Protection of Civilian Objects including Critical Infrastructure in U.S. Military Operations

NGO Recommendations for DoD Policy on Civilian Harm

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Summary

The protection of civilian objects must be consistently prioritized in U.S. military operations and U.S. security partnerships. Beyond immediate loss of life or injury to individuals resulting from specific strikes or armed clashes, damage to and destruction of civilian objects including critical infrastructure, to include strikes on dual-use objects and collateral damage harm to civilian objects, can have devastating immediate and knock-on effects and long-term consequences for civilian life, including for the basic health, safety, and security of society as well as social, cultural, and economic life. Damage to or destruction of civilian objects can cripple access to basic services such as health care and access to clean water, precipitate or exacerbate public health emergencies and food insecurity, drive displacement, and cause significant economic losses. Skilled technicians familiar with critical urban infrastructure may be killed, injured, or displaced and this can inhibit efforts to repair and restore services, thereby compounding public health and other negative effects.

Comprehensive policy to minimize civilian harm must make explicit the critical role and supporting functions of civilian objects for civilian populations across contexts, reinforce the U.S. military's commitment to and importance of protecting civilian objects, including by strengthening existing processes; and delineate the necessary steps to spare civilian objects across the targeting cycle. This should include:

1. developing the means, processes, and systems to consistently analyze the significance and value of civilian objects in relation to civilian life and specifically protection of civilians' concerns;

2. evaluating and integrating potential knock-on effects in military planning and intelligence preparation;

3. anticipating and preventing harm resulting from the damage or destruction of civilian objects during target development, including dual-use objects and civilian objects harmed as collateral damage;

4. assessing and learning from observed knock-on effects through research, post-facto assessments and lessons learned processes.

Note on Terminology

Civilian objects are any object which is not a military objective. Civilian objects often serve as an infrastructural node or asset within a larger interconnected infrastructure system. Civilian objects **include critical infrastructure,** defined as the processes, systems, facilities, technologies, networks, assets and services essential to the health, safety, security, and economic well-being of communities.[2] Examples of civilian objects include, *inter alia:*

- Privately held civilian assets, such homes, businesses, crops, livestock, and other assets;

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[1] Recommendations compiled by Annie Shiel, Protection Innovation Fellow at Center for Civilians in Conflict (CIVIC) and Archibald S. Henry, Senior Program Associate for Protection at InterAction, drawing on materials referenced herein, with inputs from various NGOs and informed by ongoing NGO dialogue with counterparts at the U.S. Department of Defense (DoD). These recommendations were submitted to DoD in November 2019.

[2] Based on definition found in U.S. Department of Homeland Security, "Critical Infrastructure Sectors." See also: Mark Zeitoun and Michael Talhami, "The impact of explosive weapons on urban services: Direct and reverberating effects across space and time," *International Review of the Red Cross*, War in Cities Edition, March 2017, Vol. 98, No. 1, pp. 53-70.

- Public services, such as hospitals, medical and other health facilities, schools, childcare centers, markets, and government offices and services;
- Public infrastructure, such as water, power, and energy systems, including wastewater systems, irrigation installations, and electrical grids, as well as public transportation, bridges, and roads, and information and communication systems;
- Cultural property, such as religious and cultural heritage sites;
- Other objects and services indispensable to human life in each area of operations, including humanitarian assets and relief supplies, as well as financial services.

Some objects, such as medical facilities and transports, as well as essential services, enjoy additional special protections under international humanitarian law.[3]

This list is not comprehensive; the range of indispensable, valuable, and significant civilian objects should be considered on a context-specific basis across urban areas and rural settings in order to ensure a comprehensive approach.

"Knock-on" effects, sometimes referred to as indirect effects, second- and third-order effects, reverberating effects, cascading effects, cumulative effects, and unintended effects, should be understood here as the consequences of an operation or strike outside of immediate damage, loss of life or injury. Such effects may occur anywhere but are especially likely in urban settings where populations depend on densely networked urban infrastructure systems. Effects may include *inter alia* interrupted or restricted service delivery, loss of or damage to civilian assets, loss of skilled technicians, disease outbreaks and other public health emergencies, loss of livelihoods and other economic losses, as well as displacement of the civilian population, food insecurity, trauma and other mental health impacts.

Recommendations

The following recommendations should be included in a comprehensive DoD policy to minimize civilian harm. Doctrine and training should also be updated in support of the policies recommended below.

Doctrine, training, strategy and planning

- Significantly increase the focus on the protection of civilian objects, including critical infrastructure, in all relevant doctrine, particularly on air and land warfare and urban operations. Army or Marine Corps doctrine and manual statements should include the protection of civilians and civilian objects, as well as an understanding of knock-on effects and mitigation techniques, as a core component and requirement of military operations.

- The protection of civilians and civilian objects, and the identification and efforts to avoid and minimize knock-on effects, should be embedded at all levels of training, including advanced professional military education (e.g., School of Advanced Military Studies , U.S. Army War College, Air War College, Command and General Staff College, Joint Professional Military Education Army ILE course, Center for Army Lessons Learned) as well as lower-level training at initial, annual/pre-deployment training for ground and air forces alike. Training should include modules on incorporating civilian harm considerations into planning, to include the protection of civilian objects, through appropriate intelligence preparation and analysis, target

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[3] See for example International Committee of the Red Cross (ICRC), "What objects are specially protected under IHL?," 14 August 2017, and ICRC, "Customary IHL: Practice Relating to Rule 28. Medical Units." With respect to essential services, see: ICRC, "Customary IHL: Rule 54. Attacks against Objects Indispensable to the Survival of the Civilian Population."

development, weaponeering, and post-facto assessment. Such modules should be integrated into overall DoD target development and targeting cycle training curriculum.

- Strategy development and operational planning must consistently include civilian protection and harm mitigation considerations, to include sections dedicated to the protection of civilian objects, including critical infrastructure. In particular, planning must ensure that appropriate munitions are selected and available throughout operations in order to minimize collateral damage.

- Combatant Commands and other relevant military organizations should include critical infrastructure analysis, especially in urban areas and interconnected urban systems, before operations are initiated, i.e., as Phase 0 and/or as part of Theater Security Cooperation Plans. This would ensure that when a Joint Task Force is formed for an operation, combatant commands can provide deeper analysis than would otherwise be conducted by staff on short notice. Such preparation may include a list of key personnel in areas of operations, including formal and informal governance figures and essential service providers, in urban environments.

Commander's intent

- Commander's intent, developed through orders, directives, and/or instructions, including the Rules of Engagement (ROE), should emphasize the importance of protection of civilians and minimizing civilian harm, including the protection of civilian objects to include critical infrastructure. The importance of protection of civilians and minimizing civilian harm should be emphasized from the beginning of operations and continually reinforced through orders, directives, instructions, and ROE as lessons are learned in the course of operations.

Intelligence preparation of the operating environment (IPOE)

- Develop the means and systems to consistently include quantitative and qualitative data about the value and significance of civilian objects, including critical infrastructure, for civilian populations in its overall intelligence picture for targeting purposes.[4] This should include the georeferenced location of the civilian object; information about the number of people served by the object and its role within the broader network of urban infrastructure systems; other nodes and critical services impacted by the object's functioning; the condition and status of the node in terms of its existing performance; whether there is an alternative/adequate back-up to the object; the cultural and material value of the object; estimate of the actual cost to rehabilitate or reconstruct the object if damaged or destroyed; the immediate and knock-on impact of the object's damage or destruction; and any critical dependencies that permit the asset or system to continue operating.[5] Investments in technology such as Geospatial Information Systems (GIS) and other tools should be systematized so as to support awareness of systems, critical vulnerabilities, objects' value and significance for civilian populations, and assist with displaying during all phases of an operation. Analysis should assess not only the role of an individual node or asset, but also assess the broader complex critical infrastructure system.

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[4] This is in addition to the U.S. military's obligations under IHL to accurately identify and distinguish military objectives, including temporary military objectives, and ensure compliance with the principle of proportionality.
[5] Critical dependencies may include, for example, an electrical transformer in the case of a water pumping station, or skilled personnel, equipment, medicine and other consumables for a health facility. Zeitoun and Talhami 2017.

- Establish processes, for example through intelligence missions or other office, to obtain information relating to the value and significance of civilian objects from the perspective of civilian populations on the ground, and continuously update relevant intelligence throughout the cycle of operations including IPOE, targeting and strike process. Sources of information should include public sources (e.g., websites, databases, and reports from local government offices and ministries); development, humanitarian, and human rights organizations; private sector construction companies and engineering consultancy firms; academia; online private sector intelligence services focused on specific sectors (e.g., water and wastewater sector); and U.S. civilian agencies and civil society, where appropriate in the area of operations.

- Regularly consult with urban planners, engineers, public health experts, and other technical specialists during the IPOE process to inform assessments about civilian objects as well as the immediate and expected knock-on effects of their damage or destruction with respect to civilian life.

- Multi-source information and intelligence collected by the U.S. military about civilian objects, including critical infrastructure -- including location, function, structure, value and significance, and to the extent possible, the status or condition of the infrastructural node in terms of performance -- should continuously feed into and inform objects' protected status and the no-strike list (NSL). The NSL must be dynamic and reflect improved context-specific understanding throughout the operational cycle.

- In addition to informing U.S. and partner targeting processes, IPOE should identify other ways in which U.S. and partner operations expose civilian objects to risk, including through the military use of protected objects, including critical infrastructure, and corresponding enemy Tactics, Techniques, and Procedures (TTPs).

- Identify, incorporate into planning, and implement all feasible precautionary measures to spare civilian objects, including critical infrastructure, and minimize civilian harm associated with and resulting from their damage or destruction. This includes planning for and ensuring the availability of appropriate weaponeering to minimize collateral damage.

- All of the above IPOE processes and considerations should inform targeting processes and activities by U.S. partner forces in addition to those of U.S. forces.

Targeting and strike process

- Consistently utilize pattern of life analysis, information about cultural norms and practices, information sought from the public domain, civilian agencies, NGOs where appropriate and necessary, local community leaders, and other all-source intelligence to continually review objects' protected status, and ensure that determinations of loss of protected status is not based on flawed intelligence or assumptions about civilian behavior. When considering an object's status, it should be presumed civilian unless proven otherwise. In case of doubt, objects should be presumed civilian. In general, the U.S. military should err on the side of protection and restraint.

- Inform the civilian population and humanitarian organizations if the protected status of a civilian object is removed or revised. For example, if a mosque is utilized by enemy forces and its protected status thereby temporarily lost, civilians who might otherwise continue to utilize the mosque should be adequately warned. In general, the U.S. military should ensure transparency about conditions and criteria for removing an object from the NSL.

- Ensure that target development and execution, including collateral damage estimates (CDEs) and proportionality assessments, incorporate the reasonably foreseeable knock-on effects of damage to and destruction of civilian objects, including strikes on dual-use objects and collateral damage, including *inter alia* the disruption of public services, transportation, communications, financial services and consequences for public health, displacement, local economies, and livelihoods. The U.S. military should also consider the extent to which targeting decisions could interrupt service delivery and destroy essential civilian assets, even if the system or asset is not the objective of attack. The need to consider the value and significance of civilian objects with respect to their critical dependencies, availability of services, and for civilian life should consistently feature in the military's ROE with respect to deliberate, time-sensitive, and dynamic strikes. These dependencies may include the human resources who operate, maintain, and repair systems, other hardware such as equipment and vehicles, and consumables such as chemicals for water treatment or fuel for generators).[6]

- Ensure that expected damage to civilian objects, including critical infrastructure, and reasonably foreseeable knock-on effects, are incorporated in capabilities analysis and weaponeering decisions, including choice of munitions and adjustments of weapons payload to minimize collateral damage. During deliberate, time-sensitive and dynamic targeting, the U.S. military should systematically adapt weapons types based on the reasonably foreseeable effects of their use, including knock-on effects, with a view to minimizing civilian harm.

- Prioritize non-kinetic options when targeting dual-use objects or developing targets that may damage or destroy civilian objects as collateral damage.

- Avoid the use of explosive devices with wide-area effects in populated areas unless absolutely necessary so as to minimize civilian casualties and the immediate and knock-on effects of their use on critical infrastructure and civilian life. Under no circumstances should imprecise munitions (e.g., unguided artillery shells) be used in populated areas.

- Consult with engineers, urban planners, public health experts, and other technical experts and individuals with unique context-specific knowledge during the targeting process and when planning strikes, especially in densely populated areas, in order to better evaluate expected immediate and knock-on effects and feed context-specific knowledge and expert analysis into CDEs and proportionality assessments. Similarly, the U.S. military should ensure regular communication and consultation with the relevant actors about critical operations, such as management of ambulance and medical transports, and steps to protect civilian objects and minimize civilian harm arising from such operations.

- Ensure that the tracking of data and trends relating to civilian harm from damage to and destruction of civilian objects is conducted in real time and that timely information feedback loops allow for adaptation of tactics during the targeting and strike process for deliberate, time sensitive, and dynamic strikes.

- The U.S. military and its partners should, as part of post-strike assessments, attempt to distinguish between strike locations where ordnance has definitively exploded and strike locations where explosive remnants of war (ERW) may be present. For the purpose of these assessments, all cluster munition and artillery strikes should be treated as potential ERW locations. Potential ERW locations, along with details about the type and number of munitions used, should be recorded and shared with the relevant mine

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[6] Mark Zeitoun and Michael Talhami, "The impact of explosive weapons on urban services: Direct and reverberating effects across space and time," *International Review of the Red Cross.*

action authorities (such as national mine action agencies, the United Nations, or humanitarian mine action organizations) to facilitate rapid and efficient survey, clearance, and assistance to survivors.

Engagement with humanitarian and human rights organizations

- Throughout the full targeting cycle, including pre- and post-strike, seek engagement with humanitarian and human rights organizations where appropriate and necessary, including to obtain information on the presence of civilian objects and their cultural and material value and significance, as well as information about changes in use of civilian objects. This information should inform measures to anticipate, avert, minimize, and mitigate civilian harm resulting from damage or destruction of civilian objects, including the placement of civilian objects on a no-strike list (NSL).

- Provide a channel for humanitarian and human rights organizations, where feasible, to provide information regarding the observed or expected knock-on effects of damage or destruction of civilian objects including critical infrastructure, and use that information to assess damage, respond to the consequences of the attacks, and inform future efforts to minimize and mitigate civilian harm by feeding into a lessons learned process.

U.S. interagency engagement

- Prior to and during operations, engage with other U.S agencies, including the Department of State, USAID, the Army Corps of Engineers, FEMA, and NASA on the presence of civilian objects, their cultural and material value and significance, cultural norms and practices, and changes in use of civilian objects. State and USAID expertise should inform operational planning and strategy, including OPLANS.

Post-facto assessment

- At the appropriate phase, battle damage assessments (BDA) and/or collateral damage assessments (CDA) should assess incidental harm, including the extent of damage or destruction to civilian objects including critical infrastructure, and anticipated impairments to function. BDA and/or CDA methodology should not only evaluate impacts on systems, but also systematically consider the knock-on effects of damage for civilian life, such as restricted or interrupted service delivery, public health concerns, loss of livelihoods, and displacement. BDAs and/or CDAs should be stored and processed in such a way that they inform lessons learned processes on civilian harm resulting from damage or destruction of civilian objects including critical infrastructure.

- During operational planning, ensure that the Civilian Casualty Mitigation Cell (CCMT) or other applicable cell or unit has the capabilities, staff, and responsibility to receive and assess reports of damage or destruction to civilian objects, including critical infrastructure, including where possible an analysis of knock-on effects and consequences for civilians. Assessments should utilize information from external sources to inform appropriate response and future civilian harm prevention and mitigation practices. In particular, assessments should inform the future categorization of objects and determination of protected status.

- Where appropriate and feasible, the U.S. military should conduct ground investigations to assess damage to civilian objects, particularly the knock-on effects of damage to critical infrastructure. In the event that it cannot do so, it should leverage the role of other actors, including other U.S. agencies and other relevant field-based expertise.

Resourcing and staffing

- Devote the resources, staffing, and expertise to assess the value and significance of civilian objects including critical infrastructure in relation to civilian life; carry out evidence-based analyses of anticipated impacts as well as observable effects post-strike; and continuously incorporate analysis into operational planning.

- Devote the resources, staffing, and expertise to receive and incorporate information on civilian objects from other U.S. government agencies, non-government actors, including humanitarian and human rights organizations as well as civilian populations, urban planners, engineers, public health specialists and other experts. The U.S. military should ensure that technical experts from relevant fields are built into the teams that conduct the IPOE, those that inform real-time decision making in the targeting process, and those that carry out post-facto assessments. The U.S. military should encourage close coordination between analysts of the human environment and targeting staff to ensure the significance of civilian objects is incorporated at the appropriate stages (e.g. target validation).

- Ensure appropriate staffing and resources within CCMT or other appropriate cell or unit to track, analyze, and receive information on damage to and destruction of civilian objects, including critical infrastructure, and ensure that timely information flows enable real-time adaptation of tactics with a view to minimizing civilian harm.

- Adequately staff and deploy legal advisers to reconcile various operational and legal requirements and constraints, relating for example to military advantage, immediate and knock-on effects on civilian life, as well as overall damage and harm caused by strikes and the totality of the military campaign.

- Devote resources to research and development to explore how CDEs can increasingly incorporate the knock-on effects within essential service systems and associated consequences for civilian life, and not only focus on static objects and the areas in their immediate proximity.

Lessons learned

- Reports and assessments of damage and destruction of civilian objects including critical infrastructure, to include information on the knock-on effects of damage, should feed into a continuous lessons learned process and inform future guidance and practices to minimize civilian harm. After Action Reviews and post-facto studies on major U.S. military operations should also assess damage to civilian objects, subsequent knock-on effects, and identify lessons to inform future efforts to minimize civilian harm.

- Lessons learned processes should include regular evaluation of potential sources of error and confirmation bias regarding the determination of objects as civilian or military, and objects' protected status.

- Commission an independent study on immediate and knock-on civilian harm arising from the damage and destruction of civilian objects, including critical infrastructure; the inclusion of such harm in CDE and proportionality assessments; and potential options to prevent and minimize harm.

Standardization and flexibility

- Ensure adequate standardization of processes to anticipate, evaluate, assess, and mitigate the knock-on effects on civilian life of damage and destruction to civilian objects, including critical infrastructure, across combatant commands, missions, and operational theaters.

- Standardization must also allow for flexibility in the range of civilian objects considered across contexts, including the potential knock-on effects of such damage in urban and rural environments, and their impact on civilian life.

Amends

- Policies on post-harm amends -- including but not limited to the acknowledgment of harm, explanations and apologies, provision of *ex-gratia* or solatia payments, livelihood and other assistance, and public guidance for filing claims -- should apply to damage or destruction of civilian objects (e.g., home, property, livelihoods) as well as civilian casualties.

- The U.S. military and civilian agencies should consider policy responses, including the provision of foreign aid, to address and mitigate the damage to and destruction of civilian objects, including the knock-on effects of such damage, both during and after conflict.

Partnered and coalition operations and security cooperation

- The U.S. military should ensure that its security partners, including host-state militaries, non-state actors, and coalition partners, take precautionary measures to spare civilian objects and limit damage to civilian objects, including dual-use objects and collateral damage, and devote the appropriate resources to analyze, quantify, and integrate foreseen knock-on effects in their military planning.

- The U.S. military should systematically include the protection of civilian objects, including critical infrastructure, in training and capacity building with security partners. Training should include the value and significance of civilian objects including critical infrastructure; considerations for knock-on effects of their damage or destruction; identifying and mitigating risks created by the military use of civilian objects; and best practices in harm prevention, mitigation, and response across the targeting cycle. Follow-up assessments should assess whether U.S.-trained forces have complied with IHL in their operations and the extent to which they have successfully mitigated damage and destruction to civilian objects and the associated knock-on effects.

Annex: Damage to Civilian Objects and Types of Impacts on Civilian Life
Examples[7]

<u>Notes</u>:
- For all categories of civilian objects, damage includes total or partial destruction by military activity. This includes airstrikes; guided munitions/bombs and other explosive devices; missiles; rockets; mortars; shelling; artillery; other armed clashes.
- This matrix is not exhaustive and is instead intended to demonstrate some concrete examples of the ways in which incidents of damage or destruction of civilian objects has resulted in significant levels of indirect civilian harm.
- This matrix focuses on the direct and indirect effects of damage/destruction to civilian objects regardless of legal implications. However, it is important to note that some of the objects noted in this matrix enjoy additional special protections under international law, and that some of the operations/strikes noted in this matrix may constitute violations of International Humanitarian Law (IHL)

Type of Civilian Objects	Residential Areas • Civilian homes, residences, private houses • Apartments and complexes • Residential compounds	Other Civilian Assets • Farms, crops • Markets, livestock • Local businesses • Factories • Private hospitals, health facilities, treatment centers • Aid compounds, facilities and other assets • Financial services	Public Infrastructure and Services • Hospitals, clinics, health centers • Bridges, roads, other transportation infrastructure • Municipal buildings and services • Water treatment plants, sewage systems, water infrastructure • Electricity grids/power plants • Schools and childcare centers • Information and communication systems • Places of worship
Direct Impact[8]	Direct Impact ▪ Civilians trapped under the ruble ▪ Destroyed houses ▪ Injury; loss of life ▪ Family separation	Direct Impact ▪ Damaged or destroyed farms, farmland, crops, livestock, markets, factories, businesses, and other civilian assets ▪ Shutdown of businesses	Direct Impact ▪ Destroyed public buildings ▪ Damaged critical infrastructure ▪ Civilian trapped under rubble; injury; loss of life

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[7] This list is not exhaustive and was last updated in September 2019. This matrix was submitted to the Department of Defense (DoD) in October 2019 as part of ongoing NGO dialogue with DoD counterparts on the Protection of Civilians in U.S. Military Operations.

[8] The typology of "direct," "indirect," and "cumulative" (or incremental) impact builds on the ICRC-InterAction report "When War Moves to Cities: Protection of Civilians in Urban Areas," May 2017, drawing on definitions found in Mark Zeitoun and Michael Talhami, "The impact of explosive weapons on urban services: Direct and reverberating effects across space and time," *International Review of the Red Cross,* War in Cities Edition, March 2017, Vol. 98, No. 1, pp. 53-70.

Example
West Mosul, Iraq, 2017
Issue: Loss of life; need for urgent medical care; civilians trapped under rubble.
In Mosul, "patients from urban areas sustained blast-related injuries and compound fractures, crush injuries from building collapses, and burns from powerful explosives, each of which required complex emergency surgeries and post-operative care."[9]

Per OCHA, by May 2018, the Civil Defence Corps "reported that it had recovered the remains of 2,600 civilians beneath the rubble in west Mosul, and only three from the east. While it is not possible to ascertain how many civilians died from the secondary effects of the conflict, such as lack of access to food, water or medicine, those

- Suspension of economic activity (can be temporary);
- Suspension of humanitarian operations (can be temporary)

Example
Fayoush Market strike, Yemen, July 2015
Issue: Destruction of a market providing economic activity, services, and livelihoods for villagers alongside a major road.

Two airstrikes took place on the Al-Fayush livestock market (for goats and sheep) nearby a petrol station and multiple other services, including a Qat market, a mosque, and a restaurant. The Al-Fayush market is located on the corner of the major N1 motorway, the primary route between Aden and Lahj (and continues all the way to Taiz and then the capital Sana'a). "It is common practice in Yemen for villagers living near major motorways to set up shops on either side of that motorway."[11] Per OCHA, at least 41 people were killed and 23 injured. Moreover, there were scores of dead goats/cattle. Given the importance of the market, commercial activities have resumed: "The constant and

- Shutdown of key public services (water, sanitation, health care, garbage collection); collapsed service provision

Examples
Raqqa, Syria, 2017
Issue: Damage to critical public services.
The international anti-ISIS Coalition bombed the Al Furosya Electric Station, the "main control board attached to the Euphrates Dam, causing severe damage to the general electric-provision operation."[13] This station provided electricity to Raqqa and its countryside suffered significant damage and had to be repaired for people in Raqqa and surrounding areas to regain access to electricity.[14]

Jaref Spa bombing, Yemen, January 2016:
Issue: Destruction of public infrastructure/services.
An airstrike destroyed a building, potentially a mosque/place of worship, as well as nearby spa – a recreational space where visitors sought natural health. Several civilian casualties were noted, including women and children.[15]

Yemen-wide, 2018:
Airstrikes, armed clashes, and shelling resulted in damage/destruction of civilian facilities, including

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[9] Srinjoy Bose, Jacqueline Parry, and Nadia Siddiqui, "Lessons Learned Study on UN Humanitarian, Civil-Military Coordination and Stabilization Efforts in Mosul," *SREO Consulting,* 2019, p. 20.
[11] Bellingcat, "LAH10001 - Fayoush Market Strike," 21 February 2019.
See also Médecins Sans Frontières (MSF), "Yemen: Airstrike hits MSF cholera treatment center in Abs," 12 June 2018.
[13] Atlantic Council, "Rebuilding Raqqa's Electrical Grid," 31 October 2018.
[14] U.N. Office for the Coordination of Humanitarian Affairs (OCHA), "Syria Crisis: Northeast Syria: Situation Report No. 24 (15 April - 15 May 2018)," 2018, p. 2.
[15] Bellingcat, "SAN10006 - Jaref Spa Bombing," 8 May 2019.

	coming from west Mosul displayed signs of malnutrition."[10]	heavy usage of that particular market area make it likely this damage was repaired as quickly as possible to allow the market to continue operating."[12]	"irrigation systems, agricultural sites, schools, hospitals, water points and sanitation plants." On average, 600 civilian structures, are damaged or destroyed every month.[16]
Indirect Impact	## Indirect Impact - Displacement (urban and rural) - Loss of family breadwinner - Loss of identification documents/access to key services - Physical insecurity - Sexual and gender-based violence - Bombs; ERWs; UXOs - Brain drain; loss of skilled personnel and workers ## Example **Yemen-wide, 2018** *Issue: Mass displacement.* Per the Civilian Impact Monitoring Report, 4,846 households suffered direct displacement as a result of impact of armed violence on houses: "The majority of the displaced households, 59%, and over a third of those losing their livelihoods (37%) were in the northern governorate of Sa'ada,	## Indirect Impact - Loss of livelihood - Displacement - Collapsed economic activity - Disease risks; public health emergencies go unaddressed - Shrinking humanitarian space - Lack of medical care and access to medical services - Malnutrition/ food insecurity - Brain drain ## Examples **Cholera treatment plant bombing, Abs, Yemen, June 2018** *Issue: Access to health care amid public health emergency.* Damage to the MSF-supported building rendered it unfunctional and MSF temporarily suspended operations in the area during a cholera outbreak. Per OCHA, "the cholera outbreak in Yemen "will likely continue until sustainable solutions can be found – including effective, reliable water and sanitation infrastructure and health services."[8]	## Indirect Impact - Widespread morbidity and mortality due to disease; public health risks/emergencies - Lack of access to clean water - Malnutrition/food insecurity - High maternal and child mortality - Breakdown in critical public services including rule of law and governance - Inability to attend school, use of schools by armed groups/insecurity - Strained humanitarian relief operations and development interventions - Inadequate repairs or maintenance - Physical insecurity - Brain drain; loss of skilled workers/ personnel - Widespread psychological trauma - Inability to practice faith or seek protection/shelter following destruction of residential areas - "Siege economy"- conditions for black market, incl. organized crime, trafficking, profiteering ## Examples **Bombing of the Haydan hospital, Sadaa, Yemen, Oct. 2015**

[10] Ibid., p. 30.
[12] Bellingcat, "LAH10001 - Fayoush Market Strike," 21 February 2019.
[16] OCHA, "Yemen: 2019 Humanitarian Needs Overview," December 2018, p. 7.
[18] Ibid, p. 25.

	where daily airstrikes and shelling hit areas along the northern and western border with Saudi Arabia. Rates of displacement increased during the year, with a monthly average of 275 displaced households over the first six months of the year, which then almost doubled to 532 over the latter six months."[17]	Yemen-wide, 2018 *Issue: Loss of livelihood from attacks on farms, local businesses.* Per the Civilian Impact Monitoring Report, "6,049 households suffered from loss of livelihood due to the targeting of farms and local businesses."[19]	*Issue: Access to medical services for civilian populations in the vicinity of a significant hospital.* The airstrike resulted in significant damage to MSF-supported Haydan hospital, which was forced to shut down. The attack "destroyed or damaged multiple wards." Two patients were also injured during the evacuation of the hospital. "The hospital was the only medical facility for about 200,000 people living within an 80-kilometer radius, which received about 150 emergency cases a week."[20] Per HRW, "the coalition has repeatedly hit hospitals […] in Yemen. In two additional coalition attacks MSF investigated, the organization found: "Beyond the immediate loss of life and destruction … the attacks led to a suspension of activities that left an already very vulnerable population without access to healthcare." [21] Taiz, Yemen, 2016 *Issue: Access to health care amid collapsed health services.* Per ICRC, in June 2017: "With over 160 health-care facilities attacked since 2015 and hundreds more forced to close because of a lack of fuel and supplies, only 45 per cent of facilities are currently functional. The dearth of essential medicines and medical supplies entering Yemen – less than 30 per cent of what is needed – and the irregular payment of health care workers and essential service providers only make matters worse."[22]

[17] Civilian Impact Monitoring Project, "Civilian Impact Monitoring Report: January-December 2018," *Protection Cluster Yemen,* 2018, p. 2
[19] Ibid.
[20] Human Rights Watch (HRW), "Hiding Behind the Coalition," 24 August 2018. See also MSF, "Yemen: MSF hospital destroyed by airstrikes," 27 October 2015.
[21] HRW, "Hiding Behind the Coalition," 24 August 2018.
[22] ICRC, "I saw my city die: Voices from the front lines of urban conflict in Iraq, Syria and Yemen," 14 June 2017, p. 27.

			Hudaydah, Yemen, 2018 *Issue: damage and destruction of water sanitation facilities and access to clean water.* Between July 26-28, 2018, a series of airstrikes damaged the al-Mina District water station and a UNICEF-supported sanitation facility in Zabid District. According to UNICEF, the al-Mina water station provided most of the water supply to the city.[23][24] In the days following, the UN Humanitarian Coordinator for Yemen warned in a statement, "We could be one airstrike away from an unstoppable epidemic."[25] Save the Children reported that suspected cholera cases nearly doubled following these strikes, from 732 suspected cases in Save the Children-supported health centers in July to 1,342 in August.[26] In October 2018, they reported an almost three-fold increase from June.[27] Yemen-wide, 2018 *Issue: Destruction of schools and potential for use by armed groups.* About 2,000 schools affected by the conflict "due to damage, presence of IDPs or occupation by armed groups. In 2018, the Education Cluster estimates that 37 schools were hit by ground clashes

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[23] U.N. Children's Fund (UNICEF), "Yemen Humanitarian Situation Report (July 2018)," *ReliefWeb,* 31 July 2018.

[24] U.N. News, "Yemen: Attacks on water facilities, civilian infrastructure, breach 'basic laws of war' says UNICEF," 1 August 2018.

[25] OCHA, "Civilians at extreme risk from airstrikes in Hodeidah," *ReliefWeb,* 29 July 2018.

[26] Save The Children, "Yemen: Surge in Suspected Cholera Cases in Hodeidah," 2018.

[27] Ibid.

			or aerial attacks."[28] And "256 schools have been destroyed by air strikes or shelling; 1,520 schools have been damaged; 167 schools are sheltering IDPs; and 23 schools are still occupied by armed groups."[29]
Cumulative Impact	**Cumulative Impact** ▪ Protracted displacement and associated vulnerabilities, including tensions with host communities ▪ Loss of livelihood ▪ Inability to return following fighting/conflict ▪ Inability to access key services ▪ Trauma **Examples** **Ramadi, Iraq, 2016** *Issue: Trauma & returns.* In mid-March 2017, more than a year after the battle for the city ended, only around 60% of people who had fled had been able to return.[30] **Yemen-wide, 2018:** *Issue: Returns.* Per OCHA, "most returnees have returned to their former	**Cumulative Impact** ▪ Loss of livelihood ▪ Chronic illnesses ▪ Chronic malnutrition ▪ Starvation ▪ Shrinking humanitarian space ▪ Economic crisis/collapse **Example** **Yemen-wide, 2019** *Issue: Damage to/destruction of civilian objects has wide-ranging reverberating effects on civilian life, compounding the humanitarian situation, fueling mass starvation.* Per NRC, since the ceasefire in December 2018, "a total of 1,631 houses, 385 farms, 47 local businesses and 13 schools were attacked in the same period. These attacks are making an already dire humanitarian situation worse and contributing to starvation, and pushing children out of school."[32]	**Cumulative Impact** ▪ Loss of life, including high maternal and child mortality ▪ Starvation ▪ Loss of livelihood ▪ Chronic illnesses ▪ Chronic malnutrition ▪ Inability to return following fighting/conflict ▪ Psychological trauma ▪ Lack of/limited prospects for education ▪ Economic crisis/collapse **Examples** **Ramadi, Iraq, 2016-2017** *Issue: Widespread destruction of public infrastructure and services in urban areas challenging the prospects for returns.* In Ramadi, Iraq, some 2,000 public buildings, 48,000 residential homes, as well as "key pieces of infrastructure, such as bridges, the main hospital, the train station and a water-treatment plant

Footnotes

[28] OCHA, "Yemen: 2019 Humanitarian Needs Overview," December 2018, p. 17.
[29] Ibid, p. 47.
[30] ICRC, "I saw my city die: Voices from the front lines of urban conflict in Iraq, Syria and Yemen," 14 June 2017, p. 32.
[32] Norwegian Refugee Council (NRC), "Civilian casualties double in parts of Yemen since ceasefire," 18 March 2019.

residences, many of which are damaged, and they are generally unable to afford repairs. Returnees often face challenges to restore social, health, housing and community infrastructure to restart their lives, and often require support to resume their livelihoods."[31]		serving more than half of Ramadi's residents, were destroyed," meaning "there is not much for many displaced people to return to."[33] **Mosul, Iraq, 2017:** *Issue: Damage to water networks impact on returns.* The destruction of water networks impeded the return of civilians in Mosul – as of late August 2017, two water treatment plants in Mosul city, Al Zuhur and Al-Dandaan,[34] were not functional and most other plants were running at lower capacity. "Whole neighborhoods [did] not have access to clean water, and many others experience[d] limited access due to the strain on the entire system."[35]

[31] OCHA, "Yemen: 2019 Humanitarian Needs Overview," December 2018, pp. 29-30.

[33] ICRC, "I saw my city die: Voices from the front lines of urban conflict in Iraq, Syria and Yemen," 14 June 2017, p. 49.

[34] CIVIC and InterAction, "Protection of Civilians in Mosul, Identifying Lessons for Contingency Planning," 17 October 2017, p. 5, citing U.N. Habitat, "Water Facilities Assessment," Mosul Mapping and Data Portal, 25 August 2017.

[35] Ibid.

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