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Attacks on healthcare in Ukraine (2022–2024): The role of civil society and open-source intelligence in promoting international accountability

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Abstract

Violence against healthcare in armed conflict reflects disregard for the rules of war and unprecedented civilian and medical personnel casualties. This study analyses the use of digital tools and open-source intelligence (OSINT) by international institutions and civil society actors to document attacks on healthcare during the ongoing war in Ukraine (2022–2024). It examines how civil society organisations and international bodies use OSINT and digital platforms to document attacks on healthcare, and what this reveals about accountability practices for protecting health systems as critical civilian infrastructure in contemporary security contexts. A qualitative comparative case study examined four organisations recording illegal attacks on healthcare in Ukraine, including surveillance by the World Health Organisation (WHO) and multi-actor civil society initiatives. The study analyses documentation practices, verification protocols, and cross-sector engagement via open-source and hybrid legal–journalistic methods. The WHO's approach provided institutional surveillance with limited reach because of political barriers, while civil society actors achieved broader impact through adaptive and networked uses of OSINT and digital verification. These practices linked grassroots evidence collection with national and international justice mechanisms, enhancing awareness, accuracy, and multi-level accountability for the illegal use of force. The study highlights an urgent need for cross-level, multi-stakeholder engagement to safeguard healthcare as a legally protected, non-combatant activity during war. The identified shift from institution-centred to networked accountability may reflect evolving strategies to hold perpetrators of illegal attacks in war to account and guide the scaling and implementation of innovative frameworks to prevent or address attacks on healthcare and strengthen its resilience in complex security settings.

Keywords:

international humanitarian law, open-source intelligence, attacks against healthcare, protection of non-combatants, multi-actor accountability

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Introduction

Armed conflict threatens health systems and humanitarian infrastructure, demanding scholarly attention at the intersection of security, defence, and international law. Since Russia's full-scale invasion of Ukraine on 24 February 2022, the World Health Organisation (WHO) has confirmed 2,200 attacks on healthcare (AHC) by the end of 2024 (Kluge, 2025). More than 40% hit primary healthcare infrastructure, with Russian forces allegedly conducting more than 90% of these strikes (Buck and Wille, 2024). The deliberate targeting of healthcare, with "double-tap" strikes and attacks on medics starkly violate International Humanitarian Law (IHL) (Geneva Academy of International Humanitarian Law and Human Rights, 2025; Lepik and Bedei, 2024). These issues extend beyond Ukraine, affecting regions such as Sudan, Myanmar, and Palestine, and emphasise urgent global concerns for the resilience and future stability of medical care (Abu-Sittah *et al.*, 2025). This article is situated at the core of debates on human security and IHL, as attacks destabilise essential healthcare and amplify human suffering. While legal controversies remain about the broader conduct of war, this study focuses on the protection of healthcare as a moral, legal, and practical imperative under IHL, irrespective of the origin of the conflict. The United Nations (UN) meanwhile describes deliberate AHC as "wilful neglect of IHL," contributing to escalating civilian and aid worker casualties and worsening health inequalities (Orcutt and McKee, 2025; United Nations Office for the Coordination of Humanitarian Affairs [OCHA], 2024).

In Ukraine, the impact of AHC is compounded by the pre-existing health disparities. Disruptions to medical supply chains, displacement of staff, loss of infrastructure, and rising communicable and non-communicable diseases exacerbate population vulnerabilities (Health Cluster Ukraine, 2024; Kluge, 2025). The war has sharply increased demands for mental health and gender-based violence support, while targeted bombings have further demoralised healthcare workers and prevented outreach to the most urgently affected populations (Falqui *et al.*, 2024). Intensification of antimicrobial resistance (AMR) has occurred due to hospital destruction, shortage of staff and medical supplies, and mass-casualties that require broad-spectrum antibiotics and delay wound treatment. Disrupted trauma evacuation pathways further accelerate spread of AMR, signalling the importance of rigorous control strategies (Geddes, 2024; Uren *et al.*, 2025).

Violence against health systems in armed conflict is not only a legal and security policy challenge but also a moral one. As Droege (2024) notes, safeguarding life and health depends on all parties upholding IHL even under military pressure. When this balance fails, dehumanisation and atrocities follow. Evocative cases, for instance the destruction of Mariupol's hospitals and strikes disabling Kyiv's paediatric care, visualise the profound consequences for civilians and medical practitioners (Buck and Wille, 2024; Freedman, 2024; United Nations High Commissioner for Human Rights [OHCHR], 2022). Leading advocates, such as Oleksandra Matviichuk, stress the need for justice in real time, not only post-conflict, and point to the transformative role of digital evidence in supporting survivors and accountability efforts (Tumarkin and Matviichuk, 2024). These dimensions reveal the urgency of developing adaptive, context-sensitive approaches to accountability, underscoring that resilience, legal innovation, and civil mobilisation are essential for protecting health systems during war.

International legal norms and critical perspectives

Customary IHL, the Geneva Conventions (ICRC International Humanitarian Law (IHL) Databases, 1949; United Nations Treaty Series [UNTS], 1950), the Rome

Statute (OHCHR, 1998), and UN Security Council (2016, May 3) Resolution 2286 form the backbone of legal protections for healthcare during armed conflict. These frameworks mandate distinction, proportionality, and precaution in the use of military violence. Intentional attacks on medical personnel, infrastructure, and transports are expressly prohibited. Despite this legal clarity, enforcement remains weak. Patterns of impunity, especially involving complex evidentiary challenges, prevent robust accountability and expose a persistent gap between law and practice. States may reinterpret legal obligations to serve strategic interests, particularly in authoritarian contexts, diminishing the power of these norms (Droege, 2024). As Rubenstein (2021) and Slim (2024) argue, compliance is often undermined by the invocation of "military necessity," and institutional mechanisms struggle to provide meaningful protection or justice. These shortcomings have prompted innovative civil society and digital initiatives to collect and publicise perpetrators in order to address accountability deficits.

Patterns of attacks on healthcare

Attacks on healthcare, including obstruction, threats, and direct violence, are prohibited under IHL and may constitute war crimes under Article 8 of the Rome Statute (OHCHR, 1998). Historical and comparative analysis, especially between Ukraine and Syria, demonstrates that deliberate targeting of health infrastructure is rarely accidental but often part of a strategic military policy (Freedman, 2024; Grzebyk and Uczkiewicz, 2025; Johnson, 2022). However, documentation before 2022 was sporadic, and promises to protect healthcare in war rarely resulted in robust action (Haar *et al.*, 2021; Rubenstein, 2021). Political and legal barriers, for instance the challenge of proving "deliberate intent" or "wilful disregard," create persistent accountability deficits. Post-2022, new digital documentation methods present opportunities to address evidentiary gaps, yet there remain standardisation and interoperability issues (Haar *et al.*, 2021; Poole *et al.*, 2025).

Civilian agency in documentation and justice

Civil society organisations (CSOs), nongovernmental organisations (NGOs), and frontline healthcare professionals have become central actors in documenting war crimes and advocating for accountability, especially where formal institutions are ineffective. Original networks of CSOs often act first in crises, providing essential data and support that external actors should reinforce rather than replace (Sphere Association, 2018; Weir *et al.*, 2019). Contemporary trends reflect "citizen journalism" and locally led investigations, which add reliability and contextual accuracy to evidence collection (Buck and Wille, 2024). Shifts in global governance increasingly prioritise these non-state actors, making them indispensable for legal and humanitarian processes. In Ukraine, a coalition of local officials, CSOs, open-source intelligence (OSINT) investigators, and digital forensic experts preserve digital evidence, continuing innovations developed in other crises, such as Syria and Yemen (Hendrix, 2022). Taken together, these developments indicate that security and accountability regarding AHC in Ukraine have become a multi-level, whole-of-society endeavour rather than solely an institutional responsibility.

Digital and open-source evidence

Digital tools, especially OSINT may now complement or replace disrupted traditional documentation methods in conflict. The Berkeley Protocol offers standardised procedures for digital investigation, enhancing rigor and consistency across

jurisdictions (Koenig, 2020). Information triangulation and layering assemble diverse data, increasing reliability, and facilitating legal use (Bohdanova, 2024; Kent, 2014). OSINT appears in this study as a vital tool for rapid collection of evidence in the environments where access and security risks limit conventional research. As humanitarian threats evolve, digital documentation enables more timely, transparent, and accountable practices, advancing both human rights and international legal standards.

Purpose of the study

Despite valuable insights, health system research in conflict settings is criticised for under-theorisation, limited contextual relevance, and neglect of local actors (Garry and Checchi, 2020; Marzouk *et al.*, 2023). Few studies address CSOs' use of digital tools or evaluate systematic documentation strategies during ongoing violence (Chlevickaitė, 2025; Lutsevych, 2024; Poole *et al.*, 2025). This research examines how selected CSOs and international bodies use OSINT and digital platforms to document AHC in Ukraine, and what this reveals about accountability practices for protecting health systems as critical civilian infrastructure in contemporary security and defence contexts. To address this overarching question, the study pursues the following objectives:

1. Compare approaches to data collection, verification, and presentation, focusing on OSINT and digital monitoring.

2. Analyse strengths, limitations, and strategic use of digital tracking methods for advocacy and accountability.

3. Evaluate the influence of institutional positioning (local vs. international) on visibility, access, and impact in active conflict zones.

Methods

Using a qualitative comparative case study design, this paper analyses how selected organisations employed digital tools, particularly OSINT, to document AHC in the Ukrainian setting between February 2022 and December 2024 and to support accountability under IHL. The case study approach is suited to examining complex, context-dependent phenomena, such as war time documentation, where the boundaries between the case and its context are not clearly defined (Yin, 2018). The unit of analysis is each organisation's approach to compiling evidence, treated as a case example that allows systematic comparison of strategies, outputs, and verification practices.

Case selection and sampling

Ukraine was selected as a conflict setting due to its high frequency of violent attacks against health care (AHC) facilities and personnel (Assessment Capacities Project [ACAPS], 2024; Brennan, 2024; Buck and Wille, 2024; Vos, 2023), a prominent role of digital tools, such as OSINT, in documenting these attacks (Johnson, 2022; Kuczyńska, 2025; Posner, 2022), and strong mobilisation of civil society in conflict monitoring and war-crimes investigation (Amelina, 2025; Bohdanova, 2024; Chlevickaitė, 2025; Johnson, 2022). In addition, AHC in Ukraine has become central to contemporary debates on accountability, erosion of IHL, and compliance in the international community (Droege, 2024;

OCHA, 2024; Orcutt and McKee, 2025; Rubenstein, 2021; Slim, 2024). Organisations were identified via a literature review, mapping of AHC documentation initiatives, and targeted web searches. Inclusion criteria were as follows:

- Operating or contributing to digital/open-access platforms tracking AHC in Ukraine (2022–2024)
- An explicit mandate related to accountability, evidence collection, and/or civilian protection
- Representation of different governance levels (local, national, and international)
- Use of open-source and/or field-based investigative methods

Four case examples met the criteria: the WHO, Truth Hounds (TH), The Reckoning Project (TRP), and Bellingcat (BC). Together, these organisations provide variation in mandate (intergovernmental vs. civil society), scale of operation, and methodological approach. Other actors (e.g. Mnemonic, Armed Conflict Location & Event Data [ACLED], Insecurity Insight) were noted during mapping but excluded to maintain analytical depth without excessive volume. Their work is considered according to its relevance in the discussion.

Data collection

Primary data consisted of organisations' publicly available outputs: incident trackers and dashboards, methodological documents, investigation reports, infographics, policy briefs, and recorded interviews with staff or investigators (e.g. conference talks, webinars, and media appearances). Quantitative indicators, such as social media followers and engagement were collected to approximate outreach and visibility. Additional contextual material derived from reports and analyses by humanitarian and research organisations working on AHC or related accountability efforts (e.g. Safeguarding Health in Conflict Coalition, Physicians for Human Rights [PHR], ReliefWeb, Assessment Capacities Project [ACAPS], Geneva Centre for Security Sector Governance [DCAF], and International Committee of the Red Cross) as well as policy institutes and think tanks monitoring the war in Ukraine. These sources were used for triangulation and to situate the four cases within the broader landscape of conflict-related health documentation.

Analytical strategy

A cross-case comparative framework was developed to address the study objectives and ensure potentially replicable analysis. Table 1 maps out the analytical categories, each one linked to the study's research objectives.

Documents and recordings were coded manually according to the above categories. OSINT-related practices were read against emerging professional standards, such as those articulated in the Berkeley Protocol on Digital Open-Source Investigations (Koenig, 2020) to assess how organisations framed and operationalised digital evidence. The analysis does not test the effectiveness of specific tools or advocacy strategies; rather, it examines how they are framed, operationalised, and communicated.

Table 1. Analytical categories for comparative tables.

Category	What is considered	Objectives addressed
Organisation overview	Founding year, type, mission, AHC mandate, HQ, working languages	Situates each case and its institutional position/influence (objective c)
Documentation platform and accessibility	Tracker/initiative name, format (map/dashboard/report), update frequency, and degree of openness	Examines how outputs are communicated and presented (objectives a and b)
Data collection and verification	Data sources (e.g. social media, satellite imagery, and witness reports), use of OSINT, verification practices (triangulation, partnerships, and legal review)	Evaluates documentation methods and evidentiary credibility (objective a)
Engagement and outreach	Social media presence, media citations, partnerships, and campaigns	Assesses public advocacy and reach (objective b)
Accountability contribution	Use in legal, political, or humanitarian mechanisms; references by courts, IGOs, or policy processes	Identifies how documentation feeds into accountability pathways (objective b)
Constraints and challenges	Funding, misinformation, language, access, and ethical/operational limits	Considers limitations that may affect accountability initiatives (objective c)

Notes. AHC: attacks on healthcare; OSINT: open-source intelligence; HQ: headquarters; IGOs: intergovernmental organisation.

Results

The analysis compares four case-example organisations working in the Ukrainian setting between February 2022 and December 2024: the WHO, Truth Hounds, The Reckoning Project, and Bellingcat. Each case example is examined across five categories: platform and accessibility; data collection and verification; engagement and outreach; accountability contribution; and constraints and challenges.

World Health Organisation (WHO)

Founded in 1948 in Geneva, the WHO operates the global surveillance system for attacks on health care (SSA), launched in 2017 to record incidents of violence against health services in humanitarian emergencies. Guided by World Health Assembly Resolution WHA65.20, SSA positions the WHO as the main intergovernmental body responsible for systematically monitoring AHC and promoting safer health services, distinguishing this initiative from the civil society case examples through its institutional role as an intergovernmental organisation (IGO) (Table 2).

Table 2. Summary of the findings for the WHO's SSA.

	Findings
Platform and accessibility	Surveillance system for attacks on health care (WHO, 2017); global online database; EN; (a) open and (b) restricted layers; filters for date, country, and attack type; updated as incidents occur.

Data collection and verification	*Sources*: WHO country offices, health clusters, local NGOs; standardised SSA template, and partner/eyewitness reports. *Verification*: Four certainty levels ("rumour" – "confirmed"); partnerships for triangulation.
Engagement	>30 million social media followers; occasional AHC advocacy posts.
Accountability contribution	Feeds advocacy, policy, international discourse, health system planning; evidence-base, rather than direct legal action.
Constraints and challenges	Confidentiality and under-reporting; dependence on member-state reporting; limited public interface; transparency – security tension.

Notes. AHC: attacks on healthcare; NGO: non-governmental organisation; EN: English language.
Sources: Humanitarian Data Exchange (2025); Kim *et al.* (2024); Meier *et al.* (2021); Parada *et al.* (2023); World Health Organization, 2019.

Truth Hounds

Truth Hounds is a Kyiv-based CSO founded in 2014 that works in Ukrainian and English and co-runs the "Attacks on Health Care in Ukraine" tracker. Its narrow focus on international humanitarian and criminal law, developed through work on Russian abuses since Euromaidan and the 2014 annexations, has built strong expertise in investigating individual criminal responsibility and supporting prosecutions (Avramenko and McCain Institute, 2023) (Table 3).

Table 3. Summary of the findings for Truth Hounds.

	Findings
Platform and accessibility	"Attacks on Health Care in Ukraine" interactive map (2022–present); UA/EN; filters; different types of AHC; open access with safeguards to avoid identifying staff/patients.
Data collection and verification	*Sources*: OSINT, open data, witness testimony. *Methods*: ethical code; Berkeley-informed procedures; data systematically stored in I-DOC (evidence analysis database, ICC-linked, artificial intelligence-assisted, and human-led). *Verification*: cross-referencing and detailed situation-analysis.
Engagement	~13.3 k followers; frequent posts; joint reports with PHR, White Helmets (Syria), and others.
Accountability contribution	Cooperation with Ukrainian prosecutors; five foreign court cases in foreign courts; nine ICC submissions; and training for investigators/prosecutors.
Constraints and challenges	Fieldwork risk (two staff killed); access and security limits; intentional censorship; and tracker reflects minimum estimates.

Notes. ICC: International Criminal Court; PHR: physicians for human rights; UA: Ukrainian; EN: English.
Sources: Attacks on Health Care Ukraine, 2025; Avramenko and McCain Institute, 2023; Physicians for Human Rights [PHR] and Truth Hounds, 2025; Truth Hounds, 2023, 2024.

The Reckoning Project

The Reckoning Project is a Ukraine-based CSO founded in 2022 that works in Ukrainian and English through a network of international partnerships. Its mission is to document IHL violations and support justice and accountability processes by combining legal expertise with journalism-based advocacy. Although it does not focus exclusively on AHC, its "Ukraine Testifies" archive preserves detailed witness statements that include AHC, linking narrative testimony to potential legal use (Table 4).

Table 4. Summary of the findings for The Reckoning Project.

	Findings
Platform and accessibility	"Ukraine testifies" map/archive (24 February 2022–February 2024); EN (UA testifies); open testimony archive; encrypted, and codified evidence for legal use.
Data collection and verification	*Sources*: In-depth witness interviews. *Methods*: "Do no harm"; trauma-informed approach; Berkeley-informed consent protocols. *Verification*: legal team plus Stanford Starling Lab (OSINT, encryption, and data integrity).
Engagement	~8.7 k followers; documentaries and photo-stories; regular advocacy presence at international conferences; and training for conflict journalists and researchers.
Accountability contribution	*National*: Memorandum of Understanding with Ukrainian Prosecutor General (evidence transfer). *International*: ICC and EU-supported initiatives; counter-disinformation and outreach to Global South media.
Constraints and challenges	Witness trauma and safety; balancing journalistic narrative with evidentiary standards; and exposure to disinformation.

Sources: European External Action Service (EEAS), 2025; Instititute for War and Peace Reporting, 2023; The Reckoning Project, 2024.

Bellingcat

Founded in 2014 in the Netherlands, Bellingcat is a civilian-led investigative collective specialising in OSINT on civilian harm and IHL violations. In the Ukrainian setting, its key projects are the "Civilian Harm in Ukraine" tracker and the "Eyes on Russia" platform. Both constitute highly interactive tools that combine open-source media with rigorous geo- and chrono-location verification informed by the Berkeley Protocol. Bellingcat's earlier investigations, including its work on the MH17 case, helped to establish OSINT as a credible basis for accountability processes (Bellingcat, 2022) (Table 5).

Table 5. Summary of the findings for Bellingcat.

	Findings
Platform and accessibility	"Civilian Harm in Ukraine" map, EN (descriptions), UA/RU (datasets); "Eyes on Russia" (11,600+ verified items), EN/UA. Open interactive maps; restricted evidentiary archives; ongoing updates; filters by time, location, category, and keyword (including AHC); geo-locations slightly obscured (safety); and data archived for future accountability use.

Data collection and verification	*Sources*: Social media, satellite imagery, OSINT community contributions. *Methods*: ~90-page methodological guide; Berkeley-informed procedures. *Verification*: geo-/chrono-location and multi-source triangulation.
Engagement	>1 million followers; *Eyes on Russia* 3.5 million+ views (2023); extensive OSINT training and capacity-building.
Accountability contribution	Justice and Accountability Unit (restricted) prepares cases; partnerships with Mnemonic (Ukrainian archive), Global Legal Action Network (GLAN), Centre for Information Resilience (CIR) for legal and archival work.
Constraints and challenges	Misinformation/disinformation and graphic content (ethics); language/context gaps (mitigated by Ukrainian contributors); transparency vs. protection of sensitive evidentiary material.

Sources: Bellingcat, 2022, 2025; Mnemonic, 2025; Strick, 2023.

Cross-case Observations

Across the four case examples, the organisation overviews suggest contrasting institutional positions: the WHO's SSA is as an intergovernmental surveillance system, while Truth Hounds, The Reckoning Project, and Bellingcat are CSOs with mandates from focused IHL documentation to broader civilian-harm investigations. Documentation platforms and accessibility also differ: the WHO provides a global database with open and restricted layers, whereas the CSOs operate specialised Ukrainian trackers and archives with variations in openness and interactivity from static dashboards to highly filterable maps.

All four initiatives rely on multiple sources and triangulation for data collection and verification, but balance these differently: the WHO mainly uses reports from country offices and partners; Truth Hounds and The Reckoning Project combine OSINT with witness testimony and fieldwork; Bellingcat relies on user-generated digital content and satellite imagery supported by detailed geo-/chrono-location methods. The CSOs explicitly reference emerging standards, such as the Berkeley Protocol.

Engagement and outreach are strongest for the CSO actors, which use social media, media collaborations, and training to publicise findings, whereas WHO's use of SSA data is embedded in institutional reporting and policy communication. Regarding accountability contribution, SSA primarily supports global situational awareness and debate, whereas Truth Hounds, The Reckoning Project, and Bellingcat maintain clearer channels to prosecutorial authorities, international courts, or dedicated justice and archival initiatives. All four face overlapping constraints: security risks, under-reporting, information overload, language and access barriers, and tensions between transparency and protection of sensitive data. These points provide empirical basis for the thematic discussion that follows on accountability and security practices in the Ukrainian setting.

Discussion: Comparative Insights

This section compares the four case examples thematically, analysing how the WHO's SSA, Truth Hounds, The Reckoning Project, and Bellingcat use digital tools to

document AHC in Ukraine, and what this implies for emerging accountability practices during wartime.

Digital evidence and OSINT practices

Truth Hounds defines OSINT as an instrument to locate, collect, and process openly accessible data for investigations. This includes satellite imagery, media reports, and personnel lists of the Russian armed forces with the aim to build qualitatively high-quality evidential investigations towards identification of alleged war criminals (PHR and Truth Hounds, 2025). The "Cruelty Cascade" report on double-tap attacks illustrates how OSINT work is combined with field visits to strike locations, allowing researchers to collect physical evidence and contextual details about Russian missile brigades, groups of forces, and the circumstances of the attacks (Truth Hounds, 2024). Together, these practices show how a Ukrainian CSO translates OSINT from a monitoring tool into an investigation-oriented strategy specialised towards individual criminal responsibility. In contrast, the WHO's SSA model remains focused on aggregate incident surveillance.

With a different focus, The Reckoning Project combines journalists, field researchers, data scientists, and international lawyers to document war crimes and pursue accountability without an exclusive mandate for AHC. Through the "Ukraine Testifies" platform and associated archival work, The Reckoning Project contributes directly to evidentiary and advocacy processes related to alleged crimes against healthcare. Additionally, it focuses on local capacity-building. Its trauma-informed methodology seeks to ensure that testimonies are collected in ways that respect human dignity and support legal admissibility, drawing on experience from Syria and Chechnya (The Reckoning Project, 2024). This approach may position testimonies as a successful complement to OSINT-guided investigations, addressing concerns in literature regarding re-traumatisation, power imbalances, and evidentiary instability in armed conflict-situated witness statements.

The case of Bellingcat highlights the challenge of managing the sheer volume of digital information generated through open-source investigations. It contributes to the Ukrainian Archive, which holds more than six million records of digital evidence on violations of human rights in Ukraine, supported by a central database and an "Auto Archiver" tool that captures volatile online content, such as Telegram posts (Centre for Information Resilience [CIR] and Bellingcat, 2025). These infrastructures are designed to standardise and streamline preservation, so that potentially relevant content is not lost before investigators or courts can assess it. By contrast, Truth Hounds uses artificial intelligence (AI) to corroborate large quantities of data, including material from other organisations' fieldwork. It emphasises that automated tools only operate after evidence has been professionally collected by trained documenters aware of security and trauma-related risks (Avramenko and McCain Institute, 2023). Together, these examples point to an emerging division of labour between large-scale archival systems and specialised investigative actors in Ukraine, each addressing different aspects of the data-volume problem.

On a methodological level, the Berkeley Protocol, translated into Ukrainian shortly after 24 February 2022, is now in active use by Ukrainian prosecutors investigating war crimes (Berkeley Human Rights Center, 2020). This study's findings confirm the traction this framework has gained, as all three CSOs (Truth Hounds, The Reckoning Project, and Bellingcat) apply its guidance in their documentation practices. This suggests a partial convergence between civil society and institutional standards for digital evidence in core crime cases, such as AHC, where investigators and judges must strengthen cyber–forensic capacities and use standardised methods to verify open-source material before it can be

admitted in court. At the same time, despite such progress and the increasing centrality of digital evidence in contemporary prosecutions, some argue that procedural rules remain underdeveloped (Kuczyńska, 2025).

A distinctive feature in this case comparison is Bellingcat's Justice and Accountability Unit, developed with the Global Legal Action Unit (GLAN), which works to ensure that publicly available open-source information is viable in legal proceedings. While the unit's case-related data is confidential because it feeds into national and international accountability mechanisms, its methodology is available in a detailed public document (Bellingcat, 2022). This semi-transparent model, based on closed evidentiary files but openly shared methods, offers one pathway for investigative collectives to strengthen the legitimacy of OSINT in formal processes without compromising sensitive information, and further illustrates how non-state actors in Ukraine are reshaping evidentiary standards for documenting AHC. These digital practices indicate that CSOs in Ukraine have developed investigation-ready evidence pipelines that complement, and in some respects surpass, traditional institutional monitoring. For European states facing potential spill-over of Russian aggression, they highlight the need to invest in OSINT capacity, secure archives and trauma-informed testimony work as part of health-security and defence planning.

Accountability: Emerging practices in wartime

Truth Hounds' work illuminates the role of civil society in contemporary justice and accountability processes. Since 2014, it has developed advanced methodologies and a refined evidence analysis database that now inform Ukraine's national justice system, for instance, through the Prosecutor General's war crimes unit (Avramenko and McCain Institute, 2023). At the same time, coordinating the many stakeholders involved domestically and internationally remains challenging. The study's findings nevertheless suggest steps towards improved interoperability, as Truth Hounds' systematic database is accessible to bodies such as the UN Commission of Inquiry, helping to avoid duplicative interviews and thus reducing burdens on witnesses.

Similar patterns emerge for The Reckoning Project (2024, p. 3), which has authored reports for UN mechanisms, such as the UN Special Rapporteur on the promotion of truth, justice, reparation and guarantees of non-recurrence, documenting Russian patterns of violations across three different countries and emphasising the "lack of historically contextualised approaches to accountability." These examples indicate a shift from predominantly institutional models of monitoring and accountability towards a multi-level, whole-of-society configuration in Ukraine. Indeed, local CSOs, transnational investigative networks, and intergovernmental bodies interact around shared digital evidence infrastructures. For other European states, effective protection of health systems as critical infrastructure may depend on integrating such civil society capacities into national defence and accountability architectures, rather than relying on intergovernmental surveillance systems, such as the WHO's SSA.

The findings further underline how Ukrainian CSOs operate against the backdrop of Russia's long-standing hostility towards an independent civil society. Indeed, this is exemplified by the 2012 "foreign agents" law and its diffusion to other post-Soviet states (Bush and Hadden, 2025). In contrast, wartime surveys in Ukraine show that volunteers and CSOs are among the most trusted institutions, and organisations such as Truth Hounds have deployed investigators to contexts, including Georgia, Tajikistan, Kazakhstan, Armenia, and Azerbaijan, exporting expertise developed in Ukraine (Lutsevych, 2024). Bellingcat's efforts to democratise investigations by involving the wider OSINT community,

and The Reckoning Project's journalistic–legal hybrid model, further demonstrate that accountability for AHC is increasingly shaped by diverse non-state actors, rather than by state or intergovernmental institutions alone.

Comparisons with Syria reinforce these observations. Research on Syrian civil society has shown how local groups stepped in to document widespread AHC violations amid profound impunity (Chlevickaitė, 2025). Cooperation between Syrian and Ukrainian organisations, including exchanges with the White Helmets, suggests that strategies and skills are being actively transferred across conflicts, with Syrian actors viewing Ukrainian advances in documentation as potentially beneficial for their own quest for justice (Truth Hounds, 2024). These cross-context connections indicate that models developed in Ukraine may be relevant for other regions facing protracted attacks on health systems.

Operational challenges and ethical reflections

The human impact of AHC is starkly evident in the examined documentation efforts through the testimonies collected by Truth Hounds and others, which describe experiences of extreme vulnerability and dehumanisation (Amelina, 2025). All three CSOs emphasise survivor-centred and trauma-sensitive practices, reflected in Truth Hounds' recognition with a "Justice for Survivors" award and The Reckoning Project's emphasis on non-leading questions and repeated, long-term engagement with witnesses (Truth Hounds, 2023). At the same time, both researchers and investigators face psychological strain from prolonged exposure to violence, prompting organisations to invest in staff training and psychosocial support (Avramenko and McCain Institute, 2023).

Operationally, the findings echo previous research on the risks and limitations of evidence collection in active conflicts, including threats to civilians involved in documentation and the difficulty of obtaining precise information through traditional investigations alone (Bohdanova, 2024; Poole *et al.*, 2025). Locally embedded teams, such as The Reckoning Project's fully Ukrainian staff and Truth Hounds's collaboration with regional prosecutors, help to mitigate some of these challenges by leveraging language skills, contextual knowledge, and local legitimacy (Grzebyk and Uczkiewicz, 2025; Instititute for War & Peace Reporting, 2023). A central legal hurdle is proving intent, particularly for tactics, such as double-tap strikes on healthcare facilities. Truth Hounds's methodology traces command changes, analyses open-source drone footage, and documents calculated targeting of first responders. Such methods found in this paper's research illustrate how digital investigations can help to establish deliberate intent under IHL. The importance of concerted efforts on this brutal and inhumane matter was best voiced by a legal team member of Truth Hounds (2023, 2024): "If you kill one person, you kill one person; if you kill one doctor, you kill 100 people."

Further complicating documentation and accountability is the ubiquitous information warfare. Disinformation campaigns can erode trust in humanitarian actors and endanger personnel, making credible and transparent investigative work more important but also more difficult (Norcliffe-Brown *et al.*, 2025). The Reckoning Project's media outputs, such as the documentary "The Hospital That Was Taken Hostage," which recounted the story of the temporarily occupied Snihurivka hospital (Vanity Fair, 2023). This exemplifies efforts to counter such narratives and sustain international attention to AHC violations. For the WHO, political constraints as an IGO create additional tension: member-state control over SSA reporting and reluctance to invoke legal liability have limited the system's capacity to drive accountability. Observers describe the WHO as a "creature of its member states" and call for reforms to strengthen verification and political decisiveness (Brennan, 2024; Meier *et al.*, 2021; Rubenstein, 2021). Strengthening prioritisation of

the issue on a political level, and increased efforts surrounding implementation strategies in the institutional sphere appear paramount to achieving accountability for contraventions of IHL that impact health and its critical infrastructures.

Opportunities and future implications

The sustainability of these documentation and accountability efforts is uncertain. While this article focused on 2022–2024, developments in the early 2025, including USAID funding cuts that saw 42% of CSOs cancelled or scale downprogrammes, may reduce the capacity of the organisations cited in this study to do their work. Such uncertainty over funding highlights the vulnerability of civil society infrastructures that underpin digital monitoring and evidence collection (ACAPS, 2025; Kottasova and Kostenko, 2025). Indeed, concerning trends indicate a "systematic defunding and deprioritisation of research, evidence generation, and rights-based advocacy on migration and health" (Orcutt and McKee, 2025). The suspension of over twenty projects, including those in Sudan, Syria, and Ukraine, reflects shifting donor priorities that risk undermining CSO-led documentation efforts globally (Pamuk and Deutsch, 2025).

More positively, initiatives, such as the Syria's Research for Health System Strengthening (R4HSSS) project, present the potential of co-produced evidence that connects local health authorities, CSOs, and international organisations (Ekzayez and Bricknell, 2025). The Ukrainian cases analysed here point in a similar direction: resilient health-security arrangements appear to depend on mindful and inclusive cooperation between civil society, state, and military institutions, advancing Sustainable Development Goals (SDG) 3 and 16 by linking protection of health systems with broader peace, justice, and strong institutions (Arugay and Baquisal, 2024). These evolving practices have security and defence implications not only for Ukraine but also for other European states vulnerable to conflict-driven health-system destabilisation; they underscore the need for anticipatory strategies that combine surveillance, robust accountability mechanisms, and investment in local knowledge to protect health systems as critical security infrastructure.

Conclusions

This study indicates that no single actor or instrument is sufficient to address the security and public-health consequences of AHC in an armed conflict. In the Ukrainian setting, the WHO's SSA, Ukrainian CSOs, and transnational investigative collectives contribute distinct capabilities: global surveillance, investigation-ready digital evidence strategies, and large-scale archiving and analysis of open-source material. Together, they indicate a shift from predominantly institutional, top-down monitoring towards a multi-level, whole-of-society configuration of accountability.

The four case examples illustrate how different models of AHC tracking and evidence transfer currently work in practice and what capacities they require: standardised but adaptable OSINT methodologies, secure and searchable archives, trauma-informed testimony collection, and interoperable databases that may be accessed by prosecutors and international mechanisms. At the same time, they underscore persistent pitfalls. For instance, funding fragility, political constraints on intergovernmental bodies, risks to documenters and witnesses, and unresolved procedural rules for digital evidence and intent under IHL.

For other European states facing the possibility of similar attacks on health systems, the Ukrainian experience suggests that effective protection of health facilities as critical

security infrastructure depends on integrating civil society documentation capacities into national defence and accountability architectures, rather than relying solely on intergovernmental surveillance. Digital and open-source methods cannot in themselves overcome weak enforcement, but they can narrow evidentiary gaps on issues, such as deliberate targeting and double-tap strikes, potentially strengthening institutional accountability if matched by political will and legal adaptation.

Finally, the cases examined here point to the importance of sustained support for locally rooted, internationally connected documentation networks. Lessons shared between Syrian and Ukrainian organisations already show how such networks can travel across conflicts. Future work should explore how these collaborative models can be institutionalised and scaled without losing their responsiveness to survivors, and how they can contribute not only to retrospective justice but also to deterring further AHC beyond Ukraine.

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Data Availability Statement

The data presented in this study is available on request from the corresponding author.

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