (2023), and the decline in rainfall have exacerbated existing vulnerabilities.
- Cross-Border Transmission: The cross-border movement of people and goods between Iraq and Turkey (porous borders) heightens the risk of cholera transmission in areas already grappling with public health challenges.

Cholera Outbreaks (2022–2024)

Syria's recent cholera outbreaks (2022–2024) have emphasized systemic vulnerabilities, including fragile health infrastructure, inadequate water and sanitation services, and fragmented surveillance capacity. The overlapping impacts of conflict, displacement, environmental degradation, and political transition continue to exacerbate the risk of cholera transmission. These factors must guide multisectoral interventions and prioritization efforts under the GTFCC PAMI tool to effectively reduce cholera risk and improve health outcomes in the most affected regions.

Figure 2: Map of AWD cases in Syria 2022-2023



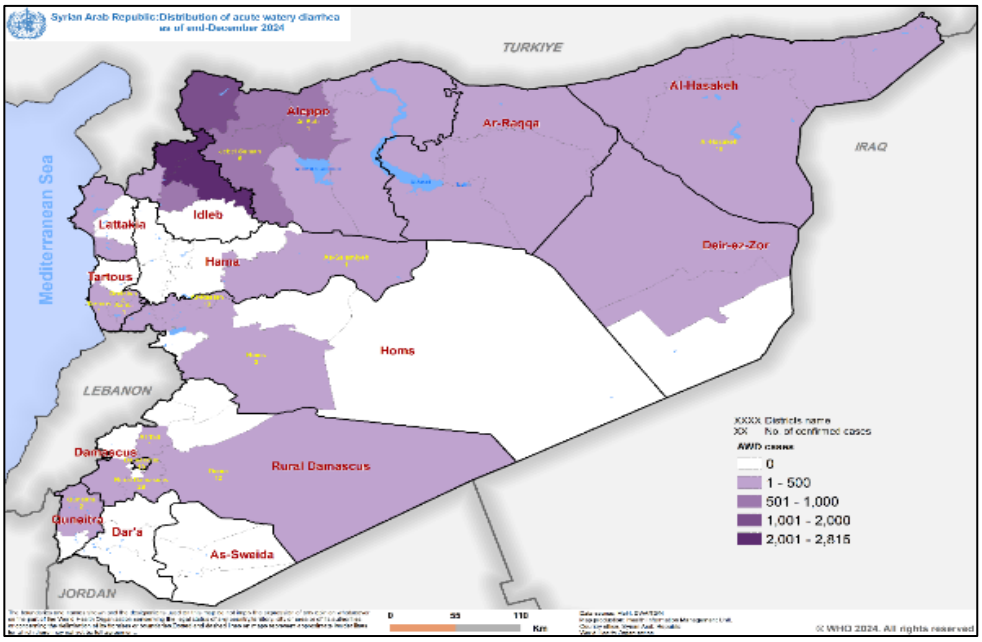
2022–2023 OUTBREAK

- First reported on 22 August 2022 in Government of Syria (GoS) controlled areas.
- Spread across 13 governorates.
- Spread to northwest Syria (NWS) by October 2022; cases persisted through 2023.
- Declared ended by GoS MoH in March 2023.
- EWARN declared the outbreak over in NWS in December 2023.
- Total suspected cases: 250,510
- Laboratory-confirmed cases: 1,582
- positivity rate by culture: 13%
- Hospital-reported deaths: 105

TABLE 3: AWD/SUSPECTED CHOLERA CASES DETAILS BY GOVERNORATES BETWEEN 22 AUGUST 2022 TO 31 DECEMBER 2023, EWARS AND EWARN

Governorate	Suspected cholera Cases (AWD)	Attack Rate (%)	RDTs Conducted	Positive RDTs	Culture + Tests	Attributed Deaths	CFR%
Aleppo	87,192	2.09	4,162	1,232	643	49	0.06%
Al-Hasakeh	6,375	0.55	828	116	27	4	0.06%
Ar-Raqqa	25,210	3.28	355	74	103	10	0.04%
As-Sweida	81	0.02	81	26	2	0	0.00%
Damascus	43	0.00	40	20	10	1	2.33%
Dar'a	25	0.00	22	5	0	0	0.00%
Deir-ez-Zor	20,825	2.67	804	423	100	24	0.12%
Hama	260	0.02	188	52	55	1	0.38%
Homs	72	0.00	59	31	25	1	1.39%
Idleb	110,064	3.89	3,756	128	581	15	0.01%
Lattakia	184	0.01	161	98	31	0	0.00%
Quneitra	30	0.03	17	4	1	0	0.00%
Rural Damascus	114	0.00	111	17	3	0	0.00%
Tartous	35	0.00	27	10	2	0	0.00%
Total	**250,510**	**1.18**	**10,611**	**2,236**	**1,582**	**105**	**0.04%**

Figure 6: Map of AWD cases in Syria 2024 ,



2024 CHOLERA OUTBREAK/CASES

- Re-emergence in August 2024 in Rural Damascus, later spreading to 10 governorates, see table 3 below.
- Total suspected cholera cases: 1,444 (EWARS), 9,388 (EWARN)
- Lab-confirmed cases: 169 by only GoS MoH, no confirmed cases by EWARN in NWS.
- Confirmed positivity rate: 44.2% (MoH data)
- Deaths among confirmed cases: 7

In addition, Al-Hol Camp in Al-Hassaka governorate reported 254 suspected cholera cases and 1 death, highlighting the vulnerability of IDP settings for cholera outbreak.

- The below chart shows the epi curve of AWD/suspected cholera cases in Syria between August 2022 and December 2024

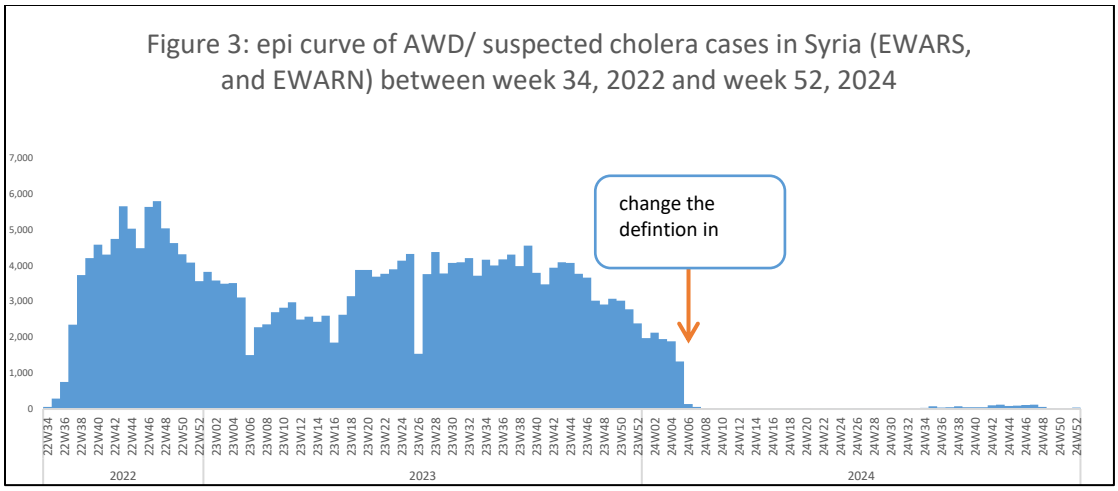


Figure 3: epi curve of AWD/ suspected cholera cases in Syria (EWARS, and EWARN) between week 34, 2022 and week 52, 2024
change the defintion in
2022
2023
2024

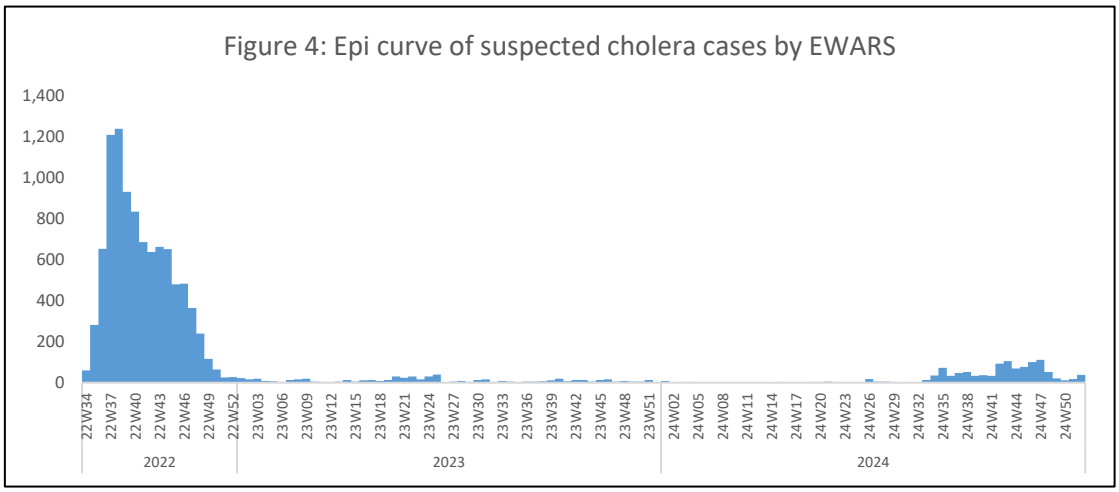


Figure 4: Epi curve of suspected cholera cases by EWARS
2022
2023
2024

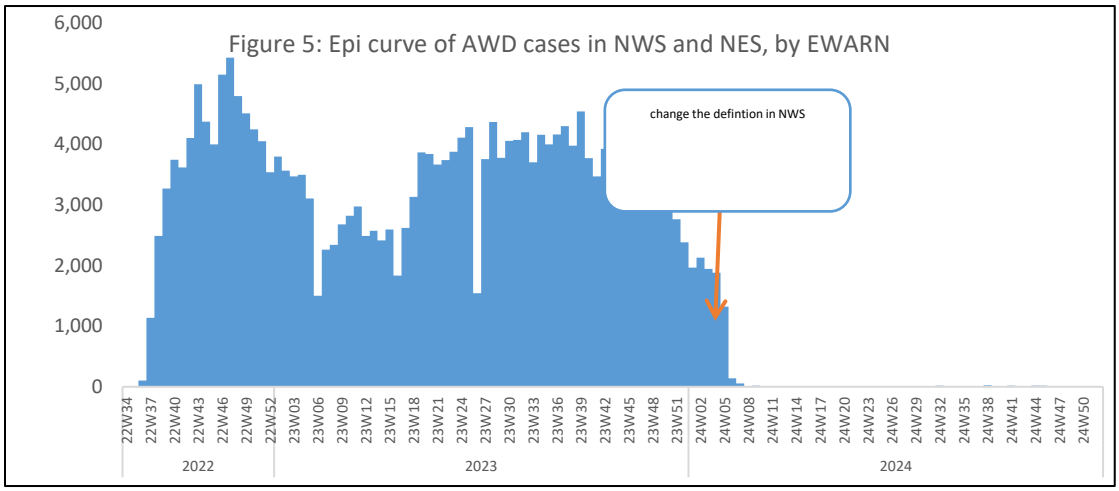


Figure 5: Epi curve of AWD cases in NWS and NES, by EWARN
change the defintion in NWS
2022
2023
2024

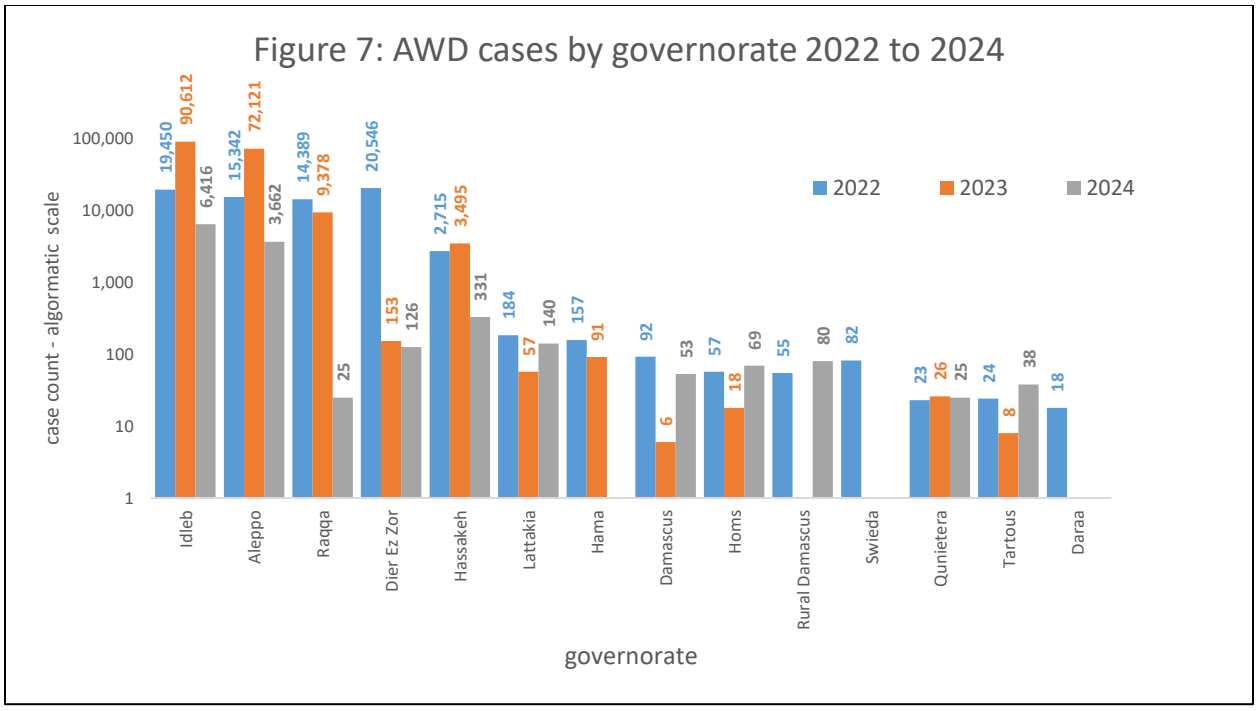
TABLE 4: AWD/SUSPECTED CHOLERA CASES BY GOVERNORATES IN 2024, EWARS & EWARN

Governorate	AWD cases	group Age			tests RDTs		culture test	
		<5	14 _5	>14	Total	positive	Total	positive
Damascus	57	1	1	55	57	53	18	18
Rural Damascus	80	0	4	76	70	33	60	52
Aleppo	280	51	26	197	261	104	51	9
Homs	71	3	12	57	71	39	71	17
Lattakia	382	17	16	342	382	208	62	51
Tartous	38	2	2	36	3	2	38	6
Hassaka	294	84	63	124	183	50	24	11
Deir Ez-Zor	215	154	24	27	213	8	151	2
Ar-Raqqa	1	0	0	1	0	0	1	1
Qunitera	26	6	5	15	26	1	21	2
Total MoH EWARS	1,444	318	153	930	1,266	498	497	169
EWARN	9,388	3,717	1,105	4,368	596	38	23	0
Total	10,832	4,035	1,258	5,298	1,862	536	520	169

Distribution of cases by governorate:

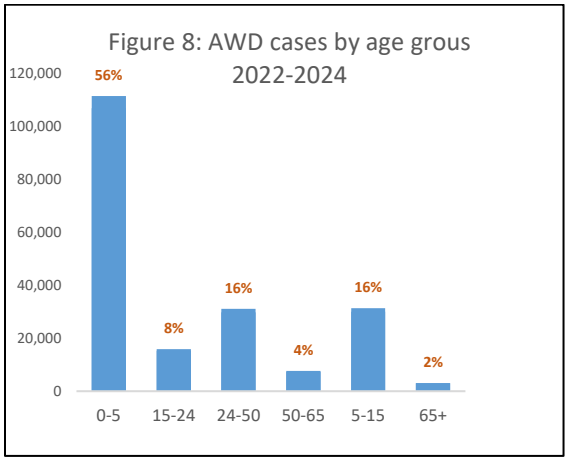
During the cholera outbreak in 2022, governorates of Idleb, Aleppo, Ar-Raqqa, Deir-ez-Zor, and Al-Hasakeh reported the highest number of suspected cases. Other governorates reported significantly fewer cases. In 2023, cholera cases were primarily reported through the EWARN system in NWS. In contrast, the 2024 outbreak data were reported by MoH EWARS system in the GoS and NE S.

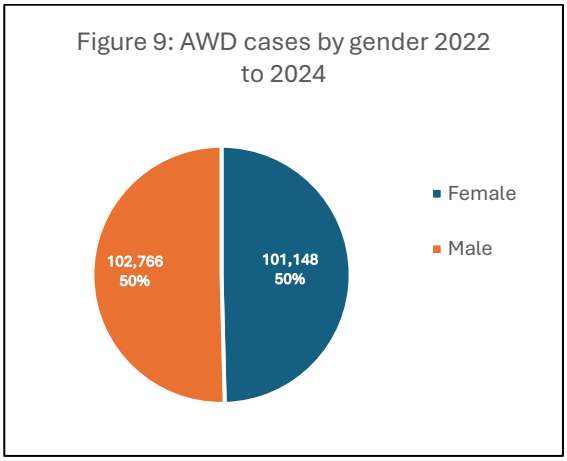
When interpreting these trends, it is essential to consider challenges related to inconsistent surveillance systems, variability in laboratory testing capacity, and political influences on reporting practices, all of which may affect the completeness and consistency of case detection between the EWARS and EWARN.



Distribution of cases by age groups and gender:

Epidemiological data for 2022-2024 AWD cases indicate that the most affected age group was children under five years, while adults aged 15 years and above accounted for approximately 30% of reported cases (Figure 5). The distribution of cases was relatively equal between males and females (Figure 6), suggesting no significant gender-based disparity in exposure or risk.





Cholera Response Pillars in Syria (2.22-2.24)

- **Leadership and Coordination:** A National Cholera Preparedness and Response Committee was established, chaired by MoH, comprising representatives from the Ministry of Health (MoH), Ministry of Water Resources, and other key governmental and

non-governmental actors Syria Arab Red Crescent SARC). The national plan was revised and disseminated among partners, with clear roles assigned to stakeholders (MoH, NGOs, public and private entities). The plan includes SOPs covering case definitions, OCV, case management, IPC, and risk communication. Coordination platforms in the health and WASH sectors were leveraged to ensure the integration of national and sub-national authorities and stakeholders. A joint coordination mechanism was also used to guide OCV campaigns, building on the cooperation with local authorities.

- **Surveillance and Laboratory** During the 2022 outbreak, the MoH used IHR protocols for notification, including alerts issued via the IHR National Focal Point. Case definitions were updated and training was conducted for EWARS/EWARN surveillance officers. Rapid Response Teams (RRTs) were trained and expanded, particularly in areas impacted by the February 2023 earthquake. Biannual case forecasting was developed and used for program planning. Surveillance was enhanced in high-risk areas, including case detection in IDP camps and vulnerable communities, along with training of frontline healthcare workers and school health units. MoH health centers were linked with RRTs. Regular data collection and analysis were shared through situation reports and sector dashboards. In addition, central MoH conducted supervisory visits to affected governorates. Rapid diagnostic tests (RDTs) were supplied, and culture testing was reactivated in six governorates through equipment provision and training. Case-based data and laboratory capacity were strengthened.
- **Case Management and Infection Prevention and Control (IPC)** The MoH adopted GTFCC clinical protocols focused on triage, admission, standard IPC, and treatment flowcharts. A total of 53 Cholera Treatment Units (CTUs) were activated in hospitals. In 2022, over 2,980 healthcare workers, including 420 MoH staff, were trained in cholera case management and IPC. This led to a drop in the case fatality rate from 0.78% to 0.1% between September 2022 and January 2023. Updated clinical posters, ORS preparation guidance, and treatment protocols were distributed to all CTUs. IPC and WASH measures were integrated into national IPC guidelines. Around 75% of cholera IPC kits were distributed to CTUs and health facilities across the country. Emergency stockpiles of rehydration supplies, Ringer's lactate, IV fluids, ORS, and disinfectants were maintained and updated. Additional equipment such as RDTs, hygiene kits, and chlorine were distributed.
- **Oral Cholera Vaccine (OCV) Campaigns in Syria (2022–2025):** In response to the resurgence of cholera in Syria, a series of Oral Cholera Vaccine (OCV) campaigns were conducted between 2022 and 2025 targeting high-risk populations across the country, including both government-controlled areas, NE Syria, and NW Syria, as well as specific vulnerable settings such as Al-Hol camp.
    - The first OCV response campaign was implemented between December 2022 and January 2023 by the MoH in coordination with WHO and UNICEF. It targeted approximately 2 million people across Deir-ez-Zor, Ar-Raqqa, Al-Hasakeh, and Aleppo governorates. A total of 1,943,907 individuals received a single dose of OCV, achieving a remarkable coverage rate of 97.2%.

- In northwest Syria, two separate campaigns were conducted in 2023 by Assistance Coordination Unit (ACU) WHO, and UNICEF. The first campaign, held from 7 to 18 March 2023, targeted 1,762,383 people in Idleb and north rural of Aleppo. However, due to operational constraints after the earthquake in February 2023, the coverage achieved was limited to 10.2%, with 179,702 individuals vaccinated with one dose. Therefore, a second campaign was conducted from 10 to 19 June 2023 targeting a population of 1,119,799 individuals. the campaign successfully vaccinated 1,092,362 people, achieving a high coverage rate of 97.5%.
- Most recently, in January 2025, a response one-dose OCV campaign was implemented in Al-Hol camp, one of the most vulnerable and high-risk settings in Al-Hasakeh governorate. The campaign targeted 25,336 individuals and achieved a 98.3% coverage rate, with 24,919 people vaccinated.
- In total, these campaigns reached over 3.2 million individuals across Syria (Aleppo, Deir Ez-zor, Al-Hassakeh, Ar-Raqqa, and Aleppo).

- **WASH Interventions:** WASH infrastructure was partially rehabilitated in affected areas. Light maintenance, such as water tank cleaning, was conducted in 97 schools across Deir-ez-Zor and Rural Damascus. Regular water quality monitoring was carried out by RRTs. A WASH assessment in 53 health facilities was completed, followed by targeted infrastructure rehabilitation. In Deir-ez-Zor, 12 rural water pumping stations in highly vulnerable communities are being converted to solar power as part of an ongoing resilience project.
- **Risk Communication and Community Engagement (RCCE)** Evidence-based RCCE approaches were employed, integrating behavioral insights, community listening, and feedback mechanisms. In collaboration with MoH, WHO, and UNICEF, training packages and materials were developed for rapid deployment by community health workers after outbreak declaration. Messages covered ORS use, OCV awareness, hygiene, and referrals, and were adapted and harmonized across partners and geographic areas. RCCE materials were integrated with WASH activities to reinforce hygiene promotion.

1.6 Justification for Using the "PAMIs for Cholera Control" Method

The Priority Areas for Multisectoral Interventions (PAMI) approach has been adopted in Syria as the most suitable method for cholera control, in light of the recurring and geographically widespread outbreaks observed over the past three years. This approach is very important in a limited resources context, as it allows for targeted, evidence-based, and cost-efficient interventions.

Between August 2022 and December 2024, cholera outbreaks were reported in 56 districts in 14 governorates. 90% of total districts reported at least one confirmed cholera outbreak during this period. Repeated outbreaks were observed in several governorates like Deir-ez-Zor, Aleppo, and Al-Hasakah, highlighting ongoing and persistent transmission risks.

This method is particularly relevant in Syria's complex operational environment, where the following challenges persist:

- Population displacement, with over 7 million internally displaced persons (IDPs) in camps or informal settlements
- Severe water scarcity and degradation of WASH infrastructure due to conflict and climate change
- Inconsistent surveillance coverage, and fragmentation in data reporting between EWARS and EWARN.
- Limited laboratory capacity and delays in confirmation, especially in underserved areas.

Additionally, the PAMI approach allows for the identification of areas with high vulnerability to cholera transmission, even when disease surveillance data are incomplete or under-reported. This ensures that areas at high risk are considered in the national strategic long-term planning.

By applying the PAMI methodology, Syria is will be able to:

- Identify and target the most affected and at-risk districts with multisectoral interventions for cholera control (surveillance, OCV, WASH, RCCE, etc.);
- Mitigate gaps in cholera surveillance and data inconsistency between EWARS and EWARN;
- Maximize the impact of limited resources by prioritizing high-burden and high-risk districts;
- Coordinate stakeholders and interventions and guide the development of the National Cholera Plan (NCP).

Ultimately, the use of the PAMI framework ensures that no high risk district is left behind and supports Syria's alignment with the GTFCC Roadmap to reduce cholera deaths by 90% by 2030.

II. Methods

1. **Inception Phase:**

To smoothly conduct this exercise, WCO/Damascus engaged in extensive discussions with the key stakeholders, mainly MoH, to agree on the details of the PAMI analysis: data needed, the sources, date and participants of the endorsement workshop, and other arrangements. Also, bilateral discussions and communication with the WASH cluster and the ministry of water resources were conducted to ensure their involvement and support to this exercise.

2. **Datasets and General Approach/ data management phase**

The identification of PAMIs in Syria did not involve the creation of new data. The approach relied on the compilation, consolidation, and cleaning of existing datasets from multiple sectors and the two surveillance systems. This methodology enabled the use of field-based data to identify

geographic districts with the highest burden and vulnerability to cholera, in line with the GTFCC guidance.

2.1. Geographic Units of Analysis

Admin districts (62 in total) were used in this PAMI exercise to ensure harmonization between EWARS and EWARN and maximum consistency between the health sector and other sectors such as WASH.

2.2. Analysis Period

- The analysis covered the period from 22 August 2022 (date of the first confirmed outbreak in recent years) to 31 December 2024, a total of 122 epi weeks.
- Pre-2022 surveillance data were excluded from detailed analysis due to limitations in disaggregation (only available in aggregate at the governorate level and lacking key details such as age, symptoms, patient outcome, or date of onset).

2.3. Population Denominator

- The absence of a recent national census (last conducted in 2004) and discrepancies among estimates from the MoH, Central Bureau of Statistics, and humanitarian actors introduced limitations in population accuracy.
- 2025 population estimates from the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) were used as the standard denominator for calculating incidence rate.

2.4. Data Sources for Priority index

Surveillance Data Sources:

- EWARS – Ministry of Health (government-controlled areas, see map 2)
- EWARN – Assistance Coordination Unit (Northwest Syria, see map 2)
- Public Health Laboratories – MoH
- EWARN Laboratories – Northwest Syria

2.5. **Key Epidemiological and Laboratory Indicators**:

- Reported cases of AWD, suspected and confirmed cholera cases
- Deaths associated with suspected cholera
- Number of suspected cases tested (RDT, culture)
- Number of cases tested positive (positive by any test method RDT/culture)
- Weeks with at least one suspected/confirmed case
- Weeks with at least one tested suspected case

2.6. Priority index- minimum Data Requirements and Standards

The following minimum standards were applied:

- A complete and validated line list of suspected cholera cases was used, including key variables such as date of symptom onset, patient age, clinical presentation, case outcome, and geographic location at the district and sub-district level.
- Weekly Aggregated Epidemiological Data: data were compiled on a weekly basis, allowing for the calculation of weekly incidence, persistence, and early detection of transmission hotspots.
- Disaggregated Testing Data: Laboratory testing data were disaggregated to distinguish between suspected, RDT-tested, and laboratory-confirmed cases. The proportion of weeks with at least one suspected case tested over the weeks with at least one suspected case reported was calculated to assess the representativeness and reliability of the surveillance data and to determine the inclusion of a testing indicator in the priority index.
- Population denominator for each geographic unit (district) by using OCHA estimates of 2024 population.

3. **Data Quality Assessment and Management of Missing Data**

Given the fragmented health governance and surveillance systems in Syria, significant efforts were made to harmonize and validate data across sources. Specific steps included:

- Deduplication of Reported Cases: A review of reporting sites from both EWARS and EWARN was conducted to identify and remove duplicate entries resulting from overlapping catchment areas or double reporting by facilities. This process ensured that cases were not counted more than once in the final dataset.
- Standardization of Case Line Lists: WHO Country Office led a technical process to consolidate data from multiple sources by harmonizing variables and formats. This involved merging and cleaning line lists from EWARS, EWARN, and laboratory databases into a unified and standardized dataset suitable for analysis and priority index calculation.
- Alignment of case definitions between EWARS and EWARN (after February 2024): The EWARN system resumed reporting AWD cases among individuals aged two years and above. This standardization contributed to a more accurate and comparable dataset, this action led to a significant drop in reported cases from NW Syria.
- Correction of missing/inconsistent values where feasible: Surveillance data entry practices varied across governorates, leading to inconsistencies in date formats (e.g., D/M/Y vs. M/D/Y) and entry errors. WHO data managers reviewed and corrected these entries to ensure date accuracy. In addition, patient demographics information like sex were sometimes missing, the sex was added based on patient name (male or female).
- Use of official geographic names for consistency: Patient location data often lacked consistency due to non-standardized spelling or informal place names used by data entry personnel. To address this, WHO's GIS officer systematically linked each reported case to its official administrative unit using the national geographic coding system

4. **Priority index, Key Challenges**:

- Inconsistent application of the standard case definition between EWARS and EWARN
- Discrepancy in laboratory testing strategies between EWARS and EWARN
- Missing or incomplete fields (e.g., case outcome, date of onset, test results)
- Non- standardized line lists (health directorates, EWARN,)
- Geo references to cases done manually at central level based on the cases address.
- Lack of centralized case aggregation before August 2022
- Multiple data sources/formats (ACU 3 sources, MoH multiple templates, NES focal points)
- Incomplete data in 2024 line list from certain governorates (Damascus, Latakia, and Hama).

5. **Vulnerability factors:**

Based on the country's context and availability of reliable data, a total of seven vulnerability factors were selected for PAMI analysis: WASH indicators, OCV implementation, population density, location along major transportation routes, and risk of cross-border transmission.

Table 5: List of vulnerability factors selected for PAMI in Syria and data sources

variable	Type	Selected according to available data	data source
Location adjacent to cross-border cholera-affected areas or identified PAMIs	Text (Yes/No)	Yes	GIS maps- IHR reports
Location along major travel routes with transportation hubs	Text (Yes/No)	Yes	IOM
Major population gatherings	Text (Yes/No)	No	N/A
Areas with high population density or overcrowded settings	Text (Yes/No)	Yes	IOM
Areas with high-risk populations	Text (Yes/No)	No	N/A
Hard-to-access populations	Text (Yes/No)	No	N/A
Population received oral cholera vaccine within the last three years	Text (Yes/No)	Yes	MoH (PHC) -ACU
Areas at high-risk for extreme climate and weather conditions	Text (Yes/No)	No	N/A
Complex humanitarian emergencies	Text (Yes/No)	No	N/A
Areas with more than 30% of the population with access to unimproved water facility type	Text (Yes/No)	Yes	WoS WASH cluster
Areas with more than 50% of the population with access to unimproved sanitation facility type	Text (Yes/No)	Yes	WoS WASH cluster

Areas with more than 50% of the population with no handwashing facility on premises	Text (Yes/No)	Yes	WoS WASH cluster

5.1. Criteria to Identify NCP Operational Geographic Units to Undergo a Vulnerability Assessment

Districts for which the priority index lacks reliability due to surveillance gaps were selected for vulnerability assessment based on the following criteria:

- Geographic proximity to high-risk areas: Districts bordering international areas with reported cholera cases or adjacent to previously identified PAMIs (for Syria those districts are bordering to Iraq).
- Potential for outbreak amplification: Districts characterized by conditions that increase transmission risk, including poor WASH access, population displacement, or high mobility.
- Insufficient multi-sectorial interventions: Districts where multisectoral interventions are not adequately established
- Data availability: Districts for which reliable vulnerability data could be obtained from national or sectoral information systems (e.g., MoH, IOM, WoS WASH Cluster, ACU).

5.2. Method for Assessing Vulnerability Factors

After checking reliability of the priority index, 14 districts lacking reliability of the priority index were assessed against the following seven vulnerability factors, with thresholds adapted from GTFCC guidance and contextualized for Syria:

- Proximity to cross-border cholera transmission zones
- Location on major travel routes or hubs
- High population density or overcrowded settings
- OCV campaigns implemented more than 3 years
- Poor water access
- Poor sanitation access
- Lack of hygiene facilities

Each district was scored based on whether it met the criteria of each indicator (Yes = 1, No = 0)

5.3. Challenges in Analyzing Vulnerability Factors

- WASH indicators are not available at the district level (available at sub-district level), requiring the application of adapted assumptions and aggregation methods.
- During the validation workshop, participants raised concerns about the accuracy of WASH indicators.

5.4. Adjustments Made Due to Data Limitations:

- Travel routes: If any sub-district within a district is marked as "Yes", the entire district is considered "Yes".

- Poor water access: If more than 30% of the population in total sub-districts were "Yes", the district is classified as "Yes".
- Poor sanitation access: If more than 50% of the population in total sub-districts were "Yes", the district is classified as "Yes".
- Lack of hygiene facilities: If more than 50% of the population in total sub-districts were "Yes", the district is classified as "Yes".
- A second review was conducted for WASH vulnerability factors, and the vulnerability scores were revised for districts with unreliable Priority Index scores.

III. PAMI EXERCISE RESULTS:

1. Priority index calculation

1.1 Justification for the Selected Testing Indicator Depending on Representativeness of Testing

The testing indicator used in the Priority Index calculation is the proportion of suspected cholera cases that were tested—regardless of method (RDT, culture)—over the analysis period (August 2022 to December 2024). This indicator was selected in line with GTFCC guidance, which recommends inclusion of testing data to assess the strength and completeness of surveillance systems across NCP operational geographic units.

The testing indicator is a critical component of surveillance data in Syria where surveillance capacity, access to laboratory services, and partner engagement vary across districts.

Due to fragmentation of governance and differing operational capacities between EWARS and EWARN , the representativeness of testing varies significantly across districts as follows:

- In some districts (e.g., Idelb , Aleppo, Deir-ez-Zor), testing rates are relatively high use sensitive case definition.
- In other districts (e.g., Lattakia, Rural Damascus), testing coverage is limited due to political; constrains, power outages, leading to underreporting and delays in confirmation.

Thus, the inclusion of this indicator aims to following:

1. To identify districts with representative data, where the number of suspected cases tested reflects sensitive surveillance system.
2. To identify districts where low testing rates may not reflect true transmission and therefore must be evaluated in along with vulnerability factors (e.g., poor WASH access, high population density, low OCV coverage).

This approach is consistent with the principles of the GTFCC PAMI for cholera control methodology, ensuring that priority setting is not biased and affected by different factors like different surveillance systems, and different political interests.

The testing indicator was selected based on its ability to:

- Demonstrate the surveillance differences in Syria’s two-system context (EWARS/EWARN),

- Ensure that areas with low testing but high vulnerability are still considered for prioritization.

TABLE 5: PRIORITY INDEX DATA DESCRIPTION

DATA OVERVIEW	
Data description *	
Number of NCP operational geographic units	62
Study period: start year	2022
Study period: end year	2024
Study period: number of years	3
Number of NCP operational geographic units with at least one case	56
Total number of cases	260,054
Total number of deaths	111
Overall case fatality	0.04%
Total number of suspect cases tested	18,060
Total number of suspect cases tested positive	3,305
Overall positivity rate	18.3%

1.2 Scoring Scale of Each Indicator

Each NCP district was assigned a Priority Index score based on three epidemiological indicators and a testing indicator, in line with the GTFCC methodology:

1. Incidence of cholera (attack rate per 100,000 population per year)
2. Mortality (cholera-specific case fatality rate per 100,000 population per year)
3. Persistence (% of epidemiological weeks with ≥1 suspected or confirmed case reported)
4. Cholera test positivity (% of suspected cases testing positive by RDT, culture,)

Each epidemiological indicator was scored on a 0–3 scale based on national distribution thresholds derived from outbreak data between August 2022 and December 2024. The total Priority Index score for each district was calculated by summing the scores across all four indicators (maximum score: 12).

Table 6: . Incidence Score (Attack Rate per 100,000 per Year)

Score	Definition	Threshold (Syria)
0	No reported case	0
1	>0 and < median incidence	>0 and < 7.97

2	≥ median and < 80th percentile	≥ 7.97 and < 622.31
3	≥ 80th percentile	≥ 622.31

Table 7: Mortality Score (Cholera-Specific Mortality per 100,000 per Year)

Score	Definition	Threshold (Syria)
0	No reported death	0
1	>0 and < median mortality	>0 and < 0.19
2	≥ median and < 80th percentile	≥ 0.19 and < 0.51
3	≥ 80th percentile	≥ 0.51

Table 8 Persistence Score (% of Weeks with ≥1 Case Reported)

Score	Definition	Threshold (Syria)
0	No weeks with cases	0
1	>0 and < median persistence	>0 and < 12.7%
2	≥ median and < 80th percentile	≥ 12.7% and < 57.9%
3	≥ 80th percentile	≥ 57.9%

Cholera Test Positivity Score

Prior to including this indicator, the representativeness of cholera testing was assessed at the national level:

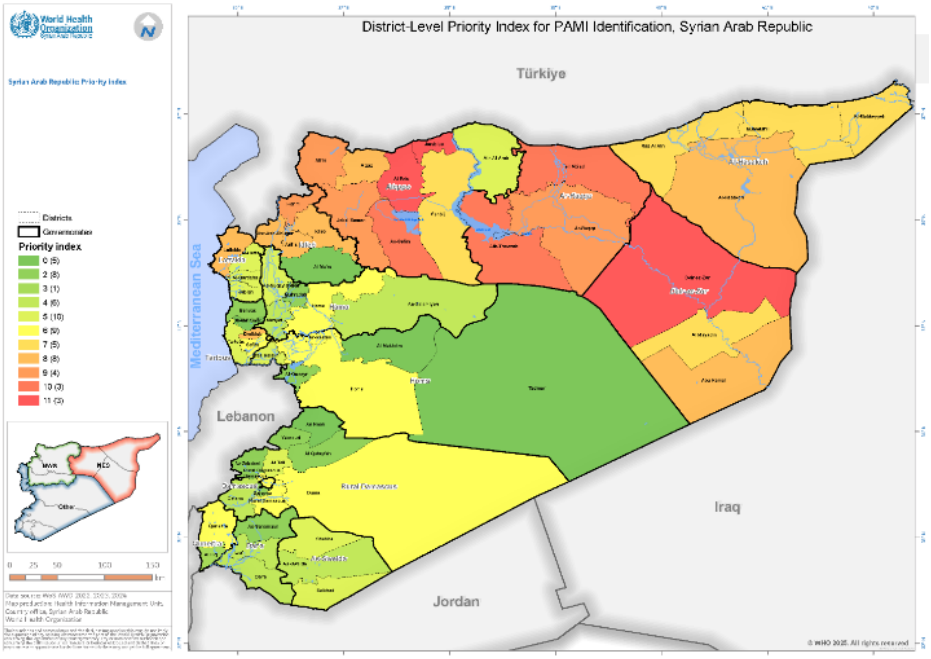
- 96.4% of districts with cases had ≥50% weekly testing coverage.
- This meets the GTFCC threshold of 80% for acceptable representativity of testing.
- Conclusion: Test positivity rate was included as the testing indicator in the priority index.

Table 9: Cholera test positivity score

Score	**Definition**
0	0% positivity
1	≤10%
2	>10% and ≤30%
3	>30%

1.3 Final Calculation of Priority Index: Priority index = incidence score + mortality score + persistence score + cholera test positivity score Total possible score per district: 12 point

Figure 10: map of priority index for PAMI identification-



2. Stakeholder Validation

As part of the national PAMI identification for cholera control process in Syria, a comprehensive in-person stakeholder validation workshop was conducted over three days from 11 to 13 May 2025 in Damascus. The workshop was a high-level national event that reinforced the Ministry of Health's commitment to cholera control and ensured multisectoral ownership of the results. It was publicly posted on the Ministry of Health website and covered by the National Syrian Arab News Agency (SANA), to ensure MoH leadership and importance.

The workshop brought together 50 representatives (annex 3: List of participants) from relevant sectors to validate surveillance and testing data, assess feasibility, and reach a collective agreement on the final threshold for identifying PAMIs for cholera control.

Workshop Format and Facilitation (see workshop agenda annex 2)

- Format: In-person, interactive workshop
- Duration: 3 full days
- Location: Damascus

The high-level attendance highlighted the national prioritization of cholera prevention, as the workshop was listed as a strategic event on the Ministry of Health's official website and Syria's official national news agency. This visibility reflects the government's consideration of the PAMI process as initial to national cholera planning and public health resilience.

Workshop Objectives:

- Validate epidemiological and laboratory data presented in the PAMI analysis for Syria
- Reach a consensus on the threshold value of the Priority Index
- Review and confirm the final list of PAMIs (initial and additional PAMIs)
- Ensure alignment between multisectoral stakeholders for the upcoming development of the National Cholera Plan (NCP)

Stakeholders Involved

The workshop brought together participants from across the health system and key sectors:

- MoH, Central Level:
  - Directorates of Primary Health Care (PHC), Communicable Diseases, Planning, and the Central Public Health Laboratory (CPHL)
- Directorates of Health from 12 Governorates:
  - Aleppo, Damascus, Rural Damascus, Quneitra, Daraa, Lattakia, Tartous, Deir Ez-Zor, Raqqa, Homs, Hama, Idleb (As-Sweida and Al-Hasakeh were unable to attend due to security concerns)
- ACU / EWARN Surveillance Teams:
  - Representing Idleb and northern Aleppo, including technical officers for surveillance, laboratory, and WASH
- Other Government Ministries:
  - Ministry of energy and Water Resources
- United Nations Agencies:
  - WHO field sub-offices (Aleppo, Deir Ez-Zor, Homs, and Qamishli in the Northeast)
  - UNICEF (Health and WASH officers)

Group Structure and Technical Discussion: Participants were organized into five thematic groups to ensure regional representation and technical diversity:

Table 10: Group Structure

Group	Coverage Area	Participants
Group 1	Aleppo and Idleb	MoH, DoH, surveillance, lab, WASH, ACU, WHO
Group 2	Lattakia and Tartous	MoH, DoH, surveillance, lab, WASH, WHO
Group 3	Homs and Hama	MoH, DoH, surveillance, lab, WASH, WHO
Group 4	Damascus, Rural Damascus, Daraa, Quneitra, As-Sweida	MoH, DoH, surveillance, lab, WASH, WHO
Group 5	Al-Hasakeh, Ar-Raqqa, Deir Ez-Zor	MoH, DoH, surveillance, lab, WASH, WHO

Each group received a standardized data package containing:

- R2 sheet of the PAMI tool (overview table) and R3 sheet of the PAMI tool: priority index summary
- Two maps for the districts with the proposed thresholds (=/>9 & =/>10)

Each group appointed a chairperson to lead the discussions, a Rapporteur responsible for presenting key findings during the plenary sessions, and a Note-taker to document critical discussion points and consensus decisions. The group aimed to achieve the following:

- Agree on a priority index threshold for Syria
- Assess the reliability of the calculated priority index
- Agree on districts which lack reliability in priority index to undergo vulnerability assessment for further decide to include as additional PAMI. Consensus on Priority Index Threshold

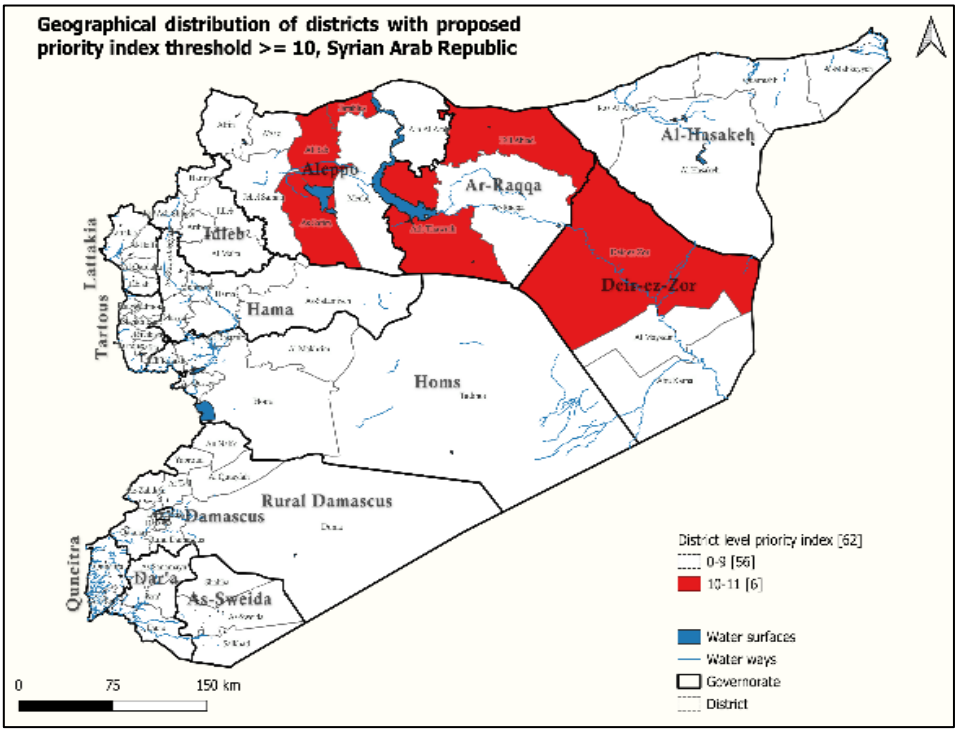
A core objective of the workshop was to establish agreement on the threshold value for the Priority Index, which determines which districts qualify as PAMIs.

Two evidence-based threshold scenarios were presented, with feasibility and impact metrics calculated for each:

Scenario 1: Threshold ≥ 10

- PAMIs identified: 6 districts (9.7% of total)
- Population covered: 1,523,797 (6.6% of total population)
- Cholera burden captured/impact:
    - 20.2% of total cases
    - 40.5% of total deaths

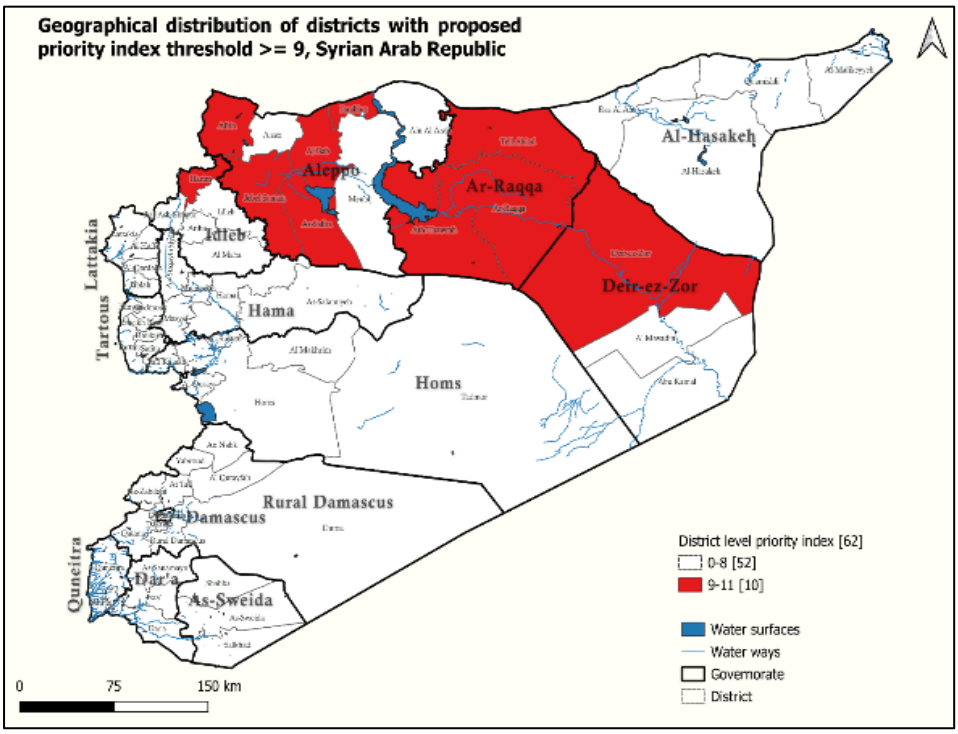
Figure11: Geographical distribution of districts with proposed priority index threshold >=10 , Syria



Scenario 2: Threshold ≥ 9

- PAMIs identified: 10 districts (16.1% of total)
- Population covered: 6,404,064 (27.7% of total population)
- Cholera burden captured/impact:
    - 63.3% of total cases
    - 82.9% of total deaths

Figure12: Geographical distribution of districts with proposed priority index threshold >=9 , Syria



Each group reviewed the results and discussed between feasibility (i.e., scale and coverage of intervention areas) and potential public health impact and presented their agreement as follows:

- Four out of five groups selected Scenario 2 (threshold ≥ 9), citing the significantly higher coverage of cases and deaths within the PAMIs (impact) and the need for broader public health reach.
- One group (the southern governorates), selected Scenario 1 (threshold ≥ 10), citing the feasibility and logistical and resource constraints as key considerations. The group emphasized the importance of high PAMIs threshold in order to allow for the inclusion of high-risk and highly vulnerable areas (e.g. Rural Damascus and Daraa) to be prioritized separately as additional PAMIs based on vulnerability assessments since the surveillance data does not reflect the actual epi situation.
- After a plenary discussion and facilitation by WHO, the consensus decision was to adopt a Priority Index threshold of ≥9 , balancing feasibility and impact. And agreed on the initial PAMIs areas as the following table 11:

#	Admin_1		Admin_2	Population_sum	Priority_index
1	SY0202	Aleppo	Al Bab	388,742	11
2	SY0208	Aleppo	Jarablus	126,545	11
3	SY0901	Deir-ez-Zor	Deir-ez-Zor	639,347	11
4	SY0207	Aleppo	As-Safira	52,435	10
5	SY1102	Ar-Raqqa	Tell Abiad	131,397	10

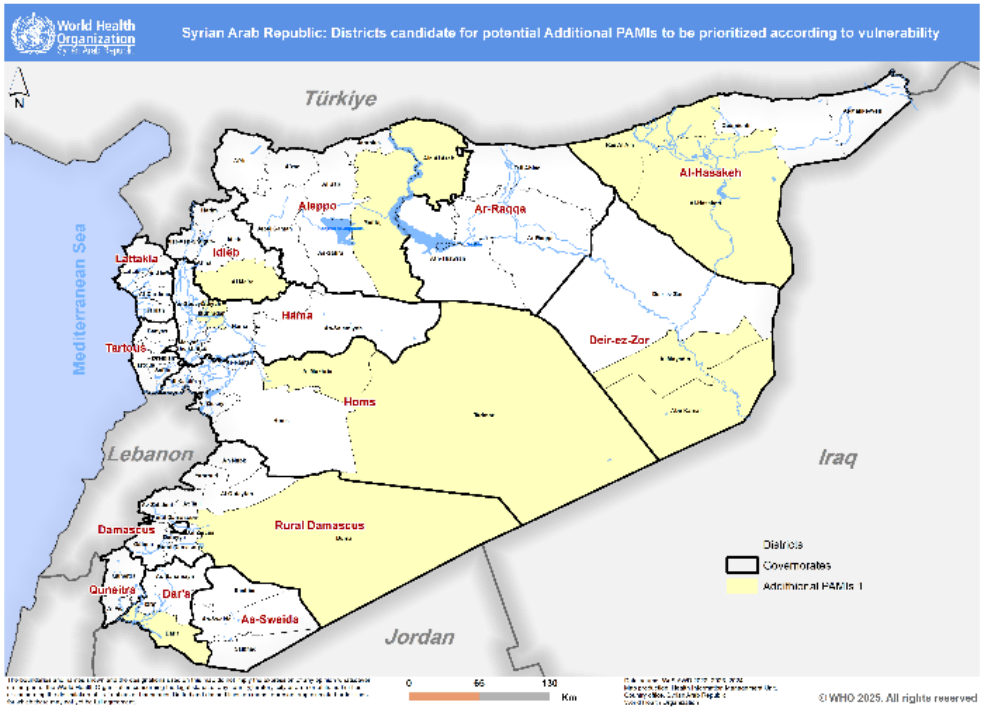
6	SY1103	Ar-Raqqa	Ath-Thawrah	185,330	10
7	SY0200	Aleppo	Jebel Saman	2,014,915	9
8	SY0203	Aleppo	Afrin	585,011	9
9	SY0703	Idleb	Harim	1,752,110	9
10	SY1101	Ar-Raqqa	Ar-Raqqa	528,229	9

Assessing reliability of the priority index:

- After agreeing on the priority index threshold, the five groups conducted a thorough review for districts with priority index below the selected priority threshold to assess reliability of the priority index. Accordingly, 12 districts were identified as having weak surveillance capacity, primarily due to the absence of functioning health facilities, limited designated reporting sites, and underreporting of AWD/suspected cholera cases. These challenges were attributed to political instability, security constraints, and resource limitations, which continue to hinder the timely detection and reporting of cholera-related data in certain regions.
- The districts where the priority index lacks reliability as identified by the groups are as below table 12:

#	Unique_id	Admin_1	Admin_2	Population
1	SY0800	Al-Hasakeh	Al-Hasakeh	603,460
2	SY0902	Deir-ez-Zor	Abu Kamal	243,799
3	SY0205	Aleppo	Menbij	515,463
4	SY0804	Al-Hasakeh	Ras Al Ain	104,184
5	SY0903	Deir-ez-Zor	Al Mayadin	293,823
6	SY0302	Rural Damascus	Duma	563,838
7	SY0206	Aleppo	Ain Al Arab	209,867
8	SY1200	Dar'a	Dar'a	561,091
9	SY0505	Hama	Muhradah	55,844
10	SY0405	Homs	Tadmor	8,576
11	SY0406	Homs	Al Makhrim	69,287
12	SY0702	Idleb	Al Ma'ra	27,949
				Population: 3,257,183 (14.1%)

Figure 13: Districts candidate for potential additional PAMs to be prioritized according to vulnerability



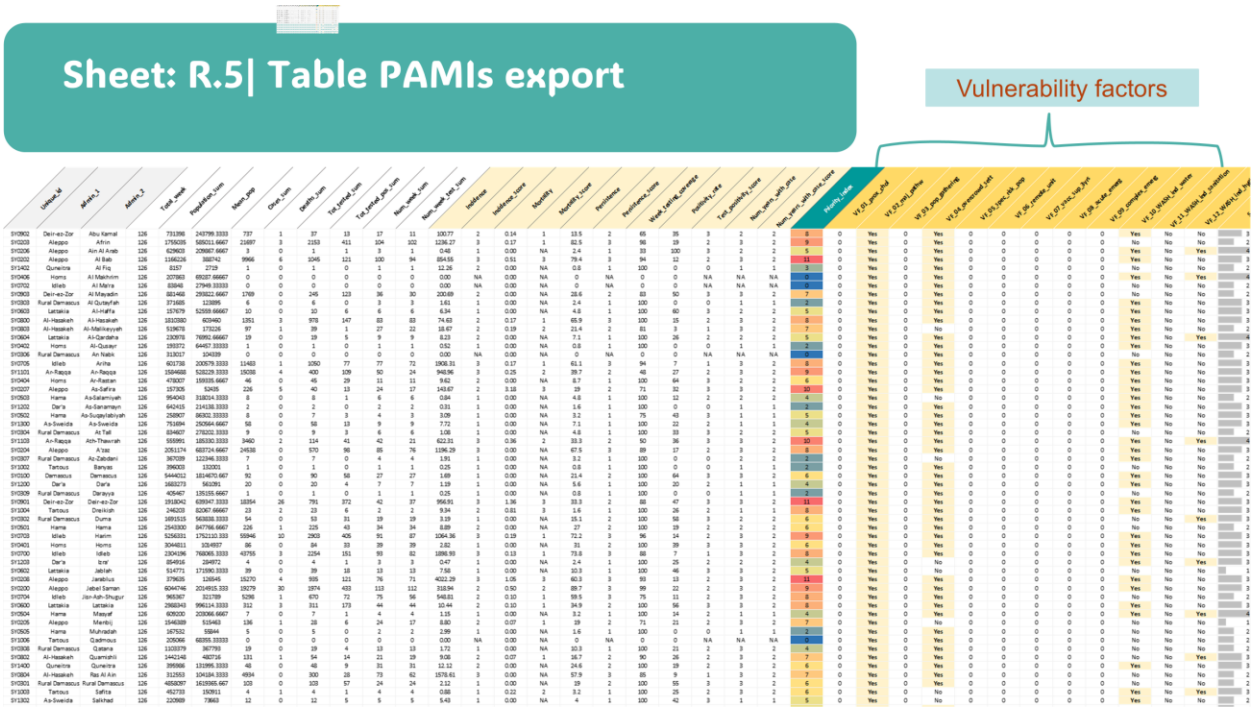
- Based on this review, a set of 22 districts were prioritized (see below table), 10 as initial PAMIs (priority index ≥9) and 12 districts as candidate/potential additional PAMIs lacking reliability in priority index and subject to further vulnerability assessment table 13.

Category	Number of Districts	Population	% of Population
Initial PAMIs	10	6,404,064	27.7%
Candidate/Potential Additional	12	3,400,000	14.7%
Non-PAMIs	40	13,277,863	57.5%

Vulnerability Factor Assessment

To complement the epi data-driven analysis and enhance the robustness of the PAMI identification process, assessment of vulnerability factors was undertaken for districts where the priority index lacks reliability (a total of 12 districts). These districts represented districts with limited surveillance coverage indicating that the Priority Index may have underestimated their true underlying cholera burden. This allowed for the inclusion of additional districts/PAMIs where cholera burden could not be reflected by the epi-data.

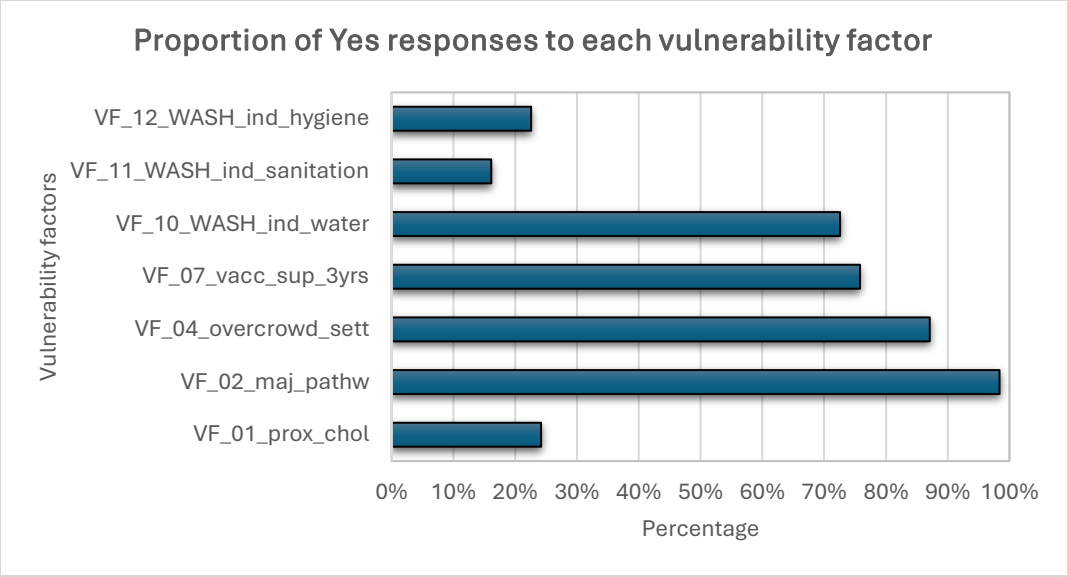
Table 15: R5table PAMIs export



A total of seven vulnerability factors were selected based on GTFCC criteria, their contextual relevance in Syria, and the availability of reliable data sources. The proportion of districts identified as "Yes" for each factor is summarized below table 16:

Vulnerability Factor	Code	Description	% of Districts "Yes"
1. Proximity to cross-border cholera transmission zones	Cross-border risk	Adjacent to cholera-affected cross-border areas or identified PAMIs	24%
2. Location on major travel routes or hubs	Major travel pathways	Located along key transport routes with travel hubs	98%
3. High population density or overcrowded settings	Overcrowded settings	High population density or presence of informal/overcrowded settlements	87%
4. OCV campaign within the past 3 years	OCV coverage	District received oral cholera vaccine in the past three years	76%
5. Poor water access	Unsafe water	>30% of population lacks access to improved water sources	73%
6. Poor sanitation access	Unsafe sanitation	>50% of population lacks access to improved sanitation	16%
7. Lack of hygiene facilities	Unsafe hygiene	>50% of population lacks access to basic handwashing facilities	23%

Figure 14 : Proportion of Yes responses to each vulnerability factor



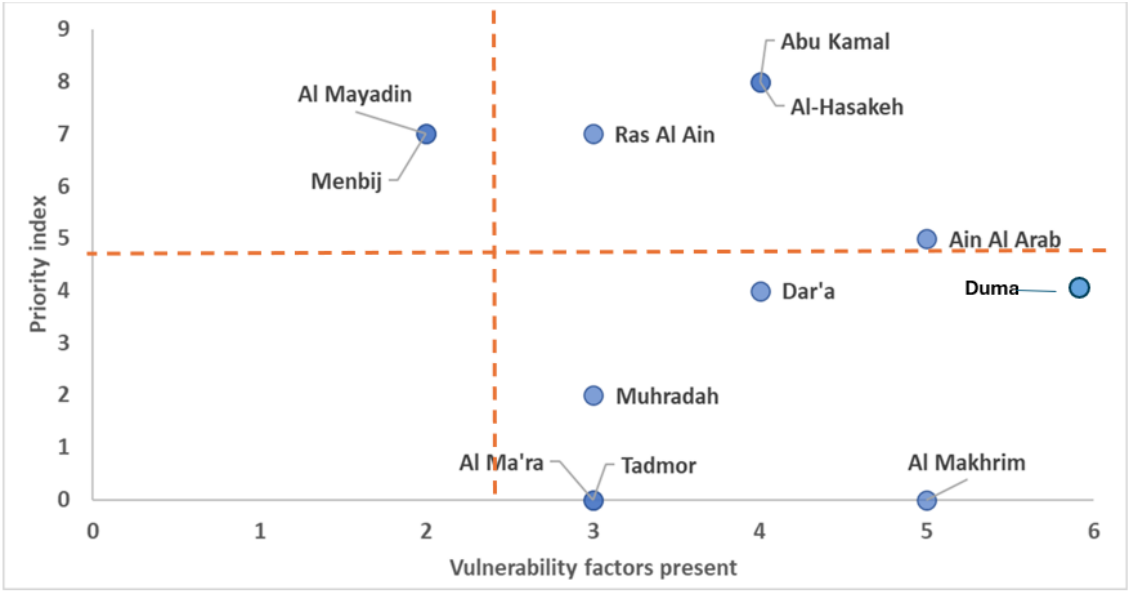
Note: *During the workshop, participants raised concerns about the accuracy of WASH indicators. A second review was conducted by Ministry of Water Officials, and the vulnerability scores were revised for districts with unreliable Priority Index scores.*

Identification of Additional PAMIs

Step1: First Level Prioritization of Additional PAMI:

For the 12 districts identified as lacking reliability of the priority index, another level of analysis (first level prioritization) was conducted to highlight the relationship between each district's priority index and the number of vulnerability factors present (see below scattered plot).

Figure 15: Relationship between priority index and vulnerability factors in candidate additional PAMIs, Syrian Arab Republic

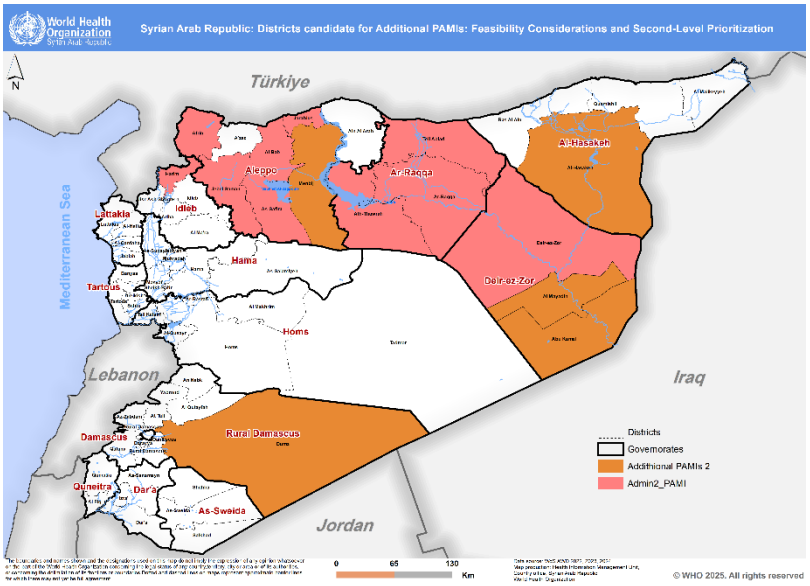


Step 2: Second-Level prioritization of Additional PAMIs

Among the 12 candidate districts/potential PAMIs, 5 districts (see below table) were prioritized for inclusion as additional PAMIs based on their vulnerability, local consensus, strategic feasibility, and impact of multi-sectoral interventions. These five districts accounted for an additional 2.3 million people (9.7% of total population), raising the total population in initial and additional PAMIs to 38.1% of the national total population table 17 .

#	**Unique_id**	**Admin_1**	**Admin_2**	**Population_sum**	Decision	**Rationale**	Population
1	SY0205	Aleppo	Menbij	515,463	Yes	vulnerability, WASH gaps, IDPs	515,463
2	SY0206	Aleppo	Ain Al Arab	209,867	No	Weak Accessibility-limited feasibility	-
3	SY0302	Rural Damascus	Duma	563,838	Yes	vulnerability, WASH gaps, IDPs, OCV gaps	563,838
4	SY0405	Homs	Tadmor	8,576	No	Small population – limited impact	-
5	SY0406	Homs	Al Makhrim	69,287	No		-
6	SY0505	Hama	Muhradah	55,844	No		-
7	SY0702	Idleb	Al Ma'ra	27,949	No		-
8	SY0800	Al-Hasakeh	Al-Hasakeh	603,460	yes	vulnerability, WASH gaps, IDPs,	603,460
9	SY0804	Al-Hasakeh	Ras Al Ain	104,184	No	Weak Accessibility-limited feasibility	-
10	SY0902	Deir-ez-Zor	Abu Kamal	243,799	Yes	High vulnerability, WASH gaps, Border proximity,	243,799
11	SY0903	Deir-ez-Zor	Al Mayadin	293,823	Yes	High vulnerability	293,822
12	SY1200	Dar'a	Dar'a	561,091	No		-
Total pop							2,220,382 (9.6%)

Figure 16: Districts candidate for potential additional PAMs: feasibility considerations and second level prioritization

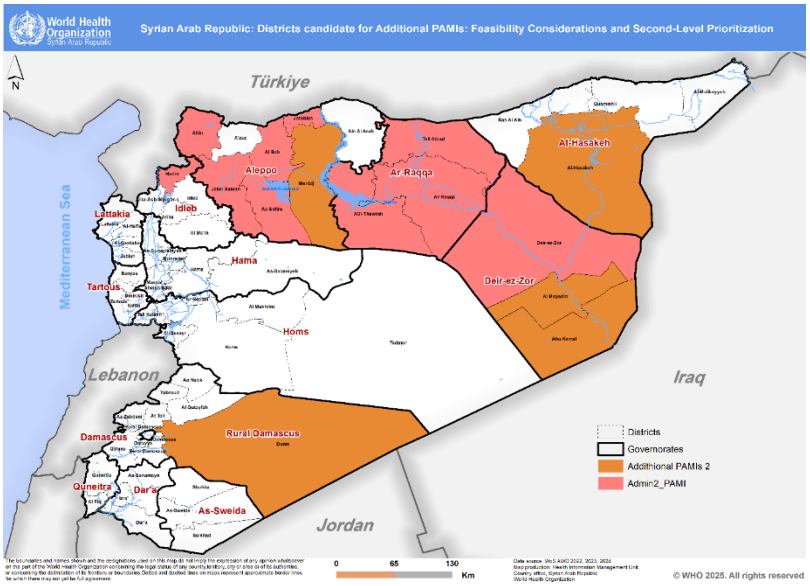


Step 3: Feasibility Considerations and third-Level Prioritization (between districts)

In line with GTFCC guidance recommending feasibility limits of ~30% of the total population covered under PAMIs, a re-assessment of the 5 additional districts was conducted. Based on updated feasibility criteria, one district (Menbij) was excluded, resulting in a reduced total of 14 initial and additional PAMIs covering 8.5 million people (35.8%). Table 18

Category	Number of Districts	Population	% of National Population
Initial PAMIs	10	6,404,064	27.7%
Additional PAMIs	4	1,704,920	7.4%
Total PAMIs	**14**	**8,108,984**	**35.1%**

Figure 17: **Districts candidate for potential additional PAMs: feasibility considerations third level prioritization**



Step 5: Final Adjustment at Sub-District Level (within districts)

Since the total population covered with the initial and the additional PAMIs exceeded 35%, another reprioritization was recommended to select high priority subdistricts within the four additional districts.

Accordingly, further prioritization among the selected additional PAMIs (4 districts) was conducted to prioritize some admin units from the lower administrative level (21 sub-districts).

This prioritization was based on vulnerability factors, which served as the main discussion guide along with other contextual information. So, additional eight subdistricts with an estimated population of 1,145,753 were prioritized and included in the final list of PAMIs (see below table showing the sub-districts prioritized as additional PAMIs). Table 19

admin_1	admin_2	admin_3	pop_mean	Proximity to cross-border cholera transmission zones	2. Location on major travel routes or hubs	3. High population density or overcrowded settings	4. OCV campaign older than 3 years	5. Poor water access	6. Poor sanitation access	7. Lack of hygiene facilities	Score
Rural Damascus	Duma	Duma	211,558	No	Yes	No	Yes	Yes	Yes	Yes	5
Rural Damascus	Duma	Harasta	163,283	No	Yes	No	Yes	Yes	Yes	Yes	5
Al-Hasakeh	Al-Hasakeh	Al-Hasakeh	328,577	No	No	Yes	No	Yes	Yes	Yes	4
Al-Hasakeh	Al-Hasakeh	Hole	55,419	Yes	Yes	Yes	No	Yes	Yes	Yes	6
Deir-ez-Zor	Abu Kamal	Abu Kamal	75,772	Yes	No	Yes	No	Yes	Yes	Yes	5
Deir-ez-Zor	Abu Kamal	Hajin	104,771	Yes	Yes	No	No	Yes	Yes	Yes	5
Deir-ez-Zor	Al Mayadin	Thiban	49,061	No	No	Yes	No	Yes	Yes	Yes	4
Deir-ez-Zor	Al Mayadin	Ashara	157,312	No	Yes	Yes	No	Yes	Yes	Yes	5

Table of summary of vulnerability factors assessment process (initial PAMI population is **6,404,064**, (27.7%), table 20

Prioritization Scenario	Description	Additional PAMIs + initial Population	% of National Population
Step 1:	12 candidate districts (Districts lacking reliability in PI)	3.3M	41.9 %
Step 2:	5 selected/prioritized districts	2.2M	37.4%
Step 3	4 selected/prioritized districts	1.7M	35.1%
Final step 4	8 prioritized sub-districts (within the 4 districts)	**1,145,753**	**32.7%**

Justification for Inclusion of Additional PAMIs

The inclusion of additional PAMIs was driven by:

- unreliability in the calculated Priority Index due to weak surveillance or low testing coverage
- Presence of multiple vulnerability factors, especially in underserved and conflict-affected areas
- National consensus during stakeholder validation that these areas pose strategic risk for transmission
- Alignment with GTFCC's recommendation to use contextual and vulnerability data to complement epidemiological indicators

This layered prioritization ensured that the final list of PAMIs is both epidemiologically grounded and operationally feasible, forming a realistic foundation for Syria's National Cholera Plan.

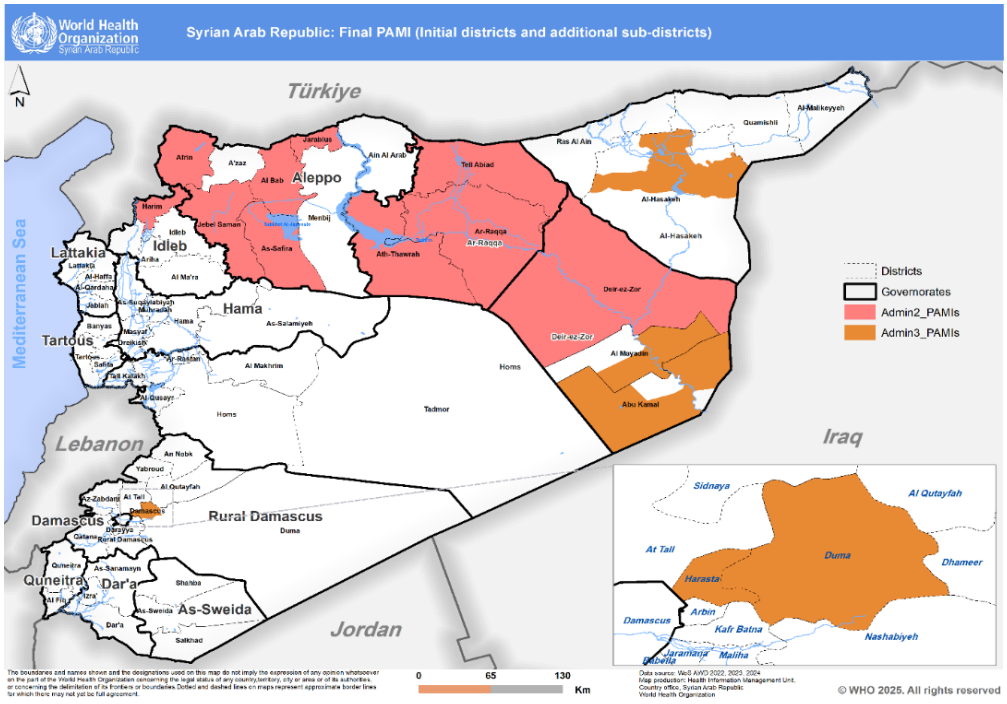
Final list of PAMIs:

Based on discussion with key stakeholders during the PAMI endorsement workshop, a consensus was reached among the participating groups on the following:

- Prioritization of 10 districts hosting 6.4 million people and having high cholera burden (xx cases and YY CFRs) as initial PAMIs based on a priority index threshold ≥9
- Prioritization of 8 sub-districts as additional PAMIs based on their vulnerability assessment
- Covering a total of 7.5 million people (32.7% of total) in both initial and additional PAMIs (see below table 21).

Initial PAMIs (districts)					
#		Admin_1	Admin_2	Admin_3	Population_sum
1	SY0202	Aleppo	Jebel Saman	-	388,742
2	SY0203	Aleppo	Al Bab	-	126,545
3	SY0207	Aleppo	Afrin	-	639,347
4	SY0208	Aleppo	As-Safira	-	52,435
5	SY0703	Aleppo	Jarablus	-	131,397
6	SY0901	Idleb	Harim	-	185,330
7	SY1101	Deir-ez-Zor	Deir-ez-Zor	-	2,014,915
8	SY1102	Ar-Raqqa	Ar-Raqqa	-	585,011
9	SY1103	Ar-Raqqa	Tell Abiad	-	1,752,110
10	SY0200	Ar-Raqqa	Ath-Thawrah	-	528,229
Total			10		6,404,064 (27.7%)
Additional PAMI (subdistricts)					
		admin_1	admin_2	admin_3	Population_sum
1	SY030200	Rural Damascus	Duma	Duma	211,558
2	SY030201	Rural Damascus	Duma	Harasta	163,283
3	SY080000	Al-Hasakeh	Al-Hasakeh	Al-Hasakeh	328,577
4	SY080006	Al-Hasakeh	Al-Hasakeh	Hole	55,419
5	SY090200	Deir-ez-Zor	Abu Kamal	Abu Kamal	75,772
6	SY090201	Deir-ez-Zor	Abu Kamal	Hajin	104,771
7	SY090301	Deir-ez-Zor	Al Mayadin	Thiban	49,061
8	SY090302	Deir-ez-Zor	Al Mayadin	Ashara	157,312
Total					1,145,753 (5%)
Total PAMI population (initial +additional) = 7,549,817 (32.7%) of total population					

Figure 17: **Final PAMIs (initial districts and additional sub-districts)**



Way Forward:

Following the comprehensive identification and validation of Priority Areas for Multisectoral Interventions (PAMIs) in Syria, the following actions are recommended to operationalize and sustain cholera prevention and control efforts through an integrated National Cholera Plan (NCP):

1. Endorsement and disseminate the PAMI Report
    - After Finalization and approval by MoH and GTFCC, disseminate the report to national stakeholders, UN partners, and technical agencies.
    - Upload the validated list of PAMIs into the GTFCC Excel tool for global reporting and visibility.
2. Utilize PAMI results to develop/implement the National Cholera Plan (NCP)
    - Utilize the PAMI list for multisectoral NCP development and implementation.
    - Align PAMI districts with programs priorities across key pillars: WASH, health system strengthening, community engagement, and OCV campaigns.
3. Strengthen Multisectoral Coordination and Subnational Planning
    - Strengthening coordination between the Ministry of Health, Ministry of Energy and Water Resources, Ministry of Education, UN agencies and NGOs to operationalize the PAMI/NCP at the governorate and district levels.
    - Support each governorate to develop governorate preparedness and response plan based on the government epidemiological and vulnerability details .
4. Enhance Cholera Surveillance and Laboratory Capacity
    - Integration of EWARS and EWARN into the National surveillance System and standardization of case definition, data collecting tool and line list, testing strategy, and reporting procedures.
    - Develop an electronic reporting system (case-based surveillance) at the district level to ensure timely reporting and data sharing of AWD cases.
    - Strengthen laboratory confirmation capacity by equipping and activating planned laboratories in all governorates e.g. Hasakeh and Daraa, while maintaining quality assurance at the central level.
    - Improve the integration of lab data and case data to reduce delays in confirmation and response.
5. Enhance the Quality and Availability of Vulnerability Data (WASH and Others)
    - Update WASH indicators by conducting household surveys (involving MoH, Ministry of Water Resources, and WASH Cluster partners) and ensure sub-district level disaggregation.
    - produce a unified baseline of WASH vulnerability factors across all districts.
    - Integrate WASH data into routine surveillance and field assessments, particularly in IDP camps and informal settlements.
6. Operationalize Targeted Oral Cholera Vaccine (OCV) Strategies
    - Build on lessons from the 2022–2025 OCV campaigns to plan targeted preventive OCV interventions in the updated PAMI districts.
    - Prioritize high-risk subdistricts and IDP settings with low WASH access for future Gavi-supported OCV applications.

7. Monitor Implementation and Update PAMI Periodically

- Conduct regular and routine monitoring of cholera trends and programmatic progress in PAMI districts.
- Update the Priority Index calculation every two years according to new situation such as new outbreaks, humanitarian shifts, or population movements to ensure continued relevance.

8. Mobilize Resources and Align Partner Investments

- Use the validated PAMI list to advocate for donor support (e.g., Gavi, the Pandemic Fund, WHO, UNICEF, ECHO, and other donors).
- Ensure partners' programmatic investments are aligned with the geographic focus of the PAMIs to maximize impact and avoid duplication.

Annexes:

Annex 1.

MoH Testing Strategy at the Onset of an Outbreak:

1. **In health areas with no culture-confirmed cholera cases:**

- Stool samples should be collected from all AWD cases meeting the standard case definition and tested using a Rapid Diagnostic Test (RDT).
- RDT-positive samples should be sent to the reference laboratory for culture confirmation. Samples should be transported in Cary-Blair medium and maintained at room temperature until they reach the laboratory.
- Laboratory confirmation and antimicrobial susceptibility testing must be conducted for AWD cases at the Ministry of Health reference lab for the first confirmed cholera cases when *Vibrio cholerae* (O1 or O139) is isolated from the first 10 RDT-positive cases.
- Confirming the first 10–20 cases is essential to determine that the outbreak is caused by toxigenic *V. cholerae*.

2. **Testing Strategy During an Outbreak (Outbreak Monitoring):**

- Once laboratory confirmation of a cholera outbreak caused by *V. cholerae* (O1 or O139) is established, it is no longer necessary to perform culture testing for every AWD patient. RDT testing alone is sufficient for case confirmation/ probable outcome.
- However, a small number of samples should still be collected regularly throughout the outbreak to monitor transmission patterns and perform antimicrobial susceptibility testing.

Rapid Diagnostic Test (RDT):

- RDT is not a substitute for bacterial culture in confirming the outbreak.

- RDT should be used by Rapid Response Teams (RRTs) and health facilities as an initial step to verify cholera alerts, particularly in areas where an outbreak has not yet been confirmed.
- In areas with confirmed outbreaks, it is not necessary to perform RDTs for every reported AWD case. Instead:
    - Conduct RDTs on the first three suspected cases reported daily from each health facility.
    - Send 25% of RDT-positive samples and all RDT-negative but clinically suspected samples to bacteriology laboratories for confirmation.
    - All other AWD cases meeting the standard definition can be considered epidemiologically confirmed.

Bacterial Culture:

1. Perform bacterial culture or PCR weekly on a limited number of RDT-positive samples (3–5 samples per facility/health area).
    - Confirm positive samples through serogrouping and conduct antibiotic susceptibility testing.
2. Culture testing must be conducted for suspected cholera cases in any newly affected area to confirm the outbreak.

3. **Testing Strategy at the End of an Outbreak:**

- When the number of AWD cases in an affected area significantly declines, testing should be intensified by conducting both RDT and culture on every reported AWD case.
- The outbreak can be declared over when all stool samples from AWD cases test negative for cholera by both RDT and culture for at least two consecutive weeks, alongside enhanced surveillance.

EWARN Testing Strategy:

- Stool samples are collected from 5% of all suspected cholera cases in each sub-district and from five suspected cholera cases admitted to CTCs/CTUs weekly.
- For children under 5 years with negative cholera stool cultures, EWARN laboratories test for rotavirus and adenovirus.

- **2022 Outbreak Testing Protocol:**
    - RDTs are performed on the first three suspected cases daily at each designated hospital.
        - If there are fewer than three suspected cholera cases, all remaining cases should be tested.
        - This task is conducted by hospital staff, and EWARN labs ensure proper training on testing, data sharing, and safe waste disposal.
- Stool culture/PCR is performed weekly on the first three RDT-positive cases from each selected hospital by EWARN laboratories.
- Antimicrobial susceptibility testing is conducted on all confirmed cholera cases.

Annex 2.

Identification of Priority Areas for Multisectoral Interventions (PAMI) for cholera control in Syria
Date: 11-13 May 2025
Dama Rose Hotel- Damascus Roof
Agenda

Day 1

Time	Topic	Speaker
Morning		
Session 1: Opening		
08:30-09:00	Registration	MoH admin
09:00-09:10	Opening by MoH	Minster of Health, Dr Musaan Al-Aali
09:10-09:20	WHO Remarks	WR, Mrs. Christina Bethke
09:20-09:30	WASH Remarks	Ministry of water resources
09:30-09:40	Workshop objectives and agenda	MoH- PHC director Dr Razan Tarabishi
09:40-10:00	Group photo and break	
Cholera in Syira		
10:00-10:30	Overview of cholera epidemiology	MoH- Dr Hani Lahham
10:30-11:30	Overview of cholera response activities -implementation, Gaps and lessons • Coordination/Leadership • Cholera surveillance • Laboratory capacity • Case management and OCV • WASH and RCCE	Dr Hani – Dr Yasser Farruh (EWARN)

	• Cholera supplies	
11:30-12:00	Q&A	all
12:00-12:30	break	
Afternoon		
Introduction to the identification of PAMIs		
12:30-13:00	Method and process for the identification PAMIs for cholera control	Shaza Mohammed/ WHO EMRO
13 :00-13 :15	Q&A	Shaza Mohammed/ WHO EMRO
PAMI identification in (Country)		
13:15-14:15	Process of data driven phase of PAMIs identification	WCO/Rasmieh Allahham
14:15-14:30	Practicum and display of PAMI excel tool	Basma ABDELGAWAD/ WHO EMRO
14:30-14:45	Q&A	Basma ABDELGAWAD/ WHO EMRO
14:45-15:00	side meeting with the proposed group leads	WHO
15:00-15:15	Wrap up of day 1	Shaza Mohammed/ WHO EMRO

Day 2

Time	Topic	Speaker
Morning		
PAMIs based on priority index threshold		
08:30-09:00	Overview of day 2	WCO
09:00-9:15	Introduction to group work	Shaza Mohammed/ WHO EMRO
09:15-10:15	Group work: Priority index threshold	Group leads TBC
10:15-10:45	Coffee break	
10:45-12:00	Group presentations Consensus on priority index threshold	MOH/WHO Chair TBD
12:00-12:30	break	
Afternoon		
Reliability of the priority index		
12:30-13:00	Introduction to group work	Muhammad Tayyab/ WHO EMRO
13:00-14:00	Group work: Reliability of the priority index	Group leads TBC
14:00-14:30	Group presentations Consensus on areas to be considered for potential additional PAMIs	Panel TBD
14:30-14:45	Wrap up of day 2	WCO
14:45-15:00	Administrative meeting	

Day 3

Time	Topic	Speaker
Morning		
Additional PAMIs		
08:30-09:00	Overview of day 3	WCO
09:00-9:15	Introduction to group work	Basma ABDELGAWAD/ WHO EMRO
09:15-10:15	Group work: Additional PAMIs	Group leads TBC
10.15-10-45	Coffee break	
10:45-12:00	Group presentations Consensus on additional PAMIs	MOH/WHO
12:00-13:00	break	
Afternoon		
Wrap up on PAMI identification		
13:00-13:30	Final list of PAMIs	WCO
13:30-14:00	Next steps	Muhammad Tayyab/ WHO EMRO
Closing		
14:00-14:15	Closing	MOH/WCO

Annex 3.

PAMI Endorsement Workshop for Cholera Control

List of participants

11 May 2025

Group 1: Aleppo and Idleb

Title	Name	Governorate
Head of Communicable Diseases Division in Aleppo	Dr. Bashar Obeid	Aleppo
Head of Communicable Diseases Division in Idleb	Dr. Jomaa Al-Yasouf	Idleb
WHO Office Director in Aleppo	Dr. Fares Qadi	Aleppo
EWARN Program Director in Idleb	Dr. Mohammad Al-Jassem	Idleb
Response Officer in Idleb	Dr. Mohannad Radwan	Idleb
Cholera Surveillance Officer in Idleb	Dr. Adnan Taleb	Idleb
Director of Laboratories in Idleb	Dr. Radwan Obeid	Idleb
WASH Coordinator in Idleb	Dr. Haitham Bakour	Idleb
Cholera Data Officer in Idleb	Dr. Fares Fares	Idleb
Laboratory Data Coordinator	Dr. Zaid Haj Hussein	Idleb
MoH, Director of PHC	Dr Razan Tabishi	National

Group 2: Lattakia and Tartous

Title	Name	Governorate
Communicable Diseases Division, Tartous	Dr. Tamim Ibrahim	Tartous
Communicable Diseases Division, Lattakia	Dr. Faten Jablawi	Lattakia
WHO Office, Damascus	Dr. Wael Ismail	National
Ministry of Health – RRT	Yasser Idlibi	National
Ministry of Health – EWARS Program	====Dr. Arwa Issa	National
Ministry of Health – Communicable Disease Program	Bassam Abu Hammoud	National
UNICEF – WASH	Farah Al-Rifai	National
Ministry of Health – Communicable Disease Program	Dr. Amer Taybi	National
WHO – RCCE	Rozam Alaali	National
WHO – Laboratory	Knouz Qadmani	National
WHO – WASH	Hania Husseini	National

Group 3: Homs and Hama

Title	Name	Governorate
Communicable Diseases Division, Homs	Dr. Ghadeer Salibi	Homs
Communicable Diseases Division, Hama	Dr. Saad Shomel	Hama

WHO Office – Homs	Dr. Nadia Al-Jamali	Homs
Ministry of Health – RCCR	Dr. Manar Kamel	National
WHO – Data Management	Ghiyath Zarzar	National
WHO – WASH	Rawnak Jabour	National
Ministry of Health – EWARS	Khawla Al-Rifai	National
Ministry of Health – Communicable Disease Program	Dr. Hani Lahham	National
Ministry of Health	Dr Mohammad Salem	National

Group 4: Damascus, Rural Damascus, Daraa, Quneitra, As-Sweida

Title	Name	Governorate
Communicable Diseases Division, Damascus	Dr. Alaa Ibrahim	Damascus
Communicable Diseases Division, Rural Damascus	Dr. Ghada Karim Al-Din	Rural Damascus
Communicable Diseases Division, Quneitra	Dr. Manar Al-Ahmad	Quneitra
Communicable Diseases Division, Daraa	Dr. Nayel Al-Zoubi	Daraa
Communicable Diseases Division, As-Sweida	Dr. Emil Hneidi	As-Sweida
WHO Focal Point	Dr. Ghassan Wazzan	Rural Damascus
Ministry of Water Resources	Mohammad Al-Haj	National
UNICEF	Hossam Baradie	National
Ministry of Health – Communicable Disease Program	Dr. Yasser Farouh	National
Ministry of Health – Public Health Laboratories	Dr. Wasim Battah	National

Group 5: Al-Hasakeh, Deir-ez-Zor, Ar-Raqqa

Title	Name	Governorate
Communicable Diseases Division, Raqqa	Dr. Baher Mohammad	Raqqa
Communicable Diseases Division, Al-Hasakeh	Dr. Elias Kroum	Al-Hasakeh
Communicable Diseases Division, Deir-ez-Zor	Dr. Mohammad Al-Asmar	Deir-ez-Zor
WHO Office – Qamishli	Dr. Qutaiba Al-Mazem	NES
WHO Office – Deir-ez-Zor	Dr. Anas Al-Jouri	Deir-ez-Zor
UNICEF – RCCE	Dina Al-Kayyal	National
WASH Cluster	(Representative not named)	National
Ministry of Water Resources	Sharhabil Hijazi	National
Ministry of Health – Immunization Program	Dr. Lamia Abu Naja	National
Ministry of Health – Environmental Health	Dr. Atef Al-Touil	National
WHO	Rasmieh Al-Lahham	National
Ministry of Health – Cholera Laboratory	Dr. Fatima Mansour	National