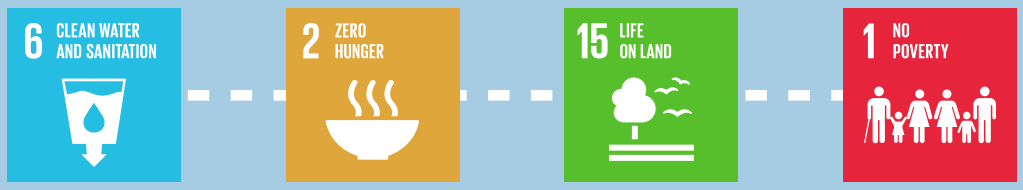
SECOND MENU OF INDICATORS TO MEASURE THE REVERBERATING EFFECTS ON CIVILIANS FROM THE USE OF EXPLOSIVE WEAPONS IN POPULATED AREAS

INDICATORS FOR WATER, SANITATION AND HYGIENE, FOOD SECURITY, ENVIRONMENTAL DEGRADATION, AND ECONOMIC OPPORTUNITIES



Alfredo Malaret Baldo
Francesca Batault

UNIDIR UNITED NATIONS INSTITUTE FOR DISARMAMENT RESEARCH

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NOTES

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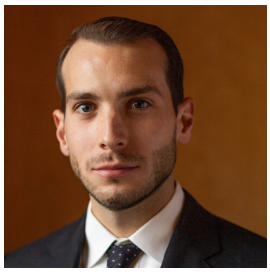
About the authors



ALFREDO MALARET BALDO is a Researcher with UNIDIR's Conventional Arms Programme. He coordinates the Development and Security research portfolio. He is the co-author of UNIDIR's Menu of Indicators to Measure the Reverberating Effects on Civilians from the Use of Explosive Weapons in Populated Areas, the First Menu of Indicators. Malaret specializes in public policy analysis, strategies for the reduction of armed violence in urban environments, and linkages between security and development efforts. He joined UNIDIR after working for Stockholm International Peace Research Institute (SIPRI); the United Nations Regional Centre for Peace, Disarmament and Development in Latin America and the Caribbean (UNLIREC); and retired United States Ambassador Dennis Jett. He has a bachelor's degree in political science and master's degrees in public affairs from Brown University and international affairs and economic development from The Pennsylvania State University.

FRANCESCA BATAULT is a former Graduate Professional with UNIDIR's Conventional Arms Programme. She is currently an Associate with the Unit for Relations with Arms Carriers of the International Committee of the Red Cross (ICRC). Prior to joining UNIDIR, Batault worked for the International Crisis Group, the International Peace Institute as well as the ICRC's regional delegation in Pretoria, South Africa. She holds a master's degree in international relations from the London School of Economics and Political Science (LSE) and a bachelor's degree with honours in politics, philosophy and economics from Northeastern University, Boston, United States.

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Abbreviations

ERW	Explosive remnants of war
EWIPA	Explosive weapons in populated areas
FAO	Food and Agriculture Organization
ILO	International Labour Organization
IMF	International Monetary Fund
ICRC	International Committee of the Red Cross
IED	Improvised explosive device
SDG	Sustainable Development Goal
UNEP	United Nations Environment Programme
UNESCO-UIS	United Nations Educational, Scientific and Cultural Institute for Statistics
UNICEF	United Nations Children's Fund
UNSD	United Nations Statistics Division
UXO	Unexploded ordnance
WASH	Water, sanitation and hygiene
WHO	World Health Organization

Executive summary

The impacts from the use of explosive weapons in populated areas (EWIPA) extend further and last longer than the shock waves and fragmentation from the explosive blast around the point of detonation. The use of EWIPA sets in motion complex knock-on effects that reverberate over space and time through a complex chain of interconnected and interdependent systems. These "reverberating effects" can be described as the consequences of the damage and destruction caused by explosive weapons, including indirect harm to civilians, but excluding direct deaths and injuries. Particular attention to populated areas is imperative given the dynamic interaction between the use of explosive force and damage to or destruction of civilian objects in such areas, which gives way to distinct reverberating effects that result in broad and enduring harm to civilians. As such, the use of explosive weapons in populated areas presents a significant likelihood of indiscriminate effects.

The First Menu of Indicators outlines research considerations for documenting reverberating effects of the use of EWIPA and presented indicators to measure the impacts on civilian casualties and injuries, sustainable cities and communities, good health, and education. Building on the First Menu of Indicators, this Second Menu of Indicators expands the focus areas to include impacts on water, sanitation and hygiene, food security, environmental degradation, and economic opportunity. Specific quantitative indicators are presented for each of these four areas. These indicators can be used to capture, measure, compare and understand how the use of EWIPA impacts the survival, well-being and dignity of civilians in ways that are often overlooked or underestimated. The indicators are designed to help researchers document the broad range and scale of impacts and help to identify the general and foreseeable patterns of harm resulting from the use of EWIPA, thereby contributing to the growing evidence base. It is expected that such data will help inform and renew the understanding of parties to conflict and all stakeholders (including humanitarian assistance providers) of the reasonably foreseeable reverberating effects, enabling them to develop, design or update appropriate doctrine, practice, strategy, tactics and programmatic responses in order to better protect civilians in conflict situations.

The indicators are catalogued into first-, second- and third-level impacts for each focus area. The order of the indicators is designed to illustrate the sequence of how damage and destruction (first-level impacts) cause disruptions to key services (second-level impacts), which in turn have implications for civilian well-being (third-level impacts). In this "impact chain" disaggregation, the second- and third-level impacts can be considered as reverberating effects. Each indicator is subsequently unpacked through its corresponding method of computation.

To maximize the use of the indicators, this Second Menu of Indicators presents five methodological recommendations, which can be summarized as follows:

1. **The impact chain:** Document impacts from the use of EWIPA as a sequence of knock-on effects.
2. **Impacts across space and time:** Use the indicators across different concentric spatial rings and windows of time to capture how these impacts evolve over space and time.
3. **Causation and accreditation:** Calculate the same indicators in parallel studies in different locations (affected versus non-affected) or covering different time periods (pre-shock or during-shock versus post-shock) to compare outcomes and thus inform causal inference.
4. **Interconnectivity of impacts:** Consider impacts from the use of EWIPA as dynamic reinforcing loops, since reverberating effects compound, intersect and interact.
5. **Disproportionate impacts:** Disaggregate data by gender and age, where relevant, to highlight and understand the different impacts on different groups.

Finally, the indicators are designed to explore harm from EWIPA through the lens of sustainable development, using many of the standardized metrics and methodologies of the Sustainable Development Goals. This approach aims to further contribute to the cumulative evidence of how armed conflict reverses development gains.

Part I: Introduction and General Research Consideration

1.1 Introduction

The impacts of the use of explosive weapons in populated areas (EWIPA) extend further and last longer than the immediate shock waves and fragmentation from the explosive blast around the point of detonation. The use of EWIPA sets in motion a series of complex knock-on effects that reverberate over time and space, with negative and enduring consequences for the survival, well-being, dignity and environment of civilians. The "reverberating effects" of the use of EWIPA are manifested through different causal pathways across a wide range of interconnected sectors, including transportation networks; energy-, waste- and water-management installations; public health and psychological well-being; education; food security; shelter; displacement; culture and identity; economic opportunities; environmental standards; and gender equality. These reverberating effects cause indirect deaths, injuries and harm to civilians, and are often underestimated, if estimated at all. They also hinder the efforts of conflict-affected States to implement the 2030 Agenda for Sustainable Development. Indeed, the above-mentioned sectors are at the core of the Sustainable Development Goals (SDGs), such as, for example, ending poverty (SDG1), ending hunger and achieving food security (SDG2), ensuring availability of clean water and sanitation (SDG6), and promoting inclusive and sustainable economic growth (SDG8). Exploring harm from EWIPA through the lens of sustainable development further contributes to the cumulative evidence of how armed conflict reverses development processes.

The First Menu of Indicators outlines research considerations for documenting reverberating effects of the use of EWIPA and presented indicators to measure the impacts on civilian casualties and injuries (SDG16), sustainable cities and communities (SDG11), good health (SDG3), and education (SDG4).[1] **This Second Menu of Indicators presents indicators to measure the impacts of the use of EWIPA in four additional focus areas: water, sanitation and hygiene (WASH), food security, environmental degradation, and economic opportunities**. These four focus areas draw inspiration from, respectively, SDG6, SDG2, a cross-sectoral analysis of indicators that affect human environmental interactions, and SDG1 and SDG8. Furthermore, by integrating lessons learned from the use and uptake of the First Menu of Indicators, this Second Menu of Indicators attempts to refine the general research considerations and deepen the discussion on causation and attribution and the compounding nature of these effects. Both the First and Second Menus outline indicators that shed light on the reverberating effects and overall impacts that the use of EWIPA has on civilians and societies, assuming that the relevant data is collected, made available, disaggregated, contextualized and used in comparison to a baseline or control scenario.

The indicators are intended for use by researchers documenting the impacts of conflict, especially those working to monitor the use of EWIPA and map the causal pathways that lead to reverberating effects. The objectives of this Second Menu of Indicators are:

- To assist research efforts documenting the broad range and scale of harms from the use of EWIPA
- To help identify the general and foreseeable patterns of harm resulting from the use of EWIPA

1 C. Wille and A. Malaret Baldo, Menu of Indicators to Measure the Reverberating Effects on Civilians of the Use of Explosive Weapons in Populated Areas, UNIDIR, 2021, https://unidir.org/publication/menu-indicators-measure-reverberating-effects-civilians-use-explosive-weapons-populated.

- To assist parties to an armed conflict to prioritize the protection of civilians when planning and conducting operations in populated areas, including by using all available evidence and knowledge to inform their understanding of reasonably foreseeable reverberating effects and the development and application of appropriate doctrine, strategy and tactics.

BOX 1

Impact of the First Menu of Indicators

The objectives of this Second Menu of Indicators build on the use and uptake of the First Menu of Indicators and thus aim to expand the indicators offered into different focus areas. The impact of the First Menu of Indicators, released in February 2021, is reflected in its use and distribution by United Nations agencies and partners to advance ongoing efforts to protect civilians. In the year since its publication, the First Menu of Indicators has also been used by specialized research entities, non-governmental organizations and academics looking at the issue at hand, informing their own analytical frameworks as well as serving as a departure point for conducting case studies and establishing new monitoring projects. Several organisations have designed projects that aim to collect data for the entire list of indicators outlined in the First Menu. Annex B contains a sample of a dozen publications and resources that cite or use the First Menu of Indicators; their inclusion should not be understood as an endorsement and the list should not be considered exhaustive. It is expected that such research efforts expand the evidence base and influence the positions, doctrine, standards, policy, and practice of parties to conflict.

The First Menu of Indicators was also intended to inform multilateral consultations on EWIPA. It is hoped that this Second Menu of Indicators is also taken into consideration in supporting and informing discussions around policies and practices to protect civilians. It is UNIDIR's aim that both publications contribute towards a broader understanding of the impact of the use of EWIPA on civilians thereby spurring critical high-level reflections. As such, UNIDIR is releasing this Second Menu of Indicators to continue facilitating the work of all interested parties in documenting and understanding the broad range of harms resulting from the use of EWIPA, hoping that it will help prevent further civilian harm and suffering.

This Second Menu of Indicators explores impacts of the use of EWIPA in the four focus areas of WASH, food security, environmental degradation, and economic opportunities. Part I provides a description of the reverberating effects and what is meant by explosive weapons and populated areas. It then explains why it is important to measure these effects. Part I concludes by outlining updated methodological considerations that aim to deepen the discussion of the impact chain from the use of EWIPA; the spatial and temporal evolution of impacts, causation and attribution; the interconnectivity of impacts; and the disproportionate gendered impacts. Part II presents detailed tables outlining the indicators for each of the four focus areas and summarizes methodological recommendations on how to use the indicators. Part III presents the menu's key takeaways, which can be used as a standalone explanatory note. Annex A unpacks the specific methods of computation for each indicator, following the same order as in the tables in Part II (i.e. WASH, food security, environmental degradation and economic opportunities).

1.2 What are reverberating effects?

Explosive weapons are generally understood to have primary, secondary and reverberating (or tertiary) effects:

- Primary effects of an explosive weapon are those caused directly by the weapon's components. These effects are caused by the high-pressure blast wave that results from the detonation, and from the fragmentation of the weapon's system. Measures of primary effects include blast overpressure, fragmentation, heat and light.

- Secondary effects of an explosive weapon result from the interaction of the blast wave and fragmentation with the surrounding environment. The most significant secondary effects include secondary fragmentation, firebrands, ground shock and cratering, fire, and flying and falling debris.

- Reverberating (or tertiary) effects of an explosive weapon are the consequences of the damage and destruction that it causes, including indirect harm to civilians but excluding direct deaths and injuries. The reverberating effects of an explosive weapon spread out in space and time after the initial impact through a complex causal chain of interconnected and interdependent systems. These effects intersect, interact and accumulate, spreading into multiple areas of civilian life.

1.2.1 What are explosive weapons?

There are many types of explosive weapon. These include, for example, air-dropped bombs, artillery projectiles, missiles and rockets, mortars, and improvised explosive devices (IEDs). While different technical features dictate the accuracy of their delivery and their explosive effect, these weapons generally operate through the detonation of an explosive substance that creates a blast zone (or blast wave), thermal energy and fragmentation effects with the potential to directly kill or injure anyone and damage, degrade or destroy anything within that zone. The potential for harm, damage or destruction increases with the use of explosive weapons that are considered to have "wide area effects", either because of the scale of the blast that they produce; their inaccuracy; the use of multiple munitions across an area; or a combination of these factors.

1.2.2 What do we mean by populated areas?

Populated areas are considered here to be areas with a concentration of civilians or civilian objects.[2] Populated areas include the environment. Populated areas may be permanent or temporary, such as cities, towns and villages, or sites for refugees and internally displaced people.

Attention to populated areas is imperative given the dynamic and complex interaction between the use of explosive force and damage to or destruction of civilian objects and the environment, including broad and enduring harm, such as disruption to essential public services and contamination of natural resources. Such interaction gives way to distinct primary, secondary and reverberating effects. **As such, the use of explosive weapons in populated areas presents a significant likelihood of indiscriminate effects**.[3]

1.3 Why measure the reverberating effects?

A comprehensive approach to measuring reverberating effects is needed to identify generalized patterns of harm from the use of EWIPA. Analyses based on incident reports can fail to capture the full reverberating effects, and hence underestimate the impacts of conflict. Damage to and destruction of civilian infrastructure – and the associated disruptions to essential services – result in time-lagged, indirect harm and deaths to civilians which extend beyond the immediate impact zone.[4] This indirect harm can potentially outweigh the direct causalities from the initial explosive blast. As such, standardized and time-lagged data are needed to systematically document a more accurate pattern of civilian harm from the use of EWIPA.

Further, measuring the reverberating effects can serve to inform the doctrine, policies and practices of parties to conflict. With respect to the conduct of hostilities, measuring the reverberating effects can allow the parties to better include these considerations under the "reasonable foreseeability" threshold in attacks, thereby ensuring greater compliance with international humanitarian law and notably, respecting the prohibitions against indiscriminate and disproportionate attacks. Further, measuring these reverberating effects can serve to inform both the choice of weapons used and guidance on weapon-specific measures to be taken in populated areas so as to minimize the risks to civilians in urban warfare[5].

Understanding the reverberating effects of EWIPA can also help governments and humanitarian organizations improve the planning and implementation of responses to protracted crises to better anticipate and meet the needs of civilians in populated areas. The sustained provision of essential services is needed to protect people's lives and livelihoods, attain an array of socioeconomic rights, and uphold human dignity. As such, fully understanding the knock-on effects of disruptions to essential services is key to building public sectors capable of continuing to provide such services during emergencies and to better protect civilians in conflict situations.

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2 "'Concentration of civilians' means any concentration of civilians, be it permanent or temporary, such as in inhabited parts of cities, or inhabited towns or villages, or as in camps or columns of refugees or evacuees, or groups of nomads." See Protocol on Prohibitions or Restrictions on the Use of Incendiary Weapons (Protocol III), 10 October 1980, https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/52d68d14de6160e0c12563da005fdb1b/3a507447d94ad829c125641f002d2729?OpenDocument, Article 1(2).

3 See International Committee of the Red Cross , Explosive Weapons in Populated Areas, 2022, https://www.icrc.org/en/explosive-weapons-populated-areas.

4 International Committee of the Red Cross, Explosive Weapons with Wide Area Effects: A Deadly Choice in Populated Areas, ICRC, Geneva, January 2022, https://www.icrc.org/en/document/civilians-protected-against-explosive-weapons p.126

5 Ibid, p.111

Lastly, the reverberating effects of EWIPA hinder progress towards conflict recovery, peacebuilding and the attainment of the SDGs.[6] A standardized framework to measure and understand these complex effects will help policymakers reflect on and analyse further actions needed to advance these global developmental goals.

1.4 How to measure the reverberating effects?

This section presents updated methodological considerations, drawn from lessons learned after the publication of the First Menu of Indicators.[7] These updated methodological considerations aim to deepen the discussion of the impact chain from the use of EWIPA; the spatial and temporal evolution of impacts; their causation and attribution; the interconnectivity of impacts; and the disproportionate gendered impacts.

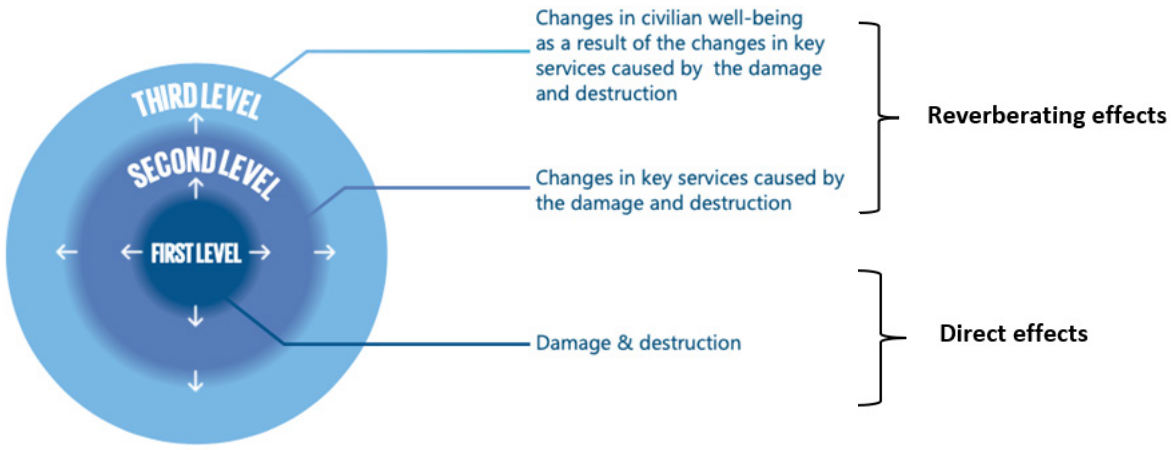
1.4.1 The impact chain

For the purposes of this Menu of Indicators, the impact chain from explosive weapons is divided into first-, second- and third-level impacts:

- The first level is the direct damage and destruction caused by the use of EWIPA.
- The second level refers to changes in key services due to the first-level impacts.
- The third level refers to changes in civilian well-being as a result of the second-level impacts.

In this impact chain, first-level impacts are direct effects, and second- and third-level impacts are reverberating effects (see Figures 1 and 2).

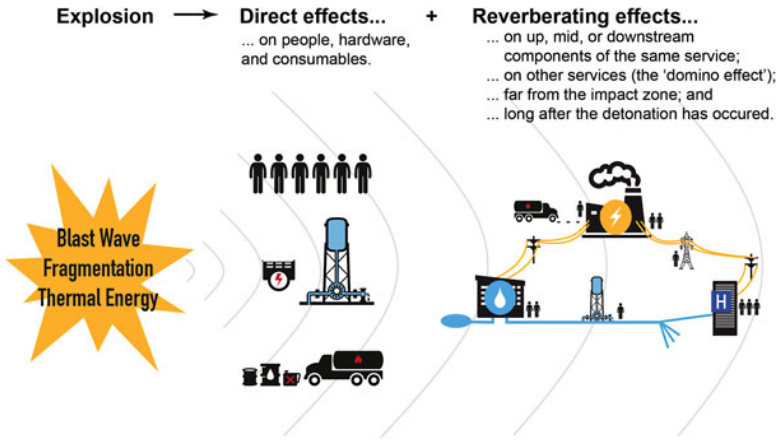
Figure 1: UNIDIR impact chain representing the impact levels from instances of explosive weapon use



6 International Committee of the Red Cross, Explosive Weapons with Wide Area Effects: A Deadly Choice in Populated Areas, ICRC, Geneva, January 2022, https://www.icrc.org/en/document/civilians-protected-against-explosive-weapons p.9,60.

7 C. Wille and A. Malaret Baldo, Menu of Indicators to Measure the Reverberating Effects on Civilians of the Use of Explosive Weapons in Populated Areas, UNIDIR, 2021, https://unidir.org/publication/menu-indicators-measure-reverberating-effects-civilians-use-explosive-weapons-populated.

Figure 2: Sketch showing the sequence of impacts, from the point of detonation to reverberating effects



Source: M. Talhami and M. Zeitoun, "The Impact of Explosive Weapons on Urban Services: Direct and Reverberating Effects across Space and Time", International Review of the Red Cross, vol. 98, no. 1, 2016, https://doi.org/10.1017/S1816383117000157.

The reverberating effects of the use of EWIPA spread out in space and time after the explosive blast through a complex chain of interconnected and interdependent structures. These effects are cumulative; they intersect and interact, spreading into multiple areas. To measure such complex interactions, both Menus of Indicators suggest the first-, second- and third-level impact chain as sequential parameters to capture knock-on effects. This impact chain is designed as a simplified framework to illustrate the sequence of harm from the use EWIPA.

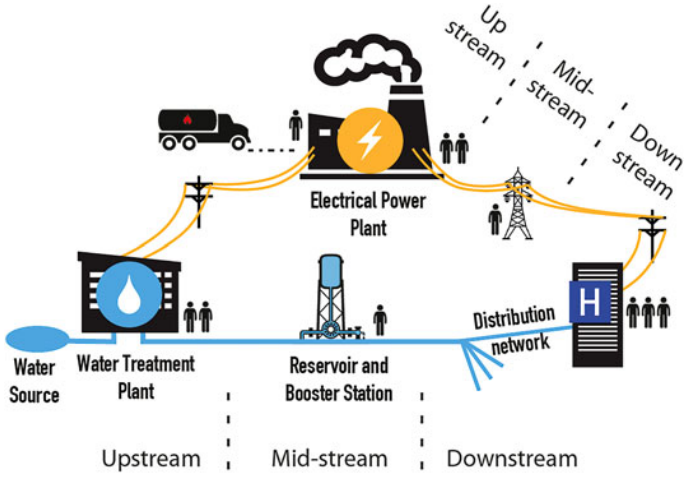
1.4.2 The importance of understanding how impacts spread across space and time

Time and location are critical considerations in documenting the reverberating effects of the use of EWIPA since impacts spread and evolve across space and time. This is because impacts differ across space (i.e., the use of EWIPA affects bordering areas differently) and may only appear or evolve after a certain period of time and may even endure beyond the conflict itself.

Location

Reverberating effects spread beyond the blast zone that surrounds the point of detonation. For example, if a health facility is destroyed, the impacts may be felt not only in the catchment area serviced by that facility, but also in overwhelmed medical facilities in neighbouring jurisdictions as the flow of patients is redirected. In a similar way, while the explosive blast may directly degrade infrastructure or hardware located within the particular blast zone surrounding the point of detonation, the impacts may also be felt in neighbouring areas as disruptions spread upstream, laterally or downstream along components of the same service or hinder the performance of other connected services. These are sometimes referred to as "domino" or "knock-on" effects. On other occasions, after destruction to housing and cumulative damage, populations may be displaced across towns, regions, national borders or continents.

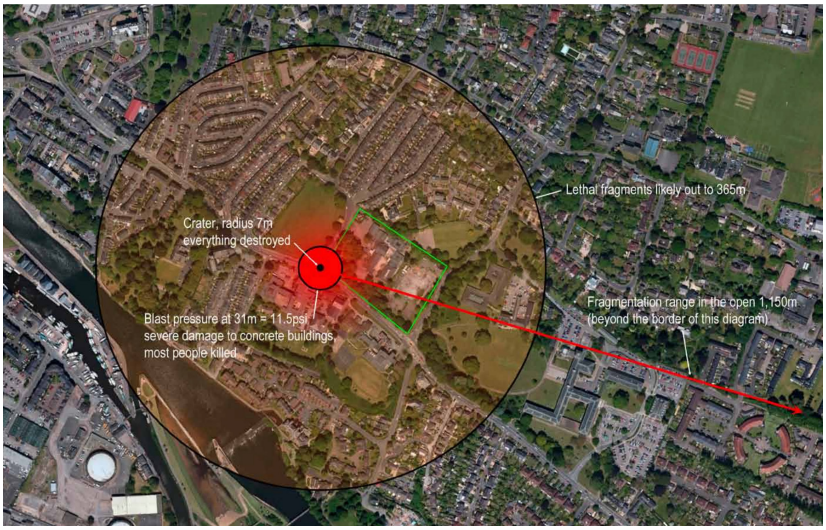
Figure 3: Sketch showing the flow of components within water and electricity services



Source: M. Talhami and M. Zeitoun, "The Impact of Explosive Weapons on Urban Services: Direct and Reverberating Effects across Space and Time", International Review of the Red Cross, vol. 98, no. 1, 2016, https://doi.org/10.1017/S1816383117000157.

Even as reverberating effects have no true spatial limitations, for quantitative research purposes it is important to delineate the geographic area under study in order to quantify observed outcomes around set parameters.[8] **As such, to quantify the different impacts of the reverberating effects across spatial dimensions, one approach is to establish several, ever larger rings as parameters to replicate the indicators; for example, starting from a radius of 10 metres (m) around the actual point of detonation and expanding at a geometric growth rate of 10 for each subsequent radius: 10 m, 100 m, 1,000 m, etc.** Doing so systematically, for each observed indicator, will help map how the reverberating effects spread across space. For an example mapping the effects radii for a 2000-pound (900 kilogram) aircraft bomb, see figure 3.

Figure 4: Image mapping the effects radii for a 2000-pound aircraft bomb



Source: L. Boillot, "The Area Effects of Weapons and the Risk of Civilian Harm", Article 36, November 2021, https://spark.adobe.com/page/Gxon0IN1OMuxl/.

8 This does not mean to imply that reverberating effects are limited by physical borders, follow concentric circles or obey a linear progression.

Time

Reverberating effects also change over time. Specific impacts may be stronger or weaker in the immediate, medium or long terms (and there is no temporal limitation to when these effects truly end). Reverberating effects can also be the result of cumulative damage from explosive weapons. As such, for quantitative research purposes, it is important to clearly define the timeframe for the study. Since each context is unique, "long term" can be defined differently in each scenario. **One approach is to establish several parameters or windows of time to gauge how the reverberating effects continue to be felt or worsen across time periods – for example, at one week after the use of EWIPA, at the one-month mark, at the one-year mark and beyond.** Doing so systematically, for each observed indicator, would yield time-lagged data to understand how impacts evolve over time.

The research can be designed to capture the temporal dynamics of these effects retroactively (as they happened in the past) or prospectively (as they are unravelling and into the future). It is also important to compare observed effects after the use of EWIPA against the same indicators in the same area from before the use of explosive weapons (baseline data) or against a counterfactual scenario. Such a comparison will give researchers the basis to argue that observed consequences are, to some extent, due to the use of explosive weapons.

BOX 2

Time & Space Clarification

From a legal perspective, in line with international humanitarian law, there are no spatial or temporal limitations on reverberating effects of the use of explosive weapons that should be considered in relation to obligations for proportionality and precautions.[9] Rather, the principle is the "reasonable foreseeability" of such effects.

However, for research purposes, especially in quantitative studies that aim to measure these effects, it is important to define the radius under consideration and the temporal windows that will be observed. Therefore, it may be important to note in the discussion of data limitations that the restrictions of the study do not have legal implications regarding the extent to which indirect or reverberating effects must be taken into account in legal assessments. The temporal and spatial limitations of the study are thus only illustrative of the full extent of the damage and destruction.

1.4.3 Causation and attribution

The aim of research on reverberating effects is to attempt to explain what occurred and demonstrate the causal pathway of how it occurred. It is challenging to causally link the use of EWIPA to observed changes in key services (second-level impacts) and changes in civilian well-being (third-level impacts). Nonetheless, it is important to attempt to demonstrate that the observed outcomes are a causal consequence of the use of EWIPA and not due to other plausible variables. To do this, the factors of location and time are key, as they provide some parameters to isolate observed outcomes and map the causal pathways. It is also key to consider the observed outcomes against baseline data on service condition or performance, since within a system there may be redundancies that could allow some nodes to fail without disrupting the service provision; or, conversely, the system may

9 International Committee of the Red Cross, Explosive Weapons with Wide Area Effects: A Deadly Choice in Populated Areas, ICRC, Geneva, January 2022, https://www.icrc.org/en/document/civilians-protected-against-explosive-weapons p.97

have pre-existing shortcomings that were only exacerbated – not caused – by explosive weapons. Similarly, in order to measure changes in service provision it is also important to document "access" to services before the use of EWIPA, in terms of the number of households, businesses or infrastructure facilities served, as opposed to just the counting number of service plants rendered inoperable. Thus, comparing post-shock indicators against pre-shock indicators (baseline data) could provide a "difference" that may reflect observed outcomes attributable to the use of EWIPA. Should a more exhaustive examination be desired, researchers could then compare observed outcomes from the preceding "difference" against a counterfactual or control scenario, allowing for a contrast (or double "difference") between an affected setting against one with prior parallel trends that has largely remained unaffected by the use of EWIPA. This approach is generally referred to as a difference-in-difference estimator.

Additionally, one suggested way to manage uncertainty over attribution is to subdivide indicators into separate categories, depending on how closely they reflect causal pathways, for example:

- **Demonstrable causality**: when there is a clear causal relationship between observed cause and effect, a logical sequence between them, and exclusive dependence. In this case, the observed effect is dependent on the use of explosive weapons as the sole cause.

- **Reasonable association**: when there is a plausible existence of a relationship between the observed cause and effect, but causality and exclusive dependence are not necessarily clear.

- **Merits deeper EWIPA-related research**: when there is a presumption that the use of explosive weapons is "contributing" to observed outcomes, but the relationship between the cause and the effect is not clear, and neither is the existence of a relationship with exclusive dependence. However, the presumed contribution is strong enough that qualitative or anecdotal evidence is worth exploring to shed light on the influence that the use of EWIPA is possibly having on the observed outcomes.[10]

While levels of confidence may help advance EWIPA research by offering guidance to manage uncertainty, attributing observed reverberating effects (second- or third-level impacts) to the use of EWIPA remains a key challenge. As such, it is of utmost importance to combine quantitative and qualitative research, since surveys, observational studies, interviews and testimonies are important study mechanisms in and of themselves and may help contextualize the indicators, shed light on the impact chain and clarify the causal pathways.

1.4.4 Interconnectivity of impacts

While both publications in this series divide indicators between focus area, these areas are interdependent. In effect, infrastructure, health, education, WASH, food security, the environment and the economic well-being of civilians are all interconnected and essential for their survival, well-being and dignity. Impacts from the use of EWIPA in these focus areas intersect, interact and compound. These impacts create pernicious reinforcing loops, affecting civilians and societies in more ways than one. For example, barriers to education for the children of today reduce earning potential for the adults of tomorrow and hamper

10 These categories are intended as food-for-thought and for illustrative purposes. These categories should be understood as an invitation to think about detailed methodological efforts for causal inference. For example, methodologies that risk-adjust for contributing factors can be useful in measuring causal consequences from the use of explosive weapons, but a detailed discussion on risk-adjusting methodologies falls outside the scope of this publication.

gross domestic product. Damage to infrastructure exacerbates food insecurity, which in turn deteriorates the health of civilians and adds pressure to overwhelmed medical facilities. Disruptions to WASH expose populations to health hazards and can aggravate gender-based violence, where the lack of toilets and access to water increases vulnerability to violence, for instance, while defecating in the open or travelling to remote locations to collect water.[11] The compounding nature of these effects is particularly grave in the way it affects forced migrants or displaced people, who in many cases lose shelter, social networks and protection, employment and property, access to health and education, and documentation, and are exposed to additional instances of victimization. To try to document the complexity and compounding nature of these impacts, the indicators below aim to illustrate how the use of EWIPA unleashes a system of negative reinforcing loops for civilians –departing from disruptions to essential services. As such, the indicators have been designed to capture disruptions to three critical elements identified by the International Committee of the Red Cross (ICRC) as necessary to keep essential services functioning: people, infrastructure (i.e. hardware, service plants or installations) and consumables.[12]

The indicators presented in part II can overlap, such as in disruptions to the systems that manage drinking water and non-potable water, or can repeat across different areas, such as energy production and distribution. This is because services in populated areas are interconnected, and the reverberating effects do not manifest as discrete outcomes. On other occasions, potentially interesting indicators were left out, such as higher rates of diet-related non-communicable diseases, because of the challenges in clearly identifying the causal pathway from the use of EWIPA. This is not to suggest, however, that indicators not included in this series of publications are not worth exploring. Finally, it is important to note that psychological impacts manifest across all focus areas. As such, users of this tool are encouraged to make maximal use of the existent literature documenting the psychological impacts of conflict and consider them as cross-cutting effects.

1.4.5 Disproportionate gendered impacts

The direct impacts of the initial blast from the use of explosive weapons vary among men, women, those who identify as non-binary, and boys and girls.[13] For example, men tend to face higher rates of death and injury, and they comprise most direct casualties of EWIPA.[14] However, when explosive weapons are used in or around residential areas and marketplaces, these affect women disproportionately, especially in contexts where they are typically responsible for buying food and other household goods at markets.[15]

The reverberating effects also have differentiated impacts on women, men, those who identify as non-binary, and boys and girls. For example, women face more pronounced health-related risks when health care is disrupted, including higher rates of miscarriages, maternal mortality and post-partum complications.[16] The destruction of schools exposes

11 S. House et al., "Violence, Gender and WASH: A Practitioner's Toolkit", ODI Humanitarian Practice Network, February 2014, https://odihpn.org/magazine/violence-gender-and-wash-a-practitioners%C2%92-toolkit-making-water-sanitation-and-hygiene-safer-through-improved-programming/.

12 See ICRC, Urban Services during Protracted Armed Conflict: A Call for a Better Approach to Assisting Affected People, 2015, https://www.icrc.org/sites/default/files/topic/file_plus_list/4249_urban_services_during_protracted_armed_conflict.pdf.

13 International Committee of the Red Cross, Explosive Weapons with Wide Area Effects: A Deadly Choice in Populated Areas, ICRC, Geneva, January 2022, https://www.icrc.org/en/document/civilians-protected-against-explosive-weapons p.56-58

14 Action on Armed Violence, "Examining the Gendered Impacts of Explosive Weapons: An Overview of Existing Datasets", 2019, https://aoav.org.uk/2019/gendered-impacts-overview-of-existing-datasets/.

15 See Reaching Critical Will, Women and Explosive Weapons, 2014, https://www.reachingcriticalwill.org/images/documents/Publications/WEW.pdf; and UNIDIR, "Gendered Impacts of Explosive Weapons in Populated Areas", Fact sheet, 2021, https://unidir.org/sites/default/files/2021-03/UNIDIR Factsheet - Gendered Impacts of_Explosive Weapons in Populated Areas.pdf.

16 Oxfam, The Gendered Impact of Explosive Weapons Use in Populated Areas in Yemen, November 2019, https://oxfamilibrary.openrepository.com/bitstream/handle/10546/620909/bp-yemen-gendered-impact-explosive-weapons-261119-en.pdf.

girls and boys to distinct risks, such as forced marriages or recruitment into armed groups, respectively.[17] When schools reopen, girls are less likely than boys to return due to security perceptions and gender norms, such as the expectation for them to take on additional caregiving roles for injured family members, making it difficult to pursue an education (for a discussion on the impacts of EWIPA on children, see box below).[18] This exacerbates gender inequalities for years to come. Gender and gender norms are thus crucial factors in understanding the full consequences of the use of EWIPA.

This Menu of Indicators encourages the inclusion and use of gender-sensitive indicators and gender-disaggregated data, in addition to age-disaggregated considerations. These are necessary to document the different gendered and age impacts of the use of EWIPA and provide a more nuanced and refined understanding of the humanitarian consequences. It is thus imperative for ongoing and future research to engage with gender- and age-disaggregated data to contribute to an evidence base of civilian harm that is gender-aware and gender-sensitive. This knowledge will serve to inform appropriate and tailored prevention and protection strategies aimed at mitigating direct and reverberating effects of the use of EWIPA. As such, all the applicable indicators presented below encourage gender and age disaggregation.

BOX 3

Children and EWIPA

Children are particularly vulnerable to the blasts from explosive weapons and suffer the effects disproportionately. They are more likely to die from blast injuries and experience injuries of greater intensity than adults.[19] The blast of an explosive weapon throws children's bodies harder and farther, while their bones – still developing – bend more, increasing the likelihood of long-term disabilities. They are also more likely to experience grave head trauma, torso injuries and severe burns.[20] The reverberating effects of EWIPA similarly show the vulnerabilities and risks to children, who face increased barriers to education and higher rates of malnutrition, WASH-related diseases, psychological trauma and developmental challenges.[21] To enhance the understanding of the impacts of EWIPA on children, this Menu of Indicators encourages research efforts to disaggregate data differentiating the adult population from children, and further breaking it down by age group and gender identification.

17 ICRC, International Humanitarian Law and the Challenges of Contemporary Armed Conflicts – Recommitted to Protection in Armed Conflict on the 70th Anniversary of the Geneva Convention, 2019, https://www.icrc.org/en/document/icrc-report-ihl-and-challenges-contemporary-armed-conflicts, p. 44; and Save the Children, Stop the War on Children: Gender Matters, 2020, https://resourcecentre.savethechildren.net/pdf/ch1413553.pdf, p. 6.

18 See United Nations Assistance Mission for Iraq, The Right to Education in Iraq Part 2: Obstacles to Girl's Education Under ISIL, 2021, https://www.ohchr.org/Documents/Countries/IQ/GirlsRightEducation_EN.pdf, p.56.

19 Save the Children, Blast Injuries: The Impact of Explosive Weapons on Children in Conflict, 2019, https://resourcecentre.savethechildren.net/pdf/ch1325872_2_0.pdf, p. 5.

20 Ibid., pp. 10–11.

21 Ibid., p. 12.

Part II: Indicators

2.1 Why focus on WASH, food security, environmental degradation and economic opportunity?

Part II presents the suggested indicators for the Second Menu of Indicators, consisting of indicators divided into four tables, with one table per focus area: **WASH, food security, environmental degradation and economic opportunity.** These four focus areas were selected because of their importance for survival, well-being and dignity of civilians. In combination with the First Menu of Indicators, these four additional focus areas reflect some of the conditions needed to secure an array of socioeconomic rights and the realization of inclusive and productive societies.

Access to safely managed **water, sanitation and hygiene** is key for public health, education, children's development and the overall functioning of a society. The consequences of unsafe or disrupted WASH can be deadly. For example, in conflict-affected settings, "children are nearly 20 times more likely to die from diarrhoeal disease than from [the direct violence of] the conflict itself".[22] In the same way, access to food is essential for people's survival, development and ability to live a productive life. Yet, conflicts "make food nearly impossible to find or afford".[23] **Food insecurity** leads to malnutrition, destabilization and displacement, which traps societies in a vicious cycle: "where there is conflict there is hunger, and where there is hunger there is often conflict".[24] A similar reinforcing loop happens between conflict and the environment: conflict degrades the environment, and the state of the environment has an impact on local, national, regional and international security. **Environmental degradation** also exposes public health to the spread of vector-borne diseases, increases the contamination and pollution of air, soil and water resources, and hinders the performance of WASH infrastructure. In addition to these compounding impacts and risks, the destruction from armed conflict reverses **economic opportunities** and hinders recovery efforts, at both the individual and societal level. The lack of economic opportunities and obstacles to earning a livelihood represent harmful impacts in and of themselves and aggravate the effects of other impacted areas. Moreover, growing competition over scarce resources increases tensions that may trigger further violence – adding yet another negative reinforcing loop that amplifies undesirable effects.

As with the First Menu of Indicators, the indicators presented in the tables below should be understood as a *starting point* to document the reverberating effects of the use of EWIPA, capture complex and compounding interactions, and map the causal pathways from the use of EWIPA to civilian harm. As such, users are encouraged to consider all relevant indicators and valuable observations, where applicable, even if not included in either Menu of Indicators. Further, while the selected focus areas represent prominent causal pathways, their inclusion should not be understood as a suggestion that these are the most important or the only conduits that lead to reverberating effects and civilian harm.

22 See UNICEF. Water, Sanitation and Hygiene (WASH), 2022, https://www.unicef.org/wash.
23 See World Food Program USA, When War Hits, Hunger Strikes Harder, 2022, https://www.wfpusa.org/drivers-of-hunger/conflict/.
24 Ibid.

2.1.1 How were the indicators developed?

The metrics presented in this publication as indicators originated from a literature review of publicly available sources (cited in the footnotes) and an analysis of the applicable Sustainable Development Goals, including their associated targets and indicators. The indicators from the SDG framework were retrieved verbatim from the guidance document submitted by the responsible United Nations agency to the SDG Indicators Metadata Repository.[25] After the literature review, relevant metrics that captured impacts on civilians' survival, well-being and dignity were selected as indicators to illustrate the types and scale of harms from the use of EWIPA. These indicators are in line with the ICRC's three critical elements necessary to keep essential services functioning: people, infrastructure (i.e. hardware, service plants or installations) and consumables. The indicators selected were then catalogued to capture the sequence of impacts – how the use of EWIPA reverberates across civilian life – using the first-, second- and third-level impact chain as a parameter to illustrate these knock-on effects (see figure 1 above).[26] The order of the indicators, presented in the tables below, is designed to illuminate the causal pathway of how damage and destruction (first-level impacts) cause disruption to key services (second-level impacts), which in turn have implications for civilian well-being (third-level impacts). In other words, the effort to catalogue indicators into first-, second- and third-level impacts is designed to illustrate how harms evolve and escalate by building upon each other.[27]

The indicators were then tailored to the context of the use of EWIPA in armed conflicts. As with the First Menu, the full second draft menu of indicators was subjected to an extensive peer-review process with experts from each of the four focus areas, combining expertise from the United Nations system, the ICRC, academia and non-governmental organizations. The peer-review process also included potential users of this tool, who provided feedback on the applicability and readiness of the metrics to capture the on-the-ground realities of affected populations. Combined with the feedback received from users of the First Menu of Indicators, the peer-review process served as a control mechanism to ensure that the selected indicators are fit for their purpose.

2.1.2 How are the tables of indicators organized?

The indicators presented in the tables below are an attempt to capture and document some of the complex and compounding reverberating effects. The indicators are accompanied by a "Focus" description that explains what is being measured. Similarly, each suggested indicator is also followed by a description of the "Reverberating Effects Chain", which maps the potential sequence of events from the use of EWIPA to the harmful observed outcome.

In addition, some indicators have an option labelled "Alternative Indicator". The alternative indicators are different measures that capture a similar or equivalent outcome to the intended focus of the suggested indicator. Alternative indicators are included when two or more ways to capture an outcome are valid or when the suggested indicator presents significant data or methodological limitations.

25 United Nations, Department of Economic and Social Affairs, Statistics Division, "SDG Indicators: Metadata Repository", https://unstats.un.org/sdgs/metadata.

26 It is important to note that, in this impact chain disaggregation, first-level impacts are primary or secondary effects, and second- and third-level impacts are reverberating effects.

27 For example, under WASH, Indicator 1.A captures the number or proportion of drinking water infrastructure facilities rendered inoperable or degraded, then 2.A captures the number or proportion of drinking-water related services disrupted, including water treatment, purification and desalination installations, and then 3.A captures the proportion of the population using safely managed drinking water services (as put forward by SDG indicator 6.1.1).

On other occasions, two suggested indicators for one focus are included, such as Indicators 2.A.I and 2.A.II for WASH. The inclusion of two suggested indicators for a focus differs from the alternative indicator formulation in that these capture slightly different outcomes (although still aligned to the overall focus or spirit of what is being measured), whereas the alternative indicators are practically equivalent. Furthermore, since energy is a cross-cutting factor for the functioning of civilian structures, Indicator 1.E, which measures the number or proportion of energy infrastructure facilities rendered inoperable or degraded, is repeated as a suggested indicator in each of the four focus areas. Finally, one suggested indicator – Indicator 2.A for the environmental degradation focus area – has "Sub-indicators". The sub-indicators are simply more precise data points than the suggested indicator. These are included to have a more comprehensive understanding of the observed outcome.

WATER, SANITATI

	Suggested Indicator	Focus (What are t
1st level: damage and destruction caused by the use of EWIPA	**1.A** Number or proportion of drinking water infrastructure rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery by the use of EWIPA	The extent of the damage an such as dams, wells, tanks, p purification, and desalination delivery.
	1.B Number or proportion of solid waste and wastewater infrastructure rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery by the use of EWIPA	The extent of the damage an waste management centres, including non-potable water
	1.C Number or proportion of water, sanitation and electrical workers killed, injured, or displaced by the use of EWIPA, disaggregated by gender and profession	Death, injury, or displacemen
	1.D Number or proportion of stocks and warehouses of consumables used to treat drinking water and wastewater damaged or destroyed, or production facilities of consumables used to treat drinking water and wastewater and keep installations functioning damaged or destroyed by the use of EWIPA	Damage and destruction of s consumables used to treat d treatment chemicals, oil) nec wastewater and maintain ins
	1.E Number or proportion of energy infrastructure rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery by the use of EWIPA	The extent of damage and de power generating plants, sub lines, and gas and oil pipelin
2nd level: changes in key services from the damage and destruction caused by the use of EWIPA	**2.A.I** Number or proportion of drinking-water related services disrupted, totally or partially, including water treatment, purification, and desalination installations compared to pre-conflict levels or counterfactual	Reduced access to clean an destruction by explosive wea
	2.A.II Proportion of housing units and shelters regularly receiving safely managed drinking water services, compares to pre-conflict levels of counterfactual	
	2.B Proportion of domestic and industrial wastewater flows safely treated (SDG Indicator 6.3.1), compared to pre-conflict levels or counterfactual	Disruptions to sanitation serv explosive weapons to the sa non-potable water distributio
	2.C Proportion of electrical grid services with total or partial service-related disruptions, compared to pre-conflict levels or counterfactual **Alternative Indicator:** Number of hours per day with electricity, compared to pre-conflict levels or counterfactual	Shortages of electricity need sanitation services functioni
	2.D Shortages of consumables used to treat drinking water and wastewater due to the damage or destruction caused by EWIPA compared to pre-conflict levels or counterfactual	Shortages of consumables (c treat drinking water and was
	2.E Number or proportion of WASH-related campaigns and interventions carried out, compared to pre-conflict levels or counterfactual	Disruption to WASH-related vector control (e.g., bed nets campaigns), due to insecurit destroyed consumables.
	2.F Number or proportion of health facilities with total or partial water-related service disruptions, compared to pre-conflict levels or counterfactual	The extent of disruptions to h damage and destruction by e
	2.G Number or proportion of schools with total or partial water-related service disruptions, compared to pre-conflict levels or counterfactual	The extent of the disruption o damage and destruction by e

28 UNICEF, Water under Fire, Volume 3, Attacks on Water and Sanitation Services in Armed Conflict and Their Impacts on Children, 2021, https://www.unicef.org/reports/
29 ICRC, "Joint UN/ICRC Op-Ed on Explosive Weapons in Populated Areas and COVID-19", 27 May 2020, https://www.icrc.org/en/document/joint-unicrc-op-ed-explosiv
30 UNICEF, Water under Fire, Volume 3, Attacks on Water and Sanitation Services in Armed Conflict and Their Impacts on Children, 2021, https://www.unicef.org/reports/

ON AND HYGIENE

the indicators trying to measure)	Reverberating Effect Chain
d destruction to drinking water infrastructure, oumps, stations, pipes/pipelines, treatment plants, n plants/installations needed to maintain service	Damage and destruction of water infrastructure affects the services provided and impacts the provision and quality of drinking water.[28]
d destruction to sanitation infrastructure, such as sewer conduits, and black water treatment plants, distribution networks.	Damage and destruction of sanitation infrastructure hinders the provision of sound solid waste management and safe non-potable water.
nt of water and sanitation workers.	Death, injury, or displacement of water and sanitation personnel reduces the number of trained/skilled staff and thereby affects the provision and maintenance of services.
stocks, warehouses, and production facilities of rinking water and wastewater (chlorine, filters, cessary for proper treatment of drinking water and stallations functioning.	Damage and destruction of stocks, warehouses, and production facilities of consumables hinder supply chains, possibly creating shortages of drinking water.
estruction to the energy infrastructure, including ostations, transformers, electricity transmission es.	Damage and destruction to the energy infrastructure, which is interconnected to the larger urban system and required for its proper functioning, hinders the provision of other WASH-related services. (Indicator 1.E will be repeated throughout the four focus areas)
d safe drinking water, caused by damage and apons to the drinking water infrastructure.	Lack of access to clean water affects public health and living standards.
vices, caused by damage and destruction by nitation infrastructure. Sanitation services include on networks.	Disruption of sanitation services affects public health and living standards.
led to keep water, waste management, and ng.	Shortages or disruptions to the energy supply will impact the functioning of water, sanitation and waste management systems which usually require power to operate at capacity.
chlorine, filters, treatment chemicals, oil) used to stewater and maintain installations functioning.	Shortages in consumables affect the quality and treatment of water-related services, which affect public health and living standards.
interventions focused on malaria and dengue distribution and indoor residual spraying y or disruptions caused by explosive weapons or	Disrupted WASH interventions have knock-on effects on public health and engender long-term societal losses. Contaminated water, debris and garbage accumulation, and poor sanitation can exacerbate the spread of vector-borne diseases such as malaria and dengue, hence the inclusion of vector control measures as a WASH-interventions.
health care due to water shortages caused by explosive weapons.	Damage and disruption of water infrastructure reduces hospitals' ability to provide quality medical care.[29]
of education due to water shortages caused by explosive weapons.	Damage and disruption of water infrastructure interferes with enrolment, attendance, and success in schools, especially for girls managing menstrual hygiene.[30]

water-under-fire-volume-3, p. 15.
ve-weapons-populated-areas-and-covid-19
water-under-fire-volume-3, pp.29–30.

WATER, SANITATI

3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	Focus (What are t
3.A Proportion of population using safely managed drinking water services (SDG indicator 6.1.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactualAlternative Indicator: Proportion of population falling below WHO water requirement (50l per capita, per day) for meeting basic consumption and health concerns, compared to pre-conflict levels or counterfactual, disaggregated by age and gender	Reduced consumption of saf
3.B.I Proportion of general population experiencing WASH-related diseases, disagated by age and gender, compared to pre-conflict levels or counterfactual **Alternative indicator I:** Number of outbreaks of water-borne, water-washed, or diarrheal diseases, compared to pre-conflict levels or counterfactual, disaggregated by age	Health outcomes (diarrheal c contaminated water, unsafe and other communicable dis attention to children under 5
3.B.II Mortality rate attributed to unsafe water, unsafe sanitation, and lack of hygiene (SDG Indicator 3.9.2), disaggregated by age and gender, compared to pre-conflict levels or counterfactual **Alternative indicator II:** Number of deaths related to water-borne, water-washed, or diarrheal diseases, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	
3.C.I Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water (SDG indicators 6.2.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Poor hygiene and waste-mar waste management services
3.C.II Proportion of population taking part in open burning of waste, compared to pre-conflict levels or counterfactual	
3.D Proportion of (a) adult population (persons over 18 years of age) and (b) children (under 18 years of age) experiencing malnutrition due to poor water or disruptions to sanitation and hygiene practices, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Rates of malnutrition, among inadequate sanitation, unsaf
3.E Number or proportion of population infected or killed by vector-borne diseases, disaggregated by age and gender, compared to pre-conflict levels or counterfactual **Alternative indicator:** Number of people infected by dengue or malaria, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Prevalence of vector-borne d water and waste manageme fever and malaria due to rubl destruction and disrupted W
3.F Number or proportion of children in school, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Loss of education potential fo non-potable running water, s

31 Ibid., p. 32.

32 A. Prüss-Üstün et al., Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Better Health, 2008, World Health Organiza FAF?sequence=1.

33 UNICEF, Water under Fire, Volume 3, Attacks on Water and Sanitation Services in Armed Conflict and Their Impacts on Children, 2021, https://www.unicef.org/reports/

ON AND HYGIENE

the indicators trying to measure)	Reverberating Effect Chain
ely managed drinking water.	Lack of safely managed drinking water is associated with inadequate sanitation, poor hygiene and lower public health and living standards.
diseases, in particular) attributed to unsafe or sanitation infrastructure, faecal-oral transmission, eases. This indicator ought to pay particular years of age.	Unsafe or contaminated water or unsafe sanitation and hygiene practices cause poor health outcomes such as water-borne, water-washed and diarrheal diseases.[31] (same as 3.C in Environmental Degradation) Unsafe and inadequate hygiene and waste management practices represent a public health hazard and diminish living standards.
nagement practices caused by disrupted water and due to explosive weapons use.	Unsafe drinking water, inadequate sanitation and poor hygiene are found to increase malnutrition, especially among children under 5 and pregnant women. Unsafe and inadequate hygiene and waste management practices represent a public health hazard and diminish living standards.
the adult population and children, caused by e drinking water and poor hygiene.	Unsafe drinking water, inadequate sanitation and poor hygiene are found to increase malnutrition, especially among children under 5 and pregnant women.[32]
diseases (mosquitos, ticks) due to improper nt. For example, increased prevalence of dengue ble and water accumulation from damage and ASH services caused by explosive weapons.	Higher rates of insects and flies from improper waste management can cause communicable disease outbreaks. Dengue vector breeding sites multiply due to small pools of water created by rubble caused by damage and destruction from the use of explosive weapons. Disruption of WASH interventions, which include vector-control activities can also increase the incidence of malaria and dengue. (same as 3C in Environmental Degradation)
or children due to due to disrupted access to afe drinking water, and toilets.	Disruptions of water in schools may impede children, especially girls, from attending school, owing to difficulties in managing menstrual hygiene. Children may also become responsible for collecting water when the household access to water is disrupted.[33]

tion, http://apps.who.int/iris/bitstream/handle/10665/43840/9789241596435_eng.pdf;jsessionid=6C2F75A220BBF335D5EC8D46F26CF-

water-under-fire-volume-3, pp. 29, 32.

FOOD SE

	Suggested Indicator	Focus (What are t
1st level: damage and destruction caused by the use of EWIPA	**1.A** Number or proportion of food production facilities and distribution networks rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	The extent of the damage an including production infrastr appropriate) and the distribu warehouses, roads, trucks, c
	1.B Number or proportion of markets (informal and formal) rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	The extent of damage and de from producers and distribut
	1.C Number or proportion of agricultural workers, farmers, food industry or delivery workers killed, injured or displaced by the use of EWIPA, disaggregated by age, gender and profession	Death, injury and displaceme workers from explosive weap
	1.D Number or proportion of stocks and warehouses of consumables used to produce, distribute and store food damaged or destroyed, or production facilities of consumables used to produce, distribute and store food damaged or destroyed	Damage to and destruction o of consumables (e.g. fertilize produce, distribute and store
	1.E Number or proportion of energy infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	The extent of damage and de power-generating plants, sub lines, and gas and oil pipelin
2nd level: changes in key services from the damage and destruction caused by the use of EWIPA	**2.A** Proportion of agricultural area under cultivation (SDG indicator 2.4.1), compared to pre-conflict levels or counterfactual **Alternative indicator:** Levels of agricultural yield, compared to pre-conflict levels or counterfactual	Decrease in domestic agricu destruction by explosive wea (ERW), unexploded ordnance
	2.B Changes in price and availability of the basic food basket, compared to pre-conflict levels or counterfactual	Access to basic food staples destruction by explosive wea
	2.C Increases or decreases in domestic consumption based on food imports and foreign aid, compared to pre-conflict levels or counterfactual	Depending on the context, in aid due to damage and destr UXO, mines or IEDs can be il food insecurity.
	2.D Shortages of essential consumables used in the production, distribution and storage of food, compared to pre-conflict levels or counterfactual	Shortages of consumables (f for the production, distributio

34 A.A. Berhe, "The Contribution of Landmines to Land Degradation", Land Degradation and Development, vol. 18, 2006, https://doi.org/10.1002/ldr.754, p. 9; and V. H lence-on-child-nutrition/.

the indicators trying to measure)	Reverberating Effect Chain
d destruction to key points in the food supply chain, ucture (agricultural sites, farms and fisheries, when tion network (ports, airports, boats, rail transport, ranes, storage and processing sites).	Damage and destruction of food production, processing and storage sites and the distribution network disrupts the supply chain thereby affecting food intake patterns and potentially leading to food insecurity.
estruction to sites where consumers access food ors – i.e. markets and trading posts.	Damage to and destruction of markets affects food access patterns and potentially leads to food insecurity.
ent of essential food industry and other related pons.	Death, injury and displacement of farmers, food industry and delivery workers hinder food production and related services.
f stocks, warehouses, and production facilities r, seeds, gas, diesel, repair parts) necessary to food.	Damage to and destruction of stocks, warehouses and production facilities of consumables hinder supply chains, possibly creating shortages.
estruction to the energy infrastructure, including bstations, transformers, electricity transmission es.	Damage to and destruction of the energy infrastructure, which is interconnected to the larger urban system and required for its proper functioning, hinders the production, storage and distribution of food and related services. (Indicator 1.E throughout)
ltural production caused by damage and apons or presence of explosive remnants of war e (UXO), mines or IEDs.	Contamination and risks from ERW, UXO, mines or IEDs can hinder the cultivation of productive lands; in addition, the use of explosive weapons can degrade land through loss of biodiversity, deforestation, micro-relief disruption and over-cultivation of alternative areas –leading to reductions in agricultural productivity.[34]
and change in price caused by damage and apons and presence of ERW, UXO, mines or IEDs.	Shortages of basic food staples caused by disruptions to local food production and distribution networks lead to food insecurity and rising prices.
creases or decreases in food imports and foreign uction by explosive weapons and presence of ERW, lustrative of looming, present or future levels of	Depending on the affected context, increases or decreases in food imports and foreign aid could represent reduced availability of food for the community: in settings where reliance on food imports and foreign aid is already high, damage and destruction to ports, airports and other avenues for food imports may decrease the availability of foods, thereby increasing food insecurity; in contrast, in settings where reliance on food imports and foreign aid is generally low, a sudden influx could be a reaction to domestic shortages or damage and destruction to local production capacities.
ertilizer, seeds, gas, diesel, repair parts) necessary on and storage of food.	Shortages in consumables (due to production or supply disruptions or destruction to warehouses or stocks) hinder the ability to produce food locally.

Hubbard, "The Impact of Explosive Violence on Child Nutrition", AOAV, 13 January 2021, https://aoav.org.uk/2021/the-impact-of-explosive-vio-

FOOD SE

3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	Focus (What are t
3.A Prevalence of undernourishment (SDG Indicator 2.1.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Rates of malnutrition among and age.
3.B Prevalence of (a) moderate and (b) severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) (SDG indicator 2.1.2), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Reduced access to safe, nut
3.C Proportion of population who receive the minimum food energy requirements (2,100 kcal per person per day) and recommended daily micronutrient intake, according to Sphere guidance, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Reduced food consumption f
3.D Prevalence of malnutrition (weight for height more than two standard deviations from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight) (SDG Indicator 2.2.2), compared to pre-conflict levels or counterfactual **Alternative Indicator:** Proportion of children in the red zone of UNICEF's Middle Upper Arm Circumference (MUAC) tape, compared to pre-conflict levels or counterfactual	Rates of malnutrition among
3.E Prevalence of stunting (height for age more than one standard deviation below the median WHO Child Growth Standards) among children under 5 years of age (SDG Indicator 2.2.1), compared to pre-conflict levels or counterfactual	Rates of stunting among chil
3.F Number or proportion of children in school, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Loss of education potential f

35 Save the Children, Food for Thought: Tackling Child Malnutrition to Unlock Potential and Boost Prosperity, 2013, https://aoav.org.uk/2021/the-impact-of-explosive-vio

ECURITY

the indicators trying to measure)	Reverberating Effect Chain
the general population, disaggregated by gender	Sustained disruption in the provision of safe and nutritious food may result in undernourishment among the general population.
ritious food for the general population.	Sustained disruption in the access to safe and nutritious food creates food insecurity among the general population, diminishing public health and living standards.
or the general population.	Sustained disruption in the consumption of food results in fewer and smaller meals and inappropriate calorie intake, diminishing public health and living standards.
children under 5 years of age.	Disruption in the provision of safe and nutritious food results in malnutrition among children.
dren under 5 years of age.	Disruption in the provision of safe and nutritious food results in stunting among children.
or children under 18 years of age.	Undernutrition and malnutrition are associated with lower academic performance, schooling delays, cognitive impairments and lower future earning potential.[35]

blence-on-child-nutrition/.

ENVIRONMENTA

1st level: damage and destruction caused by the use of EWIPA

Suggested Indicator	Focus (What are t
1.A Number or proportion of industrial complexes and fuel infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	The extent of damage and de extent of severe pollution fro
1.B Number or proportion of housing units, buildings and other civilian objects rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity	The extent of damage and de civilian objects and the ensu
1.C.I Tons of debris generated	Debris, rubble and hazardous civilian objects.
1.C.II Estimate of hazardous waste, given as proportion or volume of debris	
1.D Number or proportion of solid waste, wastewater and sanitation infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	The extent of damage and de waste-management centres treatment plants, including n
1.E Number or proportion of energy infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	The extent of damage and de power-generating plants, sub lines, and gas and oil pipelin
1.F Number and duration of fires, including nature of the material on fire	Destruction from fires and se

36 UNEP, Environmental Legacy of Explosive Weapons in Populated Areas, 2021, https://www.unep.org/news-and-stories/story/environmental-legacy-explosive-weapo

L DEGRADATION

the indicators trying to measure)	Reverberating Effect Chain
estruction to industrial complexes and the ensuing m hazardous chemicals.	Damage to and destruction of industrial complexes and fuel infrastructure increases the risk of environmental harm and health impacts through the contamination of soils, water resources and the wider natural ecosystem; there is an acute risk of exposure to hazardous chemicals present in heavy, medium or light industrial facilities located in or near urban areas when explosive weapons are used against industrial complexes.[36]
estruction to housing units, shelters and other ing extent of the pollution caused by their levelling.	Damage to and destruction of housing, shelters and civilian objects spurs displacement, engenders a hazardous human environment, and creates large amounts of debris and rubble.
s waste generated by damage and destruction to	Damage to and destruction of civilian objects create dust, debris and rubble, which may be hazardous or toxic, have an impact on human health and have additional environmental consequences as well as complicate the identification and removal of ERW.
estruction to sanitation infrastructure, such as and networks, sewer conduits, and black water on-potable water distribution networks.	Damage to and destruction of sanitation infrastructure results in pollution incidents, uncontrolled dumping or open burning of waste, or raw sewage flowing into waterways and the urban environment, which risks environmental contamination and human health impacts. (same as Indicator 1.B in WASH)
estruction to the energy infrastructure, including bstations, transformers, electricity transmission es.	Damage to and destruction of the energy infrastructure, which is interconnected to the larger urban system and required for its proper functioning, may result in disruption to waste management and treatment and fuel and energy production, which risks environmental contamination and human health impacts. (Indicator 1.E throughout)
evere decline in air quality.	Fires cause additional infrastructural damage, spread across different areas, expose civilians to burns and represent a health hazard given the inhalation of air pollutants.

ons-populated-areas.

ENVIRONMENTA

2nd level: changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	Focus (What are t
2.A Proportion of agricultural area under cultivation (SDG indicator 2.4.1), compared to pre-conflict levels or counterfactual **Alternative indicator:** Levels of agricultural yield, compared to pre-conflict levels or counterfactual	Land degradation has an imp natural habitats, biodiversity
2.B.I Number or proportion of water bodies at risk of contamination or with evidence of being polluted, compared to pre-conflict levels or counterfactual	Damage, contamination or p
2.B.II Proportion of domestic and industrial wastewater flows safely treated, (SDG Indicator 6.3.1) compared to pre-conflict levels or counterfactual	
2.C Annual mean levels of fine particulate matter in cities (population weighted) (SDG Indicator 11.6.2), compared to pre-conflict levels or counterfactual	Increased air pollution and c
2.D Proportion of hazardous waste treated, by type of treatment (SDG Indicator 12.4.2.b), compared to pre-conflict levels or counterfactual **Alternative Indicator:** Changes in the capacity of waste infrastructure to manage, treat and dispose of hazardous waste	The extent of disruptions to h to the overall functioning of t
2.E.I Municipal solid waste collected and managed in controlled facilities as a proportion of total municipal waste generated, by cities (SDG Indicator 11.6.1), compared to pre-conflict levels or counterfactual **Alternative Indicator:** Changes in the capacity of waste infrastructure to manage, treat and dispose of solid waste	The extent of disruptions to v
2.E II Proportion of the population taking part in uncontrolled dumping or open burning of waste, compared to pre-conflict levels or counterfactual	

37 A A.A. Berhe, "The Contribution of Landmines to Land Degradation", Land Degradation and Development, vol. 18, 2006, https://doi.org/10.1002/ldr.754, p. 9; and V. Hubb trition/.

38 UN Water, Towards a World Wide Assessment of Freshwater Quality, November 2016, https://www.unwater.org/app/uploads/2017/05/UN_Water_Analytical_Brief_20

39 D. Weir, "How Does War Damage the Environment?", Conflict and Environment Observatory, 2020, https://ceobs.org/how-does-war-damage-the-environment/.

40 Pax for Peace, War, Waste and Polluted Pastures: An Explorative Environmental Study of the Impact of the Conflict in north-eastern Syria, 2021, https://paxforpeace.nl/m

L DEGRADATION

the indicators trying to measure)	Reverberating Effect Chain
pact on fertility and quality of soils and damages hotspots and protected areas.	Land degradation leads to loss of biodiversity, deforestation, micro-relief disruption, and over-cultivation of alternative areas or off-limits due to risks from ERW, mines or IEDs; land could also be degraded from the lack of services provided to forcibly displaced populations.[37]
ollution of water sources.	Damage, contamination or pollution of water sources reduces the available water supply and contaminates soil and food sources via groundwater pollution; contaminated water sources may also be linked to loss of wildlife habitat and biodiversity and increase diseases or death, both within and outside an area affected by explosive weapons use; overextraction of gravel from riverbeds and quarries for reconstruction materials could have an impact on water sources, including water purification and ground water levels.[38]
ontamination due to debris and rubble.	Debris and rubble in an area affected by the use of explosive weapons, as well as the use of alternative sources of fuel, increase air pollution and lead to poor health outcomes.[39]
hazardous waste treatment efforts and disruptions he services.	Disrupted treatment or disruptions in the capacity to treat hazardous waste due to damage and destruction of infrastructure by explosive weapons results in the unsafe storage, handling and accumulation of hazardous waste, resulting in environmental harm and impacts on human health.
waste-management services.	Poor solid waste management services and the proliferation of open sewers (and open waste burning) owing to damage and destruction of infrastructure caused by explosive weapons leads to environmental damage (contaminating land, water and air) and poor health outcomes; for example, unsafe landfills with solid waste can contaminate groundwater from leachates.[40]

oard, "The Impact of Explosive Violence on Child Nutrition", AOAV, 13 January 2021, https://aoav.org.uk/2021/the-impact-of-explosive-violence-on-child-nu-

0161111_02_web_pages.pdf p.11-15

nedia/download/PAX_WWPP_v2.2.pdf, p. 13.

3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	Focus (What are t
3.A Number or proportion of population infected or killed by vector-borne diseases, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Prevalence of vector-borne d filariasis, etc.) due to improp
3.B Number or proportion of population killed or infected by zoonotic diseases, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Prevalence of zoonotic disea
3.C Mortality rate attributed to unsafe water, unsafe sanitation or lack of hygiene (SDG Indicator 3.9.2), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Death and poisoning from co ingestion of hazardous mate
3.D Mortality rate attributed to household and ambient air pollution (SDG Indicator 3.9.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactual **Alternative Indicator:** Number or proportion of respiratory illnesses reported in the local population due to air quality, disaggregated by age and gender, compared to pre-conflict levels or counterfactual (both from exposure to short term, highly polluting incidents or longer-term exposure and decline in ambient air quality)	Public health problems arisin quality due to debris, rubble proliferation of toxic chemica damaged or destroyed.
3.E Number or proportion of population experiencing heavy-metal poisoning, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Public health problems arisin metals after damage and des

41 Ibid., p. 16.
42 J. Dathan, The Broken Land: The Environmental Consequences of Explosive Weapons Use, AOAV, 2020, https://aoav.org.uk/wp-content/uploads/2020/04/The-Broke

L DEGRADATION

the indicators trying to measure)	Reverberating Effect Chain
diseases (malaria, dengue, schistosomiasis, er water and waste management.	Higher prevalence of insects and flies from improper waste management can cause outbreaks of communicable diseases;[41] dengue vector breeding sites multiply due to small pools of water created by rubble caused by explosive weapons; disruption of WASH interventions, which include vector-control activities, can also increase the incidence of malaria and dengue. (same as Indicator 3.E in WASH)
ases due to higher number of pests and animals.	Higher rates of pests and invasive species in urban areas increase the likelihood of humans becoming infected with zoonotic diseases or bitten by snakes or scorpions.[42]
ntaminated water sources or exposure to and rials and waste.	Damage and destruction to civilian objects, debris and rubble, as well as ERWs, can cause chemicals to leach into water sources, which may be poisonous. (same as Indicator 3.B.II in WASH)
g from increased pollution and a decline in air and fires due to uncontrolled burning of waste, als and other carcinogens found in buildings	Increased air pollution can cause respiratory illnesses, cancers and other health-related problems.
g from increased environmental pollution with struction to industrial complexes.	Damage to and destruction of industrial complexes and fuel infrastructure increases risk of environmental harm and health impacts through the contamination of soils, water resources and the wider natural ecosystem; there is an acute risk of exposure to hazardous chemicals present in heavy, medium or light industrial facilities located in or near urban areas when explosive weapons are used against industrial complexes, potentially leading to heavy-metal poisoning.

n-Land-v4.pdf, pp. 20–23.

ECONOMIC O

	Suggested Indicator	Focus (What are t
1st level: damage and destruction caused by the use of EWIPA	**1.A** Number or proportion of infrastructure facilities necessary to produce goods, for trade and for the service economy rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	The extent of damage and de communications, Internet an for trade and to keep the ser
	1.B Number or proportion of factories, businesses and enterprises rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	The extent of damage and de
	1.C Number or proportion of working-age population (16–64) that are killed, injured or displaced, disaggregated by gender and profession	Death, injury or displacemen economic sector.
	1.D Number or proportion of stocks and warehouses of consumables used to produce goods, for trade and in the service economy damaged or destroyed, or production facilities used to produce consumables used to produce goods, for trade and in the service economy damaged or destroyed	Damage and destruction of s consumables used to produc
	1.E Number or proportion of energy infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	The extent of damage and de power-generating plants, sub lines, and gas and oil pipelin
	1.F Number or proportion of cash-related service centres rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery **Alternative Indicator:** (a) Number of commercial bank branches per 100,000 adults and (b) number of ATMs per 100,000 adults (SDG Indicator 8.10.1) damaged or destroyed	The extent of damage and de for transactions, including AT cashing remittances and cas
2nd level: changes in key services from the damage and destruction caused by the use of EWIPA	**2.A** Number or proportion of service-related disruptions (total or partial) in the production of goods, trade and the service economy, compared to pre-conflict levels or counterfactual	The extent of disruptions of s keep the service economy ru
	2.B Change in the consumer price index (CPI), compared to pre-conflict levels or counterfactual **Alternative Indicator:** Inflation in selected goods and services, compared to pre-conflict levels or counterfactual	Changes in prices of goods a measured as either the aver services or inflationary chan
	2.C Self-reported expenses incurred by factories and businesses, compared to pre-conflict levels or counterfactual	Added costs or difficulties as
	2.D Shortages of essential consumables needed to produce goods, in trade and for the service economy, compared to pre-conflict levels or counterfactual	Shortages of consumables (o of the economy.
	2.E Proportion of domestic budget funded by domestic taxes (SDG Indicator 17.1.2), compared to pre-conflict levels or counterfactual **Alternative Indicator:** Proportion of government services and programmes financed or dependent on international humanitarian aid and development assistance, compared to pre-conflict levels or counterfactual	Decrease in government tax

PPORTUNITY

the indicators trying to measure)	Reverberating Effect Chain
estruction of infrastructure, such as d transport networks necessary to produce goods, vice economy functioning.	Damage to and destruction of infrastructure impedes the production of goods, trade and the service economy, in particular disruptions to the supply chain.
estruction to factories, businesses and enterprises.	Factories, businesses and enterprises provide goods, services and employment, which are important for economic activity.
t of working-age population and the affected	Death, injury or displacement of working-age people mean that they are unable to work, thereby creating labour shortages and disruptions to the economy (or sectors in the economy).
tocks, warehouses and production facilities of e goods, in trade and for the service economy.	Damage and destruction of stocks, warehouses and production facilities of consumables hinder supply chains, possibly creating shortages.
estruction to the energy infrastructure, including bstations, transformers, electricity transmission es.	Damage to and destruction of the energy infrastructure, which is interconnected to the larger urban system and required for its proper functioning, hinders the production of goods, trade and the functioning of the service economy. (Indicator 1.E throughout)
estruction to cash-related service centres needed TMs, banks, currency exchange posts, centres for sh reserves.	Damage to and destruction of infrastructure necessary for everyday economic activity impedes transactions, reduces confidence, and can cause bank runs and economic slowdowns.
services necessary to produce goods, trade and nning.	An economy is reliant on the provision of certain essential services in order for businesses to function and to carry out commercial transactions.
nd services or local currency depreciation, age of prices of a basket of consumer goods and ges in selected goods and services.	Increased prices of basic commodities can be caused by shortages caused by disruptions to local production, manufacturing and trade or due to the depreciation in the store-of-value of the local currency.
ssociated with doing business in affected areas.	Areas affected by explosive weapons experience higher costs of doing businesses, affecting income, employment opportunities and tax revenue.
il, gas, diesel, coal) necessary for the functioning	Shortages in consumables (due to production or supply disruptions or destruction of warehouses or stocks) hinder the ability of the economy to function.
revenue due to a local economic slowdown.	Collapsed financial systems and closed businesses mean that less tax revenue is collected, thereby possibly reducing the provision of public goods, services and social programmes or increasing dependency on international humanitarian aid and development assistance.

ECONOMIC O

3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	Focus (What are t
3.A Proportion of population living below the national poverty line (SDG indicator 1.2.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactual **Alternative Indicator I:** Proportion of population living in poverty in all its dimensions according to national definitions (SDG Indicator 1.2.2), disaggregated by age and gender, compared to pre-conflict levels or counterfactual **Alternative Indicator II:** Proportion of population dependent on in-kind assistance or cash and voucher assistance (CVA), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Levels of poverty.
3.B Proportion of population covered by social protection systems, disaggregated by gender, and distinguishing children, employment, older persons, persons with disabilities, pregnant women, new-borns, work-injury victims, and the poor and the vulnerable (SDG Indicator 1.3.1), compared to pre-conflict levels or counterfactual	Effective coverage of public
3.C Proportion of population experiencing catastrophic health expenditure, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Increased health-related exp
3.D Proportion of total government spending on essential services (education, health, and social protection) (SDG Indicator 1.a.2), compared to pre-conflict levels or counterfactual Alternative Indicator: Reductions to public spending and social programmes, compared to pre-conflict levels or counterfactual	Levels of public spending on programmes.
3.E Unemployment and underemployment rates, disaggregated by gender, age and state of disability (SDG Indicator 8.5.2), compared to pre-conflict levels or counterfactual	Rates of unemployment or ur
3.F Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation and (b) who perceive their rights to land as secure, by gender and by type of tenure (SDG Indicator 1.4.2), compared to pre-conflict levels or counterfactual	Loss or contestation of land t
3.G Proportion of informal employment in total employment, by sector and gender (SDG indicator 8.3.1), compared to pre-conflict levels or counterfactual	Increased levels of engagem

PPORTUNITY

the indicators trying to measure)	Reverberating Effect Chain
	People living within areas affected by the use of explosive weapons are more likely to experience poverty due to fewer economic opportunities, diminished productivity, higher unemployment rates, and higher costs of basic goods and services.
safety nets.	People living within areas affected by the use of explosive weapons are more likely to lose coverage under established safety nets due to budgets cuts and reduced public spending.
penditure because of scarcity and disruptions.	Costs related to health care provision dramatically increase when infrastructure is damaged or destroyed, potentially plunging civilians into debt or forcing them into financial decisions that affect their well-being.
essential services and social protection	People living within areas affected by the use of explosive weapons are exposed to compounding economic effects such as cuts to the budget of public spending and social protection programmes.
nderemployment.	Loss of domestic productivity, insecure business and financial environments, business closures, and economic slowdowns create unemployment or underemployment.
tenure and property rights.	Damage and destruction caused by explosive weapons can create an environment that leads to insecure property rights and disputes over contested land or property.
ent in the informal sector or irregular daily work.	If formal employment opportunities become scarce or costs of doing business go up, economies turn to the informal sector; the informal economy is insecure for employment and fails to collect the tax revenue that funds public spending.

2.3. Key methodological recommendations on how to use the indicators

Using the indicators outlined above can provide data for analysis and help document the general pattern of harm from the use of EWIPA. The following methodological recommendations are based on lessons learned from the use and uptake of the First Menu of Indicators and from discussions with the community of practice regarding the main challenges in research on reverberating effects. As such, these methodological recommendations are designed to help overcome some of the shared research design challenges. In effect, the indicators can have maximum effect in showing patterns of impact and producing reliable data if used based on the following methodological recommendations:

- **The impact chain**: Consider documenting impacts from the use of EWIPA as a sequence, such as: damage and destruction to civilian objects (first level), disruption to essential services (second level) and the impact on civilian well-being (third level).

- **Impacts across space and time**: Consider measuring the indicators across different concentric spatial rings and windows of time to capture how these impacts evolve over space and time.

- **Causation and accreditation**: Consider two parallel studies in different locations (affected versus non-affected) or covering different time periods (pre-shock or during-shock versus post-shock) for which the same indicators are calculated. Such a comparison can inform causal inference.
    - It is also imperative to contextualize the shock and the ensuing observed outcomes.

- **Interconnectivity of impacts**: Consider the impacts from EWIPA as dynamic reinforcing loops, since the reverberating effects compound, intersect and interact. It is important to remember that civilians tend to be affected in multiple ways by the use of EWIPA. As such, consider the indicators outlined above as a starting point, not the full picture.

- **Disproportionate impacts**: Consider disaggregating data by gender and age, where relevant, to highlight and understand the different impact on different groups.
    - It is also important to engage local offices on the importance of maintaining gender-disaggregated data, as it will facilitate a better understanding of baseline conditions and, in turn, inform appropriate responses and interventions.

In addition, when preparing and conducting research on the reverberating effects of the use of EWIPA and using the indicators outlined in both the First and Second Menus, it is advisable to engage with the following:

- Country offices and field presences to include data-collection practices into standard procedures – if possible, share data with other practitioners to maximize the investment in data collection and avoid unnecessary duplication

- Public health experts to learn from the methodological practices in documenting excess mortality in natural hazard events

- Experts monitoring conflict using open-source data, satellite imagery and claims of civilian harm since they tend to archive damage and destruction and document affected locations with precision

- Experts in the field of system dynamics since they have specialized knowledge

and techniques to understand complex problems arising from interdependence, dynamic interactions, reinforcing loops and causality – such expertise will be useful in efforts to map reverberating effects more clearly in complex ecosystems

- Climate experts since they have specialized knowledge in methodologies to capture and document impacts, such as indirect mortality, health outcomes or negative externalities, that are often underestimated or unaccounted
- The SDG data-collection community to improve access to subnational data
- Journalists and media that report on damage and destruction from explosive weapons since media documentation and analysis could be an important source of information
- Local researchers to understand which and what kind of indicators can be linked to the observed damage, using a range of research tools from quantitative indicators to qualitative studies
- Parties to conflict to include reverberating effects indicators in battle-damage assessments that seek to determine the wider impact of the strikes and encourage the standard and systematic use of such assessments

Part III: Key takeaways

The main objectives of this Second Menu of Indicators are threefold:

- To assist research efforts documenting the broad range and scale of harms from the use of EWIPA
- To help identify the general and foreseeable patterns of harm resulting from the use of EWIPA
- To assist parties to an armed conflict in prioritizing the protection of civilians in the planning and conduct of operations in populated areas.

To achieve these objectives and contribute to the protection of civilians from indiscriminate effects, this Second Menu of Indicators puts forward metrics, turned into indicators, that can be used to capture how the use of EWIPA has impacts on the survival, well-being and dignity of civilians in ways that are often overlooked or underestimated. The indicators are designed to help researchers document the broad range and scale of impacts and help to identify the general and foreseeable patterns of harm resulting from the use of EWIPA, thereby contributing to the growing evidence base. It is expected that such data will help inform and renew the understanding of parties to conflict and all stakeholders (including humanitarian assistance providers) of the reasonably foreseeable reverberating effects, enabling them to develop, design or update appropriate doctrine, practice, strategy, tactics and programmatic responses in order to better protect civilians in conflict situations.

Building on the First Menu, this Second Menu of Indicators expands the offer of "focus areas" to document the broad range and scale of harms from the use of EWIPA. As such, it explores impacts on WASH, food security, environmental degradation and economic opportunity. **The four focus areas include a number of specific quantitative indicators designed to capture, measure, compare and understand specific harms to civilians and ensuing patterns of reverberating effects**. The indicators are catalogued into first-, second- and third-level impacts for each focus area. The order of the indicators is designed to illustrate the sequence of how damage and destruction (first-level impacts) cause disruptions to key services (second-level impacts), which in turn have implications for civilian well-being (third-level impacts). In this "impact chain" disaggregation, first-level impacts are primary or secondary effects, and second- and third-level impacts are reverberating effects. Each indicator is subsequently unpacked (see annex A) by its corresponding method of computation.

To maximize the use of the indicators, this Second Menu of Indicators presents five methodological recommendations, which can be summarized as follows:

- **The impact chain**: Document impacts from the use of EWIPA as a sequence of knock-on effects.
- **Impacts across space and time**: Use the indicators across different concentric spatial rings and windows of time to capture how these impacts evolve over space and time.
- **Causation and accreditation**: Calculate the same indicators in parallel studies in different locations (affected versus non-affected) or covering different time periods (pre-shock or during-shock versus post-shock) to compare outcomes and thus inform causal inference.

- **Interconnectivity of impacts**: Consider impacts from the use of EWIPA as dynamic reinforcing loops since reverberating effects compound, intersect and interact.

- **Disproportionate gendered impacts**: Disaggregate data by gender and age, where relevant, to highlight and understand the different impact on different groups.

Further, this Second Menu of Indicators is designed to explore harm from EWIPA through the lens of sustainable development, using many of the SDG standardized metrics and methodologies. This approach aims to further contribute to the cumulative evidence of how armed conflict reverses development processes. Hopefully, it can help to further strengthen linkages between the arms control and development communities.

Finally, for all interested users, UNIDIR encourages readers to contact the Conventional Arms Programme to discuss ways to use the First and Second Menus of Indicators; share results and discuss findings from case studies; suggest updates, edits, or corrections; and explore future iterations. Please share your interest with cap-unidir@un.org.

Annex A: Methods of computation

This annex discusses specific methods of computation for each indicator, following the same order as the tables in part II. The methods of computation are provided to facilitate the use of the indicators for quantitative research purposes.

It is important to reiterate that most of the indicators should be used to demonstrate "changes" or "differences" in observed outcomes, by comparing them to pre-conflict levels (baseline data) or a counterfactual scenario. As such, where possible and when applicable, indicators ought to be calculated twice (in different time periods or settings) and then one subtracted from the other. Using the indicators to demonstrate "changes" or "differences" can inform causal inference. The computation methods that follow mostly demonstrate how to calculate each indicator once; thus, it is important to underscore the methodological imperative of repeating the calculation (in different time periods or settings) and then proceeding to calculate the difference – also known as a difference-in-difference estimator.

Note that indicators retrieved from the SDG framework have been retrieved verbatim from the guidance document submitted by the responsible United Nations agency to the SDG Indicators Metadata Repository.[43] In the same way, the notes included in the methods of computation were retrieved verbatim from the SDG Metadata Repository and the specific link is provided as an endnote for further reference.

43 United Nations, Department of Economic and Social Affairs, Statistics Division, "SDG Indicators: Metadata Repository", https://unstats.un.org/sdgs/metadata.

WATER, SANITATI

1st level: damage and destruction caused by the use of EWIPA

Suggested Indicator	
1.A Number or proportion of drinking water infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of drinking *or* Proportion (expressed as a p = (*Number of drinking water*
1.B Number or proportion of solid waste and wastewater and sanitation infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of solid wa *or* Proportion (expressed as a p = (*Number of solid waste an*
1.C Number or proportion of water, sanitation and energy workers killed, injured or displaced, disaggregated by gender and profession	Absolute number of water, sa *or* Proportion (expressed as a p = (*Number of water sanitati*
1.D Number or proportion of stocks and warehouses of consumables used to treat drinking water and wastewater damaged or destroyed, or production facilities of consumables used to treat drinking water and wastewater and keep installations functioning damaged or destroyed	Absolute number of warehou *or* Proportion (expressed as a p = (*Number of warehouses a* *and/or* Absolute number of producti *or* Proportion (expressed as a p = (*Number of production fac*
1.E Number or proportion of energy infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of energy i *or* Proportion (expressed as a p = (*Number of energy installa*

ON AND HYGIENE

Method of computation
water infrastructure facilities damaged or destroyed
ercentage) of drinking water infrastructure facilities damaged or destroyed
installations damaged or destroyed) / (*Total number of drinking water installations*) × 100
ste and wastewater infrastructure facilities damaged or destroyed
ercentage) of solid waste and wastewater facilities damaged or destroyed
d wastewater installations damaged or destroyed) / (*Total number of solid waste and wastewater installations*) × 100
anitation and energy workers killed, injured or displaced
ercentage) of water, sanitation and electrical workers killed, injured or displaced
on and electrical workers killed injured or displaced by the use of EWIPA) / (*Total number of water sanitation and electrical workers*) × 100
ses and stocks of consumables used to treat drinking water and wastewater damaged or destroyed
ercentage) of warehouses and stocks of consumables used to treat drinking water and wastewater
nd stocks of consummables damaged or destroyed) / (*Total number of warehouses and stocks of consummables*) × 100
on facilities of consumables used to treat drinking water or wastewater damaged or destroyed
ercentage) of production facilities of consumables used to treat drinking water or wastewater damaged or destroyed
ilities damged or destroyed) / (*Total number of production facilities*) × 100
nfrastructure facilities damaged or destroyed
ercentage) of energy damaged or destroyed
ations damaged or destroyed) / (*Total number of energy installations*) × 100

WATER, SANITATI

2nd level: changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	
2.A.I Number or proportion of drinking-water related services totally or partially disrupted, including water treatment, purification and desalination installations, compared to pre-conflict levels or counterfactual	Absolute number of drinking *or* Proportion (expressed as a p = (*Number of drinking water*
2.A.II Proportion of housing units and shelters regularly receiving safely managed drinking water services, compared to pre-conflict levels or counterfactual	Proportion (expressed as a p = (*Number of housing units*
2.B Proportion of domestic and industrial wastewater flows safely treated (SDG Indicator 6.3.1), compared to pre-conflict levels or counterfactual	**Responsible Agency:** UN-Ha **Method of computation:** Prop = (*Amount of wastewater sa* **Notes:** The amount of wastew is expressed in units of 1,000 summing all of the wastewat
2.C Proportion of electrical grid services with total or partial service-related disruptions, compared to pre-conflict levels or counterfactual	Absolute number of electrica *or* Proportion (*expressed as a p* = (*Number of electrical grid*
Alternative Indicator: Number of hours per day with electricity, compared to pre-conflict levels or counterfactual	Absolute number of hours pe
2.D Shortages of consumables used to treat drinking water and wastewater, compared to pre-conflict levels or counterfactual	Shortages of essential consu = (*Quantity of essential cons*
2.E Number or proportion of WASH-related campaigns and interventions carried out, compared to pre-conflict levels or counterfactual	Absolute number of WASH-r *or* Proportion of WASH-related = (*Number of WASH-related*
2.F Number or proportion of health facilities with total or partial water-related service disruptions, compared to pre-conflict levels or counterfactual	Absolute number of health fa *or* Proportion (expressed as a p = (*Number of healthcare fac*
2.G Number or proportion of schools with total or partial water-related service disruptions, compared to pre-conflict levels or counterfactual	Absolute number of schools *or* Proportion (expressed as a p = (*Number of schools with t*

1 UN-Habitat, WHO and UNSD, SDG Indicator Meta Data, 14 September 2020, https://unstats.un.org/sdgs/metadata/files/Metadata-06-03-01.pdf.

ON AND HYGIENE

Method of computation
water-related services totally or partially disrupted
ercentage) of drinking water-related services totally or partially disrupted
related services with total or partial service related disruptions) / (*Total drinking water related services*) × 100
ercentage) of houses and shelters receiving safely managed drinking water services
and shelters receiving safely managed drinking water services) / (*Total number of housing units and shelters*) × 100
bitat, WHO, UNSD
portion of domestic and industrial wastewater safely treated
fely treated) / (*Amount of waste water generated*)
water generated is calculated by summing all of the wastewater generated by different economic activities and households. Wastewater flow m^3/day, although some data sources may use other units that require conversion. The amount of wastewater safely treated is calculated by er flows that receive treatment considered equivalent to secondary treatment or better.[1]
l grid services with total or partial service-related disruptions
ercentage) of electrical grid services with total or partial service-related disruptions
installations with total or partial service related disruptions) / (*Total number of electrical grid installations*) × 100
r day with electricity
umables required for treating drinking water and wastewater
sumable demanded - Quantity of essential consumables available)
elated campaigns and interventions carried out
campaigns and interventions carried out
campaigns and interventions carried out) / (*Total number of WASH-related campaigns and interventions planned*) × 100
cilities with total or partial water-related disruptions
ercentage) of health care facilities with total or partial water-related service disruptions
ilities with total or partial water-related service disruptions) / (*Total number of healthcare facilities*) × 100
with total or partial water-related disruptions
ercentage) of schools with total or partial water-related service disruptions
otal or partial water related service disruptions) / (*Total number of schools*) × 100

WATER, SANITATI

3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	
3.A Proportion of population using safely managed drinking water services (SDG indicator 6.1.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	**Responsible Agency:** WHO, U **Method of computation:** Pop (P_{SMDWS}) = $N_{improved}$ / N_{Total} × • $N_{improved}$ is the number of • $P_{premises, available, free from contamin}$ from fecal and priority c • N_{Total} is the total number
Alternative indicator: Proportion of population falling below WHO water requirement (50 litres per capita per day) for meeting basic consumption and health concerns, compared to pre-conflict levels or counterfactual, disaggregated by age and gender	Proportion (expressed as a p = (*Population falling below W*
3.B.I Proportion of general population experiencing WASH-related diseases, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Proportion of population exp = (*Population experiencing*
Alternative indicator I: Number of outbreaks of water-borne, water-washed or diarrheal diseases, compared to pre-conflict levels or counterfactual, disaggregated by age	Difference in number of outb = (*Number of outbreaks of w diseases pre-conflict*)
3.B.II Mortality rate attributed to unsafe water, unsafe sanitation, and lack of hygiene (SDG Indicator 3.9.2), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	**Responsible Agency:** WHO **Method of computation:** Mor = (*Number of deaths from u* **Notes:** The numerator could disease that would occur if e • Measuring how widespr • Measuring the increase • Applying the fraction ob
Alternative indicator II: Number of deaths related to water-borne, water-washed, or diarrheal diseases, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Difference in deaths related = (*Deaths related to water b conflict*)

2 WHO and UNICEF, Indicator 6.1.1, 12 September 2018 https://unstats.un.org/wiki/display/SDGeHandbook/Indicator+6.1.1.
3 WHO, Indicator 3.9.2, 13 September 2018, https://unstats.un.org/wiki/display/SDGeHandbook/Indicator+3.9.2.

ON AND HYGIENE

Method of computation
UNICEF
ulation using safely managed drinking water services
$P_{premises,available,freefromcontamination} \times 100$, where
people (or households) that are using improved drinking water sources
$_{nation}$ is the population-weighted proportion of improved drinking water sources that are located on premises, available when needed, and free hemical contamination
of people (or households) in the country[2]
ercentage) of population falling below WHO water requirement (50 l per capita per day), expressed as number of people affected per 100,000
WHO water requirement) / (*Total population*) × 100,000
eriencing WASH-related diseases, expressed as number of people affected per 100,000
WASH related diseases) / (*Total population*) × 100,000
reaks of water-borne, water-washed or diarrheal diseases
vater borne, water washed or diarrheal diseases during or post-conflict) - (*Number of outbreaks of water borne,water washed or diarrheal*
rtality rate from unsafe wash (M_{Wash})
nsafe WASH) / (*Total population*) × 100,000
be estimated using an approach that calculates the population attributable fraction (PAF), which is the proportional reduction of deaths or exposure to a risk was removed or reduced to an alternative exposure distribution. The calculation of the PAF involves the following steps:
read the exposure is in the population (P_i)
d (or relative) risk of a disease resulting from the exposure (R_{Ri})
tained by P_i and RR_i to the total burden of disease[3]
to water-borne, water-washed or diarrheal diseases
orne, water washed or diarrheal diseases during or post-conflict) - (*Deaths related to water borne,water washed or diarrheal diseases pre-*

WATER, SANITATI

	Suggested Indicator	
3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA	**3.C.I** Proportion of population using (a) safely managed sanitation services and (b) a hand-washing facility with soap and water (SDG indicator 6.2.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	**Responsible Agency:** WHO, U **Definition:** The proportion of the proportion of the populat "Improved" sanitation facilit composting toilets. Populatio in the household.[4] **Method of computation:** Perc $= P_{sms} = ((N_{offsite}+N_{onsite})/N_{total}) \times$ Percentage of population wit $P_{HW} = N_{HW}/N_{Total} \times 100$, where • $N_{offsite}$ is the number of p disposed of • N_{onsite} is the number of p • N_{HW} is the number of pe • N_{Total} is the total number
	3.C.II Proportion of population taking part in open burning of waste, compared to pre-conflict levels or counterfactual	Proportion (expressed as a p = (*Population taking part in*

4 WHO and UNICEF, SDG Indicator Meta Data, 20 December 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-06-02-01a.pdf.
5 WHO and UNICEF, Indicator 6.2.1, 13 September 2018, https://unstats.un.org/wiki/display/SDGeHandbook/Indicator+6.2.1.

ON AND HYGIENE

Method of computation
UNICEF
population using safely managed sanitation services, including a hand-washing facility with soap and water, is currently being measured by ion using a basic sanitation facility which is not shared with other households and where excreta is safely disposed in situ or treated off-site. ies include flush or pour flush toilets to sewer systems, septic tanks or pit latrines, ventilated improved pit latrines, pit latrines with a slab, and on with a basic handwashing facility: a device to contain, transport or regulate the flow of water to facilitate handwashing with soap and water
centage of population using safely managed sanitation services (P_{SMS})
×100
th access to handwashing facilities with soap and water (P_{HW}) =
eople (or households) using improved sanitation facilities which are not shared and where excreta are transported off-site, treated, and
eople (or households) using improved sanitation facilities which are not shared and where excreta are treated and disposed of in situ
ople (or households) that have access to handwashing facilities with soap and water on premises
of people (or households) in the country[5]
ercentage) of population taking part in open burning of waste, expressed as number of people affected per 100,000
pen burning of waste) / (*Total population*) × 100,000

WATER, SANITATI

3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	
3.D Proportion of (a) adult population (persons over 18 years of age) and (b) children (under 18 years of age) experiencing malnutrition due to poor water or disruptions to sanitation and hygiene practices, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Proportion of population exp 100,000 = (*Population experiencing* *and* Proportion of children experi = (*Number of children exper*
3.E Number or proportion of population infected or killed by vector-borne diseases, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Proportion of population infe = (*Number of people newly* *and* Proportion of population kille = (*Number of people people* *'x'* refers to type of vector-bo
Alternative indicator: Number of people infected by dengue or malaria, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	This indicator requires a mor Malaria: https://unstats.un.or Dengue: https://apps.who.int
3.F Number or proportion of children in school, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Absolute number of children *or* Proportion (expressed as a p = (*Number of school age ch*

ON AND HYGIENE

Method of computation
eriencing malnutrition due to poor water or disruptions to sanitation and hygiene practices, expressed as number of people affected per
malnutrition due to poor water or disruptions to sanitation and hygiene practices) / (*Total population*) × 100,000
encing malnutrition due to poor water or disruptions to sanitation and hygiene practices, expressed as number of children affected per 100,000
iencing malnutrition due to poor water or disruptions to sanitation and hygiene practices) / (*Total number of children*) × 100,000
cted by vector-borne disease expressed as the number of people infected per 100,000
infected by vector borne disease$_x$ *during reporting period*) / (*Total population*) × 100,000
d by vector-borne disease, expressed as the number of people infected per 100,000
killed by vector borne disease$_x$ *during reporting period*) / (*Total population*) × 100,000, where
rne disease
e engaged computation method, and the full breakdown of the formula is available at the following links:
rg/sdgs/metadata/files/Metadata-03-03-03.pdf /iris/rest/bitstreams/1167500/retrieve
in schools compared to pre-conflict levels or counterfactual
ercentage) of children in school
ildren out of school) / (*Total number of school age children*) × 100

FOOD SE

1st level: damage and destruction caused by the use of EWIPA

Suggested Indicator	
1.A Number or proportion of food production facilities and distribution networks rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of food-pro *or* Proportion (expressed as a p = (*Number of food productio* 100
1.B Number or proportion of markets (informal and formal) rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of markets *or* Proportion (expressed as a p = (*Number of markets (forma*
1.C Number or proportion of agricultural workers, farmers, food industry or delivery workers killed, injured or displaced by the use of EWIPA, disaggregated by age, gender and profession	Absolute number of farmers *or* Proportion (expressed as a p = (*Number of farmers agricu* *workers food production and*
1.D Number or proportion of stocks and warehouses of consumables used to produce, distribute and store food damaged or destroyed, or production facilities of consumables used to produce, distribute and store food damaged or destroyed	Absolute number of wareho *or* Proportion (expressed as a p = (*Number of warehouses a* *and/or* Absolute number of producti *or* Proportion (expressed as a p = (*Number of production fac*
1.E Number or proportion of energy infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of energy i *or* Proportion (expressed as a p = (*Number of energy installa*

ECURITY

Method of computation
duction infrastructure facilities and distribution networks damaged or destroyed
ercentage) of food-production infrastructure facilities and distribution networks damaged or destroyed
n installations and distribution networks damaged or destroyed) / (*Total number of food production installations and distribution networks*) ×
(formal and informal) damaged or destroyed
ercentage) of markets (formal and informal) damaged or destroyed
al and informal) damaged or destroyed) / (*Total number of markets (formal and informal)*) × 100
and agricultural, food-production and delivery workers killed, injured or displaced
ercentage) of farmers and agricultural, food-production and delivery workers killed, injured or displaced
ltural workers food production and delivery workers killed injured or displaced by the use of EWIPA) / (*Total number of farmers agricultural d delivery workers*) × 100
ıses and stocks of consumables used to produce food damaged or destroyed
ercentage) of warehouses and stocks of consumables used to produce food damaged or destroyed
nd stocks of consummables damaged or destroyed) / (*Total number of warehouses and stocks ofconsummables*) × 100
on facilities of consumables used to produce, distribute or store food damaged or destroyed
ercentage) of production facilities damaged or destroyed
ilities damged or destroyed) / (*Total number of production facilities*) × 100
nfrastructure facilities damaged or destroyed
ercentage) of energy installations damaged or destroyed
tions damaged or destroyed) / (*Total number of energy installations*) × 100

2 ZERO HUNGER

FOOD SE

	Suggested Indicator	
2nd level: changes in key services from the damage and destruction caused by the use of EWIPA	**2.A** Proportion of agricultural area under cultivation (SDG indicator 2.4.1), compared to pre-conflict levels or counterfactual	**Responsible Agency:** FAO **Method of computation:** Prop = (*Area under productive ar* **Notes:** This implies the need denominator). The numerato farms that satisfy the sustain defined by FAO) utilized by ag holdings is not included.[1]
	Alternative indicator: Levels of agricultural yield, compared to pre-conflict levels or counterfactual	Absolute total quantity of agr
	2.B Changes in price and availability of the basic food basket, compared to pre-conflict levels or counterfactual	Change in price = (*Cost of ma* and Change in availability = (*Qua*
	2.C Increases or decreases in domestic consumption based on food imports and foreign aid, compared to pre-conflict levels or counterfactual	Increases or decreases in do = (*Quantity of domestic cons* - (*Quantity of domestic co*
	2.D Shortages of essential consumables used in the production, distribution and storage of food, compared to pre-conflict levels or counterfactual	Shortages of essential consu = (*Quantity of essential cons*

1 FAO, SDG Indicator Metadata, 1 March 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-02-04-01.pdf.

ECURITY

Method of computation
portion of agricultural land under cultivation *nd sustainable agriculture*) / (*Agricultural land area*) to measure both the extent of land under productive and sustainable agriculture (the numerator) and total agriculture land area (the r captures the three dimensions of sustainable production: environmental, economic and social. It corresponds to agricultural land area of the nability criteria of the 11 sub-indicators selected across all three dimensions. The denominator in turn is the sum of agricultural land area (as gricultural holdings that are owned (excluding rented-out), rented-in, leased, sharecropped, or borrowed. State or communal land used by farm
ricultural yield, expressed as kilogram per hectare, or bushel per acre
arket basket during or post-conflict) - (*Cost of market basket pre-conflict*) *ntity of essential consumables available*) / (*Quantity of essential consumables required*) × 100
omestic consumption based on food imports and foreign aid *sumption based on food imports and foreign aid during or post-conflict*) *nsumption based on food imports and foreign aid pre-conflict*)
umables used in the production, distribution and storage of food *sumable demanded*) - (*Quantity of essential consumables available*)

FOOD SE

3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	
3.A Prevalence of undernourishment (SDG Indicator 2.1.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	**Responsible Agency:** FAO **Method of computation:** This unstats.un.org/sdgs/metadat
3.B 3.B Prevalence of (i) moderate and (ii) severe food insecurity in the population, based on the Food Insecurity Experience Scale (FIES) (SDG indicator 2.1.2), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	**Responsible Agency:** FAO **Method of computation:** This unstats.un.org/sdgs/metadat
3.C Proportion of population who receive the minimum food energy requirements (2,100 kcal per person per day) and recommended daily micronutrient intake, according to Sphere guidance, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Proportion (expressed as a p micronutrient intake, accordi = (*Number of population wh*
3.D Prevalence of malnutrition (weight for height more than two standard deviations from the median of the WHO Child Growth Standards) among children under 5 years of age, by type (wasting and overweight) (SDG Indicator 2.2.2), compared to pre-conflict levels or counterfactual	**Responsible Agency:** UNICE **Method of computation:** Prev = *Prevalence of Wasting* = 1 *Prevalence of Overweight* = • $C_{wasting}$ is the number of c Standards median) • $C_{overweight}$ is the number o Growth Standards media • C_{Total} is the total number
Alternative Indicator: Proportion of children in the red zone of UNICEF's Middle Upper Arm Circumference (MUAC) tape, compared to pre-conflict levels or counterfactual	Proportion of children in the = (*Number of children in re* "t" indicates the period of tin
3.E Prevalence of stunting (height for age more than one standard deviation below the median WHO Child Growth Standards) among children under 5 years of age (SDG Indicator 2.2.1), compared to pre-conflict levels or counterfactual	**Responsible Agency:** UNICE **Method of computation:** Prev = (*Prevalence of children ag*
3.F Number or proportion of children in school, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Absolute number of children *or* Proportion (expressed as a p = (*Number of school-age ch*

2 See Sphere Association, The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response, 2018, Fourth Edition https://spherestandard
3 UNICEF and WHO, Indicator 2.2.2, 13 September 2018 . The WHO child growth standards that provide reference median information for this indicator can be found at h
4 WHO, Children Under 5 Who Are Stunted, n.d., https://www.who.int/healthinfo/indicators/2015/chi_2015_55_children_stunted.pdf?ua=1

ECURITY

Method of computation
s indicator requires a more engaged computation method, and the full breakdown of the formula is available at the following link: https://ta/files/Metadata-02-01-01.pdf
s indicator requires a more engaged computation method, and the full breakdown of the formula is available at the following link: https://ta/files/Metadata-02-01-02.pdf
ercentage) of population who receive the minimum food energy requirements (2,100 kcal per person per day) and recommended daily ing to Sphere guidance, expressed as number of people affected per 100,000[2] *o receive minimum food requirements and recommended daily micronutrients*) / (*Total population*) × 100,000
F, WHO, World Bank valence of malnutrition 00 × $C_{wasting}/C_{total}$ and 100 × $C_{overweight}/C_{total}$, where children under the age of 5 years who are wasted (i.e. weight-for-length/height is two standard deviations below the WHO Child Growth f children under the age of 5 years who are overweight (i.e. weight-for-length/height is more than two standard deviations from the WHO Child an) of children under the age of 5 years measured for both weight and height[3]
"red zone" of UNCIEF MUAC Tape *d zone of MUAC Tape*$_t$) / (*Total number of children measured*$_t$) × 100, where ne
F, WHO, World Bank valence of stunting *ed 0-59 months stunted for age*) / (*Total number of children aged 0-59 months who were measured*) × 100[4]
in schools compared to pre-conflict levels or counterfactual ercentage) of children in school *ildren out of school*) / (*Total number of school-age children*) × 100

ds.org/wp-content/uploads/Sphere-Handbook-2018-EN.pdf p.231.
http://www.who.int/childgrowth/standards/weight_for_age/en/.

ENVIRONMENTA

1st level: damage and destruction caused by the use of EWIPA

Suggested Indicator	
1.A Number or proportion of industrial complexes and fuel infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of industria or Proportion (expressed as a p = (*Number of industrial com*
1.B Number or proportion of housing units, buildings and other civilian objects rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity	Absolute number of housing or Proportion (expressed as a p = (*Number of housing units*
1.C.I Tons of debris generated	This indicator requires a mor
1.C.II Estimate of hazardous waste, given as proportion or volume of debris	Estimate of hazardous waste = (*Debris generated that is l*
1.D Number or proportion of solid waste, wastewater and sanitation infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of waste, w or Proportion (expressed as a p = (*Number of waste wastew*
1.E Number or proportion of energy infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of energy i or Proportion (expressed as a p = (*Number of energy installa*
1.F Number and duration of fires, including nature of the material on fire	Absolute number of fires, inc

L DEGRADATION

Method of computation
l complexes and fuel infrastructure facilities damaged or destroyed
ercentage) of industrial complexes and fuel infrastructure facilities damaged or destroyed *plexes and fuel installations damaged or destroyed*) / (*Total number of industrial complexes and fuel installations*) × 100
units, buildings and other civilian objects damaged or destroyed
ercentage) of homes, buildings and other civilian objects damaged or destroyed *buildings and other civilian objects damaged or destroyed*) / (*Total number of housing units buildings and other civilian objects*) × 100
e engaged computation method; for examples, see https://postconflict.unep.ch/publications/Iraq/UNEP_Mosul_Debris_Report_May2018.pdf
, given as proportion or volume of debris generated which is likely to be hazardous *ikely to be hazardous (expressed in tons)*) / (*Total debris generated (expressed in tons)*) × 100
vastewater and sanitation infrastructure facilities damaged or destroyed
ercentage) of waste, wastewater and sanitation installations damaged or destroyed *vater and sanitation installations damaged or destroyed*) / (*Total number of solid waste and wastewater installations*) × 100
nfrastructure facilities damaged or destroyed
ercentage) of energy damaged or destroyed *ations damaged or destroyed*) / (*Total number of energy installations*) × 100
luding duration and nature of material on fire

2nd level: changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	
2.A Proportion of agricultural area under cultivation (SDG indicator 2.4.1), compared to pre-conflict levels or counterfactual	**Responsible Agency:** United (UNFCCC) and Convention or **Definition:** Land degradation pasture, forest and woodland **Method of computation:** Prop = (*A(Degraded)*$_n$) / ($\sum_i^m$ *A(Tot* • A(Degraded)$_n$ is the tota • A(Total) is the total area
Sub-indicator 2.A.i. Forest area as a proportion of total land area (SDG indicator 15.1.1), compared to pre-conflict levels or counterfactual	**Responsible Agency:** FAO **Method of computation:** Fore = (*Forest area (reference ye* **Notes:** Forest is defined as "I thresholds in situ. It does not
Sub-indicator 2.A.ii Proportion of agricultural area under cultivation (SDG indicator 2.4.1), compared to pre-conflict levels or counterfactual	**Responsible Agency:** FAO **Method of computation:** Prop = (*Area under productive an* **Notes:** There is a need to me denominator). The numerato farms that satisfy the sustain defined by FAO) utilized by ag holdings is not included.[3]
Sub-indicator 2.A.iii Percent or proportion of land that is facing desertification, compared to pre-conflict levels or counterfactual	Proportion of land facing des = "Land subjected to severe
Sub-indicator 2.A.iv Proportion of natural habitats, biodiversity hotspots and protected sites damaged or degraded, compared to pre-conflict levels or counterfactual	Proportion of natural habitats = (*Number of natural habita and protected sights (referer*
2.B.I Number or proportion of water bodies at risk of contamination or with evidence of being polluted, compared to pre-conflict levels or counterfactual	Absolute number of water bo *or* Proportion of water bodies a = (*Number of water bodies a*
2.B.II Proportion of domestic and industrial wastewater flows safely treated, (SDG Indicator 6.3.1) compared to pre-conflict levels or counterfactual	**Responsible Agency:** UN-Ha **Method of computation:** Prop = (*Amount of wastewater sa* **Notes:** The amount of wastew are expressed in units of 1,00 equivalent to secondary trea

1 United Nations Convention to Combat Desertification, SDG Indicator Metadata,1 March 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-15-03-01.pdf.
2 FAO, SDG Indicator Metadata, 1 February 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-15-01-01.pdf.
3 FAO, SDG Indicator Metadata, 1 March 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-02-04-01.pdf.
4 Adapted from FAO, Land Affected by Desertification, n.d., https://www.un.org/esa/sustdev/natlinfo/indicators/methodology_sheets/land/desertification.pdf.
5 UN-Habitat, WHO and UNSD, SDG Indicator Metadata, 14 September 2021 https://unstats.un.org/sdgs/metadata/files/Metadata-06-03-01.pdf.

L DEGRADATION

Method of computation
Nations Convention to Combat Desertification (UNCCD), FAO, UNSD, UNEP United Nations Framework Convention on Climate Change n Biological Diversity (CBD) is defined as the reduction or loss of the biological or economic productivity and complexity of rain-fed cropland, irrigated cropland, or range, ds resulting from a combination of pressures, including land-use and -management practices portion of land that is degraded over total land area (Pn) (in hectares or km^2) *tal*)) where: l area degraded in the year of monitoring n (hectares) within the national boundary (hectares)[1]
est area as a proportion of total land area (in hectares or km^2) *ar*)) / (*Land area (reference year)*) × 100 land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these include land that is predominantly under agricultural or urban land use".[2]
portion of agricultural land under cultivation *d sustainable agriculture*) / (*Agricultural land area*) asure both the extent of land under productive and sustainable agriculture (the numerator), as well as the extent of agriculture land area (the r captures the three dimensions of sustainable production: environmental, economic and social. It corresponds to agricultural land area of the nability criteria of the 11 sub-indicators selected across all three dimensions. The denominator in turn is the sum of agricultural land area (as gricultural holdings that are owned (excluding rented-out), rented-in, leased, sharecropped or borrowed. State or communal land used by farm
sertification (in hectares or km^2) moderate or slight desertification (*reference year*) / (*Land area (reference year)*) × 100[4]
s, biodiversity hotspots and protected sites damaged or destroyed *ts biodiversity hotspots and protected sights damaged or destroyed (reference year)*) / (*Total number of natural habitats biodiversity hotspots* *nce year)*) × 100
odies at risk of contamination or evidenced as polluted t risk of contamination or evidenced as polluted *at risk of contamination or evidenced as polluted (reference year)*) / (*Total number of water bodies (reference year)*) × 100
bitat, WHO, UNSD portion of domestic and industrial wastewater safely treated *afely treated*) / (*Amount of waste water generated*) water generated is calculated by summing all of the wastewater generated by different economic activities and households. Wastewater flows 00 m^3/day. The amount of wastewater safely treated is calculated by summing all of the wastewater flows which receive treatment considered tment or better.[5]

	Suggested Indicator	
2nd level: changes in key services from the damage and destruction caused by the use of EWIPA	**2.C** Annual mean levels of fine particulate matter in cities (population weighted) (SDG Indicator 11.6.2), compared to pre-conflict levels or counterfactual	**Responsible Agency:** WHO **Method of computation:** Ann = $(\sum^{C}_{n} \times P_N) / (\sum^{P}_{n})$, where • C_n is the estimated mean • P_n is the population of th
	2.D Proportion of hazardous waste treated, by type of treatment (SDG Indicator 12.4.2.b), compared to pre-conflict levels or counterfactual	**Responsible Agency:** UNEP, **Method of computation:** Prop = (*Quantity of hazardous w* **Notes:** Hazardous waste gen health or the environment) th including recycling or export
	Alternative Indicator: Changes in the capacity of waste infrastructure to manage, treat and dispose of hazardous waste	Change in the capacity of wa = (*Tons of hazardous waste* *infrastructure during or post-*
	2.E.I Municipal solid waste collected and managed in controlled facilities as a proportion of total municipal waste generated, by cities (SDG Indicator 11.6.1), compared to pre-conflict levels or counterfactual	**Responsible Agency:** UN-Ha **Method of computation:** Mur = (*Total MSW collected and* • *t* is tons of waste genera **Notes:** MSW includes waste from selected municipal serv generated is the sum of the a service. Total MSW collected sector. It includes mixed was
	Alternative Indicator: Changes in the capacity of waste infrastructure to manage, treat and dispose of hazardous waste	Change in the capacity of wa = (*Tons of solid waste mana* *during or post-conflict*)
	2.E II Proportion of the population taking part in uncontrolled dumping or open burning of waste, compared to pre-conflict levels or counterfactual	Proportion of population taki = (*Population taking part in*

6 WHO, Indicator 11.6.2, 14 September 2018, https://unstats.un.org/wiki/display/SDGeHandbook/Indicator+11.6.2.
7 UNEP and UNSD, SDG Indicator Metadata, 4 February 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-12-04-02.pdf.
8 UN-Habitat, UNSD, SDG Indicator Metadata, 20 December 2021. https://unstats.un.org/sdgs/metadata/files/Metadata-11-06-01.pdf.

L DEGRADATION

Method of computation
ual mean levels of fine particulate matter in cities (population weighted) n annual fine particulate matter for the city (or grids) corresponding to the city, n e city or grids corresponding to that city, n.[6]
UNSD portion of hazardous waste treated *aste treated during reporting year*) / (*Quantity of hazardous waste generated during reporting year*) × 100 erated refers to the quantity of hazardous waste (waste with properties that make it hazardous or capable of having a harmful effect on human at is generated within the country during the reported year, prior to any activity such as collection, preparation for reuse, treatment, recovery, , no matter the destination of this waste.[7]
aste infrastructure to manage, treat and dispose of waste *managed, treated and disposed by waste infrastructure pre-conflict)* - (*tons ofhazardous waste managed treated and disposed by waste* *-conflict*)
bitat, UNSD nicipal solid waste (MSW) collected and managed in controlled facilities as a proportion of total MSW generated *managed in controlled facilities (t/day)*) / (*Total MSW generated (t/day)*) × 100, where ated generated from households, commerce and trade, small businesses, office buildings and institutions. It also includes bulky waste and waste vices. The definition excludes waste from municipal sewage networks and treatment, municipal construction and demolition waste. Total MSW amount of municipal waste collected plus the estimated amount of municipal waste from areas not served by a municipal waste-collection d refers to the amount of municipal waste collected by or on behalf of municipalities, as well as municipal waste collected by the private ste, and fractions collected separately for recovery operations (through door-to-door collection and/or through voluntary deposits).[8]
aste infrastructure to manage, treat and dispose of waste *ged, treated and disposed by waste infrastructure pre-conflict*) - (*Tons of solid waste managed, treated and disposed by waste infrastructure*
ng part in uncontrolled dumping or open burning of waste, expressed as the number of people affected per 100,000 *uncontrolled dumping or open burning of waste*) / (*Total population*) × 100,000

3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	
3.A Number or proportion of population infected or killed by vector-borne diseases, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Proportion of population infe = (*Number of people newly* Proportion of population kille = (*Number of people people* • x refers to type of vecto
3.B Number or proportion of population killed or infected by zoonotic diseases, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Proportion of population infe = (*Number of people newly* Proportion of population kille = (*Number of people people* • x refers to type of zoono
3.C Mortality rate attributed to unsafe water, unsafe sanitation or lack of hygiene (SDG Indicator 3.9.2), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	**Responsible Agency:** WHO **Method of computation:** Mor = (*Number of deaths from u* **Notes:** The numerator could disease that would occur if e • Measuring how widespr • Measuring the increase • Applying the fraction ob
3.D Mortality rate attributed to household and ambient air pollution (SDG Indicator 3.9.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	**Responsible Agency:** WHO **Method of computation:** Mor = (*Number of deaths attribut*
Alternative Indicator: Number or proportion of respiratory illnesses reported in the local population due to air quality, disaggregated by age and gender, compared to pre-conflict levels or counterfactual (both from exposure to short term, highly polluting incidents or longer-term exposure and decline in ambient air quality)	Absolute number of respirato or Proportion of people with res = (*Population of population*
3.E Number or proportion of population experiencing heavy-metal poisoning, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Absolute number of people e or Proportion of population exp = (*Population experiencing*

9 WHO, Indicator 3.9.2, 13 September 2018, https://unstats.un.org/wiki/display/SDGeHandbook/Indicator+3.9.2.
10 WHO, Indicator 3.9.1, 13 September 2018, https://unstats.un.org/wiki/display/SDGeHandbook/Indicator+3.9.1.
11 For more information on calculating the joint-mortality associated with household and ambient air pollution based on joint population attributable factors see WHO, SD

L DEGRADATION

Method of computation
cted by vector-borne diseases expressed as the number of people infected per 100,000 *infected by vector borne disease$_x$ during reporting period*) / (*Total population*) × 100,000 and d by vector-borne diseases, expressed as the number of people infected per 100,000 *killed by vector-borne disease$_x$ during reporting period*) / (*Total population*) × 100,000, where r-borne disease
cted by zoonotic diseases expressed as the number of people infected per 100,000 *infected by zoonotic disease$_x$ during reporting period*) / (*Total population*) × 100,000 and d by zoonotic diseases expressed as the number of people infected per 100,000 *killed by zoonotic disease$_x$ during reporting period*) / (*Total population*) × 100,000, where tic disease
rtality from unsafe WASH (M_{WASH}) *nsafe WASH*) / (*Total population*) ×100,000 be estimated using an approach that calculates the population attributable fraction (PAF), which is the proportional reduction of deaths or exposure to a risk was removed or reduced to an alternative exposure distribution. The calculation of the PAF involves the following steps: read the exposure is in the population (P_i) d (or relative) risk of a disease resulting from the exposure (RR_i) tained by P_i and RR_i to the total burden of disease.[9]
rtality attributed to joint effects of household and ambient air pollution (MAP), expressed as number of people per 100,000 *table to the joint effects of household and ambient air pollution*) / (*Total population*) × 100,000[10 11]
ory illnesses reported in local population due to air quality spiratory illnesses reported in the local population due to air quality, expressed as number of people affected per 100,000 *reported as experiencing respiratory illnesses*) / (*Total population*) × 100,000
xperiencing heavy-metal poisoning eriencing heavy-metal poisoning, expressed as number of people affected per 100,000 *heavy metal poisoning*) / (*Total population*) × 100,000

G Indicator Metadata 19 July 2016 https://unstats.un.org/sdgs/metadata/files/Metadata-03-09-01.pdf.

1st level: damage and destruction caused by the use of EWIPA

Suggested Indicator	
1.A Number or proportion of infrastructure facilities necessary to produce goods, for trade and for the service economy rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of infrastru *or* Proportion (expressed as a p = (*Number of installations n production of goods trade ar*
1.B Number or proportion of factories, businesses and enterprises rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of factories *or* Proportion (expressed as a p = (*Number of factories,busi*
1.C Number or proportion of working-age population (16–64) that are killed, injured or displaced, disaggregated by gender and profession	Absolute number of working- *or* Proportion (expressed as a p = (*Working age population k*
1.D 1.D Number or proportion of stocks and warehouses of consumables used to produce goods, for trade and in the service economy damaged or destroyed, or production facilities used to produce consumables used to produce goods, for trade and in the service economy damaged or destroyed	Absolute number of warehou *and/or* Absolute number of producti
1.E Number or proportion of energy infrastructure facilities rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of energy i *or* Proportion (expressed as a p = (*Number of energy installa*
1.F Number or proportion of cash-related service centres rendered inoperable (destroyed) or degraded and left with partially functioning (damaged) capacity for service delivery	Absolute number of energy i *or* Proportion (expressed as a p = (*Number of energy installa*
Alternative Indicator: (a) Number of commercial bank branches per 100,000 adults and (b) number of ATMs per 100,000 adults (SDG Indicator 8.10.1) damaged or destroyed	**Responsible Agency:** Interna **Method of computation:** a. Number of commercial b *population*$_{it}$) / 100,000) *and* b. Number of ATMS damag where • *i* indicates the country a

1 Adapted from IMF, SDG Indicator Metadata, 6 December 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-08-10-01.pdf.

PPORTUNITY

Method of computation
cture facilities necessary for the production of goods, trade and the service economy damaged or destroyed ercentage) of infrastructure necessary for the production of goods, trade and the service economy damaged or destroyed *ecessary for the production of goods trade and the service economy damaged or destroyed*) / (*Total number of installations necessary for the nd the service economy*) × 100
s, businesses and enterprises damaged or destroyed ercentage) of factories, businesses and enterprises damaged or destroyed *nesses and enterprises damaged or destroyed*) / (*Total number of factories businesses and enterprises*) × 100
-age population killed, injured or displaced ercentage) of working-age population killed, injured or displaced *illed injured or displaced*) / (*Total working age population*) × 100
uses and stocks of consumables used in the production of goods, trade and the service economy damaged or destroyed on facilities of consumables in the production of goods, trade and the service economy damaged or destroyed
nfrastructure damaged or destroyed ercentage) of energy damaged or destroyed *ations damaged or destroyed*) / (*Total number of energy installations*) × 100
nfrastructure damaged or destroyed ercentage) of energy damaged or destroyed *ations damaged or destroyed*) / (*Total number of energy installations*) × 100
ational Monetary Fund (STAFI – Financial Access Survey Team) ank branches damaged or destroyed by explosive weapons per 100,000 adults$_{it}$ = (*Number of commercial bank branches*$_{it}$) / ((*Adult* ged or destroyed by explosive weapons per 100,000 adults$_{it}$ = (Number of automated teller machines$_{it}$) / ((Adult population$_{it}$) / 100,000), nd *t* indicates the year[1]

ECONOMIC O

2nd level: changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	
2.A Number or proportion of service-related disruptions (total or partial) in the production of goods, trade and the service economy, compared to pre-conflict levels or counterfactual	Absolute number of service- *or* Proportion (expressed as a p = (*Number of installations in production of goods, trade a*
2.B Change in the consumer price index (CPI), compared to pre-conflict levels or counterfactual	Consumer Price Index (CPI) = (*Price of market basket in*
Alternative Indicator: Inflation in selected goods and services, compared to pre-conflict levels or counterfactual	Inflation = $(CPI_{x+1} - CPI_x) / (CPI_x)$, whe • CPI_x is the initial CPI[3]
2.C Self-reported expenses incurred by factories and businesses, compared to pre-conflict levels or counterfactual	Value of self-reported expens
2.D Shortages of essential consumables needed to produce goods, in trade and for the service economy, compared to pre-conflict levels or counterfactual	Shortages of essential consu = *Quantity of essential cons*
2.E Proportion of domestic budget funded by domestic taxes (SDG Indicator 17.1.2), compared to pre-conflict levels or counterfactual	This indicator requires a mor files/Metadata-17-01-02.pdf
Alternative Indicator: Proportion of government services and programmes financed or dependent on international humanitarian aid and development assistance, compared to pre-conflict levels or counterfactual	Proportion of government se = (*Value (in USD) of services services provided*) × 100

2 G. Mankiw, Principles of Economics, 7th edition, 2016, p. 507
3 G. Mankiw, Principles of Economics, 7th edition, 2016, p. 508

PPORTUNITY

Method of computation
related disruptions in the production of goods, trade and the service economy
ercentage) of service-related disruptions in the production of goods, trade and the service economy *the production of goods, trade and the service economy with total or partial service-related disruptions*) / (*Total number of installations in the nd the service economy*) × 100
given year) / (*Price of market basket in base year*) ×100[2]
ere
ses incurred by factories and businesses, compared to pre-conflict or counterfactual
umables needed to produce goods, trade and the service economy *umable demanded - quantity of essential consumables available*
e engaged computation method, and the full breakdown of the formula is available at the following link: https://unstats.un.org/sdgs/metadata/
rvices and programmes financed or dependent on international humanitarian aid and development assistance *s and programmes financed or dependent on internaitonal humanitarian aid and development assistance*) / (*Total value (in USD) of government*

3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA

Suggested Indicator	
3.A Proportion of population living below the national poverty line (SDG indicator 1.2.1), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	This indicator requires a mor files/Metadata-01-02-01.pdf
Alternative Indicator I: Proportion of population living in poverty in all its dimensions according to national definitions (SDG Indicator 1.2.2), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	This indicator requires a mor files/Metadata-01-02-02.pdf
Alternative Indicator II: Proportion of population dependent on in-kind assistance or cash and voucher assistance (CVA), disaggregated by age and gender, compared to pre-conflict levels or counterfactual	Proportion of population dep = (*Population dependent up*
3.B Proportion of population covered by social protection systems, disaggregated by gender, and distinguishing children, employment, older persons, persons with disabilities, pregnant women, new-borns, work-injury victims, and the poor and the vulnerable (SDG Indicator 1.3.1), compared to pre-conflict levels or counterfactual	**Responsible Agency:** ILO **Method of computation:** Cov = (*Number of beneficiares in* **Note:** Proportion of populatio unemployed people, older pe subgroup, coverage is expre
3.C Proportion of population experiencing catastrophic health expenditure, disaggregated by age and gender, compared to pre-conflict levels or counterfactual	**Definition:** While there is no greater than or equal to 40 p **Method of computation:** Prop = (*Population whose health*

4 ILO, Indicator 1.3.1, 13 September 2018, https://unstats.un.org/wiki/display/SDGeHandbook/Indicator+1.3.1.

5 WHO, "Designing Health Financing Systems to Reduce Catastrophic Health Expenditure", Technical Briefs for Policy-Makers, Number 2, 2005, https://www.who.int/healt

PPORTUNITY

Method of computation
e engaged computation method, and the full breakdown of the formula is available at the following link: https://unstats.un.org/sdgs/metadata/
e engaged computation method, and the full breakdown of the formula is available at the following link: https://unstats.un.org/sdgs/metadata/
endent upon in-kind or cash and voucher assistance expressed as number of people affected per 100,000 *on in kind or cash and voucher assistance*) / (*Total population*) × 100,000
erage by social protection systems *the total population (or group)*) / (*Total population (or group)*) n covered by social protection systems is calculated separately for each group in order to distinguish effective coverage for children, eople and people with disabilities, women with new-borns, workers protected in case of work injury, and the poor and the vulnerable. For each ssed as a share of the respective reference population.[4]
universal definition for catastrophic health spending, the WHO has proposed that health spending be deemed as catastrophic whenever it is er cent of a household's non-subsistence income, i.e. the income available after basic needs have been met.[5] portion of population experiencing catastrophic health expenditure, expressed as number of people affected per 100,000 *spending is greater than or equal to 40% of household's non-subsistence income*) / (*Total population*) × 100,000

th_financing/pb_2.pdf, p. 1.

	Suggested Indicator	
3rd level: changes in civilian wellbeing as a result of the changes in key services from the damage and destruction caused by the use of EWIPA	**3.D** Proportion of total government spending on essential services (education, health, and social protection) (SDG Indicator 1.a.2), compared to pre-conflict levels or counterfactual	**Responsible Agency:** UNESC **Method of computation:** Tota $= PXE_{n,t} = (XE_{n,t}) / (TPX_t)$, wh • $PXE_{n,t}$ = expenditure • $XE_{n,t}$ = total general • TPX_t = total governr
	Alternative Indicator: Reductions to public spending and social programmes, compared to pre-conflict levels or counterfactual	Absolute value of reductions
	3.E Unemployment and underemployment rates, disaggregated by gender, age and state of disability (SDG Indicator 8.5.2), compared to pre-conflict levels or counterfactual	**Responsible Agency:** ILO **Method of computation:** Une = (*Total unemployment*) / (*To*
	3.F Proportion of total adult population with secure tenure rights to land, (a) with legally recognized documentation and (b) who perceive their rights to land as secure, by gender and by type of tenure (SDG Indicator 1.4.2), compared to pre-conflict levels or counterfactual	**Responsible Agency:** UN-Ha **Method of computation:** Prop = (*People (adults) with legal* and = (*People (adults) who perc*
	3.G Proportion of informal employment in total employment, by sector and gender (SDG indicator 8.3.1), compared to pre-conflict levels or counterfactual	**Responsible Agency:** ILO **Method of computation:** Prop = Proportion of informal emp informal employment is calcu Proportion of informal emplo Proportion of informal emplo × 100[9]

6 UNESCO-UIS, SDG Indicator Metadata, 20 December 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-01-0a-02.pdf.
7 ILO, SDG Indicator Metadata, 1 January 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-08-05-02.pdf.
8 UN-Habitat and World Bank, SDG Indicator Metadata, 1 August 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-01-04-02.pdf.
9 ILO, SDG Indicator Metadata, 1 January 2021, https://unstats.un.org/sdgs/metadata/files/Metadata-08-03-01.pdf.

PPORTUNITY

Method of computation
CO Institute for Statistics (UNESCO – UIS) l government spending for a given level of education, expressed as a percentage of total government expenditure (all sectors) ere e on education level n as a percentage of total government expenditure in financial year *t* government expenditure on education level n in financial year *t* ment expenditure in financial year *t* [6]
to public spending and social programmes, expressed in USD
mployment rate *tal labour force*) × 100 [7]
bitat, World Bank portion of total adult population with secure rights to land *lly recognized documentation over land*) / (*Total adult population*) × 100 (a) *eive their rights as secure*) / (*Total adult population*) × 100 [8] (b)
portion of informal employment in total employment loyment in total employment = (*Informal employment*) / (*Total employment*) × 100, where ulated as yment in agriculture = (*Informal employment in agricultural activities*) / (*Total employment in agriculture*) ×100 and yment in non-agricultural employment = (*Informal employment in non-agricultural activities*) / (*Total employment in non-agriculture activities*)

Annex B: Sample of publications and resources that cite or use the First Menu of Indicators in 2021

The following list represents a sample of publicly available publications and resources that cite or use the *UNIDIR Menu of Indicators to Measure the Reverberating Effects on Civilians from the Use of Explosive Weapons in Populated Areas*, authored by Christina Wille and Alfredo Malaret Baldo, also referred to as the First Menu of Indicators. Inclusion in this list of publications and resources does not represent endorsement and the list should not be considered exhaustive.

Publications:

- International Committee of the Red Cross, Explosive Weapons with Wide Area Effects: A Deadly Choice in Populated Areas, ICRC, Geneva, January 2022, https://www.icrc.org/en/document/civilians-protected-against-explosive-weapons.
- Global Coalition to Protect Education from Attack, The Impact of Explosive Weapons on Education: A Case Study of Afghanistan, September 2021, https://protectingeducation.org/wp-content/uploads/EWIPA-Afghanistan-2021.pdf.
- M. Talhami and M. Zeitoun, "The Impact of Attacks on Urban Services II: Reverberating Effects of Damage to Water and Wastewater Systems on Infectious Disease", International Review of the Red Cross, vol. 102, December 2021, https://doi.org/10.1017/S1816383121000667.
- L. Boillot, "Protecting Civilians from the Reverberating Effects of Explosive Weapons in Populated Areas", Article 36, February 2021, https://article36.org/updates/unidir-briefing-remarks/.
- L. Cottrell and K. Dupuy, "Protecting the Environment from the Direct and Reverberating Effects of Explosive Weapons is a Vital Component of Civilian Protection", Conflict and Environment Observatory, May 2021, https://ceobs.org/we-must-not-ignore-explosive-weapons-environmental-impact/.
- C. de Jonge Oudraat and J. Wattenberg, "A Gender Framework for Arms Control and Disarmament, Women in International Security", WIIS Policy Brief, May 2021, https://www.wiisglobal.org/wp-content/uploads/2021/05/Gender-Framework-for-ACD-May-2021.pdf.

Resources:

- United Nations Office for Disarmament Affairs, "Short Course Series on Explosive Weapons in Populated Areas", https://www.disarmamenteducation.org/dashboard/index.php?go=courses&do=course-detail&course_id=53.
- United Nations Office for the Coordination of Humanitarian Affairs, "Explosive Weapons in Populated Areas", https://www.unocha.org/themes/explosive-weapons-populated-areas.
- Insecurity Insight, "Explosive Weapons: Reverberating Effects", http://insecurityinsight.org/projects/explosive-weapons.
- Global Consortium for Injury Research, https://gcir.tghn.org/resources/.

- James Madison University, "Publication Review: Menu of Indicators to Measure the Reverberating Effects on Civilians from the Use of Explosive Weapons in Populated Areas", 27 July 2021, https://www.jmu.edu/news/cisr/2021/07/27-unidir.shtml.

- Researching the Impact of Attacks on Healthcare, "Other Resources", https://riah.manchester.ac.uk/articles/resources/reports-and-articles/.

- J. Rafferty, K. Geyer and R. Acheson, "Report on the March 2021 Consultations on a Political Declaration on the Use of Explosive Weapons in Populated Areas", Reaching Critical Will, 12 March 2021, https://www.reachingcriticalwill.org/news/latest-news/15213-report-on-the-march-2021-consultations-on-a-political-declaration-on-the-use-of-explosive-weapons-in-populated-areas.

- Center for Civilians in Conflict, "Event Summary: Emerging Practices in Effective Civilian Harm Mitigation", 22 June 2021, https://civiliansinconflict.org/blog/event-summary-emerging-practices-in-effective-civilian-harm-mitigation/.

SECOND MENU OF INDICATORS TO MEASURE THE REVERBERATING EFFECTS ON CIVILIANS FROM THE USE OF EXPLOSIVE WEAPONS IN POPULATED AREAS

INDICATORS FOR WATER, SANITATION AND HYGIENE, FOOD SECURITY, ENVIRONMENTAL DEGRADATION, AND ECONOMIC OPPORTUNITIES

Building on the First Menu of Indicators, this Second Menu of Indicators expands the focus areas to include impacts on water, sanitation and hygiene, food security, environmental degradation, and economic opportunity. Specific quantitative indicators are presented for each of these four areas. These indicators can be used to capture, measure, compare and understand how the use of EWIPA impacts the survival, well-being and dignity of civilians in ways that are often overlooked or underestimated. The indicators are designed to help researchers document the broad range and scale of impacts and help to identify the general and foreseeable patterns of harm resulting from the use of EWIPA, thereby contributing to the growing evidence base. It is expected that such data will help inform and renew the understanding of parties to conflict and all stakeholders (including humanitarian assistance providers) of the reasonably foreseeable reverberating effects, enabling them to develop, design or update appropriate doctrine, practice, strategy, tactics and programmatic responses in order to better protect civilians in conflict situations.

UNIDIR UNITED NATIONS INSTITUTE FOR DISARMAMENT RESEARCH