A NEW NORMAL

Ongoing Chemical Weapons Attacks in Syria

February 2016

SYRIAN AMERICAN MEDICAL SOCIETY 1998

Above: Bab Al Hawa Hospital, Idlib, April 21, 2014.
On the cover, top: Bab Al Hawa Hospital, Idlib, April 21, 2014; bottom: Binnish, Idlib, March 23, 2015.

ABOUT THE SYRIAN AMERICAN MEDICAL SOCIETY

The Syrian American Medical Society (SAMS) is a non-profit, non-political, professional and medical relief organization that provides humanitarian assistance to Syrians in need and represents thousands of Syrian American medical professionals in the United States. Founded in 1998 as a professional society, SAMS has evolved to meet the growing needs and challenges of the medical crisis in Syria. Today, SAMS works on the front lines of crisis relief in Syria and neighboring countries to serve the medical needs of millions of Syrians, support doctors and medical professionals, and rebuild healthcare. From establishing field hospitals and training Syrian physicians to advocating at the highest levels of government, SAMS is working to alleviate suffering and save lives.

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Acknowledgements

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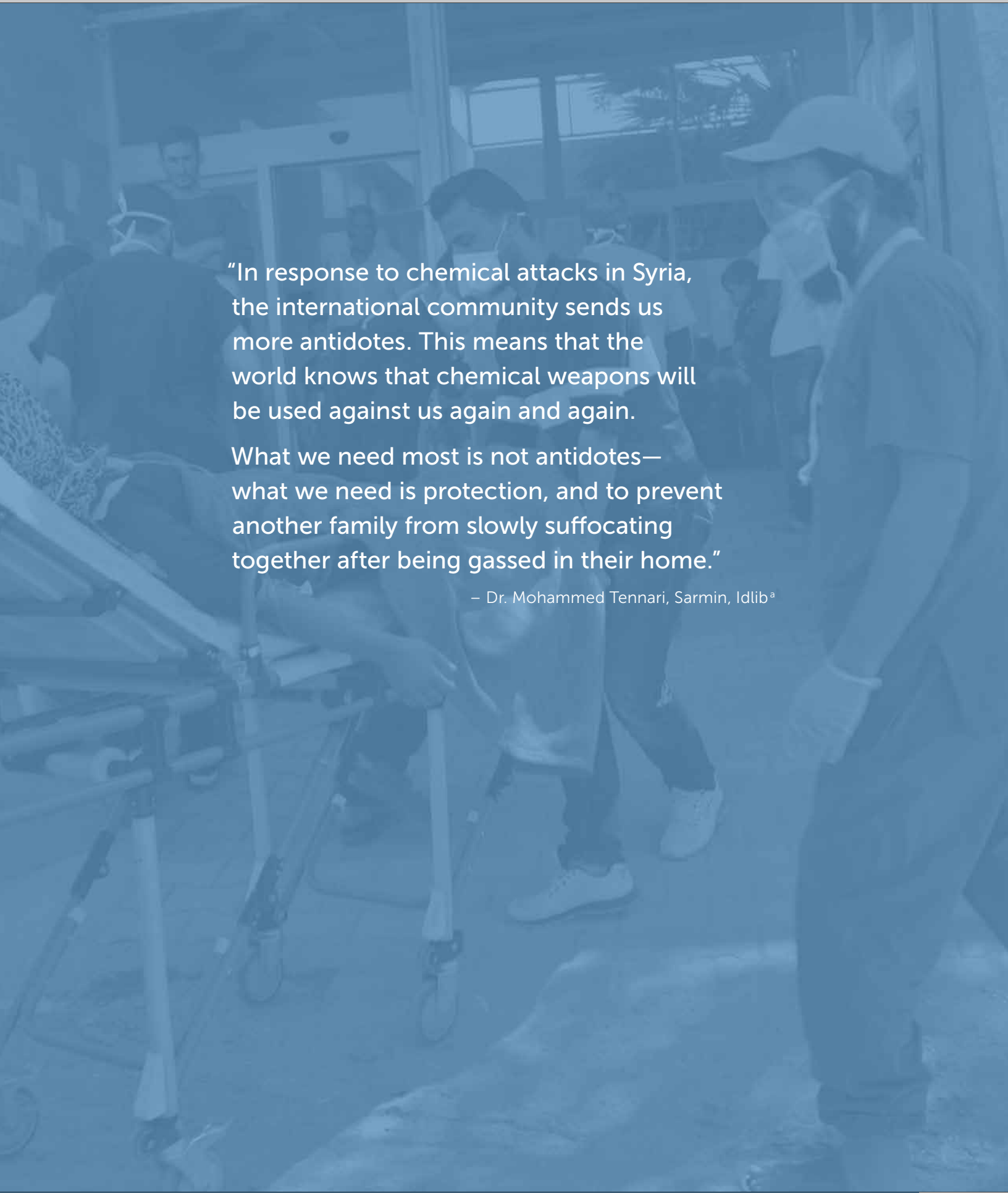

"In response to chemical attacks in Syria, the international community sends us more antidotes. This means that the world knows that chemical weapons will be used against us again and again.

What we need most is not antidotes—what we need is protection, and to prevent another family from slowly suffocating together after being gassed in their home."

– Dr. Mohammed Tennari, Sarmin, Idlib[a]

Bab Al Hawa Hospital,
Idlib, April 21, 2014

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Acronyms

CBRN-TF: Chemical, Biological, Radiological, and Nuclear Task Force

CWC: Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction

FFM: Fact-Finding Mission

Geneva Protocol: Geneva Protocol for Prohibition of the Use of Asphyxiating, Poisonous or Other Gases and Bacteriological Methods of Warfare

ICC: International Criminal Court

IDP: Internally Displaced Person

INGO: International Non-Governmental Organization

ISIL: Islamic State of Iraq and the Levant

JIM: OPCW-United Nations Joint Investigation Mechanism

NGO: Non-Governmental Organization

OPCW: Organisation for the Prohibition of Chemical Weapons

PPE: Personal Protection Equipment

SAMS: Syrian American Medical Society

SNGO: Syrian Non-Governmental Organization

UNSC: United Nations Security Council

UOSSM: Union of Medical Care and Relief Organizations

WHO: World Health Organization

Foreword

The use of chemical weapons is illegal and immoral, yet has occurred in Syria with impunity for the past three years.

These frequent chemical weapons attacks, as documented in this publication, are substantiated by the reports and findings of the Organisation for the Prohibition of Chemical Weapons (OPCW). These facts were established pursuant to the Geneva Protocol for the Prohibition of the Use of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare (Geneva Protocol), and the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (CWC).

The use of chemical weapons has constituted a war crime since 1925 under Customary International Law as well as Conventional International Law, and was reinforced as a war crime under the Geneva Conventions of August 12, 1949, to which Syria is a state party. Moreover, the widespread and systematic use of chemical weapons, particularly when used against a civilian population, also constitutes Crimes Against Humanity as defined in Article 7 of the Rome Statute of the International Criminal Court.

In response to numerous reports on the use of chemical weapons in Syria, particularly those involving sarin gas and chlorine gas, the UN Security Council (UNSC) passed Resolutions 2118 and 2209. In addition, through Resolution 2235, the UNSC established the Joint Investigative Mechanism (JIM) of the UN and OPCW to investigate these attacks.

A total of 116 alleged incidents of the use of chemical weapons have been reported by the OPCW. The OPCW Fact Finding Missions (FFMs) have investigated 29 of them, and confirmed the likelihood of exposure to chemical weapons of 23 of these cases to warrant further investigation by the UN Joint Investigative Mechanism. Surprisingly, however, the United Nations Independent Commission of Inquiry on the Syrian Arab Republic established by the Human Rights Council has not addressed this issue in its recent reports.

This report by the Syrian American Medical Society (SAMS) documents these very serious international crimes, for which individual criminal responsibility attaches. This includes command responsibility for those who ordered the use of such weapons, assisted in the supply of such weapons or the materials to make them, or knew of the commission of such crimes and failed to do anything to prevent them, even though

This report by the Syrian American Medical Society (SAMS) documents these very serious international crimes, for which individual criminal responsibility attaches.

they may have been in the position to do so. The documentation of these international crimes, as well as others, will become useful one day when criminal accountability will occur. Such criminal accountability has occurred since the end of World War II with the Nuremburg and Tokyo war crimes trials, and more recently in the former Yugoslavia and in the genocidal civil war in Rwanda, before the International Criminal Tribunal for the Former Yugoslavia and the International Criminal Tribunal for Rwanda, respectively. The establishment of the International Criminal Court created another possible forum to adjudicate the international criminal responsibility of certain actors who have committed any of the crimes within the jurisdiction of the court, namely: Genocide, Crimes Against Humanity, and War Crimes.

The documentation of these international crimes, as well as others, will become useful one day when criminal accountability will occur.

Considering the extent of the harm that has befallen the Syrian people, and I refer here to innocent civilians, it is shocking and incredible that the Security Council has not taken stronger steps to intervene and stop the carnage that is ongoing. How much more blatant must the attacks against civilians be before significant and meaningful legal action is taken by the international community?

In the meantime, NGOs like SAMS and others can and must continue to document these international crimes, not only for posterity's sake, but also because the international community needs to be confronted with its failure to act in the face of such international crimes.

—M. Cherif Bassiouni
Emeritus Professor of Law, DePaul University

Executive Summary

Since the conflict in Syria began, there have been numerous and horrific violations of humanitarian and human rights law, including the systematic use of chemical weapons. *A New Normal: Ongoing Chemical Weapons Attacks in Syria* is a report by the Syrian American Medical Society that documents 161 chemical attacks from the beginning of the conflict through 2015, using reports and first-hand accounts from physicians and health workers in Syria. SAMS compiled another 133 reported chemical attacks that could not be fully substantiated. The 161 documented chemical attacks have led to at least 1,491 deaths and 14,581 injuries from chemical exposure. Out of the 161 attacks, 77% have occurred after the passage of United Nations Security Council (UNSC) Resolution 2118 in September 2013, which created a framework for the destruction of Syria's declared chemical weapons stockpiles. In 2015, there were 69 chemical weapons attacks, making it the year with the most chemical weapons attacks in Syria to date. At least 58 chlorine attacks, or 36% of the total chemical weapons attacks, occurred after UNSC Resolution 2209 which condemns chlorine gas as a weapon in Syria.

The use of chemical weapons in Syria has continued into 2016.

Chemical weapons were used in Syria as early as December 2012, when civilians in Homs were treated for symptoms of chemical exposure. The use of chemical weapons escalated beginning in March 2013, particularly in Rural Damascus, Aleppo, and Homs. On August 21, 2013, rockets filled with sarin were launched into Rural Damascus in the largest chemical attack in Syria to date—more than 1,300 people lost their lives in this horrific attack and over 10,000 more were affected.

This massacre was a turning point in the conflict in Syria, shifting the course of chemical weapons use. In the fall of 2013, Syria acceded to the Chemical Weapons Convention and began dismantling its declared chemical weapons stockpile under the process established by UNSC Resolution 2118. The use of nerve agents all but ceased, but was replaced with the widespread use of chlorine gas. Barrel bombs filled with chlorine gas were used systematically in civilian areas of opposition-held territories beginning in 2014, particularly in Hama and Idlib. By the summer of 2015, the types of chemical agents being used and number of actors using chemical weapons increased, as non-state actors including ISIL were accused of using mustard gas and chlorine gas. The use of chemical weapons in Syria has continued into 2016.

The chemical preparedness and response efforts in Syria have been almost entirely Syrian and Syrian NGO led. Since early 2013, Syrian NGOs took

the lead in creating public awareness campaigns around chemical attacks and developing locally salient training programs for health workers and first responders. These trainings address general preparedness operations, health problems following exposure to chemical agents, personal protection equipment, decontamination procedures, medical management, criminal documentation, and more. Syrian NGOs have also taken a leading role in collecting and transferring samples for the international documentation process.

Chemical attacks have caused civilians to flee their homes and communities.

The psychological impact of chemical attacks on individuals and communities is particularly dire. Exposure victims and medical personnel often suffer from post-traumatic stress disorder, flashbacks, and depression, compounded by other daily horrors of life in a conflict zone. Chemical attacks have caused civilians to flee their homes and communities. Medical workers are placed in a particularly challenging situation, having the burden of deciding who will live and who will die.

The information and analysis in *A New Normal: Ongoing Chemical Weapons Attacks in Syria* lead to a number of conclusions:

- The rate of chemical attacks increased after UNSC Resolution 2118, through the use of chlorine-filled barrel bombs being dropped primarily over civilian areas and residential neighborhoods.
- The use of chemical weapons is part of a strategy of displacing Syrians in opposition-held territories.
- The lack of enforcement of international humanitarian and human rights law and several UNSC resolutions spurs the continued use of chemical weapons.
- Local and Syrian NGOs overwhelmingly led the chemical preparedness and response efforts inside of Syria, from developing a locally salient response training to creating a documentation protocol.

PART I

Bab Al Hawa Hospital,
Idlib, April 21, 2014

Introduction

Physicians in Syria have had to adapt their practice drastically to meet the scale, scope, and type of humanitarian need during the protracted conflict. Medical professionals have moved facilities underground to provide security for staff and patients, performed surgeries by the light of their cellphones, and treated patients from medical issues inconceivable before the conflict, such as the effects of chemical weapons exposure. **Since the beginning of the conflict, medical workers and first responders in Syria have treated victims from at least 161 chemical attacks.**

A New Normal: Ongoing Chemical Weapons Attacks in Syria documents the chemical weapons attacks in Syria from the beginning of the conflict through the end of 2015, using reports and first-hand accounts from physicians, first responders, and civilians in Syria. Syrian medical workers have played a critical role in the response to each chemical weapons attack, using limited supplies and experiential learning to act quickly and save lives. They are forced to make rapid assessments based on the symptoms that victims display, and often suffer from secondary exposure as they treat patients. In addition to treating civilians, medical workers collect samples and document the attacks, providing details about the symptoms and experiences of exposure victims.

While conventional attacks on civilians are much more frequent and take a dramatically greater toll in terms of human life—after nearly five years of conflict in Syria, organizations report that between 250,000—470,000 people have been killed, with only around 1,500 people killed from chemical attacks—the individual and collective impact of chemical attacks is unique and long-lasting. Chemical attacks have generated intense fear and psychological trauma, led to birth defects and long-term health effects, broken down communities, and driven mass internal displacement and displacement into neighboring countries. **The fear and reality of ongoing chemical attacks has become the new normal in Syria.**

The physicians who have treated chemical exposure victims tell a similar story. They talk of patients arriving in a panic, coughing, choking, or unable to breathe, children collapsing on the field hospital floors foaming at the mouth and gasping for air, and checking the victims' eyes to find pinpoint pupils. They recall the brave first responders who rush to the scenes of the chemical attacks, using t-shirts to cover their mouths instead of proper protective equipment, exposing themselves to chemical fumes in order to help civilians out from rubble and bring them to the nearest field

Chemical attacks have generated intense fear and psychological trauma, led to birth defects and long-term health effects, broken down communities, and driven mass internal displacement and displacement into neighboring countries.

hospital. Physicians and civilians who have witnessed or experienced a chlorine gas attack describe seeing barrel bombs falling, but not hearing any explosion. They describe the chaos as victims, whose skin becomes a sickly pale color, fill the hospital that soon smells like bleach.

SAMS supports over 1,700 health workers in over 100 medical facilities in Syria, many of which have treated and documented victims of the chemical attacks. *A New Normal: Ongoing Chemical Weapons Attacks in Syria* gives an overview of the chemical weapons attacks in Syria based on their experiences and documentation. It presents an overview of the chemical attacks that have occurred in Syria in table format, showing the date, location, agent used, number of victims of chemical exposure, and number of deaths for 161 attacks. This report examines the work of Syrian NGOs (SNGOs) in chemical preparedness and response, the inadequate international response, and the devastating impact that chemical attacks have on the people in Syria, from death, to trauma, to displacement.

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This report also includes information from surveys of civilians and health workers who survived chemical attacks and/or treated patients from chemical attacks. Surveys were conducted by SAMS field staff in January 2016 using convenience samples from East Ghouta and Hama. These surveys include 30 health workers—20 from East Ghouta and 10 from Hama—and 21 civilians—11 from East Ghouta and 10 from Hama. Among the 51 respondents, 6 were female. For security purposes, only the first names of respondents are used.

This report is laid out in three parts, followed by an annex:

Part I: Part I presents a brief background and an analysis of the chemical weapons attacks. It presents the attacks chronologically with a focus on trends in agents, areas targeted, and the scope of the attacks. This section includes first-hand medical accounts from several physicians who treated victims of chemical exposure.

Part II: Part II describes the on-the-ground chemical preparedness and response efforts, led primarily by SNGOs, and presents the human effects of chemical weapons attacks.

Part III: Part III summarizes conclusions that follow from the information presented and puts forth recommendations for the international community.

Annex: The report is followed by an annex with the full spreadsheet of documented chemical attacks and the methodology behind the documentation.

Background

Now approaching its sixth year, what began as peaceful demonstrations in Syria has become the worst humanitarian crisis since World War II. Over the past five years, civilians have been subjected to indiscriminate and targeted aerial attacks, deprivation through the use of siege, chemical weapons attacks, and other egregious and flagrant violations of international humanitarian law (IHL). In Syria, conventional attacks are the most deadly—however, the individual effects of chemical attacks are long-lasting and the fear they inspire can break down communities and drive mass displacement.

At the beginning of the conflict, Syria was estimated to have the third largest stockpile of chemical weapons in the world. Though relatively small-scale chemical attacks had been occurring in Syria since late-2012, it was August 21, 2013 that brought widespread international attention to the use of chemical weapons in Syria. During this attack on Rural Damascus, over 1,300 Syrians were killed and over 10,000 were injured by sarin gas. Less than a month after the deadly attacks, the Syrian government acceded to the Chemical Weapons Convention (CWC) under international pressure. This virtually halted the use of schedule 1-3 chemicals as weapons in Syria. However, despite the CWC accession and Syria's cooperation through the destruction of its declared chemical stockpiles after September 2013, the use of non-schedule chemical agents like chlorine against civilians continues unabated.

In SAMS-conducted interviews with chemical attack survivors, one respondent, a 29-year old nurse from Irbin, Rural Damascus, reported, **"Each kind of weapons has its way in killing people, but what worries me the most is the silence of the international community."**[1]

161

chemical attacks in Syria

77%

of chemical attacks occurred after UNSC Resolution 2118

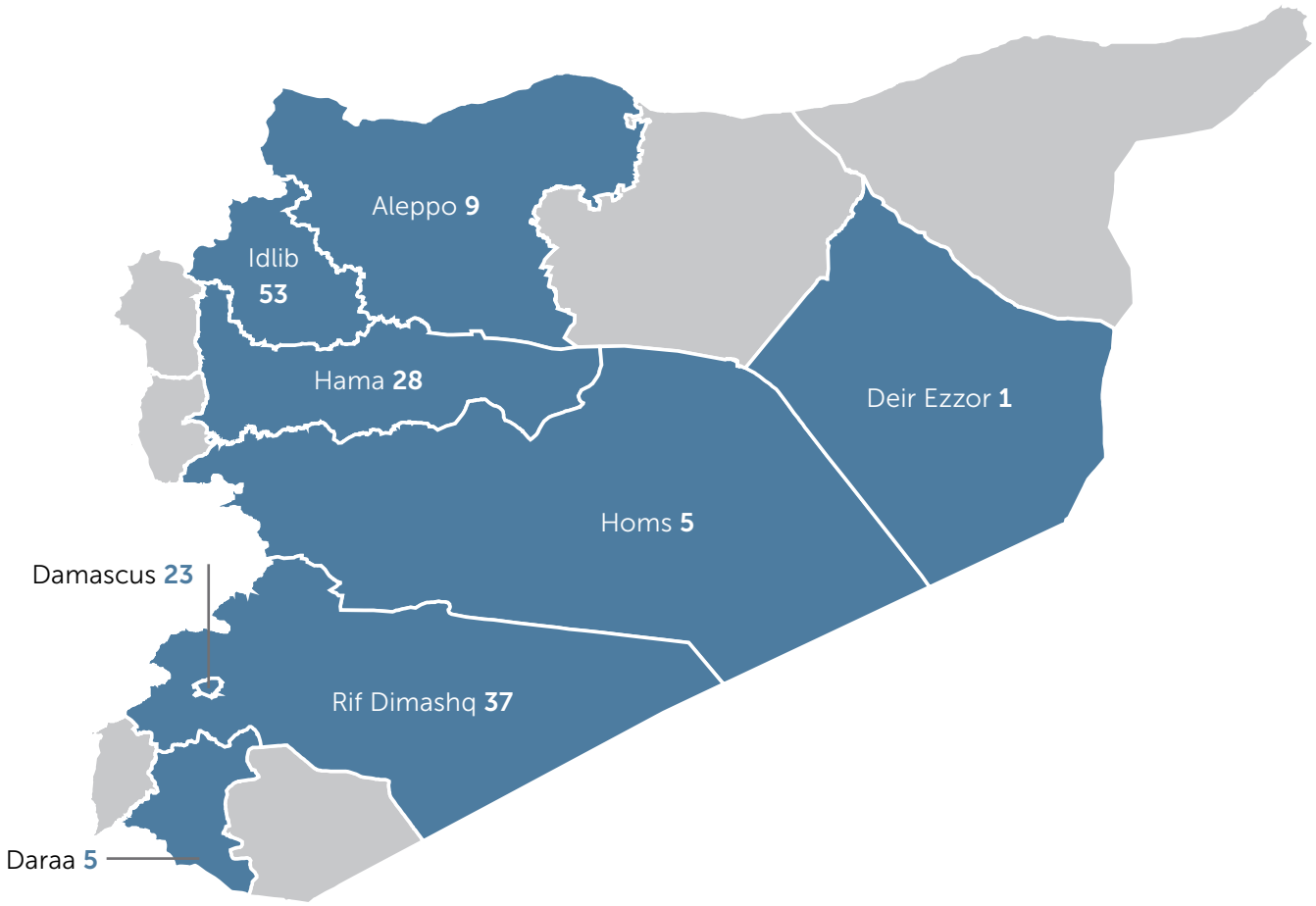
14,581

victims of chemical attacks

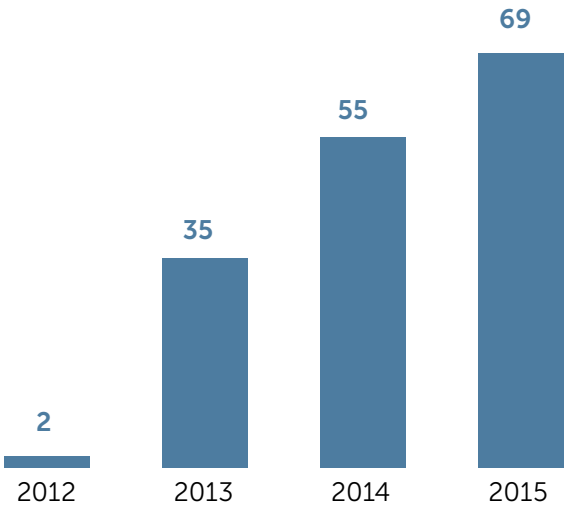
1,491

deaths from chemical attacks

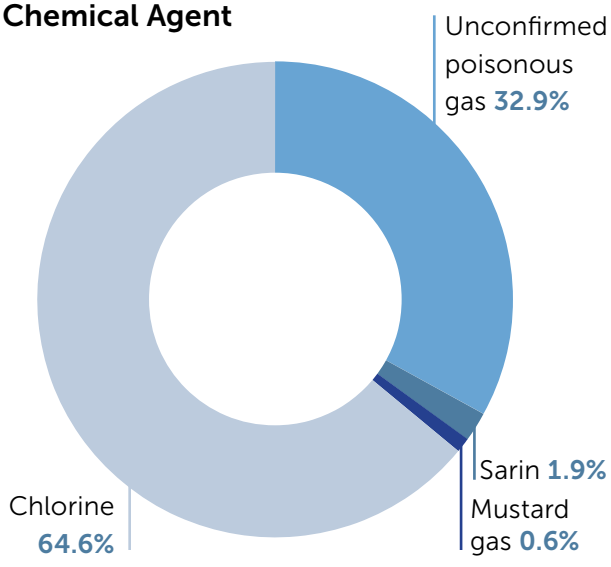
Attacks by Governorate



Attacks by Year



Chemical Agent



Chronology of Chemical Attacks

December 2012–August 2013

Chemical weapons were used in Syria as early as December 2012, when civilians in Homs were treated for symptoms matching those of chemical agents, including miosis (pinpoint pupils), nerve convulsions, loss of consciousness, eye pain, nausea, and more.[1] It wasn't until March 2013, however, that chemical weapons became frequent, with attacks occurring in Aleppo and Rural Damascus. On May 26, 2013, SAMS staff reported a chemical attack in Harasta, Rural Damascus: "According to doctors who treated patients in the field, symptoms caused by the attack included nausea, vomiting, pinpoint pupils, coughing, difficulty in breathing, headache and respiratory failure. The severity depended on the proximity of the victims to the center of the sites of the explosions and their general health. Patients' symptoms were reversed by high doses of Atropine... in addition to Oxygen and general measures. Doctors described shortage of Atropine, other ancillary medications and ventilators. There was general panic among the civilian population as the effect of the chemical agent spread over wide area due to wind. Three victims are reported to have died and another 69 injured so far in Harasta. Many are still in a critical condition. Members of the first responders reported symptoms also. Review of videos from the field showed that none of the medical personnel or patients had protective gear or proper masks."[2]

Dr. Mohamad Katoub, a medical practitioner working in coordination with SAMS in Douma, East Ghouta at the time, spoke about the growing use of chemical weapons: "We had received 5 or 6 chemical attacks at this time, but most of them had been on the front lines. We saw many soldiers and fighters who were victims, but fewer civilians. The first attack was so hard because we did not think the regime would use chemical weapons. We began to think, 'What would happen if the same chemical bomb went off in a civilian area? It would be such a disaster.'"[3]

Chemical weapons were used sporadically, but leading into the summer of 2013, the frequency and size of attacks began to increase. The majority of these chemical attacks occurred in strategic areas of Rural Damascus which would allow access to either the center of Damascus or the main highways, and which were contested by armed opposition.[4] Other attacks occurred in the strategically important cities of Aleppo and Homs. Various types of chemical agents were used during this time period, including sarin, though it was logistically difficult to confirm the agent used in each attack.

1–2: Saraqeb, Idlib, April 29, 2013. 3: Otaybah, Rif Dimashq, March 19, 2013. 4: Al Bahariyah, Rif Dimashq, May 26, 2013.

1: Sheikh Maqsood, Aleppo, April 13, 2013. 2: Harasta, Rif Dimashq, May 26, 2013. 3: Darayya, Rif Dimashq, April 25, 2013. 4: Al Bahariyah, Rif Dimashq, May 26, 2013. 5: Zamalka, Damascus, June 19, 2013.

On August 1, 2013, UN inspectors entered Syria to investigate chemical attacks. They confirmed four likely chemical attacks, in Khan al Asal, Aleppo; Jobar, Rural Damascus; Saraqeb, Idlib; and Ashrafiah Sahnaya, Rural Damascus.

On August 5, 2013, the largest chemical attack in Syria up to that point occurred in Douma, East Ghouta. Over 400 people sought treatment for symptoms of chemical exposure. This attack was a glimpse into the nightmare that would occur only 16 days later.

Other attacks occurred in the strategically important cities of Aleppo and Homs. Various types of chemical agents were used during this time period, including sarin, though it was logistically difficult to confirm the agent used in each attack.

FIRSTHAND MEDICAL ACCOUNT

"Dozens of patients came to the emergency room on August 5. Ambulances didn't stop and we had to wake up the whole medical staff to respond. Most of the cases were simple—as soon as we washed the bodies they began to respond and became better. A very small number needed atropine. The thing we were most afraid of was the uncertainty—what is happening? Is this a test? We were afraid about what may happen next. The regime may use chemical weapons against civilians in a crowded area. It was a terrible night and NGOs began to respond and media began to respond finally. But within 16 days, the massacre happened. This was not enough to convince whole world that the regime could kill with chemical weapons—400 patients sick from a chemical attack, but nobody died, was not enough. We needed to lose our children and our families to convince world."

—Dr. Mohamad Katoub, Douma, East Ghouta[5]

August 21, 2013

'All of the previous chemical attacks until August 21 were just tests to see the response."

—Dr. Khalil Al Asmar, Douma, East Ghouta[6]

The chemical attack on August 21, 2013 was a defining moment of the conflict in Syria, both for Syrians and for the international community. In the early morning, rockets filled with sarin were launched into Zamalka and Ein Tarma in East Ghouta and Moadamiya in West Ghouta, all areas of Rural Damascus that were and continue to be besieged by the government. Satellite images show the strikes coming from government-controlled areas to the east and west of Damascus.[7]

On-going shelling and inability to leave the area due to the siege made it almost impossible for civilians to escape the chemical agent. Many initially believed that a conventional rocket had been launched and did not leave their cellars, which exacerbated the effects of sarin exposure, as the gas is heavier than air and sinks to the lowest point. More than 1,300 people in East Ghouta and Moadamiya lost their lives and over 10,000 more were affected. Approximately 97% of the fatalities were civilians.[8]

"It appeared that everyone was waiting for a Srebrenica-like moment in Syria. The sarin massacre in Ghouta was Syria's Srebrenica. But the international response did not stop the suffering and the chemical weapons attacks continued afterwards."

—Dr. Zaher Sahloul, SAMS Past President

The situation overwhelmed the already limited medical system in East Ghouta. First responders reported neighbors screaming for help and an unrecognizable smell similar to burning. Paramedics were overwhelmed by the number of victims. Due to lack of equipment, such as gas masks or protective suits, first responders, paramedics, and health workers became ill as they tried to rescue people. Doctors reported receiving patients with symptoms of vomiting, foaming at the mouth, pinpoint pupils, eye redness, bloody nose and mouth, neurological convulsions, confusion, and respiratory and heart failure. The few medical points in the area could not handle the volume of cases. The floors of medical facilities and the roads in front of them were crowded with thousands of women, children, and men lying on the ground in need of care.

1–5: East Ghouta, Rif Dimashq, August 21, 2013

FIRSTHAND MEDICAL ACCOUNT

"I was sleeping in the doctor's house in one of the basements beside the operation room. At about 2:30am, we got a call from the central ER. The physicians who were on staff that night informed me that it was a chemical attack. I arrived and in the next 10 minutes, it was like a nightmare. One of the medics entered and said gas had fallen in Zamalka and all the people died. Then I realized that it was a huge chemical attack. All of the hospitals from Zamalka to Douma were filled. I asked some people to go to the mosque and use the speakers to request that everyone who had a car go to Zamalka and help. I don't know if it was a wise decision or not. But there were so many heroes that night. Our local culture says that we would die to save others.

"The numbers became over all capacity. I asked to our staff to do medical work in two schools and mosques, where there are water tanks. If there is no water, you don't have a hospital. There was just one person who could classify the patients—me. I was the only one who studied it. I had to decide quick response for bad cases and delay medium and moderate cases. After 30 minutes, there were hundreds. We didn't realize how many, but we knew there were hundreds.

"I put two medics on the door of the ER. I said that every patient who is unconscious or shaking, take him down to the ER. All kids or seniors, or anyone shouting loudly, put him in the second ER. All others should go in the third medical point. We could not do anything in the second or third medical points—we could not provide them with any medicine. From the first hour, I gave all staff their mission so that they know what to do. I told them not to ask, just to give atropine to all. The first problem was washing the bodies. The second problem was just how many people were there. The power engine became unable to warm water. The other problem was that most patients were female and we were unable to give them any privacy. They were delivered in sleeping suits.

"After 90 minutes, one of my medical staff fell down. The symptoms began to appear on medical staff themselves, and we had to change our strategy. I chose to see the patients one by one, and check vital signs to see if there was a misunderstanding. I spent 5 seconds for every patient, and did not do any medical procedures myself—I just made decisions. The staff did a great job here.

"At 11 am, the bombs and shelling began. The regime used to use bombs after every chemical attack. We see dead bodies without blood as doctors. But when the media sees blood, they will be confused. I called my friend Majed and he was crying as we prepared the first report for media. The number in Douma was 630 patients and 65 victims. We could realize some symptoms we never saw before.

"I will never forget the work of the medical staff and civil defense members—how they pulled the people up and brought them to the medical points. When everything was okay, they checked houses. One told me a story of how when he entered the house, he found a man had arrived to the door and put his hand on handle to get out but couldn't get out. He was holding his kids.

"Some people kept their birds in cages, and those were dead. Of course the free birds were okay. But humans cannot fly."

—Dr. Khalil Al Asmar, Douma, East Ghouta[9]

These attacks happened only a few days after UN investigators arrived in Syria to investigate earlier allegations of chemical weapons. A second investigation, this time into the August 21 attacks, was launched.

Following the chemical attack on August 21, the United States threatened to use limited military force against Syrian government military targets. Under

threat of U.S. military intervention, Syria acceded to the Chemical Weapons Convention (CWC) in September 2013. After extensive negotiations, the U.S. and Russia proposed a plan to eliminate Syria's chemical weapons stockpiles, which Syria agreed to, and the U.S. halted pursuing military intervention. Under this plan, Syria had to declare its chemical stockpiles, production facilities, and mixing and filling equipment. Verification and destruction of the chemical weapons was overseen by the OPCW and a timeline was created for the destruction of Syria's chemical weapons by mid-2014. The UNSC passed Resolution 2118, which implemented the framework of the U.S.-Russia deal and empowered UNSC action under Chapter VII of the UN Charter if Syria failed to comply.

2014

After Syria joined the CWC and began dismantling its chemical weapons stockpile under Resolution 2118, the use of nerve agents all but ceased. However, a deadly weapon, designed to be indiscriminate and inflict maximum amount of damage on populated areas, emerged as a keystone of the government's military strategy: the barrel bomb. Barrel bombs are canisters often filled with shrapnel and explosives, dropped from helicopters and hitting the ground causing huge explosions. The use of barrel bombs filled with chlorine gas became widespread beginning in 2014. Unlike sarin, chlorine has multiple peaceful uses, including water sanitation, and is not regulated by the CWC; however, to use it as a chemical weapon is illegal under the CWC. In April 2014, the use of chlorine, particularly in the Hama and Idlib governorates, became systematic.

On April 29, the OPCW announced its first Fact-Finding Mission (FFM) into the reports of on-going chlorine gas attacks. Despite the impending investigation, the attacks continued frequently throughout May 2014. Between the months of April and May, over 20 chlorine attacks were reported, the majority of which were in Idlib and Hama.

The OPCW FFM focused on the locations most impacted by the chlorine attacks, investigating Talmenes and Al Tamanah, Idlib and Kafr Zita, Hama. The attacks in all three locations shared similar characteristics. Witnesses reported a greenish-yellow or honey-colored gas and a smell similar to cleaning solutions and chlorine. They also noted that the barrel bombs sounded quieter when they hit the ground and in many cases did not explode. The majority of people nearby the barrel bomb's location of impact suffered no physical trauma but exhibited symptoms consistent with a pulmonary irritant. The most common symptoms were coughing, difficulty breathing, feeling of suffocation, burning sensation, excessive tearing and nasal discharge. The gas killed livestock and other animals in the area and plants exposed to the gas turned brown and died.[10]

Medical personnel struggled to respond to the high volume of patients from the chlorine attacks. In Talmenes, because of a short supply of ambulances, people used personal cars to transport victims. In Al Tamanah,

1: Kafr Zita, Hama, April 11, 2014.
2: Atman, Daraa, August 19, 2014.
3: Kafr Zita, Hama, April 18, 2014.
4: Talmenes, Idlib, April 21, 2014.
5: Kafr Zita, Hama, April 18, 2014.

1: Jobar, Damascus, August 20, 2014. 2: Kafr Zita, Hama, August 28, 2014.

there was only one ambulance equipped with oxygen to transport people to a medical point almost an hour away. The lack of protective equipment meant ambulance drivers and first responders who entered affected areas often had to receive treatment for chlorine exposure as well. Medical personnel only had surgical masks and latex gloves to protect themselves, resulting in exposure through cross-contamination. The large number of patients from frequent chemical attacks overwhelmed medical points. People had to lie on the floors because there were no longer any beds available. In Kafr Zita, despite increased oxygen supplies after repeated attacks, medical points could not handle the volume of patients and often ran out of supplies. Severe cases required intubation or medical ventilation, which were not available in field hospitals.

Though chlorine is significantly less lethal than sarin, the chlorine attacks caused significant panic among civilians. Medical personnel reported that many people sought medical treatment after attacks purely out of panic. The fear caused by these chemical attacks resulted in the displacement of hundreds of thousands civilians from their homes and districts at this time, particularly from Hama.

FIRSTHAND MEDICAL ACCOUNT

"At the beginning of the first attack on April 11, we did not know we were being exposed. The attack began at 6pm. As usual, we were on walkie talkies. We heard helicopters overhead. This is a hospital that is bombed a lot, so when we saw the helicopter, we did what we usually do—go to the basement. The hospital is 3 floors and we went to the lowest one. We moved the patients, we carried every single patient down. When we see a helicopter, our priority is that not a single person is left on the top floor.

"Normally, we hear from the walkie talkie about the bomb and then civil defense are sent to the scene where the bomb was dropped. The bomb hit the area 300 meters away from hospital.

"I went to the roof and noticed that the atmosphere was orange but the smell hadn't reached the hospital. I knew that something was wrong. Normally, we send out emergency teams, and they come back. This time the emergency team just came back with high level of people but nothing was visually wrong. Doctors still weren't sure what was wrong, and the civil defense said it must have been gas. Then the smell started seeping off of clothes. It reminded me of what you use to clean.

"It was a matter of deduction—we put one and two together from the smell and color. We began with the protocols we have, especially the ones for affected respiratory systems. There were around 90–100 cases at first, and many women children and elderly. We divided the cases between mild, moderate, and severe. We gave oxygen and hydrocortisone to the mild and moderate patients, and took the severe to the ICU. The most severe cases were transferred to Turkey. We saw people coughing up blood, sleepy to the point that they could not stay awake, blueness in fingers, and difficult breathing."

– Dr. Hassan Al Araj, Kafr Zita, Hama[11]

FIRSTHAND MEDICAL ACCOUNT

The village of **Talmenes**, in the suburbs of Idlib, was attacked by chlorine on **April 21, 2014**. The injured were transferred to and treated at four health centers: Alsiddiq field hospital, Jarjanaz field hospital, "Medical Facility A", and "Medical Facility B" at the Syrian-Turkish border.

Field Report

Area inhabitants and injured victims reported that a helicopter was flying over the area when it threw two big containers at **11:45 am**. One of the containers fell in a residential backyard without exploding, releasing an irritating smell. The second container hit a house and exploded about 100 meters from the first container. It damaged the rooms of the house and caused a dense cloud of green-yellow smoke.

The monitoring station reported the helicopter route as follows: Departure 10:30am en route to Hama → Souran → Skek → Abo Makki → Jarjanaz → Talmenes.

The container carrying the toxic substance was 180 cm in length, and 90 cm in diameter. The field investigation encountered a strong irritating smell in the area that required team members to wear protective cloths and masks to protect their airways. A number of dead animals in the area were reported, especially birds and cattle. Trees also turned yellow in the areas of the two attacks.

The two holes caused by the attacks were measured and the areas were examined.

Witnesses reported that there was a strong west to east wind on the day of the attack, which allowed the contamination to spread about 2 KM. The temperature that day was 20–25 degrees Celsius.

Medical Report

Alsiddiq field hospital in Talmenes, Idlib: Following an explosion, the Alsiddiq field hospital in the village of Talmenes received and treated approximately 250 injured patients. Jarjanaz field hospital received and treated another 100 patients. Medical facilities A and B received cases as referred from either Alsiddiq or Jarjanaz field hospitals.

19 of the 350 cases needed more advanced medical care, which they received at Medical Facility A.

One of the doctors working at Alsiddiq field hospital reported that patients arrived to the hospital from the attack area with the following symptoms: irritation, seizure (one case), vomiting, bluish skin, redness of the skin with itching, redness of the eyes, hyper secretion of saliva, dyspnea, pupil contraction, epiphora, cough, abdominal pain, difficulty breathing, and loss of consciousness.

The hospitals treated the patients in the following manner:

- Removing the patients' clothes and cleaning the contamination
- Respiratory support with oxygen, bronchodilators, frequent aspiration of secretions, and intubation if the O2 saturation was less than 80%.
- IV fluids
- Allergy management with systemic corticosteroids and intradermal adrenaline
- Symptomatic medications like antiemetic, anti-seizures, Atropine

The doctor also reported that staff evacuating the patients to the hospital demonstrated symptoms of contamination such as eye and skin irritation. All hospital staff were unharmed.

The last case was received two hours after the attack. Some of the injured were located approximately two kilometers away from the attack site. Patients were still following up with the hospital until the time of the doctor's testimony (30 hours after the incident).

Medical Facility A, Idlib: At 12:00 pm, the hospital received a warning of a chlorine attack. The hospital staff immediately made arrangements for their own protection. The hospital received

19 cases of asphyxia. The first 10 patients arrived together (4 women and 6 children).

One of the doctors and three nurses reported their testimony to the investigation team. They reported that when the ambulance arrived, there was an irritating smell so they took further protective arrangements. The patients' symptoms included dyspnea, coughing, difficulty breathing, nausea, vomiting, itching and redness of the skin.

There were no seizures, pupil contraction, bradycardia, or muscle spasms.

Managing the cases included:

- Removing the patients' clothes and cleaning the contamination
- Respiratory support with oxygen, bronchodilators, frequent aspiration of secretions, and intubation if the O2 saturation was less than 80%
- IV fluids
    - Allergy management with systemic corticosteroids and intradermal adrenaline
    - Symptomatic medications like antiemetic, anti-seizures, Atropine

A chest X-Ray was performed on the patients, which showed non-specific consolidations in the lung areas.

Thirteen of the patients were discharged eight hours after their arrival and asked to follow up with the hospital if any respiratory symptoms re-occurred. The other six cases were transferred to Medical Facility B at the Syrian-Turkish border.

Medical Facililty B, Idlib: At 1:30 pm, the hospital admitted five patients exposed to chlorine. Around 7:00 pm, the hospital received two additional cases suffering from similar symptoms.

The treating doctor send a full report with a clinical presentation of the cases. Here are the reports for the first five patients:

First case: Mohammad Abdul-Razzak Alhashash, 6-year-old boy, arrived to the hospital at 1:30 pm. He was getting prepared to go to school when he was exposed to a yellow toxic gas. He was unable to breathe and lost consciousness. The patient arrived at the hospital intubated under mechanical ventilation; both his heartbeat and breathing stopped. CPR was performed and all attempts to revive him failed.

Clinical symptoms upon arrival included: redness in the face, pink foamy secretions, pupil dilation, diffused crackles in both lungs areas.

Mohammad died at 2:00 pm on April 21, 2014.

Second Case: Khadejah Barakat, 65-year-old female, arrived to the hospital at 2:30 pm. She was at home when the toxic material container hit. Yellow gas started to spread and she experienced difficulty breathing and asphyxia.

Upon arrival, she was awake and oriented, with symptoms of dyspnea, tachycardia, sweating, irritation, extensive cough, crackles in both lungs areas, and O2 saturation of 70%.

By 2:40 pm, she was intubated and put under mechanical ventilation with aspiration. Her secretions were foamy and extensive.

Her oxygen saturation declined to 60%. At 7:00 am on April 22, 2014, the patient was transferred to Turkey for advanced medical care.

Third case: Marwa Hashash, 15-year-old girl, arrived to the hospital at 7:00 pm. She was at home when the toxic material container hit, yellow gas started to spread and she experienced difficulty breathing and asphyxia.

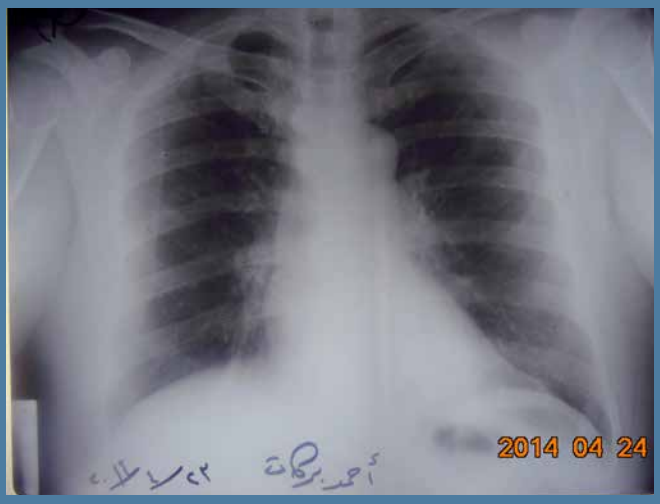
Upon arrival, she was awake and oriented, with symptoms of dyspnea, tachycardia, sweating, irritation, extensive coughing, crackles in both lungs areas, and O2 saturation of 60%.

She was transferred to Turkey for advanced medical care at 7:00 am on April 22, 2014.

Fourth case: Ahmad Barakat, 64-year-old male, arrived to the hospital at 2:30 pm. He was at home when the toxic material container hit, yellow gas started to spread and he experienced difficulty breathing and asphyxia.

Upon arrival, he was awake and oriented, with symptoms of dyspnea, tachycardia, sweating, irritation, extensive cough, crackles in both lungs areas, and O2 saturation of 80% on room air. O2 saturation increased to 90% with the oxygen mask.

The patient was observed for 48 hours. By managing with bronchodilators and oxygen, O2 saturation improved to 95%. The patient was discharged from the hospital on April 23, 2014 after performing this CXR:



The patient reported his testimony about the attack and his injury, and it matched all the other testimonies previously mentioned.

Fifth case: Marioumeh Alhashash, 19-year-old woman, arrived to the hospital at 2:30 pm. She was at home when the toxic material container hit, yellow gas started to spread, and she experienced difficulty breathing and asphyxia.

Upon arrival, the patient was unconscious, with symptoms of dyspnea, tachycardia, sweating, irritation, extensive cough, crackles in both lungs areas, O2 saturation of 45%.

The patient was intubated and put under mechanical ventilation with aspiration of secretions, which were foamy and extensive.

After observation on mechanical ventilation for 72 hours, O2 saturation did not surpass 92%.

The patient was transferred to ICU and died on April 25, 2014 of respiratory deterioration and non-cardiac lung edema. The following pictures depict the patient's situation and CXR 24 hours after the attack. (The first name on the X-Ray is inaccurate by mistake).

1: Hawash, Hama, April 26, 2015.
2: Sarmin, Idlib, March 16, 2015.
3: Binnish, Idlib, March 24, 2015.
4: Kansafra, Idlib, May 3, 2015.
5: Al Bashiria, Idlib, June 9, 2015.

March 2015–June 2015

On March 16, 2015, only 10 days after the UN Security Council passed Resolution 2209 condemning the use of chlorine as a weapon in Syria, barrel bombs filled with chlorine were dropped over the towns of Sarmin and Qaminas. One of the bombs hit the house of the Taleb family, who was hiding in the basement of the house. The six members of the Taleb family, including three children under the age of three, died of suffocation.

Between March 16 and June 9, SAMS documented 43 chlorine attacks in the Idlib governorate, with over 717 Syrians affected by exposure and 9 deaths from suffocation. These attacks coincided with the government's loss of territory in Idlib to armed opposition. These 43 attacks shared many similar features. The majority of these attacks happened in the middle of the night or early morning, increasing the effectiveness of the gas. The sound of the helicopters was often heard before the barrels were dropped, but without the explosion of a conventional barrel bomb. In the wake of the attacks, victims described smelling an odor similar to bleach. Patients experienced redness, burning of the eyes, shortness of breath, coughing, and in severe cases, frothing at the mouth. These symptoms match exposure to a choking agent.

On April 16, one month after the attack that killed the Taleb family, Dr. Mohammed Tennari, the director of the Sarmin field clinic in Idlib, testified about his experiences in front of the United Nations Security Council in an Arria-formula session hosted by U.S. Ambassador to the UN Samantha Power, who was brought to tears by his remarks. Less than two hours after the Security Council meeting, his hospital began receiving victims from another chemical attack in Idlib City.

After the Arria-formula session, Ambassador Power stated, "We need an attribution mechanism so we know precisely who carried out these attacks."[12] The U.S. Mission worked alongside others to create and ultimately pass Resolution 2235, which established a one-year Joint Investigative Mechanism (JIM) to identify those responsible for the chemical attacks. The JIM has the mandate to further investigate the chemical weapons attacks from 2014 to the present to identify those responsible. The JIM will report back to the UNSC, which will ultimately determine accountability for those responsible for chemical weapons use.

FIRSTHAND MEDICAL ACCOUNT

"I heard the helicopters from my home one Monday night as I watched a movie on TV. We hear the chopping wings of helicopters almost every day. They fly over Idlib and drop barrel bombs on our neighborhoods too often to count. But we don't usually hear the helicopters at night.

"On the night of March 16, as I heard the helicopters overhead at about 8:30pm, an announcement blared through my walkie talkie and through mosque speakers of Sarmin that there were explosive barrel bombs that had been dropped. They said that the barrels were filled with poisonous gas- it was a chemical attack. Voices shouted for people to avoid the area where the barrels were dropped and to go to higher ground for safety.

"I immediately left my house and drove to my field hospital, hoping that the injuries would be minor and fearing for my family. Sarmin had never before experienced a chemical attack. As soon as I left my house, I could smell the odor of bleach. When I arrived to the hospital, a wave of people had already begun to arrive. They were all experiencing symptoms of exposure to a choking agent like chlorine gas. Everyone was decontaminated with water before coming into the hospital, and their clothes were taken off of them. Dozens of people had difficulty breathing, with their eyes and throats burning, and many began secreting from the mouth. We lay people on the floor as the beds filled up. Our humble field hospital became chaotic. We tried our best to give people oxygen and hydrocortisone nebulizers to stabilize their breathing. The first wave of 50 people came from the Qaminas village, less than 10 minutes away from Sarmin. We saw 20 additional people from the western neighborhood of Sarmin- the wind had blown the chemical agent in that direction.

"Among the people who entered, I saw my friend Waref Taleb. He ran an electronics repair shop in town, and recently helped to fix my phone. He, his wife, his mother, and his three young children—all under the age of three—were a sickly pale color when they arrived, a sign of severe lack of oxygen and chemical exposure. In the most severe cases of chlorine exposure, your lungs fill with fluid and you suffocate. We immediately intubated Waref and gave him CPR, and rinsed off his wife and gave her atropine. His mother was already dead when she arrived. We worked quickly to treat three-year-old Aisha, two-year-old Sara, and one-year-old Mohammad, giving them oxygen and injecting them with atropine. Mohammad was foaming at the mouth. We were forced to treat Sara and Aisha on the body of their dead grandmother. As quickly as we worked, we could not save them. In a short period of time, Waref and his wife's symptoms progressed rapidly, and they too died.

"We learned from civil defenders who rushed the Taleb family to the hospital that the barrel bombs filled with chlorine had hit their house as they hid in the basement. In our daily barrel bomb attacks, it is safest to go to the basements of houses, but for a chemical attack like this, basements are the worst place you can be. Chlorine is thicker than air. One of the barrel bombs fell through a shaft in their home, filling the ventilation with gas when it broke open and released chlorine. Their basement became a makeshift gas chamber.

"Altogether that night, we saw 120 people. There were only five physicians, including myself, and about 15 nurses working at the hospital. Many civil defenders and medical staff, including me, experienced symptoms of chemical exposure from such close contact with the patients. As I worked, my chest became tighter and tighter, and I had a hard time breathing. My throat was burning. The young nurse who took care of baby Mohammed had symptoms of a critical level. The entire hospital smelled like bleach that night."

– Dr. Mohammed Tennari, Sarmin, Idlib[13]

1: Mare'e, Aleppo, August 21, 2015.
2: Irbin, Rif Dimashq, August 11, 2015.

Summer 2015

In the summer of 2015, the number of actors using chemical weapons and types of chemical agents being used increased. Chlorine continued to be used sporadically in Aleppo, Rural Damascus, and for the first time Deir Ezzour. Reports of unconfirmed gas attacks, like one which occurred in Al-Hasakah on June 28, were linked to ISIL (Daesh). On August 21, a non-state actor, reportedly ISIL, used sulphur mustard gas in an attack on Mare'e, Aleppo in which 23 people were affected on the first day. More than 60 others were affected by mustard gas exposure over the next few days. Mare'e was near the frontline of fighting between ISIL and non-state armed groups. The shell hit the home of a family of four, filling the room with a yellow gas as the parents tried to shield their children with their bodies.

A SAMS field hospital in Mare'e reported on the attack: "Initial symptoms included respiratory irritation, wheezing, coughing, irritation and redness of the eyes and mucous membranes, skin irritation, and severe itching. Civilians developed skin blisters, with doctors identifying the agent to be mustard gas. Patients were treated with dressings for skin lesions, bronchodilators, antidotes, and oxygen. No deaths have been reported as of yet. Samples have been taken from patient blood, clothing, and hair as well from the shelling site to be assessed. The SAMS-supported hospital in Mare'e has witnessed increased levels of civilian injuries and mass displacement in recent months."[14] The youngest child of the family whose home was hit, Sidra, died only a few days later. She was less than a week old when the shell hit.

FIRSTHAND MEDICAL ACCOUNT

"At 9PM, almost 20 missiles attacked Mare'e town within an hour. Most of the missiles fell into the center of the town, and the explosions were not that big, but a black liquid spread out of the missiles. Within 15 minutes, the medical staff of our Mare'e hospital moved to the incident area. A bad smell spread in the area. Suffocation symptoms appeared and breathing difficulties. Cases decreased so the medical team took the injured civilians to the hospital. The general symptoms were respiratory irritation, wheezing, coughing, irritation and redness of the eyes and mucous membranes, skin irritation, and severe itching. Within the first and second hours of the hospital received 12 cases. These patients first passed through the decontamination tent, took off their contaminated clothes and then were transferred to the emergency section. The cases were given hydrocortisone, and put under supervision. Most of the cases were minor and responded to the oxygen masks and emergency medications. They didn't need any ventilation or referred to any other hospital. Some of the cases sent home and others were kept in the hospital under supervision. The injuries were fewer as most of the population was displaced to other areas."

—Dr. Tariq Najjar, Mare'e, Aleppo[15]

PART II

Sarmin, Idlib, March 16, 2015

Symptoms of Exposure of Chemical Weapons Used in Syria

Type of Agent	Mild Exposure	Severe Exposure
SARIN		
Nerve Agent Affects the nervous system by affecting nerve transmissions. Causes seizures and loss of muscle control. **Examples:** Sarin VX Tabun Other organophosphate compounds such as pesticides	Runny nose Watery eyes Pinpoint pupils (miosis) Blurred vision Drooling Excessive sweating Cough Chest tightness Rapid breathing Diarrhea Nausea Vomiting Abdominal pain Weakness Headache Change in heart rate Change in blood pressure	Loss of consciousness Convulsions Foaming at the mouth Paralysis Respiratory failure Cardiac arrest Death
CHLORINE		
Choking Agent Affects the respiratory tract causing irritation of the nose, throat, and lungs. Can cause a buildup of fluid in the lungs. **Examples:** Chlorine Phosgene Chloropicrin	Eye tearing Nose and throat irritation Runny nose	Difficulty breathing Cough Chest pain Headache Nausea and Vomiting Lightheadedness Muscle weakness Dyspnea- upper airway swelling Pulmonary edema Fluid in the lungs Death

Type of Agent	Mild Exposure	Severe Exposure
MUSTARD GAS		
Blister Agent Causes irritation of the eyes, respiratory tract, and skin, and cause cell poisoning resulting in skin blisters. **Examples:** Sulphur Mustard Nitrogen Mustard Lewisite	**2-12 hours after exposure:** redness, itching of the skin, pain, swelling of eyes **13-24 hours after exposure:** runny nose, sneezing, hoarseness, bloody nose, sinus pain, shortness of breath, coughing, blisters begin to develop **24 hours after exposure:** Blisters and cough become worse, skin pigmentation 1- 2 hours after exposure: irritation, pain, swelling of eyes, tears, light sensitivity, blindness	**2-12 hours after exposure:** runny nose, sneezing, hoarseness, bloody nose, sinus pain, shortness of breath, coughing, abdominal pain, diarrhea, fever, nausea, vomiting, blisters begin to develop **13-24 hours after exposure:** symptoms continue to worsen **24 hours after exposure:** blisters and cough become worse, skin pigmentation, aplastic anemia Long term risk of respiratory damage and death from respiratory illnesses, and respiratory cancer Mustard gas can lead to death in high concentrations
BZ OR AGENT 15		
Psychotomimetic Agent Used as incapacitator causing hallucinations and disorientation. **Example:** BZ	Dilated pupils Blurred vision Agitation Hallucination Dry/flushed skin Gastrointestinal issues	Tachycardia Hypertension High temperature Hypothermia Death

Chemical Preparedness and Response

Syrian NGOs have spearheaded the development and implementation of emergency preparedness and response efforts for chemical attacks—from implementing public awareness campaigns, to providing equipment and supplies to respond to specific chemical agents, to training staff and first responders in critical protocols. The majority of INGOs and the international community have been largely uninvolved in this process, with funding and assistance for these efforts being inconsistent, reactionary, and short-term. The U.S. and France have provided a relatively small amount of Personal Protection Equipment to local organizations and have helped facilitate sample collection and documentation, but after Resolution 2118, funding for chemical preparedness and response efforts waned.

> "If people do not hear bombing or shelling, people get nervous and think something is coming. What will come? Will they use something new? Now we are afraid of silence."
>
> —Dr. Khalil Al Asmar, Douma, East Ghouta[b]

Pre-August 21, 2013

Since early 2013, when small-scale chemical attacks in Syria began, Syrian medical NGOs like SAMS and the Union of Medical Care and Relief Organizations (UOSSM) began providing public education on chemical attacks and basic response training sessions. The public education sessions aimed to ensure readiness at all levels, and taught community members about health problems following chemical exposure, the main principles of evacuation and primary decontamination, and the risks of unorganized responses to chemical attacks. As the small scale attacks continued intermittently in the spring of 2013, SAMS and UOSSM began to provide Personal Protective Equipment (PPEs), atropine, pralidoxime, protective clothing, ambubags, endotracheal tubes, manual suction devices, and laryngo tubes to medical staff in Aleppo. In June 2013, an on-field medical team conducted the first chemical attack simulation in a field hospital in Aleppo City, which went through the specific protocols and responses for a chemical attack. Following its successful completion, the simulation was presented to Syrian medical professionals and partners during SAMS's 13th Annual International Medical Conference in Amman, Jordan. The simulation, in addition to on-field experience, led to "The Syrian Manual in Preparedness and Response to Chemical Attacks." The manual covered topics such as clinical management and health protection from chemical, biological, radiological, and nuclear incidents; decontamination and care of contaminated victims by healthcare personnel; and guidance for medical operations in the context of chemical attacks and accidents.[1]

In the besieged areas of East Ghouta, chemical preparedness and response efforts took a different form with even more limitations. Medical staff and first responders had no means of protecting themselves from chemical attacks, and the tight siege left them unable to bring protective gear into the region. At this point in the conflict, Syrian medical staff and first responders had seen several dozen chemical attacks, though the attacks had primarily been targeted on the front lines of fighting. Medical staff grew increasingly concerned that a chemical attack with high civilian fatalities was imminent. Dr. Khalil Al Asmar, the head of the Douma Medical Office and head of the education committee of the United Medical Office of East Ghouta, was actively studying the use of chemical weapons throughout history to effectively prepare for such an attack. One of the problems he identified was that the location of a safe medical point to treat patients would be dependent on the direction of the wind at the time. He initiated a system where medical points would be set up in the layout of an "L" shape—one of the points would be an already established field hospital or clinic, and the other two points would be buildings like schools and mosques with equipment that be easily transported, such as water tanks. The medical team in Douma prepared a car filled with all of the necessary supplies and equipment to treat chemical exposure victims for each of the "L" layouts, which would be ready to move to the other medical points if the medical facility was downwind of an attack.

After the chemical attack on Douma on August 5, 2013, when over 400 people suffered from chemical exposure, SAMS began actively scaling up its chemical preparedness activities in East Ghouta. SAMS arranged to set up decontamination centers in southern Syria—planning to set up five in East Ghouta and two in Daraa—and was exploring the process of arranging PPEs for medical staff.[2] However, before the tents were built or the equipment was assembled, Rural Damascus experienced the August 21 sarin massacre. Dr. Ammar Ghanem, the Chair of the SAMS Jordan Committee which focused on the southern Syria response, said, "We knew that a major chemical attack on civilians would happen, but it happened before we were prepared."[3]

Response to August 21, 2013

Everything changed on August 21, 2013. The sarin attacks in Rural Damascus necessitated an immediate response from Syrian NGOs, INGOs, and donor governments. SAMS, UOSSM, and other Syrian NGOs responded immediately, working for several days straight to provide response protocols and feedback in real time to medical professionals in Rural Damascus, deliver PPEs, and finance antidotes for organophosphate exposure and supplies like intubation kits.[4]

Through the use of telemedicine, with Syrian American physicians in the U.S. communicating in real time with health workers in Syria, SAMS members were able to give medical recommendations and advice on

evidence collection. Dr. Ammar Ghanem worked virtually with Syrian health workers in Douma the night of August 21 and for several days afterwards, and said, "We were trying to help them not only to save lives but to show the world that this was happening and provide documentation. Medical staff on the ground were so busy—they were describing something we had never seen. They put people on the floor and in the corridors, there were people screaming all around them, they saw people dying in front of their eyes and they were not able to provide any care. At the same time, they had to do documentation—this is the responsibility of the medical staff. They needed to care for attacks on the minute and had to protect for the future by collecting documentation."[5]

Following the Rural Damascus massacre, the major Syrian medical NGOs strategized collectively on how to best collaborate on the response and maximize their efforts. On August 23, the Chemical, Biological, Radiological, and Nuclear Task Force (CBRN-TF) was established, made up of over 25 NGOs. The goal of the group was to coordinate and organize the preparedness response and to help prepare medical staff, first responders, and civilians for defense against chemical weapons attacks. The CBRN-TF utilized the technical expertise of the group members as well as outside specialists. The group also worked to document and report on the attacks based on international standards.[6]

Equipment Distribution

Following the August 2013 attacks, SAMS, UOSSM, and other Syrian medical organizations ensured the distribution of essential antidotes and protective equipment. Beginning in September 2013, SAMS distributed 1,200 protective suits and masks to 872 medical staff in 28 hospitals. UOSSM also distributed numerous PPEs to health workers. Unfortunately, because of the siege, none of the PPEs were able to be delivered to East Ghouta. Other essential supplies to manage chemical attacks were provided to clinics and medical facilities throughout opposition controlled areas of Syria, including oxygen generators, nebulization devices, throat endoscopies, catheters, serum, atropine, hydrocortisone, protective cloths, saline, and face masks. Antidotes have been provided to over 100 chemical weapons management centers.[7]

Training Programs

In the wake of the sarin massacre, chemical preparedness trainings for Syrian healthcare professionals were facilitated with leading global experts in Gaziantep, Turkey, and Amman, Jordan. During the trainings, the response protocols were updated according to participant research and recommendations.

After the 2013 agreement for the destruction of chemical weapons in Syria, interest in funding preparedness programs began to wane. However, in the spring of 2014, when Hama faced repeated chlorine

> "The morning after the Ghouta massacre, I found one of the medical staff crying and I encouraged him and keep working. He said "I had to chose between a mother and a child. What would I do if this child grows up and says 'Why did you not choose my mother?' and what if the mother says 'Why did you not let me die?'"
>
> —Dr. Mohamad Katoub, Douma, East Ghouta[c]

1: Qabr Al Inglizi, Aleppo, March 13, 2015. 2–5: Sarmin, Idlib, March 16, 2015.

attacks, the training program was re-launched. This time the program focused on a comprehensive response to choking agents like chlorine in addition to sarin.[8]

This 3-day training program, called "Medical Management and Preparedness for Chemical Attacks," was led by the CBRN-TF at the Bab Al-Hawa training center. It worked to prepare medical professionals—specifically those in affected areas like Idlib, Hama, and Aleppo—to respond properly to chemical attacks. Through theoretical lectures and practical exercises, the training addressed the following topics:

- **General preparedness operations:** effective site selection, notification and activation protocols, an overview of decontamination operations, and safety principles.
- **Health problems following exposure to chemical agents:** signs and symptoms related to each group of chemical agents and health risks related to secondary contamination.
- **Personal Protection Equipment:** the main elements and levels of PPEs, the minimum required level of protection to manage the victims, responding to challenges that appear while wearing PPEs.
- **Decontamination procedures:** the main elements of proper design for a decontamination point, the steps of the decontamination process, and challenges during the decontamination process.
- **Medical management:** main priorities of decontamination and medical management and medical treatment in mass casualty chemical incidence.
- **Criminal documentation:** an overview of the most important evidence used in documentation, the "Chain of Custody," and verification requirements.

These sessions were followed by a practical on-field simulation and evaluation, where a team of medical professionals would prepare a "facility" to respond to a chemical attack and practice contingency planning to respond to unexpected incidents. Special training courses were implemented to train civil defense members to more quickly evacuate civilians and raise awareness among the population. By the end of 2014, 526 professionals had been trained in the chemical preparedness and response protocols through 22 training courses in Aleppo.[9]

These training programs were replicated in Hama, Idlib, and Latakia. Due to the inability to hold direct training in the besieged areas of Rural Damascus, individual consultations were held during which a medical representative assessed preparedness measures and worked to find solutions for gaps. In September 2014 and November 2014, consultation was provided on the quality of East Ghouta's preparations and response plan.[10]

Decontamination Centers

SAMS and UOSSM have established decontamination centers in areas that have been particularly at risk of a chemical attack. Due to the frequency of chemical exposure victims coming to field hospitals and the harm that the secondary exposure was causing medical staff, the organizations developed the procedure of establishing private tents and centers near field hospitals to treat chemical exposure victims. These centers are well equipped with water, special equipment, and protective clothes so that after a chemical attack, victims can be properly washed, decontaminated, and ventilated. UOSSM established 18 decontamination centers in Aleppo, Idlib, Hama, Homs, Latakia, and Rural Damascus, and SAMS established five decontamination centers in Rural Damascus and Daraa.[11]

SPECIFICATION FOR CHEMICAL WEAPON TREATMENT & DECONTAMINATION CENTERS

- There has to be tight space with closing windows and doors.
- It was to be within the vicinity of a generator in order to facilitate the use of medical devices, particularly the resuscitation and oxygen machines. There should be at least 10 oxygen machines available in every center.
- There must be a proper stocking of the following drugs: Atropine, Diazepam, Adrenaline, Cortisone, Ampoules, sedative pills for nerves, and relievers like Tiger Balm.
- There must be clean water available.
- There must be a large automatic washing machine.
- There should be a fridge to keep the samples of those injured and dead (samples include blood, liver, spleen, lung, soil, leaves, tree bark, or clothing). Keep these samples in tightly sealed bags inside of the fridge.
- There should be private bathrooms with water tanks with Hydrochlorinedecalcium sf20.
- There should be a large bathroom with several showers in case of contamination from chemical weapons or anything that would affect the patients. There should also be soap.
- There should be a medical staff available, equipped with the appropriate protective clothing, rubber gloves, etc.
- There should be a hole to burn waste from infected clothes and other toxic substances.
- There should be a deep drain ditch to properly dispose of toxins without threatening public health.
- There should be new clothes, especially underwear. Patients' clothing should be treated with water and soap for five minutes and then rinsed again in normal water until there is no more soap. Then take all the samples and put them in the fridge. Take all the infected clothes and put them in the washing machine or in the deep pit.

1: Binnish, Idlib, March 24, 2015.
2: Saraqeb, Idlib, May 2, 2015.
3: Kansafra, Idlib, May 3, 2015.
4: Meshmshan, Idlib, May 15, 2015.

Documentation

CBRN-TF leaders have trained local staff and independently worked on forensic sample collection and documentation. They have provided evidence and medical reports to the OPCW FFMs and foreign embassies.

The commonly used methods for sampling in Syria are:

- **Ground (dust, stones, remnants of plants):** Take up to 50 grams and put it in a clean, dry, glass bottle.
- **Water (ground water, a small pond):** Take up to 100 milliliters and place in a clean, glass bottle.
- **Urine:** Take multiple samples, if possible separated by four hours on the first day, then once every day after. Take 20 ML each time. Keep in a clean, glass bottle. Keep in a refrigerator if possible.
- **Blood:** Take samples in the same way as urine.
- **Different materials:** Filter and wear a protective mask. Wipe the edges with a small piece of cotton or dry rag and place in a plastic bag.

When collecting samples, each health worker provides the date of sampling, exact location, name of the sampler, patient name, and weather conditions before sampling. If blood or urine was sampled, the symptoms of the patient are also listed. When transporting a sample, health workers were instructed to keep it a clean glass in a cool, dark glass, but these conditions were not always possible because of the circumstances of the conflict.[12]

SAMS physicians and partners have worked with foreign embassies and the OPCW to provide samples for documentation in the wake of several chemical attacks. In March 2013, after the attack on Khan Al Asal, SAMS field staff collected blood, urine, and hair samples from exposure victims. These samples were delivered to the U.S. Embassy in Turkey. A few weeks later, after the samples tested positive for sarin exposure, American officials declared that sarin had been used in Khan Al Asal. After the Hama attacks in 2014, the CBRN-TF worked with Turkish authorities to deliver samples to the OPCW. In the wake of the March 16, 2015 chlorine attack in Idlib, SAMS worked to gather samples from exposure victims, soil, and a piece of the barrel bomb that had struck the hospital. These samples were delivered to the OPCW and documentation organizations based in Turkey.

Summary of Medical Response Needs for Chemical Weapons Attacks

NEEDS	PURPOSE
TRAINING NEEDS	
Training course	Help health care providers recognize symptoms of chemical exposure, learn proper decontamination and treatment for chemical exposure, and understand the risk of secondary contamination
Training manual	Establish standard practices for chemical preparedness and treatment
Protocols	Assist hospitals and medical staff in responding to and documenting an attack
PROTECTIVE GEAR AND DECONTAMINATION	
Water	Needed to decontaminate patients exposed to chemical agents
Face masks	Protect against inhaling chemicals
Personal Protection Equipment (PPE)	Reduce the risk of secondary contamination
Decontamination tent	Provide a separate place to decontaminate patients to keep the health care facility free of contamination and reduce the risk of secondary contamination
Alternative Clothing	Provide those exposed to chemical agents fresh clothing after decontamination
MEDICAL EQUIPMENT	
Oxygen Concentrator	Filters surrounding air to produce concentrated oxygen which can treat patients with low levels of oxygen in their blood
Oxygen Regulator	Control the flow of oxygen from oxygen tanks
Laryngoscope	A device that allows the examination of the larynx and used for tracheal intubation
Portable Ventilators	A portable device that delivers concentrated oxygen into the respiratory system of patients who have been exposed to certain chemical agents

NEEDS	PURPOSE
MEDICAL EQUIPMENT (CONT.)	
Nebulization Devices	Delivers medication through inhalation into the lungs which is important when exposed to a pulmonary irritant like chlorine
Ambu Bags (Adult and Pediatric)	A squeezable bag with a face mask which is a more effective form of mechanical ventilation than mouth to mouth resuscitation
Aspirator	A suction device which can be used to remove excess fluid from the body
Tracheae Tubes	A catheter inserted into the trachea to maintain a patient's airways
MEDICATION	
Atropine	Antidote for nerve agent or organophosphate intoxication
Pralidoxime	Antidote for nerve agent or organophosphate intoxication
Hydrocortisone	Steroid
Diazepam	Depresses the central nervous system and helps reduce convulsions
Bronchodilators (albuterol)	Helps open airways
DOCUMENTATION	
Plastic Bags	To store samples
Tubes	To store liquid samples

Human Effect

Chemical attacks have particularly devastating psychological effects. Dr. Annie Sparrow, pediatrician and public health expert, testified, "Chlorine, cost-effective as a weapon, is designed to generate maximum fear and terror. There is nothing merciful about watching your child painfully suffocating to death, whether due to sarin, which paralyses the respiratory muscles, or chlorine, which turns into hydrochloric acid as is it is inhaled, drowning kids in the dissolution of their own lungs. I have never seen children die in a more obscene manner."[1] The psychological effects of witnessing or experiencing a chemical attack—which can often include post-traumatic stress disorder, flashbacks, epilepsy, depression, and more—is often compounded by other daily stresses and horrors. Many of those who have experienced chemical attacks have also witnessed unimaginable violence, siege and deprivation, displacement, and a break-down in community or family structure. SAMS doctors estimate that most of the Syrian population is suffering from some level of post-traumatic stress disorder, shock, or depression.

Many civilians who have experienced chemical attacks carry with them the feeling that toxic gas could be released at anytime, anywhere, and they will be unable to protect themselves or their loved ones. While most Syrians have adapted their lives to fit the reality of daily shelling and bombing, moving medical facilities and schools underground, the threat of chemical attacks takes away a feeling of any safe haven. Fear is omnipresent.

The fear caused by chemical weapons use in Syria has led civilians to flee their homes and their communities. Adiba, a 50-year-old woman, was one of the 170 victims in the April 11, 2014 chlorine attack in Kafr Zita. She experienced difficulty breathing, foaming of the mouth, and tearing in her eyes. Adiba has since moved to an IDP camp in Idlib near the Turkish border after the systematic chemical attacks in Hama. She said, "I moved away to live in camps because I was afraid of the chemical weapon attacks."[2] Similarly, thousands of civilians were displaced from Idlib in April 2015, after the scale-up in chlorine attacks in residential areas in the suburbs of Idlib City.

In Rural Damascus, the Syrian government sent the people of besieged Moadamiya the option of evacuation before and after the chemical attack on August 21, 2013. Before the attack, few people chose to leave despite the horrific siege conditions under which they were living. However, after the sarin massacre, 4,000-5,000 people, or about one third of the population, abandoned their homes in Moadamiya. It was the first time

"After four years of conflict in Syria, I have more friends who have been killed than I have who are alive. I have seen too many people from my community take their last breath at my hospital. The hardest part is knowing every day that it will happen again—you will see more of your friends come in on stretchers, you will see more children die in front of you, you will again fear for your family as you hear the sounds of helicopters above. This life is not human."

—Dr. Mohammed Tennari, Sarmin, Idlib[d]

since the beginning of the siege that large numbers of people in the town had chosen to leave.[3]

Health workers in Syria often experience particularly severe psychological trauma, but are perhaps the least likely to access mental health services. They consistently suffer from an overload of work from lack of qualified medical staff in hospitals, surplus of patients with intensive trauma and primary health needs, and 16+ hour workdays. Health workers are overworked, demoralized, depressed, and consistently affected by trauma and secondary trauma.[4] Not only do they witness horrifying injuries and death, but with the lack of medical supplies, they also have the burden of deciding who will live and who will die.

FIRSTHAND MEDICAL ACCOUNT

"One doctor from Ein Tarma, who runs a small rural hospital for 20 patients, told me with a trembling voice that he received about 700 patients in just a few hours. In spite of the heroic efforts by him and his volunteer medical team throughout that night, 141 of his patients died, including 66 children. Another doctor told me that many arrived with respiratory failure—suffocating slowly, foaming and convulsing. He could save only few by placing them on life support, with limited access to respirators. He chose to save the youngest, as they had longer lives to live. Doctors should not be placed in a situation where they had to play God. In Syria, where medical resources are scarce, and where the international community has largely turned a blind eye, this is happening every day.

"Ghouta's first responders weren't spared. We had been able to get antidotes and equipment to areas where there had been chemical attacks, but not enough protective gear, which is usually only in the hands of the military. Many doctors and nurses had symptoms of exposure after a few hours of contact with their patients.

"Dr. Abdel Rahman, from East Ghouta, treated a score of patients, protecting himself only with a simple mask. He developed blurry vision, tightness in his chest and a severe headache. His eyes began tearing and his breathing became heavier. When he told his colleagues that he was unable to continue working, and that he needed help, they injected him with atropine, the only available antidote, and rushed to intubate him and place him on life support. He did not make it, joining the long list of Syrian doctors and nurses who have died or been killed on duty."

—Dr. Zaher Sahloul, SAMS Past President[5]

"I've never been the same person since the chemical weapons attack. Before that, I saw everything, a lot of crazy stuff, but I always say that the chemical weapons attack felt like judgment day. If you talk to any survivor of chemical weapons attacks, it's the sensation of doom, the ultimate fear. It goes straight to your mind and just terrifies you. You somehow become paralyzed by fear. You don't see blood, you don't see a bomb, you don't see anything, you just see people getting killed. It's like a nightmare."

—Kassem Eid, Moadamiya, Rural Damascus[e]

PART III

Sarmin, Idlib, March 16, 2015

Conclusions

The use of chemical weapons in Syria continues with impunity—there have been over 161 chemical weapons attacks through 2015.

From the beginning of the crisis through the end of 2015, chemical weapons were used over 161 times in Syria. In addition to the 161 attacks that SAMS has tracked under international standards, SAMS has compiled information on an additional 133 reported attacks that could not be fully substantiated. The use of chemical weapons has only escalated as the conflict has continued—the year 2015 saw a remarkable increase in chemical attacks, with 69 attacks, compared to the 55 attacks in 2014. Since the beginning of the conflict, at least 14,581 Syrians have suffered from chemical exposure and 1,491 have been killed. In a flagrant violation of UNSC resolutions, 77% of these attacks occurred after UNSC Resolution 2118 which created a framework for the destruction of Syria's declared chemical weapons stockpile. At least 58 chlorine attacks, or 36% of the total chemical weapons attacks, occurred after UNSC Resolution 2209 which condemns chlorine gas as a weapon in Syria.

Chlorine use increased after UNSC Resolution 2118.

The framework brokered by the U.S. and Russia to remove and destroy Syria's declared chemical weapons stockpile, reinforced by UNSC Resolution 2118, did not prevent the use of chemical weapons; it only changed the agents used. From December 2012 to September 2013, before the framework was implemented, there were zero instances of chlorine used as a chemical weapon in Syria. From September 2013 through 2015, there have been 104 instances of chlorine used as a chemical weapon.

By removing Syria's chemical weapons stockpile, Syria's strategic capability to use chemical weapons on a large scale was removed. However, this framework did not prevent the tactical use of chemical weapons in Syria. Personnel and knowledge still remain, and the Syrian government has adapted this knowledge to create and deploy other chemical weapons, like chlorine. Chlorine attacks have been allowed to continue with impunity, and the international community has thus given tacit acceptance to the use of non-schedule chemicals.

"Fear and displacement are exactly the point of using chemical weapons. Fewer people have been killed by chemical weapons than by any other weapon, but it's a weapon of fear."

–Kassem Eid, Moadamiya, Rural Damascus[f]

Chemical attacks are part of a strategy of displacing civilians in Syria.

Chemical attacks are used strategically to cause civilian displacement in Syria. The fear caused by these silent and unpredictable weapons causes civilians to flee in larger numbers than in the aftermath of conventional attacks. Thousands of civilians were displaced following the April-May 2014 chlorine attacks in Hama, as well as following the chlorine attacks in Idlib in March-April 2015. Internal displacement as a result of the use of chemical weapons is exacerbating the humanitarian crisis.

All ten of the civilians from Hama surveyed by SAMS had moved since they survived chemical attacks in Hama in 2014. All ten of the medical professionals in Hama surveyed by SAMS believe that migration and displacement greatly increased in the wake of the chemical attacks.

Lack of enforcement spurs continued use.

The failure of the international community to meaningfully respond to the illegal and inhumane use of chemical weapons in Syria spurs their continued use. Perpetrators feel emboldened to continue to inflict terror without consequence. The lack of response to smaller-scale chemical use before 2013 was seen as a green light to continue their use. After each attack, a new baseline was established to which the international community did not respond. The operational boundary of chemical weapons use was allowed to expand as the international community was desensitized.

The U.S. government's lack of follow through on its stated "red line" sent a powerful message to perpetrators of chemical attacks that declarations of accountability were hollow. While the Syrian government gave up its declared chemical weapons stockpile following UNSC Resolution 2118, it has continued to use chlorine as a chemical weapon without consequence.

Locals and Syrian NGOs led chemical preparedness and response efforts.

Syrian NGOs led the chemical preparedness and response processes, in terms of both vision and implementation. The international community and international NGOs played a very minimal role, not sufficiently assisting the local response. A report from the SAMS Douma office following the August 2013 sarin massacre states, "Before the disaster in August 2013 we repeatedly drew attention to the huge international abandonment in this summer. [A few] government[s] have provided equipment to deal with the patients of chemical weapons but not towards its prevention. To prevent the occurrences of these disasters, the international community must continue these investigations and reports on these fronts."[1] Funding and assistance for chemical attack prevention

and response has been almost entirely reactionary and inconsistent. Abo Khaled, a nurse in Douma, described this challenge: "After the attack we prepared a place for decontamination for possible attacks in the future, but it was closed later due to lack of support."[2]

"A lot of people who are still alive became bodies moving. They lost their souls. I heard two of my neighbors talking. One said, 'Do you have milk?' The other said, 'No. Three people died in Harasta yesterday.' Those two people are dead inside. They mentioned a chemical attack like they were talking about shopping for rice. Now the chemical attacks are a normal thing, more normal than school for kids."

—Dr. Mohamad Katoub, Douma, East Ghouta[g]

Binnish, Idlib,
March 23, 2015

Recommendations

"Though the chlorine-filled barrels have killed far less than barrel bombs filled with explosives and shrapnel, they have added a new type of psychological torture to the people of Idlib. The fear and confusion caused by chemical attacks has driven new waves of mass displacement throughout Idlib. Each day, we worry about what the next day will bring. This is no way to live."

– Dr. Mohammed Tennari, Sarmin, Idlib[h]

The international community must take a more active role in civilian protection and take substantive action to enforce its own resolutions, most notably Resolutions 2118, 2209, and 2235.

- The nonproliferation community and humanitarian community, recognizing that people have been affected by chemical weapons for the past three years, should work together to ensure commitment to the international norms surrounding nonproliferation, in light of widespread and ongoing chemical weapons use.
- The international community must account, corroborate, and attribute as many chemical attacks as possible in order to preserve the record and ensure that stories of victims and communities are heard.
- All countries must empower the JIM as an independent mechanism. After the JIM establishes attribution for chemical weapons attacks in Syria, accountability must be the next step. UNSC members should refer perpetrators of chemical weapons attacks to the ICC or another independent international tribunal.
- In 2011, the OPCW Conference of States established the International Support Network for Victims of Chemical Weapons. This network created a fund financed by voluntary donations by states. The international community should make this fund available for Syrian victims of chemical weapons and increase donations to the fund. In addition, the OPCW—in coordination with local and Syrian NGOs – should establish a database to track Syrian victims of chemical attacks in order to provide them with support from the fund.
- The donor community should increase sustained support for chemical preparedness and response measures, in light of ongoing chemical attacks in Syria. Direct funding to local and Syrian NGOs initiating and carrying out these efforts is necessary. However, financial support from states must occur alongside an active effort by all states to end chemical attacks and other international humanitarian and human rights law violations, and hold perpetrators accountable for violations.

ANNEX

Bab Al Hawa Hospital,
Idlib, April 21, 2014

Methodology

The table in the annex contains a dataset of 161 verified chemical attacks that occurred in Syria from the start of the conflict through the end of 2015.

The CWC defines chemical weapons as toxic chemicals and their precursors, as well as munitions and devices that would allow the release of toxic chemicals. According to the UK guidelines of clinical management for chemical, biological, radiological, and nuclear incidents, the international standard of a chemical attack is one in which there are three or more chemical exposure victims.[1] However, with chlorine attacks, there is often evidence from ground samples to determine chlorine use. As such, there are chlorine attacks listed on this table that had fewer than three exposure victims but were confirmed through other methods of sampling.

Attacks that are included in this table were verified by at least two independent sources. These sources include SAMS, operational INGOs and SNGOs, civil defense, local documentation organizations, and OPCW and UN reports. Verified reports and data from SAMS medical facilities were used and prioritized when available. In the cases that SAMS field staff did not report attacks, the listings were cross-checked for consistency. In instances in which inconsistent data about the number of victims of chemical exposure was provided, the lowest verified numbers were used. For cases in which the inconsistencies concerned the number of fatalities, no fatalities were included in the dataset. In the cases where there were conflicting reports about whether an attack was chemical or conventional, the attack was taken out of the table. If additional fatalities occurred from the use of conventional weapons or where it was unclear if the deaths were a result of conventional or chemical weapons use, the number of fatalities was removed from the dataset. Listings that were unable to be confirmed by two independent sources were removed from the table. In many cases, the exact chemical agent used could not be verified, due to the inability to collect or assess samples or access an area after an attack. These cases are reflected by the classification 'Unconfirmed poisonous gas' in the table.

It is assumed that there are some cases in which victims of low-scale exposure did not or were unable to seek medical treatment, and therefore were not counted in the dataset. There is an inherent limit in confirmation of the specific agent used in chemical attacks, as proper and sufficient equipment to collect and test samples is lacking is many parts of Syria.

In addition to the 161 attacks listed below that SAMS has documented, SAMS has compiled information on an additional 133 reported attacks that could not be fully substantiated.

Table of Chemical Attacks in Syria

	Date	Village	Governorate	Affected	Fatalities	Chemical agent
1	12/23/12	Al Bayada	Homs	50	7	Unconfirmed poisonous gas
2	12/25/12	Zafarana	Homs	35	0	Unconfirmed poisonous gas
3	3/19/13	Khan Al Asal	Aleppo	110	26	Unconfirmed poisonous gas
4	3/19/13	Otaybah	Rif Dimashq	60	5	Unconfirmed poisonous gas
5	3/24/13	Adra	Rif Dimashq	40	2	Unconfirmed poisonous gas
6	4/4/13	Jobar	Damascus	4	0	Unconfirmed poisonous gas
7	4/6/13	Jobar	Damascus	22	0	Unconfirmed poisonous gas
8	4/7/13	Jobar	Damascus	6	0	Unconfirmed poisonous gas
9	4/9/13	Otaybah	Rif Dimashq	20	0	Unconfirmed poisonous gas
10	4/13/13	Sheikh Maqsood	Aleppo	18	5	Unconfirmed poisonous gas
11	4/14/13	Jobar	Damascus	30	1	Unconfirmed poisonous gas
12	4/17/13	Ein Tarma	Rif Dimashq	8	1	Unconfirmed poisonous gas
13	4/25/13	Darayya	Rif Dimashq	100	0	Unconfirmed poisonous gas
14	4/27/13	Kueres	Aleppo	15	10	Unconfirmed poisonous gas
15	4/29/13	Saraqeb	Idlib	14	1	Sarin
16	5/17/13	Adra	Rif Dimashq	6	1	Unconfirmed poisonous gas
17	5/23/13	Adra	Rif Dimashq	40	3	Unconfirmed poisonous gas
18	5/26/13	Harasta	Rif Dimashq	69	3	Unconfirmed poisonous gas
19	5/26/13	Qaboun	Damascus	15	0	Unconfirmed poisonous gas
20	5/26/13	Al Bahariyah	Rif Dimashq	30	—	Unconfirmed poisonous gas
21	5/27/13	Harasta	Rif Dimashq	56	—	Unconfirmed poisonous gas
22	5/29/13	Al Ahamadiya	Rif Dimashq	10	0	Unconfirmed poisonous gas
23	6/9/13	Al Bahariyah	Rif Dimashq	4	—	Unconfirmed poisonous gas
24	6/19/13	Zamalka	Rif Dimashq	25	1	Unconfirmed poisonous gas
25	6/23/13	Zamalka	Rif Dimashq	32	—	Unconfirmed poisonous gas
26	6/24/13	Qaboun	Damascus	20	1	Unconfirmed poisonous gas
27	6/27/13	Qaboun	Damascus	10	—	Unconfirmed poisonous gas
28	7/5/13	Al Khalidya	Homs	20	—	Unconfirmed poisonous gas

Date		Village	Governorate	Affected	Fatalities	Chemical agent
29	7/21/13	Al Yarmouk	Damascus	10	—	Unconfirmed poisonous gas
30	8/5/13	Douma	Rif Dimashq	400	0	Unconfirmed poisonous gas
31	8/5/13	Adra	Rif Dimashq	25	0	Unconfirmed poisonous gas
32	8/21/13	East Ghouta	Rif Dimashq	9,400	1,242	Sarin
33	8/21/13	Moadamiya	Rif Dimashq	1,226	105	Sarin
34	8/24/13	Jobar	Damascus	30	0	Unconfirmed poisonous gas
35	8/25/13	Ashrafiah Sahnaya	Rif Dimashq	5	0	Unconfirmed poisonous gas
36	8/28/13	Jobar	Damascus	9	0	Unconfirmed poisonous gas
37	11/28/13	Jobar	Damascus	8	0	Unconfirmed poisonous gas
38	1/13/14	Darayya	Rif Dimashq	10	4	Unconfirmed poisonous gas
39	3/2/14	Adra	Rif Dimashq	20	4	Unconfirmed poisonous gas
40	3/9/14	Jobar	Damascus	5	0	Unconfirmed poisonous gas
41	3/27/14	Harasta	Rif Dimashq	25	5	Unconfirmed poisonous gas
42	4/4/14	Jobar	Damascus	6	0	Chlorine
43	4/11/14	Harasta	Rif Dimashq	4	3	Unconfirmed poisonous gas
44	4/11/14	Kafr Zita	Hama	170	3	Chlorine
45	4/12/14	Kafr Zita	Hama	25	0	Chlorine
46	4/12/14	Al Tamanah	Idlib	57	0	Chlorine
47	4/14/14	Halfaya	Hama	5	0	Chlorine
48	4/14/14	Atshan	Hama	25	0	Chlorine
49	4/16/14	Al Zowar	Hama	5	0	Chlorine
50	4/16/14	Harasta	Rif Dimashq	15	1	Unconfirmed poisonous gas
51	4/18/14	Kafr Zita	Hama	100	—	Chlorine
52	4/18/14	Al Tamanah	Idlib	70	4	Chlorine
53	4/19/14	Kafr Zita	Hama	50	2	Chlorine
54	4/21/14	Talmenes	Idlib	350	3	Chlorine
55	4/22/14	Darayya	Rif Dimashq	10	0	Chlorine
56	4/28/14	Ibn Warden	Hama	10	0	Chlorine
57	4/28/14	Latamenah	Hama	—	—	Chlorine
58	4/29/14	Al Tamanah	Idlib	35	0	Chlorine
59	5/8/14	Kafr Zita	Hama	3	0	Chlorine
60	5/19/14	Kafr Zita	Hama	20	2	Chlorine
61	5/21/14	Kafr Zita	Hama	4	0	Chlorine

Date		Village	Governorate	Affected	Fatalities	Chemical agent
62	5/22/14	Kafr Zita	Hama	80	0	Chlorine
63	5/22/14	Al Tamanah	Idlib	12	4	Chlorine
64	5/22/14	Latamenah	Hama	8	0	Chlorine
65	5/25/14	Kafr Zita	Hama	25	0	Chlorine
66	5/25/14	Al Tamanah	Idlib	0	0	Chlorine
67	5/26/14	Khan Shaykhoun	Idlib	23	0	Unconfirmed poisonous gas
68	5/29/14	Latamenah	Hama	17	0	Chlorine
69	5/29/14	Al Tamanah	Idlib	15	0	Chlorine
70	6/6/14	Irbin	Rif Dimashq	4	0	Unconfirmed poisonous gas
71	6/29/14	Kafromeh	Idlib	16	0	Chlorine
72	7/17/14	Kafr Zita	Hama	70	0	Chlorine
73	7/27/14	Kafr Zita	Hama	0	0	Chlorine
74	7/29/14	Halab Alqadema	Aleppo	15	0	Chlorine
75	8/1/14	Latamenah	Hama	8	0	Chlorine
76	8/19/14	Atman	Daraa	7	0	Chlorine
77	8/20/14	Jobar	Damascus	7	3	Unconfirmed poisonous gas
78	8/22/14	Irbin	Rif Dimashq	44	3	Chlorine
79	8/28/14	Halfaya	Hama	10	0	Unconfirmed poisonous gas
80	8/28/14	Al Sayyad	Hama	50	0	Chlorine
81	8/28/14	Kafr Zita	Hama	0	0	Chlorine
82	8/30/14	Kafr Zita	Hama	0	0	Chlorine
83	9/8/14	Haytet Al Jarash	Rif Dimashq	3	0	Chlorine
84	9/13/14	Murak	Hama	0	0	Chlorine
85	9/14/14	Haytat Al Jarash	Rif Dimashq	9	0	Chlorine
86	9/15/14	Dukhaniyya	Rif Dimashq	3	0	Chlorine
87	9/22/14	Dukhaniyya	Rif Dimashq	6	0	Chlorine
88	9/24/14	Adra	Rif Dimashq	9	7	Chlorine
89	10/1/14	Deir al-Adas	Daraa	—	0	Chlorine
90	10/9/14	Inkhil	Daraa	0	0	Chlorine
91	10/15/14	Jobar	Damascus	4	0	Unconfirmed poisonous gas
92	10/20/14	Harasta	Rif Dimashq	15	2	Chlorine
93	1/26/15	Itbaa	Daraa	8	0	Unconfirmed poisonous gas
94	2/21/15	Hayan	Aleppo	3	0	Unconfirmed poisonous gas
95	3/1/15	Jobar	Damascus	6	0	Unconfirmed poisonous gas

Date		Village	Governorate	Affected	Fatalities	Chemical agent
96	3/9/15	Muzayrib	Daraa	2	0	Chlorine
97	3/15/15	Qabr al-Inglizi	Aleppo	6	0	Chlorine
98	3/16/15	Qaminas	Idlib	70	0	Chlorine
99	3/16/15	Sarmin	Idlib	50	6	Chlorine
100	3/23/15	Sarmin	Idlib	3	0	Chlorine
101	3/24/15	Binnish	Idlib	30	0	Chlorine
102	3/24/15	Qaminas	Idlib	8	0	Chlorine
103	3/25/15	Qadam	Damascus	2	0	Chlorine
104	3/26/15	Sarmin	Idlib	5	0	Chlorine
105	3/29/15	Idlib City	Idlib	47	0	Chlorine
106	3/31/15	Idlib City	Idlib	38	0	Chlorine
107	4/10/15	Kafr Zita	Hama	4	0	Unconfirmed poisonous gas
108	4/16/15	Idlib City	Idlib	40	0	Chlorine
109	4/18/15	Al Tamanah	Idlib	15	1	Chlorine
110	4/25/15	Kurin	Idlib	0	0	Chlorine
111	4/26/15	Kafr Awed	Idlib	51	0	Chlorine
112	4/26/15	Al Hawash	Hama	25	0	Chlorine
113	4/27/15	Al Nairab	Idlib	4	0	Chlorine
114	4/28/15	Al Krassa	Idlib	12	0	Chlorine
115	4/29/15	Kansafra	Idlib	10	0	Chlorine
116	4/29/15	Saraqeb	Idlib	12	0	Chlorine
117	4/30/15	Kastoon	Hama	10	0	Chlorine
118	5/1/15	Al Nairab	Idlib	0	0	Chlorine
119	5/2/15	Al Nairab	Idlib	12	2	Chlorine
120	5/2/15	Saraqeb	Idlib	50	0	Chlorine
121	5/3/15	Kansafra	Idlib	25	0	Chlorine
122	5/3/15	Jobar	Damascus	2	—	Chlorine
123	5/3/15	Joseph	Idlib	—	0	Chlorine
124	5/3/15	Ablin	Idlib	12	0	Chlorine
125	5/6/15	Al Bashiria	Idlib	0	0	Chlorine
126	5/7/15	Al Janudiya	Idlib	50	1	Chlorine
127	5/7/15	Kafr Bateekh	Idlib	25	0	Chlorine
128	5/7/15	Kansafra	Idlib	4	0	Chlorine
129	5/10/15	Al Bashiria	Idlib	0	0	Chlorine

Date		Village	Governorate	Affected	Fatalities	Chemical agent
130	5/15/15	Meshmshan	Idlib	20	0	Chlorine
131	5/15/15	Ain Souda	Idlib	—	0	Chlorine
132	5/15/15	Latamenah	Hama	50	0	Chlorine
133	5/16/15	Sarmin	Idlib	5	0	Chlorine
134	5/16/15	Al Sikhna	Homs	3	0	Chlorine
135	5/17/15	Meshmshan	Idlib	3	0	Chlorine
136	5/17/15	Al Kastan	Idlib	9	0	Chlorine
137	5/19/15	Al Bashiria	Idlib	7	0	Chlorine
138	5/19/15	Meshmshan	Idlib	30	2	Chlorine
139	5/19/15	Idlib City	Idlib	4	0	Chlorine
140	5/19/15	Jisr al-Shughur	Idlib	32	0	Chlorine
141	5/30/15	Al Tamanah	Idlib	15	0	Chlorine
142	6/7/15	Al Kastan	Idlib	8	0	Chlorine
143	6/8/15	Saraqeb	Idlib	2	0	Chlorine
144	6/8/15	Kansafra	Idlib	3	0	Chlorine
145	6/9/15	Saraqeb	Idlib	0	0	Chlorine
146	6/9/15	Al Bashiria	Idlib	3	0	Chlorine
147	6/9/15	Sfouhen	Idlib	6	0	Chlorine
148	6/13/15	Jobar	Damascus	9	0	Chlorine
149	7/7/15	Aleppo City	Aleppo	53	0	Chlorine
150	7/8/15	Sheikh Yassin	Deir Ezzour	12	5	Chlorine
151	7/21/15	Harasta	Rif Dimashq	5	2	Chlorine
152	7/27/15	Jobar	Damascus	23	0	Chlorine
153	7/27/15	Zamalka	Rif Dimashq	19	0	Chlorine
154	7/30/15	Jobar	Damascus	15	0	Chlorine
155	8/6/15	Jobar	Damascus	3	1	Unconfirmed poisonous gas
156	8/7/15	Al Rastan	Homs	30	5	Chlorine
157	8/11/15	Irbin	Rif Dimashq	4	1	Unconfirmed poisonous gas
158	8/21/2015-8/24/2015	Mare'e	Aleppo	85	1	Mustard Gas
159	9/3/15	Jamaiyyet Zahraa	Aleppo	3	0	Unconfirmed poisonous gas
160	9/25/15	Harasta	Rif Dimashq	9	0	Unconfirmed poisonous gas
161	10/25/15	Jobar	Damascus	4	0	Chlorine
Total				**14,581**	**1,491**	

Notes

Background

1. Interview with nurse, Irbin, East Ghouta, Syria, 15 January 2016.

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1. Syrian Network for Human Rights, *Comprehensive report of using chemical weapons by Syrian Regime,* 14 May 2013, http://sn4hr.org/public_html/wp-content/pdf/english/2013/Usage-of-chemical-weapons-by-Syrian-Regime.pdf.
2. Report from SAMS field office, 28 May 2013.
3. Interview with Dr. Mohamad Katoub, Gaziantep, Turkey, 25 July 2015.
4. Interview with Dr. Mohamad Katoub, Gaziantep, Turkey, 25 July 2015.
5. Interview with Dr. Mohamad Katoub, 25 July 2015.
6. Interview with Dr. Khalil Al Asmar, Gaziantep, Turkey 25 July 2015.
7. John Irish, *French Intelligence: Syria's Assad behind chemical attack,* Reuters, 2 September 2013, http://www.reuters.com/article/us-syria-crisis-france-chemical-idUSBRE9810GQ20130902#4u0OWUzF0khvfAXq.97.
8. Syrian Network for Human Rights, *The second largest chemical weapons attack on civilians in the modern era,* p.4, 26 August 2013, http://sn4hr.org/public_html/wp-content/pdf/english/Documenting-Chemical-weapon.pdf.
9. Interview with Dr. Khalil Al Asmar, 25 July 2015.
10. United Nations, Organisation for the Prohibition of Chemical Weapons, *Note by the Technical Secretariat: Third Report of the OPCW Fact-Finding Mission in Syria,* S/1230/2014, p. 1, 18 December 2014, *available at* http://photos.state.gov/libraries/netherlands/328666/pdfs/THIRDREPORTOFTHEOPCWFACTFINDINGMISSIONINSYRIA.pdf
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12. Somini Sengupta, "U.N. Security Council Sees Video Evidence of a Chemical Attack in Syria", *New York Times,* 16 April 2015, http://www.nytimes.com/2015/04/17/world/middleeast/un-security-council-sees-video-evidence-of-a-che mical-attack-in-syria.html?_r=0
13. Interview with Dr. Mohammed Tennari, 14 April 2015.
14. Report from SAMS field office, 21 August 2015.
15. Interview with Dr. Tariq Najjar, 21 August 2015.

Chemical Preparedness

1. Houssam Alnahhas, Response to Chemical Threats, Community and Medical Response, International Union of Medical Care and Relief Organizations, 27 May 2015.
2. Phone interview with Dr. Ammar Ghanem, 23 December 2015.
3. Phone interview with Dr. Ammar Ghanem, 23 December 2015.
4. Houssam Alnahhas, Response to Chemical Threats, Community and Medical Response, International Union of Medical Care and Relief Organizations, 27 May 2015.
5. Interview with Dr. Ammar Ghanem, 23 December 2015.
6. Houssam Alnahhas, Response to Chemical Threats, Community and Medical Response, International Union of Medical Care and Relief Organizations, 27 May 2015.
7. Houssam Alnahhas, Response to Chemical Threats, Community and Medical Response, International Union of Medical Care and Relief Organizations, 27 May 2015.
8. Houssam Alnahhas, Response to Chemical Threats, Community and Medical Response, International Union of Medical Care and Relief Organizations, 27 May 2015.
9. Houssam Alnahhas, Response to Chemical Threats, Community and Medical Response, International Union of Medical Care and Relief Organizations, 27 May 2015.
10. Houssam Alnahhas, Response to Chemical Threats, Community and Medical Response, International Union of Medical Care and Relief Organizations, 27 May 2015.

11. Houssam Alnahhas, Response to Chemical Threats, Community and Medical Response, International Union of Medical Care and Relief Organizations, 27 May 2015.
12. Houssam Alnahhas, Response to Chemical Threats, Community and Medical Response, International Union of Medical Care and Relief Organizations, 27 May 2015.

Human Effect

1. Annie Sparrow, Statement to the House Foreign Affairs Committee, "Assad's Abhorrent Chemical Weapons Attacks" Hearing 17 June 2015, *available at* http://docs.house.gov/meetings/FA/FA00/20150617/103638/HHRG-114-FA00-Wstate-SparrowA-20150617.pdf
2. Interview with Adiba, Hama, Syria, 20 January 2016.
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Conclusions

1. Report from SAMS field office, 5 August 2013.
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1. "CBRN incidents: clinical management & health protection." https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/340709/Chemical_biological_radiological_and_nuclear_incidents_management.pdf

Quotes

a. Interview with Dr. Mohammed Tennari, Washington, DC, 14 April 2015.
b. Interview with Dr. Khalil Al Asmar, 25 July 2015.
c. Interview with Dr. Mohamad Katoub, 25 July 2015.
d. Interview with Dr. Mohammed Tennari, 14 April 2015.
e. Interview with Kassem Eid, 4 January 2016.
f. Interview with Kassem Eid, 4 January 2016.
g. Interview with Dr. Mohamad Katoub 25 July 2015.
h. Interview with Dr. Mohammed Tennari, 14 April 2015.

Photos

Houssam Alnahhas: Cover (top), inside cover, 4, 12, 50.

Syrian Network for Human Rights: 17 (all), 18 (all), 19 (all), 21 (1–3), 22 (all), 26 (1), 28 (2), 36 (1), 38 (2, 4).

SAMS: Cover (bottom), 21 (4), 26 (2–5), 28 (1), 30, 33, 34 (all), 36 (2–5), 38 (1, 3), 44, 47, 59.

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Photos on 22–24: Houssam Alnahhas, Report on toxic gas attacks in the suburbs of Idlib and Hama. Chemical, Biological, Radiological and Nuclear Task Force (CBRN-TF). 4 May 2014.

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