DIGITAL PEACEBUILDING

2026 Issue 2

Use of Remote Sensing in Naming and Shaming

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Executive Summary

Naming and shaming (NS) can reduce violence by imposing reputational costs on an actor that pressures them to change their behavior. The outcomes of NS vary widely and can trigger backlash, potentially worsening conflict. Additionally, NS isn't a long-term solution to reducing violence. Remote sensing (RS) technology may improve the likelihood of success of NS, particularly in improving the initial implementation of an NS campaign through improved identification and publicity. However, RS also introduces unique risks that can exacerbate violence. NS nor RS technology, alone, address the underlying causes of violence.

Introduction

Naming and shaming (NS) is a tactic employed to reduce violence by publicizing actions that deviate from accepted international norms. Remote sensing (RS) can strengthen an NS campaign by providing unprecedented transparency and documentation of previously unseen behaviors. Evidence of intolerable behavior early in NS can lead to swift compliance, however, RS can also accelerate violence and promote new forms of violence. This brief discusses the ways in which RS can facilitate successful NS and provides recommendations and considerations for using RS in NS campaigns.

Naming and Shaming

NS is an instrument used by state and nonstate actors to try to change another actor's behavior to "get other countries to comply with accepted norms."[1] This instrument typically "target(s) a range of undesirable behaviors" with economic, political, or reputational repercussions.[2] For NS to achieve its intended goal of reducing violence, the "shamed actor" must fear retribution or care about the perception others have of them for the factor to be effective.[3, 4]

The outcomes of NS in facilitating peace are highly contingent on the following conditions:

- appropriate identification: being able to clearly see the action that is to be shamed[5]
- publicity: how large of an audience the action draws; whether the public feels moved to condemn the named party[6]

1 Qingli, Wendy He and Haridas Ramasamy. 2020. "Naming and Shaming China: America's Strategy of Rhetorical Coercion in the South China Sea." Contemporary Southeast Asia 42 (3) (12): 317-345. https://doi.org/10.1355/cs42-3a.
2 Ilgit, Asli, and Deepa Prakash. 2019. "Making Human Rights Emotional: A Research Agenda to Recover Shame in 'Naming and Shaming.'" Political Psychology 40, no. 6 (2019): 1297–1313. http://www.jstor.org/stable/45223193.
3 Bassan-Nygate, Lotem, and Gadi Heimann. 2024. "Dealing with Guilt and Shame in International Politics." International Relations (London) 38 (2). London, England: SAGE Publications: 256–78. doi:10.1177/00471178221086147.
4 Gilbert, P. 2019. Distinguishing Shame, Humiliation and Guilt: An Evolutionary Functional Analysis and Compassion Focused Interventions. In: Mayer, CH., Vanderheiden, E. (eds) The Bright Side of Shame. Springer, Cham. https://doi.org/10.1007/978-3-030-13409-9_27.
5 Pawson, Ray. 2002. "Evidence and Policy and Naming and Shaming." Policy Studies 23 (3): 211–30. https://doi.org/10.1080/01442870220000 45993.
6 Pawson. "Evidence and Policy and Naming and Shaming."

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• if this factor is paired with another instrument: coupling naming and shaming with tools like sanctions or NGO presence to further persuade the shamed country to change their behavior[7, 8]

• the composition of the stakeholder group: whether the country doing the shaming is viewed as a dominant global influence and if the country being shamed fears condemnation

Technologies, like RS, improve the efficacy of NS in reducing violence, primarily through improving the first two conditions, identification of violence and publicity or visibility of the violence.

Remote Sensing

RS is "the practice of collecting information about the Earth's surface without direct contact," like imagery captured by satellites and drone, extending the "reach of monitors and the quality of information they collect."[9, 10] RS is used for a variety of purposes, including but not limited to military missions, meteorological forecasting, disaster monitoring and detecting human rights violations in conflict zones.[11, 12] RS benefits NS by improving early warning of conflict, improving visibility of compliance, and documenting war crimes.

"Remote Sensing improves the efficacy of Naming and Shaming in reducing violence, primarily through... identification of violence and publicity or visibility of the violence."

Detecting Potential Conflict

The way in which NS can stop or reduce violence is by identifying potential conflict early and intervening before further escalation. Early detection can manifest as the identification of environmental changes, including: changes in nighttime light emissions that signal the expansion of imprisonment camps, a receding lake that will cause conflict over water access, fortifying military positions and other increased militaristic activity that suggests preparation for conflict, or destroyed food sources that will lead to food insecurity.[13, 14, 15, 16, 17]

The success of detecting changes requires both the employment of the technology as well as the technical capability and capacity (i.e., analysts) to transform imagery into actionable information.

RS can facilitate detection for naming and shaming in several ways. RS can:

- identify environmental changes
- detect movement changes (e.g., an abandoned village or military movement)
- provide timely and comparative imagery

RS has its limitations, though. RS can capture imagery that illustrates a change, but requires analysts or additional technology (e.g., artificial intelligence) to translate imagery into intelligence. This analytic product then must be effectively used in NS to prevent conflict. Thus, RS requires a team of dedicated analysts who are looking to find early warning indicators in imagery. Additionally, RS

7 Murdie, Amanda M., and David R. Davis. 2012. "Shaming and Blaming: Using Events Data to Assess the Impact of Human Rights INGOs." International Studies Quarterly 56, no. 1 (2012): 1–16. http://www.jstor.org/stable/41409819.

8 Peterson, Timothy M, Amanda Murdie, and Victor Asal. 2018. "Human Rights, NGO Shaming and the Exports of Abusive States." British Journal of Political Science 48 (3). Cambridge, UK: Cambridge University Press: 767–86. doi:10.1017/S0007123416000065.

9 Kazanskiy, Nikolay, Roman Khabibullin, Artem Nikonorov, and Svetlana Khonina. 2025. "A Comprehensive Review of Remote Sensing and Artificial Intelligence Integration: Advances, Applications, and Challenges." Sensors 25 (19): 5965. https://doi.org/10.3390/s25195965. p. 1.

10 Verjee, Aly. 2025. "How Surveillance Motivates New Violence: Ceasefire Monitoring, Remote Sensing Technology, and Noncompliance." Surveillance & Society 23 (3): 287–302. https://ojs.library.queensu.ca/index.php/surveillance-and-society/article/view/18908/12805.

11Columbia School of International and Public Affairs. 2019. Defining a Brave New Field. New York: International Peace Institute. https://www.sipa.columbia.edu/sites/default/files/migrated/downloads/International%2520Peace%2520Institute_Defining%2520a%2520Brave%2520New%2520Field.pdf.

12 University of Minnesota Polar Geospatial Center. 2026. "Introduction to Satellite Imagery." Polar Geospatial Center. Last modified January 14, 2026. https://www.pgc.umn.edu/guides/commercial-imagery/intro-satellite-imagery/.

13 Robinson, Eric, and Sean Mann. 2021. "Part 1: Investigating the Growth of Detention Facilities in Xinjiang Using Nighttime Lighting." Tearline, February 26, 2021. https://www.tearline.mil/public_page/xinjiang-nighttime-1.

14 Naghizadeh, Mikael Hiberg. 2025. "What We Don't See: Uncovering Intercommunal Violence through Remote Sensing." Political Geography 116 (January): 103259. https://doi.org/10.1016/j.polgeo.2024.103259.

15 Al Achkar, Ziad, Isaac Baker, Brittany Card, Benjamin Davies, Joan Heck, Samuel Plasmati, and Nathaniel Raymond. 2013. Sudan: Anatomy of a Conflict. Cambridge, MA: Harvard Humanitarian Initiative. https://hhi.harvard.edu/sites/g/files/omnuum6866/files/humanitarianinitiative/files/sudan-anatomy-of-a-conflict.pdf.

16 Dorschel, Martin, and Roxana Duerr. 2017. "Help from Space: Possibilities and Limitations of Remote Sensing in Crisis and Disaster Management." KfW Stories, May 23, 2017. https://www.kfw.de/stories/kfw/stories/society/social-cohesion/remote-sensing-in-crisis-and-disaster-management/.

17 Columbia School of International and Public Affairs. "Defining a Brave New Field."

Case Study: Detecting a Recessing Lake, Destroyed Villages, and an Arms Influx

In a hard-to-access area of Cameroon, remote sensing identified intercommunal violence caused by disputes over water access, which intensified "due to the receding of Lake Chad." Additionally, RS detected 112 [razed] villages, displacing more than 100,000 people, and "an influx of arms from neighboring Chad." This detection of environmental changes, displacement, and militaristic activity demonstrates how RS integration can strengthen a NS campaign. Illustrating these changes through before and after imagery provides evidence of imminent violence.

Sources:
Naghizadeh, Mikael Hiberg. 2025. "What We Don't See: Uncovering Intercommunal Violence through Remote Sensing." Political Geography 116 (January): 103259. https://doi.org/10.1016/j.polgeo.2024.103259.
Okpara, Uche T., Lindsay C. Stringer, Andrew J. Dougill, and Mohammed D. Bila. 2015. "Conflicts about Water in Lake Chad: Are Environmental, Vulnerability and Security Issues Linked?" Progress in Development Studies 15 (4): 308–325. https://doi.org/10.1177/1464993415592738.

often comes with licensing restrictions that limit who can access the imagery or analytic product, which may keep those who can intervene from receiving the necessary information. RS can also put vulnerable populations at further risk by increasing surveillance, raising privacy concerns.



Copernicus Sentinel, processed by Pierre Markuse, 2023.
Satellite imagery of fires in Israel and the Gaza strip - 7 October 2023.
https://commons.wikimedia.org/wiki/File:Fires_in_Israel_and_the_Gaza_strip_-_7_October_2023_(53245908850).jpg

Monitoring Compliance

NS can reduce violence by monitoring compliance to agreements and immediately NS someone if they don't comply with the terms of the agreement. These agreements can include peace treaties, which formally establish terms for peace, or cease fires, to agree to temporarily stop fighting. RS technology helps governing bodies monitor other nation states.[18, 19]

While peace treaties and cease fire agreements are meant to stop or reduce conflict, their success largely depends on verifiable compliance.

RS can aid in the monitoring of compliance to agreements by:

- immediately detecting any changes to activity
- providing evidence of compliance or non-compliance
- standardizing monitoring; reduces risk of intimidation or pressure on human monitors
- eliminating reliance on self-reporting

"Remote Sensing technology helps governing bodies monitor other nation states."

However, RS has limitations. RS platforms can be lost and unrecoverable, causing a significant setback for monitoring compliance [to a treaty], or potentially increasing noncompliance as actors are aware they are no longer monitored.[20]

Additionally, an important aspect of compliance monitoring is identifying non-compliance in real time. "Modern remote sensing technologies present significant challenges in data processing, analysis, and interpretation."[21] While human analysis can create a lag between a noncompliant action and identification RS models that integrate AI into their workflow provide "automated, efficient, and precise

18 Luna, Javier Canales. 2019. Naming and Shaming in the European Union Emission Trading Scheme: A Legal Review. Master's thesis, European Law School. https://www.researchgate.net/profile/Javier-Canales-Luna/publication/335368992_Naming_and_shaming_in_the_European_Union_Emission_Trading_Scheme_a_legal_review/links/5e74b7b3a6fdccda8b714cce/Naming-and-shaming-in-the-European-Union-Emission-Trading-Scheme-a-legal-review.pdf.
19 Verjee. "How Surveillance Motivates New Violence."
20 Durden, Tyler. 2025. "'Shame & Name' Climate Activist Satellite Backed by Bezos Lost." ZeroHedge, July 1, 2025. https://www.zerohedge.com/technology/shame-name-climate-activist-satellite-backed-bezos-lost.
21 Kazanskiy, Nikolay, Roman Khabibullin, Artem Nikonorov, and Svetlana Khonina. 2025. "A Comprehensive Review of Remote Sensing and Artificial Intelligence Integration: Advances, Applications, and Challenges." Sensors 25 (19): 5965. https://doi.org/10.3390/s25195965.

Case Study: Ukraine's Abducted Children

Analysis of satellite RS imagery, in conjunction with open source information, concluded that children from Ukraine were taken to various locations in Russia where they are forced into re-education activities including, "cultural, patriotic, or military programming that aligns with pro-Russia narratives." Imagery from RS shows these re-education schools are continuing to expand and that more than half are directly managed by the Russian government. This data has been shared with Ukrainian law enforcement and Europol, was the "basis for the 2023 arrest warrants issued for Russia President Vladimir Putin" by the International Criminal Court, and is being used to pursue a Genocide Convention case against Russia and the International Court of Justice. This RS documentation for NS has sparked wide condemnation of Russia's actions.

Sources:
Yale Humanitarian Research Lab. 2025. "Ukraine's Stolen Children: Inside Russia's Network of Re-Education and Militarization." Yale School of Public Health. https://files-profile.medicine.yale.edu/documents/e6294def-3f80-4d71-9cc7-91f6af70a523
Tom Lantos Human Rights Commission, 2025, "Ukraine: Abducted Children and Mechanisms for Accountability." Human Rights Commission. https://humanrightscommission.house.gov/events/hearings/ukraine-abducted-children-and-mechanisms-accountability#:~:text=Children%20have%20suffered%20violence%20and,accountable%20for%20human%20rights%20violations.

analysis of vast and complex datasets."[22]

The use of RS is thought to deter noncompliance and improve monitoring of compliance to treaties and ceasefires but it could inadvertently increase violence. The presence of RS "in ceasefire monitoring creates a new class of violations: resistance to [remote sensing] itself."[23] This is because the actors being monitored may want to understand the capacity and capability of the RS technology and may "devalue classical forms of eyewitness and interview-led monitoring," helping the monitored actor to "shirk responsibility for violations."[24]

This may "train conflict parties in counter measures, thus improving the military capacity of belligerents."[25]

Documenting War Crimes

NS can reduce violence by documenting and publicizing war crimes. War crimes generate global attention, particularly when there is strong evidence of the crimes. This documentation can lead to international criticism of the shamed actor and can enable formal accountability through national and international criminal systems.



Alhaj, Abedallah. Aerial view of destruction in Beach refugee camp, Gaza Strip. July 3, 2024. Photograph. UNRWA. Wikimedia Commons. CC BY-SA 3.0 IGO. https://commons.wikimedia.org/wiki/File:Aerial_view_of_destruction_in_Beach_refugee_camp,_Gaza_Strip.jpg. Cropped to fit page; no other changes were made to this photo.

22 Kazanskiy. "A Comprehensive Review of Remote Sensing and Artificial Intelligence Integration." p. 1.
23 Verjee. "How Surveillance Motivates New Violence." p.2
24 Verjee. "How Surveillance Motivates New Violence." p.2
25 Verjee. "How Surveillance Motivates New Violence." p.2

Documentation for NS plays a particular role in setting the identification condition. High resolution imagery can provide a clear picture of violence.

RS can facilitate documenting evidence of war crimes for use in NS.

- imagery can independently motivate a NS campaign prior to having enough evidence for a formal legal proceeding
- imagery of war crimes can provide enough evidence to the general population to draw conclusions and impose reputational cost on the shamed actor

An important piece of documenting war crimes is keeping the affected population informed of the legal proceedings. While it may be difficult for the deployer of remote sensing to keep people informed, particularly because those with the most vested interest are often displaced, it is possible to deploy the technology and reduce this limitation.

While documentation may be seemingly straight forward and beneficial to reducing violence, RS documentation can backfire. The "presence of private satellite networks" can create tension between nations, potentially leading to "cyberattacks or sabotage against satellite systems," and "further widens the digital divide globally."[26] Additionally, when powerful nations are involved, human rights groups may be hesitant to criticize them, incentivizing the human rights group to focus investigations on "less powerful states."[27] The African Union has pointed out that "the international criminal justice system… [focuses] primarily on cases from the Global South," leading "several African nations" to threaten to "withdraw from ICC jurisdiction because of these concerns," creating distrust in international criminal law.[28] Agreements "between governments and geospatial data companies to blur or otherwise censor sensitive data" can cause human rights investigations to be skewed if investigators have incomplete information.[29] This can cause people, including the affected population and the human rights organizations or investigators, to distrust RS technology, and can create friction between human rights agencies, governments, and affected populations.

Case Study: Naming and Shaming China using Aerial Imagery

In 2015, a journalist was embedded on a US Navy surveillance plane to publicize China's "extensive and fast paced" actions to build artificial islands in the South China Sea. The intent was to "impose reputational costs on China." This did bring awareness, sparking condemnation from the Philippines, Singapore, Australia, and Japan. However, China responded by threatening their ability and willingness to take violent action, calling the patrol "very irresponsible," and stating "a Chinese guided missile destroy and navy patrol ship shadowed the vessel… and [China] is not frightened to fight a war with the US in the region, and is determined to safeguard its national interests and dignity." This case study highlights where NS can achieve triggering global criticism, while also increasing tensions bewteen nations.

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Campbell, Caitlin. 2015. "Naming and Shaming: U.S. Surveillance over China's Land Reclamation Projects and Regional Reactions." U.S.-China Economic and Security Review Commission. GovInfo. https://www.govinfo.gov/content/pkg/GOVPUB-Y3_2_C44-PURL-gpo174872/pdf/GOVPUB-Y3_2_C44-PURL-gpo174872.pdf.

Fox News, "China Calls Navy's Patrol through Disputed Islands 'Provocative,'" October 28, 2015, updated May 2, 2016.

26 De Rosa, Sergio. 2025. "The Political Issues of Satellite Networks for Telecommunications." Aerotec. Missili Spaz. 104: 79. https://doi.org/10.1007/s42496-025-00256-6.

27 Kannegieter, Hannah. 2023. "Privacy and Veracity Implications of the Use of Satellite Imagery from Private Companies as Evidence in Human Rights Investigations." Harvard Human Rights Journal, November 29, 2023. https://journals.law.harvard.edu/hrj/2023/11/privacy-and-veracity-implications-of-the-use-of-satellite-imagery-from-private-companies-as-evidence-in-human-rights-investigations/.

28 Kannegieter. "Privacy and Veracity Implications of the Use of Satellite Imagery."

29 Kannegieter. "Privacy and Veracity Implications of the Use of Satellite Imagery."

30 Naghizadeh, Mikael Hiberg. 2025. "What We Don't See: Uncovering Intercommunal Violence through Remote Sensing." Political Geogra-

Recommnedations

Integrating RS technology into a NS framework can lay the foundation for a successful, short-term reduction in violence. NS is not a mechanism for prolonged peace and requires integration with other diplomatic tools to continue peaceful conditions long-term. While RS improves the chances of a successful NS campaign, this technology also presents additional challenges and risks, such as creating distrust by threatening privacy.[30]. Because of this, actors planning to use NS and RS should:

- analyze all conditions (identification, publicity, instrument pairing, and stakeholder composition), with particular consideration for the other diplomatic instruments that can sustain peace long-term, and RS application for identification and publicity
- if using RS, have deliberate imagery management throughout the imagery lifecycle (collection, distribution, destruction) to prevent exposing vulnerable populations to further violence
- integrate a feedback loop with the affected population
- users of RS must be weary of technology replacing "in-depth knowledge about local social conditions and processes," to avoid RS creating more distance between human rights activists and conflict[31]
- implement ways to monitor for increased violence or other unintended consequences

30 Paci, Tristan, and Maurice Sayinzoga. 2024. Space and Democracy: Increasing Transparency and Accountability in Outer Space Governance. Washington, DC: National Democratic Institute for International Affairs. https://www.ndi.org/sites/default/files/Space_Democracy_Paper.pdf.
31 Naghizadeh, Mikael Hiberg. 2025. "What We Don't See: Uncovering Intercommunal Violence through Remote Sensing." Political Geography 116 (January): 103259. https://doi.org/10.1016/j.polgeo.2024.103259.

DIGITAL PEACEBUILDING

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Alternatives to SWIFT: Subverting Economic Sanctions

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Executive Summary

Economic sanctions are a widely used tool, often invoked to prevent violence and facilitate peacebuilding through harming the economic prospects of a belligerent actor. Sanctions imposed through the SWIFT system have this ability by cutting off access to international finances and preventing transactions. Today, however, there are substitutes and alternatives to SWIFT which allow countries to subvert these sanctions. SWIFT must maintain its dominance in the field of financial telecommunications by adapting to eclipse these alternatives and assuage concerns about Western preeminence within SWIFT governance in order to best preserve this prominent tool of economic sanctions in facilitating peacebuilding. It can accomplish this by working to make its system faster and less costly, manipulating its role as a regulations standards bearer, establishing itselft as a key platform for the emerging Central Bank Digital Currencies, and actively promoting a more varied governance structure and diverse board of directors.

Introduction

Preventing the facilitation of violence through economic sanctions is a vital tool in peacebuilding today. The Society for Worldwide Interbank Financial Telecommunications (SWIFT) is an organization with technology that is essential for the international financial system. Sanctions have been increasingly facilitated through SWIFT by suspending members from using that technology, effectively stopping them from engaging in international trade and finance. However, direct substitutes and alternatives to SWIFT have sprung up in response to its use as a tool for financial sanctions. These alternatives provide a pathway for target countries to subvert sanctions, hindering the facilitation of peacebuilding.

Sanctions

Sanctions are typically characterised by relatively simplistic definitions in the oftentimes verbose realm of international affairs. They entail measures, economic or financial, which allow the "sender" country to "extract political concessions from the target country,"[1] or to engage in "economic coercion for political gains".[2] These desired political gains often represent peacebuilding efforts at the international level, such as the end of a violent conflict, invasion, or belligerent act. Through the broad categories of trade, aid, and finance, sanctions can and have been responsible for the facilitation of peace and the curbing of violence around the world.

1. Hovi, Jon, Robert Huseby, and Detlef Sprinz. 2005. "When Do (Imposed) Economic Sanctions Work." World Politics 57, no. 4 (July): 479-499. https://doi.org/10.1353/wp.2006.0011.

2. Pape, Robert. 1997. "Why Economic Sanctions Do Not Work." International Security 22 (2): 66-97. https://doi.org/10.2307/2539263.

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Financial sanctions have become an increasingly appealing tool of sender states in the past few decades, demonstrating a higher likelihood of success than other forms of sanctions.[3] Suspension of target states from SWIFT specifically has taken on a key role in imposing penalties on target states, blocking access to what is essentially the "plumbing", or necessary back channel, of the international financial network.[4] In response to this suspension, alternative technologies to SWIFT have sprung up around the world. These alternative technologies, broken down into direct substitutes to SWIFT and alternatives to SWIFT (payment systems and cryptocurrencies), enable the subversion of this key form of economic sanctions, facilitating the continuation of violence.

How Sanctions Facilitate Peacebuilding by Hindering Violence

When sanctions are imposed by the sender state, they can prevent violence in two primary ways: directly and indirectly. Direct violence prevention can be precipitated by preventing aggressor action through dissuading potential belligerents from engaging in violence against the target group, forestalling a third party or outside actors from engaging in an ongoing conflict,[5] or raising the cost of action for carrying out acts of violence, inherently scaling down the level of violence by diminishing available materials.[6]

Far more abundant are the forms of indirect violence prevention. This includes sanctions which target a country or group's elites, representing approximately one-third of Western-backed sanctions[7] since 1990.[8] This form of economic sanctions, often referred to as "smart" sanctions, freezes assets or targets specific elite-owned corporations, those who would have the power to dissuade the regime from committing acts of violence. These aim to minimize collateral damage to bystanders in the violence, although they are considered largely symbolic measures in academic literature because target governments typically take actions to shield those elites.[9] Economic sanctions also represent an indirect precursor to the sender engaging military force, a signaling tool attempting to gain the prescribed concessions and prevent violence by emphasizing the severity of the grievance.[10] Additionally, all governments must also be wary of instability in their general populations, which has the ability to destabilize their leadership or even usurp it.

While economic sanctions which target a country's economy generally are often not disastrous, they impose high costs on the general populations by facilitating increases in consumer prices or cuts to public spending.[11] In doing so, these leaders risk wider instability and a shift in public opinion away from the target state's violent actions. When these economic sanctions are levied on a target country, foreign direct investment simultaneously decreases, which can have adverse ripple effects like stagnating the economy and raising unemployment rates, particularly in least developed countries, generating social instability.[12] Finally, economic sanctions will indirectly facilitate reputational harm for the target country, deterring lucrative or vital alliances.[13] Each of these categories illuminates the far reaching indirect costs of sanctions.

Certain conditions indicate when economic sanctions may be more or less successful in facilitating peace. Unilateral sanctions are gererally more successful, extracting concessions at a higher rate than multilateral sanctions because they avoid free-riders, indicate the importance of the issue for the sender state(s),[14] and avoid inter-country disputes about specific implementation preferences.[15]

3. Dashti-Gibson, Jaleh, Patricia Davis, and Benjamin Radcliff. 1997. "On the Determinants of the Success of Economic Sanctions: An Empirical Analysis." American Journal of Political Science 41 (2): 608-618. https://doi.org/10.2307/2111779.

4 .Robinson, Gary, Sabine Dorry, and Ben DeRudder. 2022. "Global networks of money and information at the crossroads: Correspondent banking and SWIFT." Global Networks 23, no. 2 (September): 478-493. https://doi.org/10.1111/glob.12408.

5. Rogers, Elizabeth. 1996. "Using Economic Sanctions to Prevent Deadly Conflict." Economic Sanctions, (May), 92-101. https://www.belfercenter.org/publication/using-economic-sanctions-prevent-deadly-conflict.

6. Bergeijk, Peter, and Thomas Biersteker. 2015. "How and When do Sanctions Work? The Evidence." Issue - EU, 17-28. 10.2815/710375.

7. Weber, P. M., and G. Schneider. 2020. "Post-Cold War sanctioning by the EU, the UN, and the US: Introducing the EUSANCT Dataset." Conflict Management and Peace Science 39, no. 1 (August): 97-114. https://doi.org/10.1177/0738894220948729.

8.Tsz-Ning, Wong, Julia Grauvogel, and Marinov Nikolay. 2024. "Targeted Sanctions Against Authoritarian Elites." SSRN, (March), 1-57. https://dx.doi.org/10.2139/ssrn.4094157.

9. Anh, Daniel, and Rodney Ludema. 2020. "The sword and the shield: The economics of targeted sanctions." European Economic Review 130, no. 1 (November): 1-21. https://doi.org/10.1016/j.euroecorev.2020.103587.

10. Dizaji, Sajjad, Piotr Lis, Syeb Murshed, and Mahjoob Zweiri. 2020. "What the political economy literature tells us about blockades and sanctions." International Institute of Social Studies Working Paper 663. https://www.iss.nl/en/news/what-political-economy-literature-tells-us-about-blockades-and-sanctions.

11. Shin, Geiguen, Seung-Whan Choi, and Shali Luo. 2016. "So economic sanctions impair target economies?" International Political Science Review 37:485-499. 10.1177/0192512115590203.

12. Biglaiser, Glen, and David Letzian. 2011. "The effect of sanctions in U.S foreign direct investment." International Organization 65 (3): 531-551. 10.1177/0192512115590203.

13. U-Jin Ang, Adrian, and Dursun Peksen. 2007. "When Do Economic Sanctions Work?Asymmetric Perceptions, Issue Salience, and Outcomes." Political Research Quarterly 60, no. 1 (March): 135-145. https://doi.org/10.1177/1065912906298632.

14. Hufbauer, Gary C., Jeffrey Scott, and Kimberly Elliott. 2007. Economic Sanctions Reconsidered. N.p.: Peterson Institute for International Economics. https://ebookcentral-proquest-com.revproxy.brown.edu/lib/brown/reader.action?pq-origsite=primo&ppg=186&docID=3385467#.

15. Bapat, Navin, and Clifton Morgan. 2009. "Multilateral Versus Unilateral Sanctions Reconsidered: A Test Using New Data." International

Case Study: Russia's Substitute for SWIFT

Russia's System for Transfer of Financial Messages (SPFS) best exemplifies a direct substitute for SWIFT. It was established in 2014, following the international political fallout of its invasion of Crimea. Exhibiting the influence which Western nations have over SWIFT, it was the European Union who introduced a resolution to suspend Russia from the SWIFT system following this invasion. Although the suspension was not implemented by SWIFT, the threat was enough to prompt Russia to develop its own financial telecommunications system, enabling its banks and institutions to still engage in transactions should it ever be suspended from SWIFT, which many of its banks were in 2022. Also still using the SWIFT regulations and standards (ISO 20022), SPFS is connected with 400 banks worldwide, although most are concentrated within Russia. Although not an intimidating rival for SWIFT, its planned merger with India's Structured Financial Messaging System (SFMS) and China's CIPS could make it a larger player in the global economy in the future, challenging the effectiveness of SWIFT sanctions.

Source: Cipriani, Marco, and Linda Goldberg. 2023. "Financial Sanctions, SWIFT, and the Architecture of the International Payment System." Journal of Economic Perspectives 37, no. 1 (Winter): 31-52.

A strong prior relationship between the sender and the target state makes eliciting a change in behavior more likely,[16] which is even more effective if there is a robust trade relationship between those two states.[17] Finally, the likelihood of success for financial sanctions is higher than other forms of sanctions.[18] One key form of financial sanctions is those being placed on access to and membership in the SWIFT network. SWIFT is an acronym for the Society for Worldwide Interbank Financial Telecommunications, a "network which securely transports messages containing the payment instructions between financial institutions involved in the transaction".[19] It includes a "global financial information infrastructure" with both clear standards and regulations surrounding financial transactions, as well as physical equipment such as data centers and message-processing zones.[20] Each of these is intended to ensure the secure telecommunication and transmission of essential financial messages.[21]

Without the ability to initiate transactions in a regulated manner through SWIFT, target states can lose the ability to engage in critical transactions related to essential goods, including energy products like oil and gas.[22] Energy products are essential for states or groups engaging in violence. Without imported substances like coal, oil, food, and arms, military operations could effectively grind to a halt, indicating that sanctions on SWIFT can have a profound direct impact on the ability of belligerents to carry out violence. Access to foreign currency reserves and foreign financial support would effectively be lost, further curtailing the capacity for violence and contributing to the potential for economic instability in a target state's economy.[23] Even beyond elites, sanctions on SWIFT can prevent remittances being transferred, which could sour public sentiment against the belligerent groups, especially in developing countries where remittances are a significant source of income.[24]

"Without the ability to initiate transactions in a regulated manner through SWIFT, target states can lose the ability to engage in critical transactions related to essential goods, including energy products like oil and gas."

16. Elliott, Kimberly A. 1997. "Evidence on the Costs and Benefits of Economic Sanctions." Peterson Institute for International Economics, October, 1997. https://www.piie.com/commentary/testimonies/evidence-costs-and-benefits-economic-sanctions.
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20. Robinson, Gary, Sabine Dorry, and Ben DeRudder. 2022. "Global networks of money and information at the crossroads: Correspondent banking and SWIFT." Global Networks 23, no. 2 (September): 478-493. https://doi.org/10.1111/glob.12408.
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23. Sottosanti, Danielle. 2022. "SWIFT Sanctions on Russia may be felt for years to come." The Statement. https://thestatement.bokf.com/articles/2022/03/10/17/40/SWIFT-sanction-on-Russia.
24. Cipriani, Marco, and Linda Goldberg. 2023. "Financial Sanctions, SWIFT, and the Architecture of the International Payment System." Journal of Economic Perspectives 37, no. 1 (Winter): 31-52. https://doi.org/10.1257/jep.37.1.31.

It is important to also note that all standards and regulations for international financial communications are set by SWIFT. When a message is sent within the SWIFT systems, it maintains a common standard of credibility and reliability through required anti-fraud measures and safety precautions,[25] essential for large-scale international transactions.[26] Any transactions taking place outside of the SWIFT system would have no such guarantee of reliability and credibility, entailing slower transactions (higher costs).

There are some drawbacks to the use of the SWIFT system. The required fees for its use are higher than some alternatives (such as cryptocurrencies), and can require up to 1-5 days of processing time because of necessary fraud protections and security precautions.[27] Furthermore, with its headquarters residing in Belgium, SWIFT as an organization is subject to Belgian law and, accordingly, to the laws of the European Union (EU). Consequently, any sanctions which may be imposed by Belgium or the EU must be adhered to by SWIFT, generating Western bias in its governance. The United States also exerts outsized influences in this process, due to its central nature as a pillar of the global financial system, historically holding vast influence over decisions to impose sanctions.[28] Furthermore, SWIFT is overseen by the central banks of the G-10 nations, an overwhelmingly Western-led bloc, with a board of directors who are also primarily from those countries.[29] With this governance structure, the interests of Western nations are usually prioritised. This fact has led to considerable pushback from non-Western nations and blocs.

Alternatives to SWIFT - Facilitating Violence and Preventing Peacebuilding

Nearly half a century of SWIFT dominance in the international world order, with sanctions being primarily instituted by Europe and the United States, has led to backlash among primarily non-Western blocs and nations, who have generated their own alternative messaging systems to either circumvent sanctions or challenge the dominance of the dollar in the world economy.[30] These alternatives fall within two categories: substitutes and alternatives to SWIFT. Each represents an avenue for target states to avoid the repercussions of SWIFT sanctions and an attempt to enhance financial independence from Western nations.[31]

Substitutes for SWIFT

Direct substitutes for SWIFT were developed to counteract sanctions and gain a more independent financial telecommunications structure. Three systems exist today which fall under this category, carrying out approximately the same functions of SWIFT, with most even using SWIFT regulations (ISO 20022) as a foundation. The first is Russia's System for Transfer of Financial Messages (SPFS), which was generated as a direct response to the threat of removal from the SWIFT system after Russia's 2014 invasion of Crimea.[32] This substitute, expanded upon in the Case Study: Russia's Substitute for SWIFT, is primarily utilized for internal transactions, although is still connected with 23 foreign banks.[33] While not close to reaching the scale of SWIFT, it has been enough to enable Russia to continue facilitating international transactions, undermining the intended effects of SWIFT sanctions. This can be extrapolated to include

25. McKee, Michael, and Chris Whittaker. 2022. "Expulsion and Effect of SWIFT as a Means of Blocking International Financial Transactions." Trade and Security 3 (June): 72-85. https://www.dbpia.co.kr/pdf/pdfView.do?nodeId=NODE11535625&googleIPSandBox=-false&mark=0&minRead=15&ipRange=false&b2cLoginYN=false&icstClss=080000&isPDFSizeAllowed=true&accessgl=Y&language=ko_KR&hasTopBanner=true.
26. Scott, Susan, and Markos Zachariadis. 2012. "Origins and development of SWIFT, 1973–2009." Business History 54, no. 3 (June): 462-482. https://doi.org/10.1080/00076791.2011.638502.
27. Adenekan, Tobiloba. 2024. "Exploring the Viability of Replacing SWIFT with Digital Currencies: A Study of Technology, Regulation, and Market Dynamics." (December). https://www.researchgate.net/publication/387517358_Exploring_the_Viability_of_Replacing_SWIFT_with_Digital_Currencies_A_Study_of_Technology_Regulation_and_Market_Dynamics.
28. Cipriani, Marco, and Linda Goldberg. 2023. "Financial Sanctions, SWIFT, and the Architecture of the International Payment System." Journal of Economic Perspectives 37, no. 1 (Winter): 31-52. https://doi.org/10.1257/jep.37.1.31.
29. "Swift and sanctions." n.d. Swift. Accessed April 19, 2025. https://www.swift.com/about-us/legal/compliance-0/swift-and-sanctions.
30. Robinson, Gary, Sabine Dorry, and Ben DeRudder. 2022. "Global networks of money and information at the crossroads: Correspondent banking and SWIFT." Global Networks 23, no. 2 (September): 478-493. https://doi.org/10.1111/glob.12408.
31. Soprano, Roberto. 2024. "Financial (secondary) sanctions and the creation of a new international payments system." In Economic Sanctions Under International Law: Trade Continuity with Special Purpose Vehicles, 1-18. N.p.: Routledge,Taylor & Francis Group.
32. Cipriani, Marco, and Linda Goldberg. 2023. "Financial Sanctions, SWIFT, and the Architecture of the International Payment System." Journal of Economic Perspectives 37, no. 1 (Winter): 31-52. https://doi.org/10.1257/jep.37.1.31.
33. Perez, Christian. 2022. "What Does Russia's Removal From SWIFT Mean For the Future of Global Commerce?" Foreign Policy, March 8, 2022. https://foreignpolicy.com/2022/03/08/swift-sanctions-ukraine-russia-nato-putin-war-global-finance/.

Case Study: China's Alternative Payment System

A prime example of an alternative to SWIFT, the Chinese Cross-Border Interbank Payment System (CIPS) was developed in 2015. In addition to financial telecommunications services, CIPS also provides a platform for international settlements and payments. An essential caveat: all payments must be made in renminbi (RMB), and are backed by the People's Bank of China. This caveat represents a challenge to dollar privilege and the primacy of US currency in the global economy, and is notably capable of enabling transactions with countries under SWIFT sanctions. This is prominant as an alternative to the largely Western-backed and controlled SWIFT, something which decades of SWIFT sanctions imposed by Western states has made desirable for developing countries. Interestingly, CIPS also utilizes SWIFT's standards and regulations for financial telecommunications. Although it does not yet rival the size or scope of SWIFT, with the volume of its transactions being 0.3% of SWIFT's, its presence as an alternative payment system still poses a challenge to the effectiveness of SWIFT sanctions and peacebuilding efforts.

Source: Cipriani, Marco, and Linda Goldberg. 2023. "Financial Sanctions, SWIFT, and the Architecture of the International Payment System." Journal of Economic Perspectives 37, no. 1 (Winter): 31-52.

the ability to engage in violence even after the implementation of SWIFT sanctions on Russian banks in 2022 after the invasion of Ukraine, which has continued despite these severe ramifications. This can be attributed in part to SPFS and Russia's push more generally to diversify their economy to avoid the effects of Western-imposed sanctions.[34] US-led SWIFT sanctions against Iran in 2019 resulted in INSTEX, the Instrument in Support of Trade Exchanges. This substitute permitted payments clearing for countries engaging in transactions with Iran, primarily among 10 European nations.[35] Despite its creation to facilitate continued trade between these countries, INSTEX was only utilized once for the purpose of importing medical supplies during the Covid Pandemic, and was liquidated in 2023.[36] India similarly generated an internal payments system alternative to SWIFT, known as the Structured Financial Messaging System (SFMS), although this system is currently only utilized for domestic purposes.[37] Interestingly, due to the public nature of SWIFT regulations and formatting standards, both the Indian and Russian alternative systems utilize ISO 20022, the exact SWIFT regulations for financial telecommunications which are made public by SWIFT, allowing these countries to freeride on the pre-established and standardized regulations.



Image: Crypto Mining Center Source: Marko Ahtisaari, CC BY 2.0 <https://creativecommons.org/licenses/by/2.0>, via Wikimedia Commons

34. Perez, Christian. 2022. "What Does Russia's Removal From SWIFT Mean For the Future of Global Commerce?" Foreign Policy, March 8, 2022. https://foreignpolicy.com/2022/03/08/swift-sanctions-ukraine-russia-nato-putin-war-global-finance/.
35. Cipriani, Marco, and Linda Goldberg. 2023. "Financial Sanctions, SWIFT, and the Architecture of the International Payment System." Journal of Economic Perspectives 37, no. 1 (Winter): 31-52. https://doi.org/10.1257/jep.37.1.31.
36. Foreign, Commonwealth and Development Office (UK). 2023. "The 10 INSTEX shareholder states have decided to liquidate INSTEX due to continued obstruction from Iran: E3 statement." GOV.UK, March 9, 2023. https://www.gov.uk/government/news/the-10-instex-shareholder-states-have-decided-to-liquidate-instex-due-to-continued-obstruction-from-iran.
37. Cipriani, Marco, and Linda Goldberg. 2023. "Financial Sanctions, SWIFT, and the Architecture of the International Payment System." Journal of Economic Perspectives 37, no. 1 (Winter): 31-52. https://doi.org/10.1257/jep.37.1.31.

Case Study: Cryptocurrencies and their Role in Subverting Sanctions in Iran

Iran has become a leader in the use of cryptocurrencies to subvert international sanctions, going so far as to make it legal for imports to be paid for via cryptocurrencies. This enabled the country to subvert both US and multilateral sanctions against it, allowing them to continue engaging with the global economy. Exploiting additional funds through hacking the platforms for these cryptocurrencies has also increased these elusive assets. Due to the expansive sanctions imposed on its economy, Iran also utilizes its oil surplus to power bitcoin mining centers, generating approximately $1 billion in revenue in 2020. These actions produce even more funds which can be used to subvert economic sanctions. This model can be looked to as an example for other countries affected by SWIFT sanctions, exemplifying how they may continue to engage in international finance despite SWIFT sanctions.

Source: Reinsch, William A., and Andrea L. Palazzi. 2022. "Cryptocurrencies and U.S. Sanctions Evasion: Implications for Russia." Washington DC: CSIS.

Alternatives to SWIFT

While SWIFT is essential for the modern-day financial system, one of its main critiques is the inefficiency it generates by separating the communication of the transaction from the transaction itself. Alternatives to SWIFT, including both country-based payment schemes and cryptocurrencies, remedy this inefficiency, combining the communication of the transaction and the transaction itself. China's Cross-Border Interbank Payment System (CIPS), for example, requires payments to be made in RMB rather than the traditional dollar,[38] making the transactions more efficient while also promoting its own currency.[39] BRICS Pay also represents a push to generate a similar payment scheme amongst BRICS members in their local currencies without Western influences.[40] Each of these systems enables SWIFT sanctions to be undermined, a problem that is only being further compounded by collaboration between these alternative systems, creating a more comprehensive system with closer economic ties.[41] As more alternatives emerge and agree to collaborate,the threat to the monopoly SWIFT maintains will increase, further dampening the effectiveness of SWIFT sanctions in facilitating peace and preventing violence.

Cryptocurrencies represent the other alternative to SWIFT. An expanding field, there are over 2000 digital currencies today forecasted to have over 900 million users around the world in 2025.[42] This continuously evolving form of currency has key advantages which allow it to be used in financial transactions without being monitored, effectively enabling countries to avoid SWIFT sanctions. Peer-to-peer transactions, the blockchain technology cryptocurrencies employ, and vague adherence to control methods which would otherwise be required by banks, all make it difficult to identify the individual or entity on either side of the transaction.[43] Cyberattacks in order to acquire funds are also common, another illegal avenue for countries to access funds to facilitate violence. Furthermore, countries may engage in cryptocurrency mining to gain access to funds and transactions, something which has become prevalent in energy-rich countries like Iran and Russia.[42] Cryptocurrency has the added

"At least four countries are known to have utilized cryptocurrences to avoid international sanctions, in-cluding North Korea, Iran, Venezuela, and Russia."

38. Robinson, Gary, Sabine Dorry, and Ben DeRudder. 2022. "Global networks of money and information at the crossroads: Correspondent banking and SWIFT." Global Networks 23, no. 2 (September): 478-493. https://doi.org/10.1111/glob.12408.
39. McKee, Michael, and Chris Whittaker. 2022. "Expulsion and Effect of SWIFT as a Means of Blocking International Financial Transactions." Trade and Security 3 (June): 72-85. https://www.dbpia.co.kr/pdf/pdfView.do?nodeId=NODE11535625&googleIPSandBox=false&mark=0&minRead=15&ipRange=false&b2cLoginYN=false&icstClss=080000&isPDFSizeAllowed=true&accessgl=Y&language=ko_KR&hasTopBanner=true.
40. Frieden, Evan. 2024. "BRICS Pay as a challenge to SWIFT network." the interpreter. https://www.lowyinstitute.org/the-interpreter/brics-pay-challenge-swift-network.
41. Cipriani, Marco, and Linda Goldberg. 2023. "Financial Sanctions, SWIFT, and the Architecture of the International Payment System." Journal of Economic Perspectives 37, no. 1 (Winter): 31-52. https://doi.org/10.1257/jep.37.1.31.
42. Macfarlane, Emma. 2020. "Strengthening Sanctions: Solutions to Curtail the Evasion of International Economic Sanctions through the use of Cryptocurrency." Michigan Journal of International Law **42, no. 1 (Fall): 199-ii. Michigan Journal of International Law.**
43. Reinsch, William A., and Andrea L. Palazzi. 2022. "Cryptocurrencies and U.S. Sanctions Evasion: Implications for Russia." CSIS. https://www.csis.org/analysis/cryptocurrencies-and-us-sanctions-evasion-implications-russia.
44. Reinsch, William A., and Andrea L. Palazzi. 2022. "Cryptocurrencies and U.S. Sanctions Evasion: Implications for Russia." CSIS. https://www.csis.org/analysis/cryptocurrencies-and-us-sanctions-evasion-implications-russia.

benefit of lacking a coherent regulatory framework at the international level, while having large discrepancies in regulation in individual countries, preventing repercussions for sanctions violations. At least four countries are known to have utilized cryptocurrencies to avoid international sanctions, including North Korea, Iran, Venezuela, and Russia.[45] As long as cryptocurrency transactions remain largely anonymous and vulnerable to cyber attacks, countries will continue to utilize them to avoid sanctions, and especially to conduct financial transactions without the use of SWIFT.

The use of digital currencies has the potential to gain legitimacy through the establishment of central bank digital currencies (CBDC). The vast majority of central banks around the world, approximately 90%, are exploring the implementation of a digital currency, a liability of these reserve banks themselves, and reflective of that country's currencies.[46] This will not only represent a new field of unregulated digital currency, but also an opportunity to combat dollar privilege globally, as has been seen by China's CIPS system, a frontrunner in this CBDC movement. SWIFT has conducted experiments to determine the feasibility of these CBDCs being processed and transmitted through its own system, although it has not yet made an effort to implement this theorized system.[47]



US Dollar Privilege in the Global Economy Promotes the Generation of Alternatives to SWIFT
Image Source: Wikimedia Commons contributors, "File:20 Dollars art5.jpg," Wikimedia Commons, https://commons.wikimedia.org/w/index.php?title=File:20_Dollars_art5.jpg&oldid=971139920.

Drawbacks

Alternatives to SWIFT, both direct alternatives and substitutes, share notable limitations. SWIFT encompasses thousands of banks and financial institutions from over 200 countries, while direct substitutes for the SWIFT system do not have the same reach or participation.[48] Being the dominant system for over half a century, SWIFT also maintains a high level of credibility and reliability. When a transaction is made through SWIFT, fewer independent controls are needed to verify the information, saving members and countries both time and money. Alternatives to SWIFT do not yet enjoy the same level of trust and reliability, requiring additional checks for security and reliability.

In these consequential transactions, any moment of time spent on due diligence can entail significant financial losses. Furthermore, due to the strength of the dollar privilege, substitutes which require payments to be made in different currencies, such as China's CIPS system, are less convenient for many countries accustomed to the use of the dollar as the vehicle for international trade and finance.

Just as the lack of an international regulatory framework for cryptocurrency is a benefit for countries wishing to subvert SWIFT sanctions, it is also a limitation for the adoption of cryptocurrencies by banks, governments, and established financial institutions. Without clear international regulations, like those which SWIFT adheres to, many countries are wary to conduct these large transactions with cryptocurrency because of concerns related to the stability of these platforms, their general susceptibility to cyberattacks, and inability to adhere to specific country regulations like anti-money laundering campaigns and anti-terrorism funding laws.[49]

45. Macfarlane, Emma. 2020. "Strengthening Sanctions: Solutions to Curtail the Evasion of International Economic Sanctions through the use of Cryptocurrency." Michigan Journal of International Law 42, no. 1 (Fall): 199-ii. Michigan Journal of International Law.
46. "Connecting digital islands: Paving the way for global use of CBDCs and tokenised assets." 2022. Swift. https://www.swift.com/news-events/news/connecting-digital-islands-paving-way-global-use-cbdcs-and-tokenised-assets.
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48. Kaur, Navneet, and Ramanjeet Kaur. 2022. "Alternatives to SWIFT: A Vital Tool in Global Banking." International Journal of Business Management and Research 12, no. 2 (July): 57-60. https://deshbhagatuniversity.in/wp-content/uploads/2023/07/Management-Journal-Dec-2022-Final-5_compressed.pdf#page=57.
49. Adenekan, Tobiloba. 2024. "Exploring the Viability of Replacing SWIFT with Digital Currencies: A Study of Technology, Regulation, and Market Dynamics." (December). https://www.researchgate.net/publication/387517358_Exploring_the_Viability_of_Replacing_SWIFT_with_Digital_Currencies_A_Study_of_Technology_Regulation_and_Market_Dynamics.

Recommendations

Today, SWIFT still plays an integral role in facilitating peacebuilding through imposing economic sanctions.

It is vital that SWIFT cement its place in the changing world of international finance today. To do so, it can **manipulate its role as the inancial communications regulations standards bearer**, regularly updating its communications standards internally, which will be of little effort to the system itself but prove a challenge to the direct substitutes who independently implement these regulations. Doing so will damage the credibil-ity of these substitutes, making it even more difficult for target states under sanctions to engage in transac-tions with other institutions.

To combat the appeal of alternative payment systems, **SWIFT must work to make its own system faster and less costly**, ensuring that alternative systems which are more efficient do not lure away SWIFT members through legitimate competitive advantages.

In order to remain competitive in the era of increasingly fluid cryptocurrency use, **SWIFT must establish itself as a key platform for the emerging Central Bank Digital Currencies** currently in development in the majority of central banks around the world. Already engaging in feasibility experiments, SWIFT must commut fully to this notion, solidifying itself as a platform for financial telecommunications in both the traditional sense and in the emerging world of tokenized assets in digital currencies. This will allow it to continue its role as the dominant player in the international financial communications field.

To address a key underlying factor in the emergence and use of these alternatives and substitutes to SWIFT (the fact that economic sanctions utilizing SWIFT have typically been imposed by a Western bloc of na-tions), **SWIFT must actively promote a more var-ied governance structure and diverse board of directors**. This includes expanding oversight of SWIFT beyond G-10 nations, and making active efforts to select members of the board of directors from those same countries outside the G-10. In doing so, SWIFT concerns about the unilateral control of Western na-tions can be addressed, incentivizing more trust and use of SWIFT's technology as opposed to the creation and use of alternatives.

These actions will enable SWIFT to maintain and grow its monopoly in financial telecommunications, ensuring that this avenue for financial sanctions can be utilized to facilitate peacebuilding for decades to come.

DIGITAL PEACEBUILDING

2025 Issue 5

3D Printing in the Illicit Arms Trade

Sophia Sirois

Executive Summary

The illicit arms trade undermines peace and public security, fueling violence and contributing to other illicit activities. Three-dimensional printing (3DP) technology amplifies the threat of the illicit arms trade by enabling non-state actors to manufacture unregulated, undetectable, and untraceable weapons. Although current structural and intellectual limitations in 3DP restrict its use for mass production, technological advancements in 3DP signal the increasing risks for its applications in the illicit arms trade, and a growing threat to public safety. Mitigating these risks necessitates strengthening international frameworks, establishing licensing requirements and mandates for 3D printers and their products, creating a global database of firearm designs, and deploying preventative software.

Introduction

The illicit arms trade significantly contributes to violence and criminality, undermining peacebuilding efforts and global security. Illicit weapons networks bypass regulated supply chains, allowing for the spread of dangerous weapons, without being subjected to any global verification systems. This lack of regulation on the weapons themselves or verification of the actors purchasing them contributes to global conflict. 3DP holds the ability to exacerbate these challenges by further enabling non-state actors to construct firearms outside of traditional regulatory frameworks, further decentralizing illicit weapons production.

Although, current 3DP methods are limited by material and technical limitations including durability, inconsistent precision, and reliance on metal, the rapid advancement of technology is quickly removing these constraints, making the use of 3DP weapons increasingly viable for illicit use.

This brief explores the ways in which 3DP can be used for illicit weapons manufacturing and smuggling, outlines the technological and legal gaps that facilitate its misuse, and presents targeted policy recommendations to proactively curb the use of 3DP in the illicit arms trade and its risks.

Overview: The Illicit Arms Trade

The illicit arms trade facilitates the unauthorized movement of firearms, firearm components and ammunitions, often across national borders.[1] Also referred to as "illicit arms flows", the illicit trafficking of small arms includes the diversion of weapons from legal to illegal markets within a nation.[2]

The trafficking and use of these illicit arms globally fuels conflict, violence, and repression, undermining peace and security, development, and humanitarian efforts.[3] These weapons that operate outside of traditional regulatory frameworks undermine state capacity through the deterioration of

1. United Nations. 2021. "Protocol Against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition, Supplementing the United Nations Convention Against Transnational Organized Crime." United Nations Treaty Collection.
2. Mercado, Guillermo Vazquez del, Ruggero Scaturro and Alex Goodwin. 2025. "Measuring the Scope and Scale of Illicit Arms Trafficking." Global Initiative Against Transnational Organized Crime.
3. Brehm, Maya. 2008. "The Arms Trade and States' Duty to Ensure Respect for Humanitarian and Human Rights Law." Journal of Conflict & Security Law. 12(3): 359-387.

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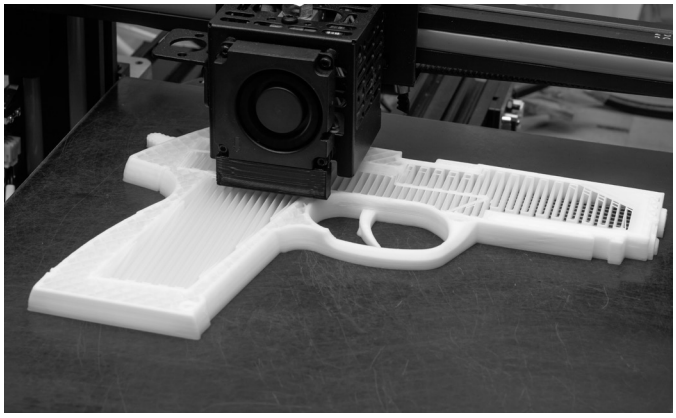
security and obstruction of law enforcement agencies enforcement abilities.[4]

Notably in both active and post-conflict regions, trafficked arms enable criminal organizations, armed groups, and terrorist networks to operate more effectively by evading legal restrictions.[5] These conflict settings can serve both as a source and destination for illicit arms trafficking with surplus weapon stockpiles and unsecured supplies from conflict zones being trafficked to other conflict zones or areas.[6] Even in post-conflict societies, illicit arms may remain, contributing to continued criminal activity and instability, ultimately undermining peacebuilding efforts.[6] Through these applications, the illicit arms trade uniquely both intensifies ongoing violence, and is itself perpetuated by conflict, forming a reciprocal dynamic between violence and weapons proliferation.[7]

The illicit arms trade poses a multifaceted threat to domestic and international security. Emerging technologies such as 3D printing may further facilitate the expansion of these illicit networks and their effects, by creating new, decentralized methods for weapon production and distribution outside the reach of existing regulatory oversight.

Overview: 3D Printing Technology

3-dimensional printing technology, also known as digital fabrication technology, creates physical objects by building up or carving away layers of material as designed by a digital model.[8] Overtime, advancements in 3DP have expanded the range of viable materials (polymers, metals, ceramic, biological, etc.)[9] and techniques (digital light process ing, laser sintering/melting, etc.)[10] that can be used, expanding possibilities for innovation. 3DP has been known to



Echt&Klreativ. n.d. “3D Printed Weapon Used for an Assassination Attempt Black and White.” https://stock.adobe.com/images/3d-printed-weapon-used-for-an-assassination-attempt-black-and-white/298133562?prev_url=detail

produce a wide range of products including automotive parts, houses, medical supplies, and others demonstrating its wide range of capabilities.[11] Additionally, 3DP is cost-effective for low-volume production and customized designs.[12] However, it is these same features that make 3DP attractive for misuse in areas such as the illicit arms trade.

Illicit Weapons Manufacturing & Smuggling

With the use of 3DP technology, illicit actors are able to produce fully 3D printed weapons that only require a basic hardware store nail as a firing pin, or hybrid 3D printed weapons that combine 3D components with unregulated metal parts that can oftentimes be found in a hardware store.[13] These weapons, often referred to as “ghost guns,” are untraceable.[14] Lacking serial numbers or other identification markers, 3DP ghost guns pose significant challenges for law enforcement agencies to trace specific guns to crimes or suspects, an attribute that is appealing for illicit actors.[15]

Currently, there is a lack of material regulation for 3DP materials used to print small arms. Many of

4. Andrade, Erin, Mark Hoofnagle, Elinore Kaufman, et.al.. 2021. “Firearm Laws and Illegal Firearm Flow between US States.” Journal of Trauma and Acute Care Surgery 88 (6):752-759.
5. United Nations. 2017. “Human Cost of Arms Trafficking ‘Runs Deep’, Disarmament Chief Stresses as Security Council Debates Halting Illicit Trade on ‘Dark Web’.” UN Press.
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14. Williams, Samantha. 2024. “The Rise of 3D-Printed Guns: Technology and Implications.” cadmore.com.
15. Kshetri, Nir. 2025. “The Escalating Threat of 3D-Printed ‘Ghost Guns’.” governing.com.

Case Study: 3D Weapons in the Myanmar Conflict

In 2021, photographs circulated on various social media platforms showing members of the People's Defense Force in Myanmar holding 3D printed firearms. These weapons were identified as 3D printed semi-automatic pistol-caliber carbines, also known as FGC-9, a specific type of rifle. These rifles were originally designed by a member of an online 3DP firearms network, where blueprints for 3DP weapons are routinely uploaded. Notably, these 3DP firearms do not require any regulated components to manufacture, allowing actors in this conflict to produce firearms in almost any location while avoiding detection as long as they have obtained the relevant materials and equipment.

Source: Hartwig, N, M. Hassan, L. Pilkinton, L. Watson, C. Lloyd. 2024. "3D-Printed Firearms & Myanmar: Implications for Conflict and Security." Arquebus

3DP materials used to print small arms. Many of the the polymers, plastics and other lightweight materials used can serve broad purposes, exposing a regulatory gap that can make 3DP technology attractive for actors in the illicit arms trade.[16] Additionally, the use of non-metal materials in 3DP arms productions allows for the manufacturing of undetectable firearms that are able to bypass standard security screeners such as x-ray machines and metal detectors, increasing the risk posed by these weapons.[17]

"Striking a balance between fostering technological advancement and implementing robust regulatory measures is essential."[18]

The untraceable and undetectable nature of 3DP firearms makes them a significant threat to public safety and law enforcement efforts, while also making them increasingly attractive for illicit actors looking to circumvent regulatory barriers and evade law enforcement detection. Current systems do not adequately address these gaps in enforcement capabilities, highlighting the urgent need for enhanced regulation of 3DP technology in the context of weapons production.

The Expansion of Illicit Networks

3DP enables illicit actors to produce firearms without reliance on traditional supply chains, decentralizing weapons manufacturing and allowing for production to occur with minimal to no oversight.[18] The adaptability and cost-effectiveness of 3DP make it particularly appealing to nonstate actors that cannot obtain conventional arms due to regulatory or other barriers.[19] As technology continues to advance and 3DP production costs decline, it is likely that more illicit actors will look to incorporate 3DP methods into their illicit arms trade networks.[20]

A concerning aspect of the use of 3DP in the context of the illicit arms trade is the spread of digital blueprints for firearms. In an era characterized by growing global internet connectivity, the online distribution of 3DP firearm designs through social media and the "deep" and/or "dark web" by hard-to-trace accounts and extremist groups is becoming a growing trend.[21] This ease of access facilitates blueprint sharing across borders, further enabling unregulated weapons production by illicit actors.[22]

Without targeted policy interventions to address both decentralized manufacturing and the online dissemination of 3DP weapons, the spread of these "ghost guns" will likely escalate, further complicating future efforts to combat the illicit arms trade.

Regulatory Gaps

Existing national and international arms control frameworks contain significant gaps that prevent the effective regulation of 3DP weapons. A key regulatory challenge arises from the lack of explicit inclusion of 3DP firearms in arms control agreements. Although

16. Brockmann, Kolja. 2018. "3D-printable Guns and Why Export Controls on Technical Data Matter." Stockholm International Peace Research Institute.
17. Talbot, Thaddeus, Adam Skaggs. "Regulating 3D-Printed Guns Post-Heller: Why Two Steps are Better than One." The Journal of Law, Medicine & Ethics 48(2):98-104.
18. Sholademi, Damilola Bartholomew. 2024. "3D Printing and its Impact on Arms Proliferation." International Journal of Research Publication and Reviews 5(10):256-269.
19. Martin, Wes. 2021. "3D Printed Guns Fighting the Government in Myanmar." Grey Dynamics.
20. Pathak, Janhavi. 2025. "Print & Fire: Are 3D Weapons Transforming Threat Landscape?" Bloomsbury Intelligence & Security Institute.
21. Johnson, Chris. 2022. "Artificial Intelligence and Investigations of Illegal 3D Printed Weapons." Voyager Labs.
22. Hazarika, Monalisa. 2024. "3d Printed Firearms: Prospects for International Action in 2024." forumarmstrade.org.

some international instruments such as the UN Program of Action on Small Arms and Light Weapons, and the Arms Trade Treaty are aimed at curbing the spread of illicit weapons, they do not currently address the unique threats posed by 3DP weapons, leading to inconsistent regulatory approaches across nations.[23] Compounding this complication is the rapid pace of advancement in 3D technology, which makes it difficult for governments to update legislation and enforcement mechanisms quickly and effectively.[24]

Ineffective and non-standardized regulatory systems and insufficient enforcement mechanisms enable the continued operation of illicit trafficking.[4] For example, inconsistencies in regulation between states in the United States has allowed for illicit networks to operate across borders, negatively impacting even those states with stricter regulations,[4] demonstrating the need for policies similar to and expanding on those in the European Union that aim to place overarching uniform safeguards and security enhancements, to target criminal markets and reduce illicit arms trafficking and its impacts.[25]

"Firearm restrictions around the world can be circumvented."[13]

The current gaps in national and international arms control frameworks allow illicit actors to operate more easily and effectively, highlighting a significant flaw in structures aimed at combatting illicit arms trafficking. This demonstrates the urgent need for standardized global policies that will address these inconsistencies and strengthen enforcement efforts against the spread of illicit weapons.

The Limitations of 3D Printing for Illicit Arms Trafficking

While 3D printing holds potential to continuously contribute to the illicit arms trade, the technology also currently faces a number of limitations that can constrain its broader use in weapons production and trafficking:

Case Study: The "Liberator" 3DP Handgun

In May 2013 the blueprints for a 3DP handgun known as the "Liberator" were made available online. The "Liberator" is a one bullet handgun constructed from fifteen 3DP parts, and one metal piece, a standard hardware store nail that serves as the firing pin. Global law enforcement agencies have tested the weapon and determined it to be deadly, with the exact performance of the gun being dependent on the materials used to print.

Five days after the Liberator blueprints were posted online, the U.S. Department of State, Bureau of Political-Military Affairs, Office of Defense Trade Compliance instructed the creator to remove data files for the "Liberator", among others from the internet, after finding them to be in violation of the Export Control Act. The "Liberator" blueprints had already been downloaded an estimated one-hundred thousand times in only the first two days that they were accessible online.

Since the "Liberator", a number of new 3DP weapon blueprints have been shared on various online platforms and continue to grow more sophisticated in their designs over time.

Source: Walther, Gerald. 2015. "Printing Insecurity? The Security Implications of 3D-Printing of Weapons." Science and Engineering Ethics 21:1425-1445

Material limitations. Many consumer-grade 3D printers utilize thermoplastic polymers to create firearm components which lack the strength, durability, and heat resistance needed for essential components like barrels or firing pins.[14] To address these weaknesses, it is common for 3DP firearms to incorporate some metal components into their designs, which can often be sourced from hardware stores.[14] These limitations reduce structural integrity, making 3DP arms less accurate and more prone to malfunction, although law enforcement tests have demonstrated that fully or hybrid 3DP weapons can still operate effectively in limited uses.[13]

Technological Knowledge Requirements. Producing functional 3DP firearms requires a considerable amount of technical understanding. Proficiency in 3D modeling software is needed to modify or customize

23. Astroprint. 2024. "3D Printed Guns: A Growing Concern for Security and Legislation." astroprint.com.
24. Murphy, Colin. 2024. "Understanding EU Policy on Firearms Trafficking." European Parliamentary Research Service.
25. JLC3DP. 2024. "The Limits of 3D Printing: Comparison with Traditional Manufacturing." jlc3dp.com.

firearm blueprints, while an understanding of firearm mechanics aids to ensure proper operation post-production.[14] Furthermore, familiarity with 3D printer settings, post-printing steps for refinement and assembling, the ability to troubleshoot common printing issues, and skills in metalworking for hybrid weapons may be required to some extent.[14] These technical demands may currently act as a barrier for some illicit actors in contexts where expertise or specific tools are not readily available or easily accessible.



RJMendez. n.d. "3D Printed Ghost Gun." https://stock.adobe.com/images/3d-printed-ghost-gun/1152008016?prev_url=detail

Print Speed. The slow pace of 3D printing can provide another barrier to the mass production of 3DP weapons for the illicit arms trade. The additive construction of 3DP objects can be time consuming, especially when used for complex designs.[26] This limitation not only reduces the pace at which small arms can be produced, but also ultimately reduces the cost-efficiency for the mass production of illicit arms.[26]

Innovative Technology Restrictions. Regulatory countermeasures to prevent the use of 3DP for small weapons manufacturing also continues to evolve alongside advancements in 3DP technology. Companies such as 3DPrinterOS and MIX Lab have been developing software that uses artificial intelligence to detect and block print jobs of known designs for firearms and firearm components.[26] The wide-scale adoption of such systems would limit access to unauthorized 3DP weapon designs and restrict illicit production.

Policy Recommendations

As 3DP technology continues to advance, overcoming current barriers of use and expanding its potential for misuse through illicit arms production and trade, it poses new and dangerous threats to global security. The following recommendations aim to strengthen regulatory and enforcement capabilities to address the implications of 3DP in the context of the illicit arms trade:

- Develop an international legal framework that specifically addresses the unique threat posed by 3DP weapons and create a global standard for 3D printer regulations.
- Implement requirements for the licensing and registration of high-capacity 3D printers that are capable of producing firearms.
- Mobilize partnerships with 3D printer manufacturers to embed coding identifiers into 3D printed products similar to serial numbers.
- Standardize the use of software algorithms that detect and block the printing of known firearms and component designs across all 3D printer manufacturers.
- Form a global database of known firearm designs shared among law enforcement agencies and manufacturers to inform investigations and the prevention of 3DP firearms manufacturing.

A proactive and coordinated response through a combination of paralleled technological advancement, targeted laws and regulations, diplomacy and international cooperation offers a path forward that will support continued innovation, while mitigating the risks of 3DP in the context of the illicit arms trade.

26. Listek, Vanesa. 2024. "Daring AM: Software Advances Aim to Curb Illegal 3D Printing of Firearms." 3dprint.com.

DIGITAL PEACEBUILDING

2024 Issue 4

Bottom-Up Elections: Crowdsourcing ICTs for the Prevention of Fraud and Violence

Tzion M. Jones

Executive Summary

This policy brief explores the extent to which crowdsourcing and Information and Communication Technologies (ICTs) can inform strategies for deterring electoral fraud and related violence. Electoral fraud, when exposed, often incurs violence public response. Election monitoring can itself encourage the use of electoral violence in lieu of fraud, and thus monitors struggle to prevent violence. ICT-enabled crowdsourcing has the potential to enhance the efficiency of election monitoring, especially in developing democracies. Its utility is dependent on strong civil societies and high civic engagement. Data validity and the potential for ICT-enabled insurgency or lateral surveillance are also challenges, and the rise of artificial intelligence brings additional risks of manipulation. Recommendations include investing in civic engagement, expanding ICT infrastructure, and further research into secure crowdsourcing in the AI context. These strategies aim to enhance election integrity and empower citizens to safeguard their own democracies.

Introduction

We live in a time of growing concern over the integrity of global democracy. Many of the world's democratic countries enter critical elections this year, against the backdrop of rapidly evolving artificial intelligence. At the same time, social media has steadily established itself as a pillar of election dynamics over the past decade or so. This policy brief seeks to examine methods for maintaining citizen-centric avenues of vertical accountability through the use of information and communication technologies, with a particular focus on crowdsourcing.

What is Electoral Fraud?

Electoral fraud can broadly be defined as any conduct seeking to corrupt the tabulation of ballots, certification of results, registration of voters, or otherwise illegally manipulate the results of an election.[1] Scholars tend to qualify electoral fraud by both its intentional obscurity and its violation of standing electoral law in a given country.[2] The legal definition of electoral fraud is therefore subject to change with the evolution of legislation and technology. A legalistic framework is nonetheless important in understanding electoral fraud, and distinguishing legitimate instances from legal-yet-unfavorable conduct. Electoral fraud can take a variety of forms, and by some accounts includes the use of violence and coercion against voters.[3]Still others find it useful to classify manipulation by force, or electoral violence, as a separate phenomenon from traditional fraud.[4] In any case, electoral fraud and the pursuit thereof can bring about violence in a number of ways.

1 Alvarez, R. Michael, Hall, Thad E., and Hyde, Susan D., eds. "Election Fraud : Detecting and Deterring Electoral Manipulation." Blue Ridge Summit: Brookings Institution Press, 2008.

2 Lehoucq, Fabrice. "Electoral Fraud: Causes, Types, and Consequences." Annual Review of Political Science 6, no. 1 (February 6, 2003): 233–56. https://doi.org/10.1146/annurev.polisci.6.121901.085655.

3 ibid.

4 Dawn Brancati and Elizabeth M. Penn. 2023. "Stealing an Election: Violence or Fraud?" *Journal of Conflict Resolution*, 67(5): 858:892.

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Following Fraud: Conditions for Violence

Protesting Perceived Manipulation:
Public perception of a fraudulent election may incur violent response by the citizenry, regardless of the accuracy of such perceptions. The simple belief that fraud has occurred is often a more reliable predictor of violence and unrest post-election. [5]

Voters are more likely to respond violently to electoral manipulation when they feel they have little agency or are control over the circumstances.[6] To secure their position, incumbent parties may also employ violence in handling public protest following a fraudulent victory.[7]

Stringent accountability measures institutional constraints can deter violent suppression of post-election protest by limiting the legitimate uses of force and introducing consequences for illegitimate uses.[8]

The Role of Election Monitors:
In a similar vein, the presence of external election monitors throughout can discourage candidates from fraudulent manipulation altogether.[9]

However, when electoral monitors expose and produce evidence of electoral fraud, the citizenry or political opposition may pursue collective action in the aftermath, including the use of force.[10] Additionally, once exposed, incumbents are not deterred from violence by the presence of observers as their corruption is no longer a secret. [11]

Further still, when election monitors are present, incumbents may actually pursue violent manipulation in favor of traditional fraud, as it is easier to tell whether their proxies and client networks have shirked their obligations.[12]

In sum, while monitoring elections can deter non-violent forms of fraud, they do not prevent violence on their own and in fact create new opportunities for it.

Monitors' capacity for violence prevention is limited by a number of other factors.

- *Conflicting Mandates:* Some scholars call for explicit violence prevention mandates for monitoring operations, citing their ability to mediate between opposing groups, coordinate with security forces, map out areas at increased risk for conflict and devise preemptive strategies. Others believe these additional responsibilities will detract from their primary goal of assessing election integrity. [13]

  In any case, proper violence prevention mandates typically require large and flexible budgets not reliably available to the organizations in question. [14]
- *Host Country Context:* Also of import are the sociopolitical conditions on the ground immediately prior to an election, and before the deployment of foreign monitoring operations. Developments concerning voter registration, delimitation of constituencies, and selection of party candidates in the host country are critical elements in the potential for violence that may take place before external monitors can collect the data.

  Scholars advise greater cooperation with local monitoring groups who may be privy to such information and can organize violence prevention efforts, but are less willing to openly criticize the validity of the election. [15]

Harmonizing deployments and systems of information with domestic actors and civil society organizations is promising, cost-effective way to improve violence prevention efforts in election monitoring.

As the next section will demonstrate, many of the shortcomings in violence prevention associated with election monitors can be alleviated with the help of

5 Daxecker, Ursula, Jessica Di Salvatore, and Andrea Ruggeri. "Fraud Is What People Make of It: Election Fraud, Perceived Fraud, and Protesting in Nigeria." *The Journal of Conflict Resolution* 63, no. 9 (2019): 2098–2127. https://www.jstor.org/stable/48597413.

6 ibid.

7 Hafner-Burton, Emilie M., Susan D. Hyde, and Ryan S. Jablonski. "When Do Governments Resort to Election Violence?" *British Journal of Political Science* 44, no. 1 (2014): 149–79. http://www.jstor.org/stable/43821581.

8 ibid.

9 Smidt, Hannah. "From a Perpetrator's Perspective: International Election Observers and Post-Electoral Violence." *Journal of Peace Research* 53, no. 2 (2016): 226–41. http://www.jstor.org/stable/43920011.

10 Daxecker, Ursula E. "The Cost of Exposing Cheating: International Election Monitoring, Fraud, and Post-Election Violence in Africa." *Journal of Peace Research* 49, no. 4 (2012): 503–16. http://www.jstor.org/stable/41721603.

11 Smidt, "From a Perpetrator's Perspective: International Election Observers and Post-Electoral Violence." 230-231.

12 Brancati & Penn, "Stealing an Election: Violence or Fraud?"

13 Garber, Larry. "Contemporary Election Observation Challenges." *Violence Prevention through Election Observation*. US Institute of Peace, 2020. http://www.jstor.org/stable/resrep26058.6.

14 ibid.

15 ibid.

Case Study: 'Photo-Quick Count' Monitoring and Aggregation Fraud in Afghanistan[1]

In many developing countries, democratic institutions are young and fragile, leaving electoral processes susceptible to corruption from networks of political elites. During Afghanistan's 2010 parliamentary election, Callen and Long used novel crowdsourced monitoring technology to detect fraudulent vote tabulation in favor of influential candidates.

The monitoring technique, dubbed 'Photo Quick Count,' involved taking on-site photographs of election returns forms (i.e. candidate vote tallies) at local polling centers immediately following election day, and comparing them to photographs of the same forms at provincial and national aggregation centers after the months-long tabulation process. In a clean election free of manipulation, the aggregate tallies for each candidate would be consistent throughout.

The experiment required photography and hand-coding of about 49,000 vote entries for 1,784 candidates at 471 polling stations across the country, made possible only by employing a decentralized citizen-based research team. Citizen researchers also wrote letters to a smaller sample of tabulation officials informing them of the crowd-based Photo Quick Count system and how it worked, which significantly reduced incidence of tampered, missing, or inconsistent data from respective centers. Crowdsourcing allowed the entire operation to be completed on a budget of $100,000 USD. For comparison, the largest monitoring operation by an entirely foreign team for the same election was only able to visit 85 polling stations.

The 'Photo Quick Count' experiment demonstrates a cost-effective, scalable, method of vertical accountability well-suited to crowdsourced implementation and viral adoption. It also requires very little international support, encouraging more engaged citizenship and strengthening democratic institutions. Callen and Long anticipate even lower costs and broader scope as the country's cellular networks and infrastructure expand.

1 Callen, Michael, and James D. Long. "Institutional Corruption and Election Fraud: Evidence from a Field Experiment in Afghanistan." The American Economic Review 105, no. 1 (2015): 354–81. http://www.jstor.org/stable/43497063.

ICT-enabled crowdsourcing techniques.

How Crowdsourcing Can Help Fill the Gap

In simplest terms, crowdsourcing is the mobilization of the general public, including online communities, for the completion of small tasks that incrementally contribute to a larger significant goal. Crowdsourcing, in conjunction with various ICTs, can address many of the limitations to violence prevention in traditional election monitoring.

Crowdsourcing is especially useful in the developing world where administrative capacity of democracies is low and the decentralized 'crowd' can accomplish tasks that usually require complex bureaucracy.[16]

Two recent case studies of elections in Afghanistan show that increased cell phone penetration and citizen-based monitoring ICTs can significantly reduce instances of electoral fraud. [17]

When novel monitoring technologies are introduced to clients of incumbents carrying out manipulation, fraud in favor of well-connected candidates is found to occur less frequently. Crowdsourcing can therefore allow election monitors to systematically deter key agents of corruption from carrying out fraud on candidates' behalf. [18]

In addition to deterring fraud, crowdsourcing can also prevent violence during and post election. The literature indicates two primary factors at play.

First, mobile phone networks allow citizens to laterally share information that organically neutralizes conflict. Second, crisis mapping software, SMS-to-radio broadcasts and other ICTs allow information aggregated from the crowd to quickly reach the ears

16 Livingston, Steven. "ICT's Role in Fighting Crime in Africa." Africa's Information Revolution: Implications for Crime, Policing, and Citizen Security. Africa Center for Strategic Studies, 2013. http://www.jstor.org/stable/resrep19165.5.

17 Gonzalez, Robert M. "Cell Phone Access and Election Fraud: Evidence from a Spatial Regression Discontinuity Design in Afghanistan." American Economic Journal: Applied Economics 13, no. 2 (2021): 1–51. https://www.jstor.org/stable/27087096.

18 Callen, Michael, and James D. Long. "Institutional Corruption and Election Fraud: Evidence from a Field Experiment in Afghanistan." The American Economic Review 105, no. 1 (2015): 354–81. http://www.jstor.org/stable/43497063.

of civil society leaders and larger organizations for timely response.[19]

Additionally, crowdsourcing can enable the collection of precise local data in real time. This effect can be further enhanced via ICT-enabled capacity building programs that teach citizens to identify critical risk factors and opportunities for response within their local context.[20] Locally crowdsourced information from an engaged civil society can therefore aid in the contextual adaptation of monitoring operations pre-deployment.

Early warning systems involve anticipating moments of escalation, collecting and relaying information about potential crises, assessing said information and developing a timely and appropriate response. In this context, early warnings can identify precursors to violence as well as corruption, as seen in the Afghanistan case with secondary vote tabulation.

A 2017 study of the Nigerian context found that ICT-enhanced early warning systems can be a powerful tool for stemming violent outbreak post-election in the Global South, but stressed the importance of corresponding frameworks for early response to such warnings.[21] These frameworks and their capacity will vary across contexts, but the literature highlights the critical role of civil society organizations in validating the use of crowdsourcing technologies.[22] Community-based prevention systems that funnel information on potential escalation or corruption to reputable social leaders trained in mediation can improve dynamic early response while strengthening cooperation between monitoring institutions and the electorate.[23]

Where conditions allow for effective early warning and response to electoral fraud and violence, and where individual agents of corruption can be identified and made aware of the monitoring technologies in place, those agents may not act on obligations to their incumbents for fear of being held accountable. In turn, the preference for client-based violent manipulation among externally monitored incumbents may be reduced.

Crowdsourcing and ICTs provide people-centric methods of deterring electoral fraud and violence while empowering the electorate to take ownership of their democracy. Humanist methods are especially critical in the context of rapid automation and artificial intelligence. Increasing local agency in violence prevention reduces reliance on elite-level response mechanisms, which in turn may reduce the likelihood of violent response when these elite-level mechanisms fail to protect election integrity.[24][25][26]

Crowdsourcing's Potential Pitfalls

Crowdsourcing is not without its shortcomings. A number of factors influence its potency in deterring both violence and fraud.

- *Civil Society and Civic Engagement:* ICT crowdsourcing efforts are only as good as their respective civil societies. [27] Strong civil societies can only make use of ICTs insofar as they are well-distributed across populations.[28] Further, increased ICT penetration or mobile phone ownership does not, in itself, imply increased civic engagement and vice versa.[29] The technology changes the nature of civic engagement and mobilization, but is not a substitute. Recent reports suggest social media can be strategically utilized to help cultivate civic engagement and strengthen the role of civil society.[30]

- *Data Validation:* Ensuring truth and validity of crowdsourced data without compromising response time is a major challenge. Organizers must consider the interests and biases of those re-

19 Martin-Shields, Charles, And Elizabeth Stones. "Smart Phones And Social Bonds: Communication Technology And Inter-Ethnic Cooperation In Kenya." Journal of Peacebuilding & Development 9, no. 3 (2014): 50–64. https://www.jstor.org/stable/48603499.

20 Alihodžić, Sead. "Electoral Violence Early Warning And Infrastructures For Peace." Journal of Peacebuilding & Development 7, no. 3 (2012): 54–69. https://www.jstor.org/stable/48603421.

21 Martinluther, Nwaneri, and Uwakwe Ikechukwu Stanley. "Harnessing Early Warning Systems as Instrument for Prevention of Post-Election Violence in Nigeria." Journal of African Foreign Affairs 4, no. 1/2 (2017): 163–79. https://www.jstor.org/stable/26664045.

22 ibid.

23 Alihodžić "Electoral Violence Early Warning And Infrastructures For Peace."

24 Martin-Shields & Stones, "Smart Phones And Social Bonds"

25 Tsuma, William, Christy McConnell, Peter Mwamachi, and Anne Kahl. "Crowdsourcing for Collaborative Prevention: Strengthening the 4th Generation Conflict Early Warning for Multi-Stakeholder Response." Peace Infrastructures, 2012. https://www.peaceinfrastructures.org/documents/crowdsourcing-collaborative-prevention.

26 Maina, Grace. "New Technology for Peace in Kenya." Edited by Andrea Ó Súilleabháin. Leveraging Local Knowledge for Peacebuilding and Statebuilding in Africa. International Peace Institute, 2015. http://www.jstor.org/stable/resrep09572.9.

27 Livingston, "ICT's Role in Fighting Crime in Africa"

28 ibid.

29 Martin-Shields & Stones, "Smart Phones And Social Bonds"

30 Dubow, Talitha, Axelle Devaux, and Catriona Manville. "Civic Engagement: How Can Digital Technology Encourage Greater Engagement in Civil Society?" RAND Corporation, 2017. http://www.jstor.org/stable/resrep17637.

Case Study: Crowdsourced Voter Surveillance and Coercive Campaigning in Israel[1]

In modern democratic societies, political campaigns increasingly employ digital tools to monitor and influence voter behavior. During Israel's March 2020 election, the Likud party used the Elector app, a sophisticated crowdsourced voter surveillance (CVS) tool, to mobilize supporters and track voter engagement. Anat Ben-David's 2023 study investigates the implications of such surveillance practices, revealing how they can transform ICT-enabled political participation into mechanisms of control.

The Elector app enabled party activists to monitor and influence voters by reporting their interactions in real time. The app collected extensive voter data, including personal information and political inclinations, allowing the party to target specific individuals with tailored messages and interventions. This approach, while enhancing voter engagement, raised significant ethical and privacy concerns.

Ben-David's research employed a mixed-methods approach, including digital ethnography of perceptions and usage of Elector, interviews with app developers, voters, and Likud campaigners, and an analysis of user data from the app to assess its scope and effectiveness mobilizing the electorate. The study found that CVS, enabled via Elector, turned citizens into active participants in lateral surveillance, compromising their own privacy and potentially undermining democratic principles. The app's widespread use illustrates how the same rhetoric of civic engagement and participation that are necessary to maximize crowdsourcing's positive impact can be leveraged by political candidates to control the outcome of an election, blurring the lines between legitimate political engagement and coercive manipulation.

The case of the Elector app in Israel's 2020 election highlights the dual nature of ICTs in the election space. While they can enhance voter engagement and facilitate bottom-up accountability frameworks, they also pose risks to privacy and democratic integrity in partisan hands. If crowdsourcing ICTs are to provide a citizen-centric approach to election integrity, the study underscores the need for robust regulatory and normative frameworks to ensure ethical usage that centers neutrality.

1 Ben-David, Anat. "Little Samaritan Brothers: Crowdsourcing Voter Surveillance" The Law & Ethics of Human Rights 17, no. 2 (2023): 127-165. https://doi.org/10.1515/lehr-2023-2008

porting in, and their impact on the data. Crowdsourcing also must rely on mixed-media submissions as different forms of communication are more accessible or trustworthy in different areas of a given state (e.g. urban blogs, rural newspapers).[31] Oversaturation of data, biased or not, can overwhelm and impede systemic response.[32] To mitigate this, aggregating submissions for verification by trained experts, before re-broadcasting from a single, trustworthy channel such as the radio or specialized monitoring platforms appears the most successful practice.[33][34]

- *Organized Violence:* Crowdsourcing and ICTs may also encourage organized violent responses to fraud, as they solve many collective action problems inherent to insurgency.[35] For example, private long distance communication enables greater in-group coherence and reduces certain free-rider problems.[36] Other research suggests this is a product of environments of decentralized, competing information without any collectively trusted sources. The information gaps create security dilemmas between ethnic or political groups that may incite violence.[37] This further underscores the value of rebroadcasting the voice of the crowd in aggregate, by external monitors with a claim to neutrality.

- *Automation and Social Control:* Much of the data collection for election monitoring described in this brief could be achieved nonconsensually via automation and social media scraping, especially with the rise of more powerful artificial intelligence. The bottom-up advantages of crowdsourcing are reversed in this scenario, and

31 Dowd, Caitriona, Justino, Patricia, Kishi, Roudabeh, & Marchais, Gauthier. "Comparing 'New' and 'Old' Media for Violence Monitoring and Crisis Response: Evidence from Kenya." Research & Politics 7, no. 3 (2020). https://doi.org/10.1177/2053168020937592

32 Mutahi, P. and Kimari, B. "The Impact of Social Media and Digital Technology on Electoral Violence in Kenya." Institute of Development Studies Working Paper 493, 2017.

33 Martin-Shields & Stones, "Smart Phones And Social Bonds"

34 Livingston, "ICT's Role in Fighting Crime in Africa"

35 Brennan, Glyn. "How Digital Media Reshapes Political Activism: Mass Protests, Social Mobilization, And Civic Engagement." Geopolitics, History, and International Relations 10, no. 2 (2018): 76–81. https://www.jstor.org/stable/26802343.

36 Pierskalla, Jan & Hollenbach, Florian. "Technology and Collective Action: The Effect of Cell Phone Coverage on Political Violence in Africa." American Political Science Review 107 (2013). In Press. 10.1017/S0003055413000075.

37 Martin-Shields & Stones, "Smart Phones And Social Bonds"

the potential for exploitation, manipulation, and bypass of civil society are increased.[38] Grievance mechanisms for vulnerable populations may be an important application of ICTs as governments gain access to more powerful tools of manipulation. Again, the strength of ICTs is in their human connectivity.

Recommendations

Against the backdrop of rapidly evolving artificial intelligence technologies and increased potential for large scale state manipulation of democracy, it is important to safeguard and cultivate strategies for accountability and conflict prevention that center human beings. To that end, I recommend the following:

- Targeted investment in civic engagement and digital literacy programs, as well as expansion of ICT infrastructure in order to close digital divides, increase participation in crowd-reliant monitoring techniques, and maximize capacity for mobilization.

- Focus on harmonizing ICTs and crowdsourcing with extant election monitoring entities to expand their reach — this may include hiring local informants for contextual adaptations pre-deployment and designing early warning systems with trusted monitor organizations as a re-broadcasting point for collected data.

- Further research into the security concerns of anonymous crowdsourcing in the context of generative AI and human-like bots. Literature on AI, crowdsourcing ICTs and election monitoring is sparse now, but that may change following the influx of global elections in 2024. Research should be on the cusp of new developments so as not to act on obsolete conclusions.

38 Pauwels, Eleonore. "Artificial Intelligence and Data Capture Technologies in Violence and Conflict Prevention: Opportunities and Challenges for the International Community." Global Center on Cooperative Security, 2020. http://www.jstor.org/stable/resrep27551.

DIGITAL PEACEBUILDING

2026 Issue 1

Watching For Peace: Governing Adaptive Surveillance and the Reduction of Violence in Refugee Camps

Tyler Cerrato

Executive Summary

Adaptive surveillance technologies can reduce violence in refugee camps, though their expansion introduces new governance risks. These environments are not temporary shelters but long-term, legally liminal spaces where protection and deprivation coexist, making violence both predictable and, to a degree, preventable. Four core surveillance functions—environmental monitoring, behavioral detection, identity control, and participatory reporting—can mitigate violence when aligned with identifiable risk patterns. Yet each carries tradeoffs that may weaken refugee agency. To navigate these tensions, this article advances a Rights-Informed Adaptive Surveillance framework grounded in proportionality, accountability, community trust, and data protection.

Introduction

Refugee camps—long-term, legally liminal spaces of both deprivation and protection—are increasingly governed through adaptive surveillance.[1] United Nations High Commission for Refugees' (UNHCR) PRIMES platform structures identity management at scale, while tools like Greece's "Centaur" extend monitoring into behavioral domains.[2] Often introduced as solutions to insecurity, these systems can feel to refugees less like protection than intrusion, raising concerns about opacity, coercion, and the erosion of agency.[3]

Surveillance does not simply reduce violence; it reshapes the conditions under which violence occurs. This article asks how different forms of surveillance interact with different forms of violence—a problem less of ethics than of governance.

Violence in Refugee Camps

Violence in refugee camps is structured and patterned rather than random. It typically manifests across four categories: gender-based violence, interpersonal conflict, armed actor coercion, and structural exploitation.[4] These categories align with humanitarian protection and conflict literature, where violence is understood as both direct harm and structural violence—harm embedded in unequal social systems.[5]

Gender-based violence—harmful acts directed at individuals based on gender—frequently occurs in low-visibility areas—water points, sanitation facilities, or transitional spaces—where environmental design increases vulnerability.[6] Interpersonal tensions often emerge from resource scarcity and social fragmentation, while armed actors may ex-

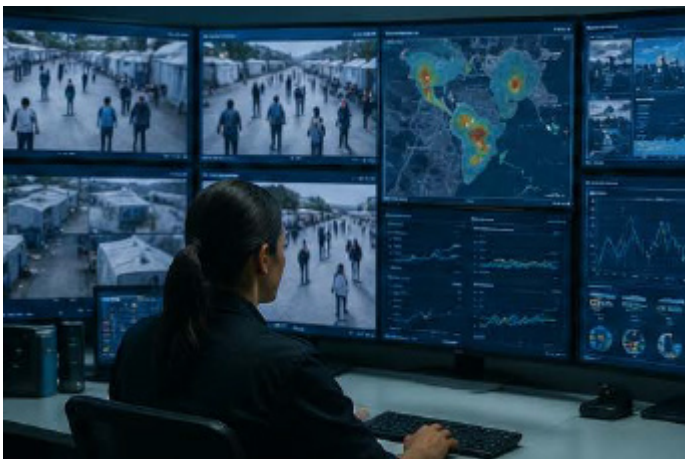
1. Simon Turn, "What Is a Refugee Camp? Explorations of the Limits and Effects of the Camp," Journal of Refugee Studies 29, no. 2 (2015): 139–148; Ilana Feldman, "What Is a Camp? Legitimate Refugee Lives in Spaces of Long-Term Displacement," Geoforum 66 (2014): 244–252.
2. UNHCR, "PRIMES: Population Registration and Identity Management EcoSystem," UNHCR; AlgorithmWatch, "Greece Automates Refugee Surveillance," 2022.
3. Vicki Squire, The Contested Politics of Mobility: Borderzones and Irregularity (London: Routledge, 2011); Martina Tazzioli, The Making of Migration: The Biopolitics of Mobility at Europe's Borders (London: Sage, 2020).
4. United Nations High Commissioner for Refugees, Global Trends: Forced Displacement in 2023 (Geneva: UNHCR, 2024).
5. Johan Galtung, "Violence, Peace, and Peace Research," Journal of Peace Research 6, no. 3 (1969): 167–191.
6. UNHCR, Guidelines for the Prevention of and Response to Gender-Based Violence Against Refugees, Returnees and Internally Displaced Persons (Geneva: UNHCR, 2003); International Rescue Committee, Responding to Gender-Based Violence in Humanitarian Settings (New York: IRC, 2017).

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Editor: Dawn Brancati

ploit weak governance at camp peripheries.[7] Structural forms of harm, including trafficking or corruption, persist where oversight mechanisms are limited.[8]

Exposure to these forms of violence has measurable downstream effects, shaping attitudes toward trust, cooperation, and reconciliation.[9] Because such patterns exhibit spatial and temporal regularity, they also present opportunities for targeted intervention.



AI-enabed analytics and data integration identify baseline deviations and potential threats, enabling early intervention and preventative peacebuilding. Source: Image generated by ChatGPT-5.5 in response to the prompt "generate an image depciting behavioral and pattern detection," April 17, 2026.

Adaptive Surveillance

Adaptive surveillance refers to the integration of digital systems capable of collecting and analyzing data in real time, often through biometric registration, environmental sensors, and machine learning analytics—extending earlier definitions centered on automated video analysis.[10][11] Unlike traditional monitoring approaches, these systems are designed not only to observe but also to anticipate, identifying patterns that may signal emerging risks.[12]

In practice, this shifts security from reactive responses toward more predictive forms of intervention, though the effectiveness of this shift remains uneven across contexts.

Surveillance Functions and Violence Reduction

Monitoring to Prevent Gender-Based Violence

Environmental monitoring systems—CCTV, lighting analytics, and spatial sensors—increase visibility and deter opportunistic violence. Evidence from crime prevention literature demonstrates that surveillance combined with environmental design can reduce crime in high-risk areas.[13]

Environmental and spatial monitoring primarily targets gender-based violence, particularly opportunistic forms occurring in low-visibility environments such as water points, sanitation areas, and transit corridors.

By altering opportunity structures and increasing perceived risk of detection, these interventions contribute to reductions in physical violence, though their effects on trust and legitimacy remain conditional and often limited. It is most effective where violence is spatially predictable and where authorities can act on the surveillance through patrols or infrastructure redesign.

Positive Effects

- Reduces gender-based violence in low-visibility areas — Monitoring in predictable risk zones disrupts conditions enabling gender-based violence, directly reducing opportunities for harm.
- Enables predictive spatial redesign — Incident clustering data supports infrastructure redesign, particularly where spatial patterns remain stable.
- Improves patrol allocation — Surveillance enhances deployment efficiency, reducing reliance on reactive or escalatory interventions.
- Provides deterrence — Visible monitoring raises perceived costs of violence, especially where enforcement is credible.

Limitations

- Privacy erosion and perceived overreach — May

7. Sarah Kenyon Lischer, Dangerous Sanctuaries: Refugee Camps, Civil War, and the Dilemmas of Humanitarian Aid (Ithaca: Cornell University Press, 2005).
8. International Organization for Migration, Human Trafficking and Migrant Smuggling in Crisis Contexts (Geneva: IOM, 2015).
9. Guy Grossman, Devorah Manekin, and Dan Miodownik, "The Political Legacies of Combat: Attitudes Toward War and Peace Among Israeli Ex-Combatants," International Organization 69, no. 4 (2015): 981–1009.
10. UNESCO, Recommendation on the Ethics of Artificial Intelligence (Paris: UNESCO, 2021).
11. Arun Hampapur, Lisa Brown, Jonathan Connell, Sharat Pankanti, Andrew Senior, and Yingli Tian, "Smart Surveillance: Applications, Technologies and Implications," IBM T. J. Watson Research Center Technical Report.
12. Andrew Guthrie Ferguson, The Rise of Big Data Policing: Surveillance, Race, and the Future of Law Enforcement (New York: NYU Press, 2017).
13. Eric L. Piza et al., "CCTV Surveillance for Crime Prevention: A 40-Year Systematic Review," Campbell Systematic Reviews 15, no. 3 (2019).

undermine dignity and autonomy, weakening postitive peace.[14]

- Displacement of violence — Violence may shift to unmonitored areas rather than decline overall.
- Psychological effects — Constant monitoring can produce stress and self-censorship.
- Potential misuse — Systems may reinforce coercive control without safeguards.

Environmental & spatial monitoring may backfire if deterrence displaces violence or erodes trust, ultimately weakening long-term legitimacy despite short-term reductions.

Pattern Detection to Prevent Conflict and Emerging Violence

AI-enabled systems detect anomalies in movement and crowd behavior, enabling early intervention. These systems, such as computer vision, crowd analytics, and gate-recognition systems, extend surveillance from reactive to predictive domains.[15]

Behavioral and pattern detection systems are most relevant to interpersonal violence and emerging collective or coordinated violence, including tensions that may escalate into group conflict or organized harmful activity.

Their strength lies in enabling anticipatory action, though contributions to peace depend heavily on accuracy, legitimacy, and institutional response capacity. It is most effective under conditions of high-quality data, low signal noise, and the capacity of institutions to interpret the information and act on it.

Positive Effects

- Early detection of escalating conflict — Identifying precursors enables timely intervention, reducing escalation into violence.
- Identification of coordinated activity — Detects organized behavior, helping disrupt mobilization and collective violence pathways.
- Targeted intervention — Enables precise responses, potentially supporting both negative and positive peace when perceived as legitimate.

Limitations

- Algorithmic bias and false positives — May result in unjust targeting, particularly of vulnerable populations.[16]
- Misclassification — At-risk groups may be disproportionately flagged, reinforcing marginalization.
- Structural inequality — Systems may replicate biases embedded in training data.
- Over-reliance — Reduced human judgment may lead to inappropriate interventions.

Overall, academic evidence suggests moderate support for effectiveness. Effective outcomes are highly dependent on governance quality. Adaptive surveillance may backfire if biased or inaccurate systems generate false threats, escalating tensions, eroding trust, and undermining legitimacy.

Case Study: WFP SCOPE Biometric System and Rohingya Data Sharing

The World Food Programme's SCOPE system uses biometric data to manage food distribution in refugee populations. In Bangladesh, SCOPE was deployed in Rohingya refugee camps to improve efficiency and reduce fraud. However, investigations revealed that biometric data collected for humanitarian purposes was shared with the Government of Myanmar without fully informed consent from refugees. This raised serious concerns about data protection, coercion, and the potential use of surveillance systems in facilitating repatriation under unsafe conditions. The case illustrates how weak governance and unclear data-sharing frameworks can transform surveillance tools into instruments of harm, undermining trust and potentially exposing vulnerable populations to political risk.

Sources: Human Rights Watch Report on Rohingya Data Sharing & Martin, A. et al. (2021). Digital identity in humanitarian contexts: Risks and governance challenges.

Access Control to Prevent Resource Inequality and Infiltration

Biometric identity systems regulate access and reduce fraud. UNHCR's PRIMES system represents one of the most extensive deployments of biometric governance in humanitarian contexts.[17]

Identity and access control systems address structural and resource-based violence, including inequalities in aid distribution and access to services, as well as risks associated with armed actor infiltration.

14. David Lyon, Surveillance Studies: An Overview (Cambridge: Polity, 2007).
15. Sarah Brayne, Predict and Surveil: Data, Discretion, and the Future of Policing (Oxford: Oxford University Press, 2020).
16. Cathy O'Neil, Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy (New York: Crown, 2016).

"Data collection in humanitarian contexts can create new risks for vulnerable populations if not governed responsibly."
- Madianou, 2021, Big Data & Society

By enhancing order, predictability, and fairness in resource allocation, these systems can reduce grievance-driven conflict, though they introduce significant concerns related to data sovereignty, privacy, and long-term surveillance exposure. It is most effective where data is accurate, governance data policies are in place, and system use is understood and perceived as legitimate.

Positive Effects

- Prevents aid diversion — Promotes equitable distribution, reducing grievances linked to resource inequality.
- Limits unauthorized access — Reduces infiltration by armed actors, contributing to stabilization.
- Enhances accountability — Improves traceability and institutional reliability, supporting trust where transparency exists.

Limitations

- Data permanence — Creates long-term vulnerabilities, especially in unstable contexts.
- Exclusion errors — Denial of access may generate new grievances and conflict.
- State misuse — Data may be repurposed for coercive purposes.
- "Techno-colonial" dynamics—where humanitarian data infrastructures concentrate control with external actors—may reinforce power asymmetries.[18]

The evidence on identity and access control suggests mixed outcomes, with benefits in efficiency offset by significant governance risks. Adaptive surveillance may backfire if exclusion errors or data mismanagement create new forms of structural violence leading to degraded trust in institutions.

Reporting Systems to Address Underreported Violence

Digital reporting tools enable community-based monitoring and increase visibility of underreported violence, particularly gender-based violence.[19]
Participatory and reporting systems are most closely associated with underreported forms of violence, including gender-based violence, interpersonal abuse, and exploitation that may otherwise remain hidden from formal governance systems.
These systems are strongly linked to peacebuilding outcomes through their emphasis on agency, participation, and trust-building, particularly when reporting leads to credible institutional response.



Feedback and reporting mechanisms empower refugees to report incidents, provide input, strengthening trust and improving camp governance. Source: Image generated by ChatGPT-5.5 in response to the prompt "generate an image depicting participatory & reporting systems to address underrported violence," April 17, 2026.

Positive Effects

- Improves reporting rates — Increases visibility of hidden violence, particularly gender-based violence, with strong support in humanitarian research.
- Enhances institutional responsiveness — Real-time reporting enables faster interventions, improving perceived legitimacy.
- Strengthens trust — When effective, participatory systems empower communities and reinforce cooperation between refugees and authorities.

Limitations

- Retaliation risks — Reporting may expose individuals to harm, particularly in tightly controlled environments.
- Digital inequality — Unequal access to technology may exclude vulnerable groups, limiting effectiveness.
- Information overload — Systems may generate

18. Mirca Madianou, "Technocolonialism: Digital Innovation and Data Practices in the Humanitarian Response to Refugee Crises," Social Media + Society 5, no. 3 (2019).

19. International Organization for Migration, "Addressing Gender-Based Violence," Migrant Protection Platform.

Case Study: Predictive Analytics and the CENTAUR System

The CENTAUR system, developed for migration and border monitoring contexts, integrates AI-driven analytics to identify patterns in population movement and potential security risks. While not exclusively deployed in refugee camps, its application to displacement contexts demonstrates how predictive surveillance may be used to anticipate unrest or irregular activity. Proponents argue that such systems enable earlier intervention and more efficient resource allocation. However, critics highlight risks of algorithmic bias, lack of transparency, and the potential for misclassification of vulnerable individuals as security threats. The case underscores the tension between predictive capability and ethical governance, particularly in settings where data quality is uneven and oversight mechanisms are limited.

Sources: Broeders, D. & Dijstelbloem, H. (2016). The datafication of mobility and migration management.

more data than institutions can process, reducing responsiveness.

- Trust erosion if ineffective — Failure to act on reports can undermine confidence and discouage participation.

Academic evidence provides strong support for participatory approaches, though effectiveness depends heavily on institutional follow-through. The system may backfire if reporting systems fail to produce action, questioning the need and efficacy of these systems. Ultimately, this could lead to eroded trust and disengagement by refugee populations in the future.

Adaptive Surveillance as a Tool for Peacebuilding and Refugee Camp Governance

Adaptive surveillance systems—comprising biometric identity platforms, AI-enabled analytics, and environmental monitoring technologies—are increasingly deployed in refugee camps as mechanisms of governance and violence mitigation. These systems enable real-time data collection on movement, behavior, and resource access, allowing authorities to monitor risk environments and respond to emerging threats.[20]

Governance Substitution

In many refugee camps, adaptive surveillance fills gaps in administrative coordination and service delivery. While improving efficiency, these systems shift authority toward technologically mediated control, raising concerns about accountability and legitimacy.[21]

Violence Conditioning

By increasing visibility and reducing anonymity, surveillance alters the conditions under which violence occurs. However, its effectiveness depends on institutional capacity and credibility of enforcement.[22]

Pathways to Violence Reduction and Peacebuilding

Deterrence of Opportunistic Violence

Environmental monitoring systems reduce opportunistic violence—particularly gender-based violence in low-visibility areas—by increasing perceived risk and limiting feasible opportunities for harm. When combined with infrastructure improvements and responsive patrols, these interventions
demonstrate relatively strong effectiveness, though impacts may vary across different camp layouts and population densities.

Anticipatory Prevention

Behavioral analytics and pattern detection tools enable early identification of conflict dynamics, allowing intervention before interpersonal tensions escalate into collective violence. This capacity to interrupt escalation pathways represents a shift from reactive to preventive approaches to camp security, although its effectiveness depends heavily on data quality, interpretation, and timely response.

Stabilization of Resource Access

Biometric identity systems contribute to camp governance by improving accountability in aid delivery and reducing inequalities in access to services. By limiting diversion and enhancing transparency, these systems address grievance-based drivers of conflict and support more predictable resource distribution within camp settings. At the same time, errors in enrollment or access may generate exclusion, introducing new

20. International Committee of the Red Cross, Digital Technologies and War (Geneva: ICRC, 2022).
21. Linnet Taylor, "What Is Data Justice? The Case for Connecting Digital Rights and Freedoms Globally," Big Data & Society 4, no. 2 (2017).
22. Jonathan Hall et al., "Exposure to Violence and Attitudes Toward Transitional Justice," Political Psychology 39, no. 2 (2018): 345–363.

tensions.

Enhanced Reporting and Responsiveness

Participatory and reporting technologies increase the visibility of underreported violence while enabling more responsive action by camp authorities and humanitarian actors. These systems can strengthen trust and inclusion when reporting leads to credible outcomes, but their effectiveness depends on user access, perceived safety, and the reliability of response mechanisms.

Constraints and Risks to Peacebuilding

Reinforcement of Power Asymmetries

Surveillance systems may deepen existing inequalities by concentrating information and decision-making authority in the hands of camp authorities or external actors. Continuous monitoring can constrain autonomy and reinforce dependency, particularly where displaced populations have limited influence over governance processes.[23]

Data Vulnerability and Privacy Risks

The collection and storage of biometric and behavioral data create long-term vulnerabilities, especially in politically unstable contexts. Data misuse, repurposing, or unauthorized access can expose individuals to coercion or discrimination, raising concerns about the ethical foundations of surveillance in humanitarian settings.

Algorithmic Bias and Misclassification

Predictive systems are susceptible to bias and error, potentially resulting in false positives or disproportionate targeting of vulnerable populations. These distortions can undermine legitimacy and reduce trust in camp governance structures.

Displacement and Partial Effectiveness

Surveillance may shift violence to less monitored areas rather than eliminate it entirely, producing uneven security outcomes across camp environments. Additionally, reliance on technological systems may divert attention from strengthening human-centered governance practices.

Gaps in Knowledge and Future Challenges

Durability of Impact

It remains unclear whether surveillance-driven reductions in violence are sustained over time or diminish as individuals adapt to monitoring systems, raising questions about long-term effectiveness in camp settings.

Ambiguous Effects on Trust

While some surveillance functions enhance responsiveness and legitimacy, others may erode trust through perceived overreach, suggesting a complex relationship between monitoring and social cohesion within camps.

Contextual Variability

Differences in camp design, governance arrangements, and technological infrastructure significantly shape outcomes, limiting the transferability of findings across refugee contexts.

Substitution Effects in Camp Governance

A central unresolved issue is whether adaptive surveillance strengthens governance capacity within camps or functions primarily as a technical overlay that compensates for, rather than improves, underlying institutional limitations.[24]

"AI systems can amplify existing inequalities when deployed without robust governance and oversight mechanisms."

- UNESCO, 2021, Recommendation on the Ethics of AI

Recommendations

For adaptive surveillance to reduce violence in refugee camps without undermining refugee agency, governance must be embedded directly into how these systems are designed and implemented. This article proposes a Rights-Informed Adaptive Surveillance framework that integrates four core principles to guide the use of surveillance technologies in camp environments.[25]

1. Proportionality

Surveillance interventions should be calibrated to the specific risks they are intended to address, ensuring

23. Elspeth Guild, Didier Bigo, and Sergio Carrera, eds., Foreigners, Refugees or Minorities? Rethinking People in the Context of Border Controls and Visas (Farnham: Ashgate, 2013).

24. Stephen A. Matlin et al., "Digital Solutions for Migrant and Refugee Health: A Framework for Analysis and Action," The Lancet Regional Health – Europe 50 (2024): 101190.

that the scope and intensity of monitoring do not exceed what is necessary to reduce violence. This requires continuous evaluation to ensure that surveillance remains justified as conditions evolve.

2. Accountability

Effective surveillance systems require clearly defined governance structures that establish responsibility for decision-making, oversight, and redress. Accountability ensures that surveillance practices are subject to review and that institutions remain answerable to affected populations and relevant oversight bodies.

3. Community Trust

The effectiveness of surveillance depends on whether affected populations perceive systems as legitimate and protective rather than coercive. Building trust requires transparency in system use, meaningful engagement with refugee communities, and consistent responsiveness to reported concerns.

4. Data Protection

Surveillance systems must safeguard the collection, storage, and use of sensitive data to prevent misuse or long-term harm. This includes minimizing data collection, enforcing strict access controls, and aligning data practices with established ethical and legal standards.

Together, these principles shift surveillance from a purely technical intervention to a governed system of risk management. Embedding governance within surveillance ensures that violence reduction efforts do not come at the expense of dignity, autonomy, or long-term trust within refugee camp environments.

25. OECD, OECD Framework for the Classification of AI Systems (Paris: OECD Publishing, 2022); UNESCO, Recommendation on the Ethics of Artificial Intelligence.

DIGITAL PEACEBUILDING

2026 Issue 4

The Effect of Refugee Camp Design and Infrastructure on Gender-Based Violence

Christina Charie

Executive Summary

Gender-Based Violence (GBV) occurs at higher rates in refugee camps and settlements than in other settings. The absence of adequate GBV programming combined with limited WASH infrastructure create an environment where GBV is more likely to occur. Infrastructure improvements have the potential to alleviate GBV in refugee camps by increasing feelings of safety, reducing exposure, and decreasing isolation from the community. Refugee camp design and infrastructure improvements are limited in their ability to address IPV incidents occurring within households and providing substantial deterrents for GBV committed against individuals without legal status in their host country. Infrastructure improvements and gender-segregated programming, however, can increase distrust, making proper implementation crucial to success.

Introduction

Refugee camps provide vital emergency housing and services to large displaced populations, but gender-based violence (GBV) is more pronounced within these settlements. Refugee camp infrastructure design can overcome some of these challenges. It can reduce GBV by providing comprehensive WASH infrastructure and reducing isolation via communal spaces. With limited data collection and reporting mechanisms, designing effective GBV programming in refugee camps is a challenge for practitioners. Infrastructure, however, cannot address IPV that occurs within households and has a limited impact on cultural norms. This policy brief outlines the most effective refugee camp infrastructure and design elements for reducing GBV and offers recommendations for its implementation.

Refugee/IDP Camps

Refugee camps are "temporary facilities" that assist "people who have been forced to flee their homes due to war, persecution, or violence."[1] With the barriers to resettlement mounting, refugee camps have evolved into "long-lasting, multifaceted human settlements" for displaced populations.[2] Humanitarian actors note that refugee housing should be "safe and secure" while leaving flexibility to adapt to the context.[3] More frequently, guidance encourages refugee/IDP camps to be used as a last resort for temporary, immediate housing needs.[4]

Gender-Based Violence (GBV)

GBV is a gendered "spectrum of violence" inclusive of "domestic violence, human trafficking, harmful traditional practices."[5] In refugee settings, GBV is a "life-threatening health and protection issue" that causes "sexual, physical, mental, and

[1]"What Is a Refugee Camp? Definition and Statistics | USA for UNHCR." Accessed February 16, 2026. https://www.unrefugees.org/refugee-facts/camps/.
[2]Dantas, Abdon, and Miguel Amado. "Refugee Camp: A Literature Review." Journal of Urban Planning and Development 149, no. (2023): 03123003. https://doi.org/10.1061/JUPDDM.UPENG-4311.
[3] UNHCR. "Safe and Secure Settlements." July 26, 2025. https://emergency.unhcr.org/emergency-assistance/settlement-and-shelter/guidance-settlements/safe-and-secure-settlements.
[4]"What Is a Refugee Camp? Definition and Statistics | USA for UNHCR." Accessed February 16, 2026. https://www.unrefugees.org/refugee-facts/camps/.
[5]Simon-Butler, Andrew, and Professor Bernadette McSherry. Defining Sexual and Gender-Based Violence in the Refugee Context. 2019.

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economic harm."[6] Ultimately, GBV is rooted in patriarchal systems in both conflict and non-conflict settings, meaning that it disproportionately impacts women while still being inclusive of men.[7]

Refugee Camp Design and Infrastructure

Refugee camp design includes the services, layout, spacing, and community resources provided in the settlement.[8] In practice, refugee camp design focuses on accommodating the number of refugees in need of services and meeting basic human needs,[9] but the UN considers transportation, irrigation, energy, information, and communications as infrastructure.[10] For the purposes of GBV, WASH facilities, and the lighting used, are the most relevant aspects of infrastructure.[11] The absence of "clean water, functional toilets, waste management systems and menstrual hygiene supplies" exacerbates GBV.[12]

GBV In Refugee Camps and Settlements

Cultural and Gendered Norms

The lack of programming addressing cultural normand attitudes justifying sexism facilitates environments that encourage GBV, which are exacerbated by conflict and refugee settings.[13,14,15] This increases experiences of gender-based discrimination by disrupting gendered norms, particularly the notion of men as the provider, leading to the equation of masculinity with violence.[16,17,18,19] Stigma factors into whether women will seek GBV care because women who experience GBV are viewed as "loose," threatening their family's privacy and the stability of their marriages.[20]



Source: Matias Costa/IRC/Panos. Panoramic Interior Composite Image of Shukri Ali Aden's Dwelling in the Hagadera Refugee Camp in Dadaab, Kenya. She Fled Jamame in Somalia in 1992. She Belongs to a Women's Group Who Run a Bakery and Sell Their Goods in the Refugee Camp. Dadaab Is the World's Largest Refugess Camp on the Border between Kenya and Somalia. The Majority of Refugees Come from Somalia.

For the Past 20 Years, Ongoing Violence Has Resulted in Millions of People Leaving Somalia. Over 400,000 Somali Refugees Live in Dadaab, the Largest Refugee Camp in the World, Located in Eastern Kenya. With Funding from the European Commission's Humanitarian Aid and Civil Protection Department (ECHO), the IRC Runs Hagadera Hospital, Which Cares for 120,000 of These Refugees by Providing Medicineto Help Reduce the Transmission of Diseases, as Well as Treatment, Such as the Removal of Cataracts, That Dramatically Improves Quality of Life. The IRC Also Helps Women to Start Businesses so They Are Able to Buy Firewood and Avoid the Risk of Sexual Violence That Comes

Camp and Settlement Structural Factors

Presence of camp security and distance from the nearest police station are associated with higher rates of GBV,[21] with additional research demonstrating that women rarely seek help from police on their own.[22] Research suggests that over half (70%) of GBV reports in refugee camps take place at the victim's home.[23] While refugee camps have short-term protection shelters in the case of GBV, these spaces can only hold a few individuals and are temporary.[24] While the WASH Handbook stipulates that refugee camps should have separate toilet facilities for men and women, in practice, this is not always consistent.[25,26] Concerns about sharing bathrooms and spaces with unknown men result in some women choosing to sleep outside instead.[27] Off-site water infrastructure and limited lighting also contribute to

[6]UNHCR US. "Gender-Based Violence." Accessed February 23, 2026. https://www.unhcr.org/us/what-we-do/protect-human-rights/protection/gender-based-violence.
[7]"What Is Gender-Based Violence (GBV)–and How Do We Prevent It? | The IRC." August 13, 2025. https://www.rescue.org/article/what-gender-based-violence-and-how-do-we-prevent-it.
[8]UNHCR. "Principles & Standards for Settlement Planning." June 26, 2025. https://emergency.unhcr.org/emergency-assistance/settlement-and-shelter/guidance-settlements/principles-standards-settlement-planning.
[9]Aburamadan, Rania, Claudia Trillo, and Busisiwe Chikomborero Ncube Makore. "Designing Refugees' Camps: Temporary Emergency Solutions, or Contemporary Paradigms of Incomplete Urban Citizenship? Insights from Al Za'atari." City, Territory and Architecture 7, no. 1 (2020): 12. https://doi.org/10.1186/s40410-020-00120-z.
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[12]Abuzerr, Samer, Hani Hamdan, and Jinan Charafeddine. "A Qualitative Study on Gendered Wash Insecurity and Health Outcomes among Internally Displaced Populations in Conflict-Affected Context." BMC Public Health 26, no. 1 (2025): 80. https://doi.org/10.1186/s12889-025-25777-4.
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[14]Jensen, Mie A. "Gender-Based Violence in Refugee Camps: Understanding and Addressing the Role of Gender in the Experiences of Refugees." Inquiries Journal 11, no. 02 (2019). http://www.inquiriesjournal.com/articles/1757/gender-based-violence-in-refugee-camps-understanding-and-addressing-the-role-of-gender-in-the-experiences-of-refugees.
[15]Kisaakye, Peter, Stella Muthuri, George Odwe, et al. "Experiences of Childhood Violence and Violence Perpetration and the Association with Inequitable Gender Norms and Violence Justification in Humanitarian Settings in Uganda." Global Public Health 20, no. 1 (2025): 2531914. https://doi.org/10.1080/17441692.2025.2531914.
[16]Jensen, Mie A. "Gender-Based Violence in Refugee Camps: Understanding and Addressing the Role of Gender in the Experiences of Refugees." Inquiries Journal 11, no. 02 (2019). http://www.inquiriesjournal.com/articles/1757/gender-based-violence-in-refugee-camps-understanding-and-addressing-the-role-of-gender-in-the-experiences-of-refugees.
[17]Krause, Ulrike. "A Continuum of Violence? Linking Sexual and Gender-Based Violence during Conflict, Flight, and Encampment." Refugee Survey Quarterly 34, no. 4 (2015): 1–19.
[18]Jensen, Mie A. "Gender-Based Violence in Refugee Camps: Understanding and Addressing the Role of Gender in the Experiences of Refugees." Inquiries Journal 11, no. 02 (2019). http://www.inquiriesjournal.com/articles/1757/gender-based-violence-in-refugee-camps-understanding-and-addressing-the-role-of-gender-in-the-experiences-of-refugees.
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[23]Dahie, Hassan Abdullahi, Mohamed Maalim Dakane, and Bashir Said Hassan. "Prevalence, Patterns, and Determinants of Gender-Based Violence among Women and Girls in IDP Camps, Mogadishu-Somalia." Journal of Migration and Health 8 (January 2023): 100193. https://doi.org/10.1016/j.jmh.2023.100193.
[24]Krause, Ulrike. "A Continuum of Violence? Linking Sexual and Gender-Based Violence during Conflict, Flight, and Encampment." Refugee Survey Quarterly 34, no. 4 (2015): 1–19.
[25]Jensen, Mie A. "Gender-Based Violence in Refugee Camps: Understanding and Addressing the Role of Gender in the Experiences of Refugees." Inquiries Journal 11, no. 02 (2019). http://www.inquiriesjournal.com/articles/1757/gender-based-violence-in-refugee-camps-understanding-and-addressing-the-role-of-gender-in-the-experiences-of-refugees.
[26]Freedman, Jane. "Sexual and Gender-Based Violence against Refugee Women: A Hidden Aspect of the Refugee 'Crisis.'" Reproductive Health Matters 24, no. 47 (2016): 18–26.
[27]Ibid.

GBV, particularly among female youth populations as they travel to retrieve water for families.[28]

Stress/Psychological Factors

Research suggests that individuals in refugee camps experience PTSD and associated symptoms at higher rates than refugees in other types of settlements.[29] PTSD could drive higher cases of GBV, though a causal relationship is not identified.[30] Despite the absence of a causal link, emotional and psychological abuse remains the second most prevalent form of GBV,[31] with estimates showing that 60.9% of refugee women experience controlling behavior from a partner.[32]

"Ten-year-old girls have reported GBV in refugee/IDP camps."

At-Risk Populations

1. **Young Women and Girls**: Women and girls ages 15-24 are three to four times more likely to experience GBV in refugee settings than women in other age groups,[33,34] with just under half (42.3%) of reported cases of GBV occurring among victims twenty years of age or younger.[35] Ten-year-old girls have reported GBV in refugee/IDP camps.[36]

2. **Socioeconomic Status**: Female refugees living in poverty are more likely to experience physical and sexual abuse, even leading to reliance on survival sex.[37] The reliance on external aid also makes theft and violent crime more common, particularly if women are the primary aid receivers.[38] The results of reducing GBV through work programs are mixed,[39] as additional research notes that the type of work women complete within the household might put them at a greater risk of GBV.[40]

Infrastructure Mechanisms for GBV Mitigation

WASH Infrastructure Increases Feelings of Safety

The primary way refugee camp design and infrastructure alleviates gender-based violence (GBV) is through increasing feelings of safety. Doors, locks, and lighting in latrine areas contribute to women feeling safer when using the bathroom[41,42,43] because it reduces the risk of sexual assault, rape, and other forms of GBV.[44] Sharing a latrine with five households or fewer decreases fears of GBV,[45] while separate latrine facilities for boys and girls encourage girls to remain in school longer before marriage.[46,47] Increasing the distance between men's and women's facilities also contributes to higher feelings of safety.[48] Lighting access is influenced by the gender dynamics of the refugee camp setting, so lantern or flashlight distribution programs must take into account which family members receive the device. Dispersing portable lighting to each household in a camp setting might not increase women's access to lighting because patriarchal family structures dictate that male family members distribute resources.[49]

Decreasing Distance to Water Sources

Distances between housing and water sources leaves women and girls more vulnerable to attack because they are the primary water collectors in

[28]Logie, Carmen H., Moses Okumu, Madelaine Coelho, et al. "Water Insecurity and Sexual and Gender-Based Violence among Refugee Youth: Qualitative Insights from a Humanitarian Setting in Uganda." Journal of Water, Sanitation and Hygiene for Development 12, no. 12 (2022): 883–93. https://doi.org/10.2166/washdev.2022.236.

[29]Al-Hourani, Dalia, Mahmoud Al-Wriekat, Rocio Llmas-Ramos, and Ines Llmas-Ramos. "Traumatic Symptoms Among Syrian Refugees in Host Countries: A Comparative Study of Jordan and Spain." Societies 15, no. 11 (2025). https://doi.org/10.3390/soc15110295.

[30]Krause, Ulrike. "A Continuum of Violence? Linking Sexual and Gender-Based Violence during Conflict, Flight, and Encampment." Refugee Survey Quarterly 34, no. 4 (2015): 1–19.

[31]Dahie, Hassan Abdullahi, Mohamed Maalim Dakane, and Bashir Said Hassan. "Prevalence, Patterns, and Determinants of Gender-Based Violence among Women and Girls in IDP Camps, Mogadishu-Somalia." Journal of Migration and Health 8 (January 2023): 100193. https://doi.org/10.1016/j.jmh.2023.100193.

[32]Muuo, Sheru, Stella Kagwiria Muthuri, Martin Kavao Mutua, et al. "Barriers and Facilitators to Care-Seeking among Survivors of Gender-Based Violence in the Dadaab Refugee Complex." Sexual and Reproductive Health Matters 28, no. 1 (2020): 1722404. https://doi.org/10.1080/26410397.2020.1722404.

[33]Tadesse, Gebresilassie, Fantahun Andualem, Gidey Rtbey, et al. "Gender-Based Violence and Its Determinants among Refugees and Internally Displaced Women in Africa: Systematic Review and Meta-Analysis." BMC Public Health 24, no. 1 (2024): 2851. https://doi.org/10.1186/s12889-024-20329-8.

[34]Logie, Carmen H., Moses Okumu, Madelaine Coelho, et al. "Water Insecurity and Sexual and Gender-Based Violence among Refugee Youth: Qualitative Insights from a Humanitarian Setting in Uganda." Journal of Water, Sanitation and Hygiene for Development 12, no. 12 (2022): 883–93. https://doi.org/10.2166/washdev.2022.236..

[35]Dahie, Hassan Abdullahi, Mohamed Maalim Dakane, and Bashir Said Hassan. "Prevalence, Patterns, and Determinants of Gender-Based Violence among Women and Girls in IDP Camps, Mogadishu-Somalia." Journal of Migration and Health 8 (January 2023): 100193. https://doi.org/10.1016/j.jmh.2023.100193

[36]Muuo, Sheru, Stella Kagwiria Muthuri, Martin Kavao Mutua, et al. "Barriers and Facilitators to Care-Seeking among Survivors of Gender-Based Violence in the Dadaab Refugee Complex." Sexual and Reproductive Health Matters 28, no. 1 (2020): 1722404. https://doi.org/10.1080/26410397.2020.1722404.

[37]Simon-Butler, Andrew, and Professor Bernadette McSherry. Defining Sexual and Gender-Based Violence in the Refugee Context. 2019.

[38]Krause, Ulrike. "A Continuum of Violence? Linking Sexual and Gender-Based Violence during Conflict, Flight, and Encampment." Refugee Survey Quarterly 34, no. 4 (2015): 1–19.

[39]Maxi Leila Robbers, Gianna, and Alison Morgan. "Programme Potential for the Prevention of and Response to Sexual Violence among Female Refugees: A Literature Review." Reproductive Health Matters 25, no. 51 (2017): 69–89. https://doi.org/10.1080/09688080.2017.1401893.

[40]Logie, Carmen H., Moses Okumu, Madelaine Coelho, et al. "Water Insecurity and Sexual and Gender-Based Violence among Refugee Youth: Qualitative Insights from a Humanitarian Setting in Uganda." Journal of Water, Sanitation and Hygiene for Development 12, no. 12 (2022): 883–93. https://doi.org/10.2166/washdev.2022.236..

[41]Abuzerr, Samer, Hani Hamdan, and Jinan Charafeddine. "A Qualitative Study on Gendered Wash Insecurity and Health Outcomes among Internally Displaced Populations in Conflict-Affected Context." BMC Public Health 26, no. 1 (2025): 80. https://doi.org/10.1186/s12889-025-25777-4.

[42]Navarrete, José. A qualitative research of humanitarian workers' perceptions of preventing Gender-Based Violence (GBV) in the Cox's Bazar refugee camps, Bangladesh. Artículos de Investigación. 2019, 45–74. https://doi.org/10.15332/25006681/5286.

[43]De Lange, Rink, Annick Lenglet, Jean Francois Fesselet, et al. "Keeping It Simple: A Gender-Specific Sanitation Tool for Emergencies." Waterlines 33, no. 1 (2014): 45–54.

[44]Osman, Mai Izeldeen. "Gender Dimension of Water Sanitation and Hygiene Program (WASH) Interventions in South Sudanese Refugee Camps." The Ahfad Journal 37, no. 2 (2020): 33–43.

[45]"Shining a Light: How Lighting in or around Sanitation Facilities Affects the Risk of Gender-Based Violence in Camps." Oxfam Policy & Practice, 2018. https://policy-practice.oxfam.org/resources/shining-a-light-how-lighting-in-or-around-sanitation-facilities-affects-the-ris-620605/.

[46]Hasan, Md. Beyond Hygiene: The Impact Of WASH Infrastructure AND Safety Perceptions On Adolescent Girls' School Attendance In Rohingya Refugee Camps. 2025.

[47]"Guidlines for Integrating Gender-Based Violence Interventions in Humanitarian Action." IASC, August 2015. https://gbvguidelines.org/wp/wp-content/uploads/2015/09/TAG-wash-08_26_2015.pdf.

[48]"Shining a Light: How Lighting in or around Sanitation Facilities Affects the Risk of Gender-Based Violence in Camps." Oxfam Policy & Practice, 2018. https://policy-practice.oxfam.org/resources/shining-a-light-how-lighting-in-or-around-sanitation-facilities-affects-the-ris-620605/.

[49]Ibid.

Case Study: Bidi Bidi Refugee Settlement, Uganda

A team of researchers designed a MHM friendly WASH infrastructure system based on extesnive commmunity feedback. Coined the Cocoon Mini, the facility provides a latrine, solar lighting, bathing facility, water access, and menstrual product disposable bin. The Cocoon Mini is locked structure with privacy doors and walls. The team launched a pilot program within the Bidi Bidi Refugee Settlement, surveying particpants after using the Cocoon Mini. 94% of menstruators reported that they approved of the Cocoon Mini after the pilot. Each unit costs $360 USD in materials and labor, making the Cocoon Mini a scalable, community-accepted solution to WASH infrastructure that can also be applied to GBV.

Source: Beeman, Aly, Joseph Kwesiga, Nicole Ippoliti, et al. "Using Human-Centered Design to Co-Design Dedicated Menstrual Health Spaces with People Who Menstruate in Bidi Bidi Refugee Settlement, Uganda: Learnings for Further Adaptation and Scale in Humanitarian Settings." BMC Women's Health 23, no. 1 (2023): 1–16.

164418761 https://doi.org/10.1186/s12905-023-02421-0.

refugee communities.[50,51,52] Time spent travelling to the nearest water sources can decrease school attendance among younger girls, which can put them at a higher risk of future GBV.[53]

Reducing Reliance on Firewood

Providing fuel and upgraded solar-powered cookware can reduce the reliance on firewood for essential activities in refugee camps.[54] Decreasing the distance travelled to access energy reduces the risk of GBV in refugee camps because it reduces exposure.[55]

Social Spaces: Promoting Community

Creating clustered social spaces near refugee camp shelters facilitates the formation of kinship among refugees.[56] Female refugees describe losing community support systems as a major barrier to seeking help when GBV occurs.[57] Creating spaces where women feel safe to engage in community life decreases opportunities for isolation, alleviating the risks of GBV.[58,59,60] Survivors report turning to NGO safe spaces within refugee camps to cope.[61]

Programming and Reporting Mechanisms

Expanding options for programming and reporting can mitigate the impacts of GBV among survivors.[62] Digital apps and AI systems can expand support options for survivors, increasing the likelihood of receiving GBV programming.[63,64] This allows personnel to identify individuals in need of support and target programming based on available data.

Limitations of Refugee Camp Infrastructure

Addressing Experiences of IPV in the Home

Women living in refugee camps report that their husbands were the main perpetrators of IPV, meaning WASH infrastructure improvements may not directly reduce IPV cases.[65] While there is a link between adequate housing and well-being, there is not enough evidence to suggest that housing improvements would reduce GBV.[66] Infrastructure and design improvements can reduce isolation, but it can be difficult to rebuild the community that refugees found back home.[67]

Cultural Norms and Intergenerational Violence

In communities where GBV is frequent and normalized, introducing programming during

[50]Osman, Mai Izeldeen. "Gender Dimension of Water Sanitation and Hygiene Program (WASH) Interventions in South Sudanese Refugee Camps." The Ahfad Journal 37, no. 2 (2020): 33–43.
[51]"Guidlines for Integrating Gender-Based Violence Interventions in Humanitarian Action." IASC, August 2015. https://gbvguidelines.org/wp/wp-content/uploads/2015/09/TAG-wash-08_26_2015.pdf.
[52]Lukasiak, Miriam, Jack Palmieri, Pia Svensson, Gilbert Tumwine, and Anette Agardh. "Exploring Perceptions and Experiences of Gender-Based Violence among Women in a Refugee Camp Setting in Uganda—A Qualitative Study." PLOS ONE 19, no. 12 (2024): e0314972. https://doi.org/10.1371/journal.pone.0314972.
[53]"Guidlines for Integrating Gender-Based Violence Interventions in Humanitarian Action." IASC, August 2015. https://gbvguidelines.org/wp/wp-content/uploads/2015/09/TAG-wash-08_26_2015.pdf.
[54]Thomas, Peter James Matthew, Sarah Rosenberg-Jansen, and Aimee Jenks. "Moving beyond Informal Action: Sustainable Energy and the Humanitarian Response System." Journal of International Humanitarian Action 6, no. 1 (2021): 21. https://doi.org/10.1186/s41018-021-00102-x.
[55]Bradley, Tamsin, and Katherine Liakos. Using Energy Programming to Address Violence Against Women and Girls in Humanitarian Settings. n.d.
[56]Al-Homoud, Majd, and Samarah Ola. "Socio-Spatial Adaptation and Resilient Urban Systems: Refugee-Driven Transformation in Zaatari Syrian Refugee Camp, Jordan." Urban Science (Basel, Switzerland) 9, no. 4 (2025): 133. https://doi.org/10.3390/urbansci9040133.
[57]Lukasiak, Miriam, Jack Palmieri, Pia Svensson, Gilbert Tumwine, and Anette Agardh. "Exploring Perceptions and Experiences of Gender-Based Violence among Women in a Refugee Camp Setting in Uganda—A Qualitative Study." PLOS ONE 19, no. 12 (2024): e0314972. https://doi.org/10.1371/journal.pone.0314972.
[58]Abuzerr, Samer, Hani Hamdan, and Jinan Charafeddine. "A Qualitative Study on Gendered Wash Insecurity and Health Outcomes among Internally Displaced Populations in Conflict-Affected Context." BMC Public Health 26, no. 1 (2025): 80. https://doi.org/10.1186/s12889-025-25777-4.
[59]Navarrete, José. A qualitative research of humanitarian workers' perceptions of preventing Gender-Based Violence (GBV) in the Cox's Bazar refugee camps, Bangladesh. Artículos de Investigación. 2019, 45–74. https://doi.org/10.15332/25006681/5286.
[60]De Lange, Rink, Annick Lenglet, Jean Francois Fesselet, et al. "Keeping It Simple: A Gender-Specific Sanitation Tool for Emergencies." Waterlines 33, no. 1 (2014): 45–54.
[61]Lukasiak, Miriam, Jack Palmieri, Pia Svensson, Gilbert Tumwine, and Anette Agardh. "Exploring Perceptions and Experiences of Gender-Based Violence among Women in a Refugee Camp Setting in Uganda—A Qualitative Study." PLOS ONE 19, no. 12 (2024): e0314972. https://doi.org/10.1371/journal.pone.0314972.
[62]International Review of the Red Cross. "Enabling Access or Automating Empathy? Using Chatbots to Support GBV Survivors in Conflicts and Humanitarian Emergencies." December 1, 2025. http://international-review.icrc.org/articles/enabling-access-or-automating-empathy-using-chatbots-to-support-gbv-survivors-in-conflicts-and-humanitarian-emergencies-930.
[63]Spencer, Sarah W., and Caroline Masbougi. Artificial Intelligence In Gender-Based Violence In Emergency Programming: Perils AND Potentials. n.d.
[64]The Frontier Technologies Hub. "AI-Enhanced GBV Reporting — Frontier Tech Hub." Accessed April 20, 2026. https://www.frontiertechhub.org/pilot-portfolio/ai-gbv-chatbot.
[65] Lukasiak, Miriam, Jack Palmieri, Pia Svensson, Gilbert Tumwine, and Anette Agardh. "Exploring Perceptions and Experiences of Gender-Based Violence among Women in a Refugee Camp Setting in Uganda—A Qualitative Study." PLOS ONE 19, no. 12 (2024): e0314972. https://doi.org/10.1371/journal.pone.0314972.
[66]Bradley, Tamsin, and Katherine Liakos. Using Energy Programming to Address Violence Against Women and Girls in Humanitarian Settings. n.d.
[67]Lukasiak, Miriam, Jack Palmieri, Pia Svensson, Gilbert Tumwine, and Anette Agardh. "Exploring Perceptions and Experiences of Gender-Based Violence among Women in a Refugee Camp Setting in Uganda—A Qualitative Study." PLOS ONE 19, no. 12 (2024): e0314972. https://doi.org/10.1371/journal.pone.0314972.

an ongoing crisis becomes more difficult.[68,69] Refugees also noted that cultural norms can prevent GBV programming from having its intended impact,[70] as many are hesitant to talk about GBV, even during programming.[71] This reluctant to discuss GBV leads to gaps in data availability in refugee settings. While proxies such as the fear of GBV help capture the situation in refugee camps, the absence of precise data acts as a barrier to program design and implementation.[72]Additionally, GBV programming often targets women, which neglects to counter notions of toxic masculinity among male refugees.[73]

Legal Status of Refugees and Displaced Populations

Without legal status in their host country, refugees have options for legal accountability, which can only be fully addressed through the country's immigration processes. Without legal status in a host country, there is no strong legal deterrent preventing GBV against refugees.[74] Combined with a lack of economic resources to win a legal battle, refugees are more vulnerable.[75] A lack of legal protection is also associated with decreased levels of reporting within communities that are already unlikely to discuss their experiences.[76, 77]

Case Study: Dzaleka Refugee Camp, Malawi

In the Dzaleka Refugee Camp, a community-based website repository contains a wide range of reporting and legal resources for refugees. This includes legal representation and documentation assistance. The webpage also directs community members to a 24/7 GBV hotline for immediate assistance on the home page. Users can also access job posting and programming information in one conveinent place.

Sources: Services, Dzaleka Online. "Resource Hub - Dzaleka Refugee Camp." Dzaleka Online Services, April 25, 2026. https://services.dzaleka.com/resources.

The Frontier Technologies Hub. "AI-Enhanced GBV Reporting — Frontier Tech Hub." Accessed April 20, 2026. https://www.frontiertechhub.org/pilot-portfolio/ai-gbv-chatbot.

Negative Effects

Increase Fears of GBV

When lights are installed without addressing the distance women and girls need to travel to access latrines, men tend to congregate around women's facilities.[78,79] Public lighting can make women and girls easier targets when travelling at night,[80] meaning that partial lighting still causes fears of GBV.[81] Any approach to lighting improvements must be comprehensive, taking into account cultural norms when deciding if public lighting or personal lanterns are the best approach.[82] Poor quality latrine infrastructure can increase fears of GBV because men can watch women when they use the bathroom through broken windows or doors.[83] Investment in high-quality latrines, while costly upfront, reduces risks of GBV, ensures latrines are reliable, and reduces repair expenses in the long-term.[84,85]

Increase Distrust

Providing services and aid to the women of a household can create distrust and erode community relationships.[86] This distrust can increase gender-based violence because access to materials and aid makes them a target for theft.[87]

[68]Schuller, Mark. "'Pa Manyen Fanm Nan Konsa': Intersectionality, Structural Violence, and Vulnerability Before and After Haiti's Earthquake." Feminist Studies (College Park, United States) 41, no. 1 (2015): 184-210,241-242.
[69]Navarrete, José. A qualitative research of humanitarian workers' perceptions of preventing Gender-Based Violence (GBV) in the Cox's Bazar refugee camps, Bangladesh. Artículos de Investigación. 2019, 45–74. https://doi.org/10.15332/25006681/5286.
[70]Ibid.
[71]"Shining a Light: How Lighting in or around Sanitation Facilities Affects the Risk of Gender-Based Violence in Camps." Oxfam Policy & Practice, 2018. https://policy-practice.oxfam.org/resources/shining-a-light-how-lighting-in-or-around-sanitation-facilities-affects-the-ris-620605/.
[72]Cavill, Sue, Jeanne Vidal, Brian Reed, Jonathan Rouse, and Julie Fisher. Lighting, WASH, and GBV in Camp Settings. Oxfam International, 2018.
[73]Lukasiak, Miriam, Jack Palmieri, Pia Svensson, Gilbert Tumwine, and Anette Agardh. "Exploring Perceptions and Experiences of Gender-Based Violence among Women in a Refugee Camp Setting in Uganda—A Qualitative Study." PLOS ONE 19, no. 12 (2024): e0314972. https://doi.org/10.1371/journal.pone.0314972.
[74]Navarrete, José. A qualitative research of humanitarian workers' perceptions of preventing Gender-Based Violence (GBV) in the Cox's Bazar refugee camps, Bangladesh. Artículos de Investigación. 2019, 45–74. https://doi.org/10.15332/25006681/5286.
[75]Lukasiak, Miriam, Jack Palmieri, Pia Svensson, Gilbert Tumwine, and Anette Agardh. "Exploring Perceptions and Experiences of Gender-Based Violence among Women in a Refugee Camp Setting in Uganda—A Qualitative Study." PLOS ONE 19, no. 12 (2024): e0314972. https://doi.org/10.1371/journal.pone.0314972.
[76]Navarrete, José. A qualitative research of humanitarian workers' perceptions of preventing Gender-Based Violence (GBV) in the Cox's Bazar refugee camps, Bangladesh. Artículos de Investigación. 2019, 45–74. https://doi.org/10.15332/25006681/5286.
[77]"Shining a Light: How Lighting in or around Sanitation Facilities Affects the Risk of Gender-Based Violence in Camps." Oxfam Policy & Practice, 2018. https://policy-practice.oxfam.org/resources/shining-a-light-how-lighting-in-or-around-sanitation-facilities-affects-the-ris-620605/.
[78]Ibid.
[79]Navarrete, José. A qualitative research of humanitarian workers' perceptions of preventing Gender-Based Violence (GBV) in the Cox's Bazar refugee camps, Bangladesh. Artículos de Investigación. 2019, 45–74. https://doi.org/10.15332/25006681/5286.
[80]"Shining a Light: How Lighting in or around Sanitation Facilities Affects the Risk of Gender-Based Violence in Camps." Oxfam Policy & Practice, 2018. https://policy-practice.oxfam.org/resources/shining-a-light-how-lighting-in-or-around-sanitation-facilities-affects-the-ris-620605/.
[81]Bradley, Tamsin, and Katherine Liakos. Using Energy Programming to Address Violence Against Women and Girls in Humanitarian Settings. n.d.
[82]"Shining a Light: How Lighting in or around Sanitation Facilities Affects the Risk of Gender-Based Violence in Camps." Oxfam Policy & Practice, 2018. https://policy-practice.oxfam.org/resources/shining-a-light-how-lighting-in-or-around-sanitation-facilities-affects-the-ris-620605/.
[83]Ibid.
[84]Ibid.
[85]Sommer, Marni, Suzanne Ferron, Sue Cavill, and Sarah House. "Violence, Gender and WASH: Spurring Action on a Complex, under-Documented and Sensitive Topic." Environment & Urbanization 27, no. 1 (2015): 105–16. https://doi.org/10.1177/0956247814564528.
[86]Schuller, Mark. "'Pa Manyen Fanm Nan Konsa': Intersectionality, Structural Violence, and Vulnerability Before and After Haiti's Earthquake." Feminist Studies (College Park, United States) 41, no. 1 (2015): 184-210,241-242.
[87]Ibid.

Community-based approaches and consultations can be used to determine who should have access to portable lighting and which public areas should have communal lighting, reducing the risk of distrust-related GBV.[88]

Recommendations

As refugee crises continue to persist long-term, the following infrastructure adaptations can make refugee camps better-suited to prevent GBV in the long-term:

1. *Expanding Community-Spaces and Short-Term Protection Shelters*: Public spaces are essential to reducing isolation and rebuilding the community within refugee and displaced populations.[89] Humanitarian actors must ensure that refugee settlements meet basic needs, but leave room to add community resources after the initial emergency phases in case populations remain in the camp long-term. GBV protection shelters are often too small to meet the needs of a refugee population, despite being noted as a source of support.[90] To reduce isolation within refugee camps, actors should ensure that short-term protection shelters are evenly distributed throughout the settlement so that all residents are within walking distance of at least one shelter.
2. *Increased Reporting Facilitated by AI and Digital Platforms*: AI can increase GBV monitoring by providing counseling and programming services to GBV victims via chatbots while streamlining data collection.[91] Decreased reporting prevents humanitarian organizations from collecting accurate data on GBV to design effective programming.[92,93] Mobile apps and digital platforms can anonymously collect data, allowing for reporting without compromising a survivor's standing within their community like traditional accountability mechanisms.[94] Digital platforms also allow refugees to access services in areas where humanitarian physical presence is limited. AI-facilitated GBV programming, however, does come with risks. Primarily, AI-based responses can threaten data privacy, generate inaccurate output, and contain gendered biases. Thus, AI should be implemented in consultation with communities and feminist organizations.[95]
3. *WASH Infrastructure: Novel Approaches to Latrine Safety and Lighting*: The Bidi Bidi Cocoon Mini case study demonstrates that low-cost comprehensive WASH infrastructure exists in the humanitarian space, but there is a lack of uptake despite its scalability. While the Cocoon Mini has primarily been deployed to improve menstrual health and hygiene, its main features also alleviate GBV, making similar solutions a model for other refugee settings.[96] Additionally, the Cocoon Mini utilizes a solar lighting system that avoids the pitfalls of lanterns or other community lighting solutions.[97]

[88]"Shining a Light: How Lighting in or around Sanitation Facilities Affects the Risk of Gender-Based Violence in Camps." Oxfam Policy & Practice, 2018. https://policy-practice.oxfam.org/resources/shining-a-light-how-lighting-in-or-around-sanitation-facilities-affects-the-ris-620605/.

[89]Al-Hourani, Dalia, Mahmoud Al-Wriekat, Rocio Llmas-Ramos, and Ines Llmas-Ramos. "Traumatic Symptoms Among Syrian Refugees in Host Countries: A Comparative Study of Jordan and Spain." Societies 15, no. 11 (2025). https://doi.org/10.3390/soc15110295.

[90]Lukasiak, Miriam, Jack Palmieri, Pia Svensson, Gilbert Tumwine, and Anette Agardh. "Exploring Perceptions and Experiences of Gender-Based Violence among Women in a Refugee Camp Setting in Uganda—A Qualitative Study." PLOS ONE 19, no. 12 (2024): e0314972. https://doi.org/10.1371/journal.pone.0314972.

[91]DeGraw, Erin. "Using AI to Track Gender-Based Violence." Think Global Health. Accessed April 19, 2026. https://www.thinkglobalhealth.org/article/using-ai-track-gender-based-violence.

[92]Muuo, Sheru, Stella Kagwiria Muthuri, Martin Kavao Mutua, et al. "Barriers and Facilitators to Care-Seeking among Survivors of Gender-Based Violence in the Dadaab Refugee Complex." Sexual and Reproductive Health Matters 28, no. 1 (2020): 1722404. https://doi.org/10.1080/26410397.2020.1722404.

[93]Asgary, Ramin, Eleanor Emery, and Marcia Wong. "Systematic Review of Prevention and Management Strategies for the Consequences of Gender-Based Violence in Refugee Settings." International Health 5, no. 2 (2013): 85–91. https://doi.org/10.1093/inthealth/iht009.

[94]DeGraw, Erin. "Using AI to Track Gender-Based Violence." Think Global Health. Accessed April 19, 2026. https://www.thinkglobalhealth.org/article/using-ai-track-gender-based-violence.

[95]Spencer, Sarah W., and Caroline Masboungi. Artificial Intelligence In Gender-Based Violence In Emergency Programming: Perils AND Potentials. n.d.

[96]Beeman, Aly, Joseph Kwesiga, Nicole Ippoliti, et al. "Using Human-Centered Design to Co-Design Dedicated Menstrual Health Spaces with People Who Menstruate in Bidi Bidi Refugee Settlement, Uganda: Learnings for Further Adaptation and Scale in Humanitarian Settings." BMC Women's Health 23, no. 1 (2023): 1–16. 164418761. https://doi.org/10.1186/s12905-023-02421-0.

[97]"Shining a Light: How Lighting in or around Sanitation Facilities Affects the Risk of Gender-Based Violence in Camps." Oxfam Policy & Practice, 2018. https://policy-practice.oxfam.org/resources/shining-a-light-how-lighting-in-or-around-sanitation-facilities-affects-the-ris-620605/.

DIGITAL PEACEBUILDING

2025 Issue 4

Use of 3D Printing in War-Induced Health Consequences

Yosumin Qurbonbekova

Executive Summary

3-Dimensional Printing (3DP) can help address physical health challenges in warzones by making prosthetics for injured limbs and offering ways to repair damaged healthcare infrastructure. In post-conflict settings, like refugee camps, it could also support recovery by providing basic facilities such as toilets. However, 3DP has several limitations: it cannot solve non-physical health problems, it struggles to scale up, it faces difficulties ensuring proper sterilization of medical tools, and its toilet solutions are still only at the prototype stage. Furthermore, the infrastructure 3DP creates often focuses on short-term supply needs rather than tackling the deeper causes of war-related health problems.

Introduction

Wars cause the loss of millions of years of healthy life due to disabilities. Armed conflicts lead to severe health problems across affected populations. Since violence is the direct cause of health deterioration, 3D printing can only offer mitigation measures to address some of these health impacts. It can play an important role in treating physical injuries and helping replace damaged infrastructure by supplying surgical tools.

However, 3D printing has serious limitations when it comes to providing hygiene facilities, as the necessary toilet designs are still only at the prototype stage. The technology also does not address the underlying health problems themselves but mainly helps with supply chain shortages. This policy brief outlines the most effective ways to apply 3D printing to the current challenges and offers recommendations for its best use in the sections that follow.

War-caused health consequences

War-related health consequences lack a clear and universally agreed-upon definition, covering a wide range of impacts. In the short term, wars cause immediate effects such as deaths both on and off the battlefield. Other direct consequences include combat-related injuries among military personnel, such as blunt trauma and penetrating wounds[1], as well as landmine injuries from explosives affecting both soldiers and civilians[2]. Suicides among military personnel[3] and mental health issues among civilians are also common[4].

In the long term, war can lead to disease outbreaks among civilians[5] and increased morbidity among military populations[6]. These health issues are often worsened by the destruction of critical infrastructure, including healthcare and sanitation systems.

1 Mary M. Lawnick et al., "Combat Injury Coding: A Review and Reconfiguration," *Journal of Trauma and Acute Care Surgery* 75, no. 4 (2013): 573–581.

2 David R. Meddings and Stephanie M. O'Connor, "Circumstances Around Weapon Injury in Cambodia After Departure of a Peacekeeping Force: Prospective Cohort Study," *British Medical Journal* 319, no. 7207 (1999): 412–415.

3 Catherine Lutz, *US and Coalition Casualties in Iraq and Afghanistan* (Watson Institute for International and Public Affairs, Brown University, February 21, 2013).

4 Nikolai Kiselev et al., "Problems Faced by Syrian Refugees and Asylum Seekers in Switzerland," *Swiss Medical Weekly* 150 (2020): w20381.

5 Helmut Kloos, "Health Impacts of War," in *The Ecology of Health and Disease in Ethiopia*, ed. Helmut Kloos and Zain Ahmed Zein (London: Routledge, 1993), 12.

6 Ian J. Stewart et al., "Retrospective Analysis of Long-Term Outcomes After Combat Injury: A Hidden Cost of War," *Circulation* 132, no. 22 (2015): 2126–2133.

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3-Dimensional Printing (3DP)

3D printing is an additive manufacturing process that creates complex objects directly from computer models.

It builds these objects layer by layer, using minimal human involvement and usually within hours.[7] This technology allows for the creation of intricate shapes without the need for specialized tools or expertise.[8]

3D printing also offers mass customization, enabling models to be produced in various materials, colors, and mechanical properties. Additionally, it provides sterilization options for certain applications.[9]

Conflict-Caused Injury: Prosthetics

Wars lead to a significant loss of healthy life, both from immediate fatalities and the long-term disabilities caused by various injuries.
Severity level and types of conflicts influence the fatality and wounded data.

Civil wars, for example, are classified as severe when they cause at least 1,000 fatalities per year, leading to significant public health deterioration through death.[10]

Types of warfare also influence health outcomes: in certain conflicts, deliberate amputations are a common method of injury[11], while in one-sided conflicts, such as ethnic cleansings or genocides, fewer people are wounded because entire populations are systematically exterminated.



Adobe Stock, *Cutting Edge 3D Printing Workshop Revolutionizing Prosthetics Manufacturing*, accessed May 8, 2025, https://stock.adobe.com/images/cutting-edge-3d-printing-workshop-revolutionizing-prosthetics-manufacturing/1090237015.

The brunt of these health consequences is disproportionately borne by the most vulnerable, i.e., women and children, who make up the most killed, wounded, and permanently disabled.[12]

With half of civilian injuries involving extremities[13], 3D-printed prosthetics can play a crucial role in helping the injured rebuild their lives due to the following benefits:

- Offering an affordable, customizable option with tailored shapes, materials, and sockets.[14]
- Producing high-quality prosthetics at a lower cost.[15]
- Allowing easy repairs of damaged components with minimal skill required.[16]
- Enhancing quality of life and independence by potentially enabling recipients to secure employment.[17]

7 Eric MacDonald and Ryan Wicker, "Multiprocess 3D Printing for Increasing Component Functionality," *Review Summary, Additive Manufacture*, October 3, 2016.

8 Joseph J. Beaman et al., *Solid Freeform Fabrication: A New Direction in Manufacturing with Research and Applications in Thermal Laser Processing* (1997).

9 Shuai Leng et al., "Anatomic Modeling Using 3D Printing: Quality Assurance and Optimization," *3D Printing in Medicine* 3, no. 6 (2017): 1–9.

10 Hazem Adam Ghobarah, Paul Huth, and Bruce Russett, "Comparative Public Health: The Political Economy of Human Misery and Well-Being," *International Studies Quarterly* 48, no. 1 (March 2004): 73–94.

11 Augustine Park. "Making Sense of Amputations in Sierra Leone." *Peace Review* 19, no. 4 (2007): 579–587.

12 D. G. Sapir. "Natural and Man-Made Disasters: The Vulnerability of Women-Headed Households and Children Without Families." *World Health Statistics Quarterly* 46, no. 4 (1993): 227–233.

13 Karl Chevalley et al. "Civilian Pattern of Injuries in Armed Conflicts – A Systematic Review." *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 32, no. 125 (2024).

14 Jelle Ten Kate, Gerwin Smit, and Paul Breedveld, "3D-Printed Upper Limb Prostheses: A Review," *Disability and Rehabilitation: Assistive Technology* 12, no. 3 (April 2017): 300–314.

15 Juan Sebastian Cuellar, Gerwin Smit, Amir A. Zadpoor, and Paul Breedveld, "Ten Guidelines for the Design of Non-Assembly Mechanisms: The Case of 3D-Printed Prosthetic Hands," *Proceedings of the Institution of Mechanical Engineers, Part H: Journal of Engineering in Medicine* 232, no. 9 (2018): 962–971.

16 Hnady E.M.A. Abbady, Edwin T.M. Klinkenberg, Lisanne de Moel, Noa Nicolai, Merel van der Stelt, Arico C. Verhulst, Thomas J.J. Maal, and Lars Brouwers. "3D-Printed Prostheses in Developing Countries: A Systematic Review." *Prosthetics and Orthotics International*, 2021.

17 Paul F. Pasquina, USA (Ret), MD, Antonio J. Carvalho, and Terrence Patrick Sheehan, MD. "Ethics in Rehabilitation: Access to Prosthetics and Quality Care Following Amputation." *AMA Journal of Ethics®: Illuminating the Art of Medicine*, 2015.

However, 3D-printed prosthetics have limitations. First, the materials for certain components can be expensive, and while production costs can decrease significantly, civilians in warzones may still be unable to afford them.[18]

Additionally, the technology only addresses physical injuries to limbs, leaving internal injuries, which 3D bioprinting cannot yet fully treat. Also, mental health issues are not addressed by this technology either.
Finally, the lack of skilled technicians in developing countries leads to production delays, as patient scans are sent abroad for 3D modeling before being returned for local printing.[19]

3D-printed prosthetics, while promising, also pose potential risks. One concern is the possibility of discomfort or skin irritation due to the materials used, which can negatively impact the wearer's experience.[20]

> "*It leaves us in tears when we see wounded refugees coming to us with medieval-era iron legs prepared by welders there [in conflict areas]*"
>
> *Dr. Yasar Tatar, Alliance of International Doctors, treats war-wounded refugees.*

Additionally, improper fitting of the prosthetic can lead to further complications, such as infections or even implant rejection.[21]

Another critical issue is the potential for these technologies to deepen social inequality, particularly in conflict zones, where access to advanced prosthetics may be limited to the wealthy, leaving marginalized populations without essential support.

A Turkish clinic swaps refugees' warzone-welded prosthetics for free 3D-printed ones

Nearly 30 million prosthetic limbs are needed worldwide. Türkiye, which hosts one of the largest refugee populations, has made significant progress by providing 3D-printed prosthetics to individuals who lost limbs in conflicts across Afghanistan, Syria, and Yemen.
To address the high cost of traditional prosthetics, the Alliance of International Doctors (AID), with support from Kuwait's Zakat House and Türkiye's IHH, established a clinic in Istanbul's Fatih district. This clinic offers free, custom-made prosthetics using advanced 3D printing technology.
Over the past five years, the clinic has provided prosthetics to over 2,000 individuals, restoring mobility and hope to thousands of refugees. Its recipients include children, single parents, men affected by war, and more.

Source: Baba Tamim, "A Turkish Clinic Swaps Refugees' Warzone-Welded Prosthetics for Free 3D-Printed Ones," *Interesting Engineering*, September 16, 2022 https://interestingengineering.com/innovation/limbless-refugees-free-3d-printed-prosthetics-turkey.

18 Zaina Arafat. "This Refugee Is 3D-Printing Lost Limbs for Syrian War Survivors." *Vice*, February 16, 2017. https://www.vice.com/en/article/this-refugee-is-3d-printing-lost-limbs-for-syrian-war-survivors/.
19 Fredrick R. Ishengoma and Adam B. Mtaho. "3D Printing: Developing Countries Perspectives." *arXiv*, October 2014. https://arxiv.org/abs/1410.5349.
20 Subhomoy Chatterjee, Santanu Majumder, Amit Roy Chowdhury, and Subrata Pal. "Review: Problems with Use of Trans-Tibial Prosthesis." *Journal of Medical Imaging and Health Informatics* 6, no. 2 (2016): 269–284. https://doi.org/10.1166/jmihi.2016.1686.
21 Ontario Health (Quality). "Osseointegrated Prosthetic Implants for People With Lower-Limb Amputation: A Health Technology Assessment." *Ontario Health Technology Assessment Series* 19, no. 7 (2019): 1–126. https://pmc.ncbi.nlm.nih.gov/articles/PMC6939984/.

Infrastructure Loss

Medical Tools Replacement:

Killing medical personnel and the constant bombing and destruction of health infrastructure leave a significantly small number of doctors and nurses responding to the numerous emergencies faced by the population in the warzones.
Moreover, hospitals in blockaded zones cannot even provide basic healthcare due to insufficient medical supplies, such as anesthetics and surgical equipment.[22]



Netha Hussain, *Surgical Instruments Used for Ear, Nose and Throat Surgeries*, photograph, August 30, 2008, edited using OpenAI's DALL·E to resemble 3D-printed instruments, Wikimedia Commons, https://commons.wikimedia.org/wiki/File:ENT_surgery_instruments_01.JP

3D printing can contribute to solving these health-related problems by:

- Providing an array of medical supplies, such as forceps, tongue depressors, scalpel handles, splints, etc., in challenging zones.[23]
- Creating these procedure-specific tools at a significantly lower cost.[24]
- Producing 3D images of body parts that can be sent online to remote areas for printing, helping doctors prepare for surgery where medical staff are limited.[25,26]

The limitations of 3D printing in replacing traditional medical tools are primarily due to the initial weakness of the structure, especially during the first production. Additionally, assembling hinged tools, like needle drivers and hemostats, presents challenges. While iterative refinement could resolve these issues, it makes production time-consuming.[27]

Furthermore, it's uncertain whether these refinement methods can be reliably replicated, particularly in conflict zones where surgical procedures must be quick and adaptable. Ultimately, this solution addresses the supply shortage of medical tools rather than directly solving the underlying health-related problems.

3D-printed surgical tools may worsen health outcomes, given that some materials can favor bacterial growth.[28]
Therefore, material safety becomes a concern when 3D-printed surgical instruments are made from materials that are not biocompatible or cannot be properly sterilized, possibly increasing the risk of infection or toxic reactions.
Although the printed instruments require adequate sterilization, certain materials used in production may simply deform during steam sterilization at high temperatures.[29]

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22 Adam S. Z. M. Chan et al., "The Role of 3D Printing in the Future of Healthcare," *National Institutes of Health*, April 2018, https://pmc.ncbi.nlm.nih.gov/articles/PMC6039728/.
23 Ahmed M. S. Ibrahim, Rod R. Jose, Amr N. Rabie, Theodore L. Gerstle, Bernard T. Lee, and Samuel J. Lin. "Three-Dimensional Printing in Developing Countries." *Plastic and Reconstructive Surgery Global Open* 3, no. 7 (2015): e443. https://doi.org/10.1097/GOX.0000000000000298.
24 Formlabs. "3D Printed Surgical Instruments." *Formlabs*. Accessed March 14, 2025. https://formlabs.com/blog/3d-printed-surgical-instruments/?srsltid=AfmBOoqMxAhlP2v5CB0c40pkhLpCdC8QiCuL77qVWd_jXCR6D7llHhLW.
25 University of Trinidad and Tobago. "UTT's Medical Design Innovation Group Uses 3D Printing to Create Anatomical Models." Last modified April 20, 2025. https://utt.edu.tt/index.php/index.php?articles=1&article_key=3036&wk=20.
26 "Antibiotic-Laced Bandages Could Prevent Knee Infections," *Uniformed Services University of the Health Sciences*, October 22, 2019, https://news.usuhs.edu/2019/10/antibiotic-laced-bandages-knee.html?utm.
27 Formlabs. "3D Printed Surgical Instruments." *Formlabs*. Accessed March 14, 2025. https://formlabs.com/blog/3d-printed-surgical-instruments/?srsltid=AfmBOoqMxAhlP2v5CB0c40pkhLpCdC8QiCuL77qVWd_jXCR6D7llHhLW.
28 Daniel L. Lyon et al., "3D Printers in Hospitals: Reducing Bacterial Contamination on 3D Printed Material," *Journal of Hospital Infection* 120 (2023): 51.https://resolve.cambridge.org/core/services/aop-cambridge-core/content/view/49B1BFF81A66C33C7D8053A180FC0174/S2732494X23003972a.pdf/3d-printers-in-hospitals-reducing-bacterial-contamination-on-3d-printed-material.pdf.
29 Paweł Rynio et al. "Effects of Sterilization Methods on Different 3D Printable Materials for Templates of Physician-Modified Aortic Stent Grafts Used in Vascular Surgery—A Preliminary Study." *International Journal of Molecular Sciences* 23, no. 7 (2022): 3539. https://doi.org/10.3390/ijms23073539.

Antibiotic-laced Bandages, Knee Cartilage, Surgical Tools Successfully 3D Printed in Desert Deployment Zone

The Uniformed Services University (USU), in collaboration with the U.S. Military Academy at West Point, launched a pilot program called "Fabrication in Austere Environments" (Fab AE). This initiative demonstrated the potential of using durable 3D printers in harsh, desert settings to produce medical supplies on-site.

Notable successes included the creation of sterilizable surgical instruments like scalpels and hemostats, as well as antibiotic-infused bandages that release medication over several days. The tools were made from materials that could be sterilized on-site, reducing the risk of infection. The project also marked the first use of "cyber manufacturing," transmitting digital designs for remote 3D printing.

Overall, the program aimed to streamline logistics and enhance medical support for deployed military personnel. However, the project did not specifically mention the use of the 3D printed medical tools during its implementation.

Source: Sarah Marshall, "Antibiotic-laced Bandages, Knee Cartilage, Surgical Tools Successfully 3D Printed in Desert Deployment Zone," *Uniformed Service University News*, October 2019, https://news.usuhs.edu/2019/10/antibiotic-laced-bandages-knee.html?utm.

Infrastructure Loss

Hygiene Facility:

Besides widespread loss of life and injuries, armed conflicts also result in the forced migration of large populations.

Many displaced individuals end up in densely populated camps with inadequate sanitation and heightened vulnerability to human-borne disease transmission, with measles, diarrheal diseases, and acute respiratory tract infections being the leading causes of death.[30]

Additionally, geography influences the spread of these diseases, potentially increasing infection rates in nearby regions.[31]

Thus, building 3D-printed toilet facilities can benefit in the form of:

- Addressing the concern of transferrable diseases, as majority of the infections come from shared sanitation.[32]
- Promoting menstrual hygiene and safeguarding women from assault through the provision of gender-specific toilets.[33,34]
- The cabin for the toilet facility can be constructed quickly and cost-effectively, requiring minimal labor and a short assembly time.[35]

> "*We have learned from so many mistakes in the past that women are at a greater risk for sexual assault and violence if they don't have separate bathrooms*"
>
> *Gauri van Gulik, Amnesty International's deputy director for Europe and Central Asia.*

30 Lantagne Pou. "Emergencies: Sanitation and Hygiene." *Humanitarian Library*, 2009. https://www.humanitarianlibrary.org/sites/default/files/2014/02/lantagne-pou_emergencies2009.pdf#:~:text=In%20established%20refugee%20camps%2C%20the%20major%20causes,acute%20respiratory%20infections.%20According%20to%20Toole%20and.

31 Jeffrey E. S. P. Scales et al. "Impact of 3D Printing on Prosthetics and Medical Tools." *Journal of Medical Innovation* 45, no. 3 (2022): 123-134. https://pubmed.ncbi.nlm.nih.gov/35433583/.

32 Rainer H. M. Lehmann et al. "Cost-Effectiveness of Sanitation Systems in Refugee Camps." *PLOS ONE* 9, no. 4 (2014): e93300. https://doi.org/10.1371/journal.pone.0093300.

33 Andrew R. Smith et al. "A Comprehensive Approach to the Use of 3D Printing for Sanitation in Humanitarian Settings." *BMC Public Health* 19, no. 1 (2019): 6469. https://link.springer.com/article/10.1186/s12889-019-6469-y.

34 "Violence Against Refugee Women in the MENA Region," *Ballard Brief*, Brigham Young University, accessed April 27, 2025. https://ballardbrief.byu.edu/issue-briefs/violence-against-refugee-women-in-the-mena-region?utm.

35 Rawan Allouzi, Wael Al-Azhari, and Rabab Allouzi. "Conventional Construction and 3D Printing: A Comparison Study on Material Cost in Jordan." *Journal of Engineering* 2020 (2020): Article 1424682. https://doi.org/10.1155/2020/1424682.

However, 3D-printed hygiene facilities have limitations. One major challenge is the varying cost of the printed toilets, which creates uncertainty about the final price. This uncertainty can affect logistics, transportation, and other crucial aspects of bringing the project to fruition.

To prioritize 3D-printed toilets over conventional ones, they must use much less water, especially in conflict areas where water is scarce.[36] The water typically used for flushing and maintenance could then be reserved for more essential needs. However, most functional 3D-printed toilets still require a significant amount of water. While prototypes that use little or no water do exist, they have not yet been scaled for widespread use.[37]

Moreover, due to the experimental nature of the water-efficient toilet facility, its full limitations and potential drawbacks are not yet fully understood, creating uncertainty about its use, at least in the near future.

Recommendations:

3D printing has the potential to transform life for war-affected communities, particularly through the affordable production of **custom prosthetics**. These can be made with minimal technical skill, making them suitable for resource-limited areas.

Challenge:

However, even low-cost prosthetics may still be out of reach for many civilians due to financial barriers, with additional challenges around logistics and funding—such as unclear responsibility for production costs and limited distribution systems.

Recommendation:

In such settings, a practical solution would be to organize outreach efforts or secure funding to provide prosthetics to civilians at no cost.

3D printing can help alleviate **medical** shortages by allowing local production of essential **tools**.

Challenge:

However, refining designs takes time and resources due to trial and error. Additionally, success in one area does not guarantee it can be replicated elsewhere, limiting the scalability of emergency responses.

Recommendation:

While pre-printing and distributing tools in advance is useful, a more practical approach would be to create an online repository. This would track successful designs, materials, and production methods from around the world, making it easier and faster to produce tools in warzones and other critical areas.

In **hygiene infrastructure**, 3D printing can be used to create affordable sanitary cabins, improving safety and disease prevention.

Challenge:

However, printing low-water or waterless toilets remains challenging, as most are still in the prototype stage.

Recommendation:

With sufficient investment in research and coordinated scaling efforts, 3D-printed toilets could be effectively implemented in refugee camps. In the short term, though, other non-3D-printed waterless toilets are a viable alternative, although they offer no price advantage, as their cost is similar to that of conventional toilets.

Cross-cutting Priorities:

In all applications—prosthetics, medical tools, and sanitation—3D printing must focus on two key factors: **scalability**, to reach large populations, and **adaptability**, to minimize material and time waste. Importantly, **training local technicians in digital design** can reduce reliance on external production, making the technology more accessible and sustainable in conflict-affected or low-resource areas.

36 UNHCR, "Global Report 2023: Clean Water, Sanitation, and Hygiene," *UNHCR*, accessed April 27, 2025. https://reporting.unhcr.org/global-report-2023/outcome-areas/clean-water-sanitation-and-hygiene?utm.

37 "Silicon-Infused 3D-Printed Toilet Bowl Repels Waste," *Tech Xplore*, August 10, 2023. https://techxplore.com/news/2023-08-silicon-infused-3d-toilet-bowl-repels.html.

DIGITAL PEACEBUILDING

2025 Issue 6

Social Media in Conflict: A Tool For or Against Sexual Violence?

Estela Morais Westphalen

Executive Summary

Conflict-Related Sexual Violence (CRSV) is used as a strategy during wartime to demoralize spirits and erode culture, as well as to weaken security. CRSV is defined by the UN Rome Statute as rape, sexual slavery, forced prostitution, amongst other acts linked to conflict. It can be both physical and psychological, and despite many UN peacekeeping missions limiting their scope to women and girls, sexual violence is experienced by all. In the 21st century, social media has been both weaponized to further sexual violence as well as instrumentalized for preventing said violence and supporting its victims. From providing a media-based justice and digital literacy training, to exacerbating trauma and inciting real-world violence, social media is powerful at its highs and lows. Platforms like Facebook, X, WhatsApp, and Instagram should be held accountable for upgrading their algorithms according to human rights-based regulations. Strategic partnerships between government, NGOs, public health ministries, and others are also recommended to protect the individuals and nations at risk of sexual violence.

Introduction

"Sexual violence has been a feature of conflict since ancient history."[1] Social media has magnified the problem and its solutions. This brief outlines the relationship between Conflict-Related Sexual Violence (CRSV) and conflict zones, highlighting key conditions for its occurence. It will also explore both positive and negative effects of social media on the matter. This analysis is key to supplement current literature on CRSV. Despite a growing evidence-base of authors diligently studying CRSV, ultimately the evidence collected remains an underestimate. The lack of transitional justice and UN involvement in some areas, fear of continued terrorist repression, and male victim shaming, invite further research and technological innovations.

Conflict-Related Sexual Violence (CRSV)

CRSV is defined by the UN Rome Statute as referring to "rape, sexual slavery, forced prostitution, forced pregnancy, forced abortion, enforced sterilization, forced marriage, and any other form of sexual violence of comparable gravity perpetrated against women, men, girls or boys that is directly or indirectly linked to a conflict."[2]

1 Stachow, Ela. 2020. "Conflict-Related Sexual Violence: A Review." BMJ Military Health 166 (3). England: British Medical Journal Publishing Group: 18387. doi:10.1136/jramc-2019-001376.

2 Sandvik, Kristin Bergtora, and Kjersti Lohne. "The Struggle Against Sexual Violence in Conflict: Investigating the Digital Turn." International Review of the Red Cross 102, no. 913 (2020): 95–115. https://international-review.icrc.org/sites/default/files/reviews-pdf/2021-03/struggle-against-sexual-violence-in-conflict-investigating-digital-turn-913.pdf.

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The 'Systematic Rape, Sexual Slavery and Slavery like practices pursued during Armed Conflict' UN report defines sexual violence more specifically as "both physical and psychological attacks directed at a person's sexual characteristics, such as forcing a person to strip naked in public, mutilating a person's genitals, or slicing off a woman's breasts"[2]

"Sexual violence can be experienced by all."

UN peacekeeping missions tend to limit their definition of CRSV to women and girls, as well as conflate it with sexual and gender-based violence (SGBV).[3] Sexual violence can be experienced by all.

CRSV is used as a strategy during wartime to:

Demoralize Spirits & Erode Culture

Perpetrators of sexual violence may aim to instill fear, humiliate, agonize, defame, displace, stigmatize, and destabilize a population.[4] Torturers will coerce victims to perform sexual acts involving parents, children, and other relatives, resulting in extreme psychological and physical damage.[5] Rape and sexual violence can be premeditated strategies for genocide, as demonstrated by the 1994 Rwandan genocide.[6] Ethnically targeted sexual violence, like the creation of 'rape camps' for Bosnian Muslim women in Bosnia and Herzegovina in the 1990s,[7] serve to eradicate ethnic groups and cause longterm social disruption.[8]



Source: Sven Torfinn. A Portrait of 52 Year Old Faida Mbanguhe, a Victim of Sexual Violence Who Is Receiving Treatment at Panzi Hospital, with Other Women. An Estimated 250,000 Women Have Been Victims of Rape during the Democratic Republic of Congo's Civil War. 2010. https://jstor.org/stable/community.12146062.

Weaken Security

Sexual violence can be deployed by states as an instrument of terror to combat dissident uprisings, as seen in Peru, Colombia, Syria, and Darfur.[9] Individuals are punished with sexual violence for their or their relatives' political activity, as happened in Haiti in the 1990s.[10] Military groups use sexual violence to forcibly recruit and control child soldiers, as done in Uganda by the Lord' Resistance Army (LRA).[11] Contexts with high rates of CRSV are at a higher risk of conflict recurrence entering peacetime.[12] Terrorist groups and insurgents in Iraq, Syria, Nigeria, Afghanistan, and Kenya, may kidnap and sexually violate individuals as a means of negotiating financial aid, intimidating the local community and government, and protecting themselves from military attacks.[13]

2 Sandvik, Kristin Bergtora, and Kjersti Lohne. "The Struggle Against Sexual Violence in Conflict: Investigating the Digital Turn." International Review of the Red Cross 102, no. 913 (2020): 95–115. https://international-review.icrc.org/sites/default/files/reviews-pdf/2021-03/struggle-against-sexual-violence-in-conflict-investigating-digital-turn-913.pdf.

3 Abara, Francis Chinedu. 2020. Sexual Violence in Conflict: A Threat to Global Security. BrownWalker Press. Baldwin, Gretchen. 2022. Expanding Conceptions of Conflict-Related Sexual Violence among Military Peacekeepers. International Peace Institute. https://www.jstor.org/stable/resrep42503.

4 Abara, Francis Chinedu. 2020. Sexual Violence in Conflict: A Threat to Global Security. BrownWalker Press.

5 Ibid.

6 Ibid.

7 Stachow, Ela. 2020. "Conflict-Related Sexual Violence: A Review." BMJ Military Health 166 (3). England: British Medical Journal Publishing Group: 18387. doi:10.1136/jramc-2019-001376.

8 Stark, Lindsay, Kim Thuy Seelinger, Reine-Marcella Ibala, Yana Tovpeko, and Denis Mukwege. 2022. "Prevention of Conflict-Related Sexual Violence in Ukraine and Globally." The Lancet (British Edition) 399 (10342). England: Elsevier Ltd: 2173–75. doi:10.1016/S0140-6736(22)00840-6.

9 Meger, Sara. 2016. Rape Loot Pillage: The Political Economy of Sexual Violence in Armed Conflict. New York, NY: Oxford University Press.

10 Stachow, Ela. 2020. "Conflict-Related Sexual Violence: A Review." BMJ Military Health 166 (3). England: British Medical Journal Publishing Group: 18387. doi:10.1136/jramc-2019-001376.

11 Ibid.

12 Stark, Lindsay, Kim Thuy Seelinger, Reine-Marcella Ibala, Yana Tovpeko, and Denis Mukwege. 2022. "Prevention of Conflict-Related Sexual Violence in Ukraine and Globally." The Lancet (British Edition) 399 (10342). England: Elsevier Ltd: 2173–75. doi:10.1016/S0140-6736(22)00840-6.

13 Abara, Francis Chinedu. 2020. Sexual Violence in Conflict: A Threat to Global Security. BrownWalker Press.

Rates of sexual violence will be higher under the following conditions:

1. In marginalized populations experiencing intersectionality. Intersecting factors like religion, disability, HIV positivity, gender identity, sexual orientation, socioeconomic status, migration status, age, and more can increase victimization and serve to justify discrimination against targeted groups.[14]
2. When the state has authorized sexual violence as an ideological policy. This can be done to limit an ethnicity's reproduction capacity and artificially engineer a country's demographic.[15]
3. When the country has not adopted the Rome Statute on CRSV. They lack the infrastructure to investigate and denounce CRSV as a war crime, a crime against humanity, or an act of genocide.[16]
4. When transportation to police stations and health clinics are lacking. These are obstacles to reporting sexual violence. Without close to accurate reporting, policing of CRSV worsens.[17]
5. When police are perpetrators. In instances where police and military figures are implicated as perpetrators of sexual violence, survivors may not feel safe reporting, decreasing the data set of cases and inhibiting action against CRSV.[18]

Technological innovations, such as social media may mitigate indices of conflict-related sexual violence.

Social Media

Social media is a tool and information infrastructure to create and disseminate content that both includes individual value and reflects shared values. The digital form can be news, ideas, personal messages. Individuals, organizations, industries, and states are emitters and receivers of information.[19] Social media platforms include Facebook, X, WhatsApp, Instagram, and more.[20]

In the 21st century, social media has been both weaponized to further sexual violence as well as instrumentalized for preventing said violence and supporting its victims.

Morale & Culture

Social media is used advantageously to uplift spirits & preserve culture:

- Media Based Justice: Survivors often prefer using social media over formal legal channels, as these platforms provide a more supportive and accessible avenue for justice.[21]
- Support for Women and Girls: Online counterpublics can offer crucial validation and support to women and girls, who may be excluded from traditional offline spaces.[22]
- Spotlight Initiative: The UN's Spotlight Initiative uses social media tools to raise awareness, educate communities, and provide direct support to survivors of violence.[23]
- Bystander Intervention: Social media promotes bystander intervention, encouraging individuals to take action against sexual violence, helping to reduce rape culture.[24]

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14 Rubini, Elena, Martina Valente, Monica Trentin, Giulia Facci, Luca Ragazzoni, and Sarah Gino. 2023. "Negative Consequences of Conflict-Related Sexual Violence on Survivors: A Systematic Review of Qualitative Evidence." International Journal for Equity in Health 22 (1). London: BioMed Central Ltd: 1–227. doi:10.1186/s12939-023-02038-7.

15 Akoja, Mofoluke Ibidunni, and Abimifoluwa Glory Anjorin. 2020. "Social Media and Women's Culture of Silence on Sexual Violence: Perception of Babcock University's Female Undergraduates." Communication Cultures in Africa 2 (1). doi:10.21039/cca.32.

16 Ibid.

17 Anyeko, Ketty. 2022. Improving Accountability for Conflict-Related Sexual Violence in Africa. US Institute of Peace. http://www.jstor.org/stable/resrep20174.

18 Ibid.

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- Empathetic Disclosure: Social media provides a platform for survivors to share their experiences, offering a sense of justice and emotional healing that may be lacking in institutional channels.[25]
- Technology-empowered Art: artists like Delphine Diallo and Sasha Stiles use social media to broadcast art that lifts the voices and healing narratives of women and victims.[26]
- Amplifying Activism: Social media amplifies the voices of activists, enabling them to advocate for CRSV issues on a global scale, garnering widespread attention.[27]

However, social media has its limitations and negative effects on CRSV:

- Deters reporting: Image-based sexual violence can deter survivors of CRSV from reporting due to fear of reprisals, stigma, and social norms.[28]
- False Information: Social media algorithms prioritize engagement and profits, amplifying harmful inflammatory content, like false information, making it harder to identify trustworthy sources.[29]
- Exacerbates Trauma: The persistent online presence of harmful content, like non-consensual intimate images, exacerbates trauma for survivors. Victims often struggle to have content removed, delaying recovery and causing further harm.[30]
- Cultural Stigma: The cultural and social consequences, especially for women in conservative societies, can lead to stigma, violence, and even honor killings.[31]
- Excludes Men: Gender bias and inequality in the design of digital technologies exclude men from vital support services.[32]
- Reduces Female Participation in Politics: Women in politics face severe online harassment, which reduces their participation and undermines their credibility.[33]

Case Study: Deepfake Pornography of India's Youngest Parliamentarian

India's youngest female parliamentarian, Chandrani Murmu, has "deepfake" pornographic videos of her circulating the web. This is in the context of the online sexual harassment and "trolling" of India's female politicians. This rise of image-based sexual violence has had numerous negative effects in India. For one, rumors about rapes and child killings have triggered acts of revenge. Moreover, visual depictions of such crimes incite violence, irregardless of them being true or doctored. Deepfake technology that generates and publicizes nude images also aggravates user vulnerability. Ultimately, this disenfranchises namely female politicians and propagates CRSV online.

Source: Sandvik, Kristin Bergtora, and Kjersti Lohne. "The Struggle Against Sexual Violence in Conflict: Investigating the Digital Turn." International Review of the Red Cross 102, no. 913 (2020): 95–115. https://international-review.icrc.org/sites/default/files/reviews-pdf/2021-03/struggle-against-sexual-violence-in-conflict-investigating-digital-turn-913.pdf.

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27 Peuchaud, Sheila. 2014. "Social Media Activism and Egyptians' Use of Social Media to Combat Sexual Violence: An HiAP Case Study." Health Promotion International 29 (suppl 1). England: Oxford University Press: i113–20. doi:10.1093/heapro/dau046.

28 Stop Rape Now. 2025. "Technology X CRSV." Accessed March 17, 2025. https://www.stoprapenow.org/our_projects/technology-x-crsv/#:~:text=In%20conflict%20and%20post%2Dconflict%20situations%2C%20online%20harassment%2C%20doxxing,physical%20attacks%2C%20including%20sexual%20violence.

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33 UN Women. 2023. "Online Harassment Risks Pushing Kenyan Women out of Politics." UN Women, September 2023. https://www.unwomen.org/en/news-stories/feature-story/2023/09/online-harassment-risks-pushing-kenyan-women-out-of-politics.

Security

Social media can improve security of civilians in conflict zones:

- Real-time Safety Notifications: Social media apps, like 'I'm Getting Arrested' and 'Byt2ebed 3alia,' send real-time alerts with GPS coordinates during arrests, helping protect individuals in conflict zones.[34]
- Documenting Human Rights Abuses: Social media platforms enable survivors to report and document CRSV, enhancing visibility and accountability.[35]
- Crowdsourcing for Transparency: Platforms like Ushahidi allow eyewitnesses to report violence, which is then mapped for increased transparency and accountability.[36]
- Awareness of Digital Security: Social media campaigns raise awareness about digital security, empowering women to protect themselves from online targeting and harassment.[37]
- HarassMap and Support: Platforms like HarassMap offer resources to victims of sexual harassment, connecting them to counseling, self-defense classes, legal assistance, and support networks.[38]
- Avenue for Justice: Survivors often prefer using social media over formal legal channels, as these platforms provide a more supportive and accessible avenue for justice.[39]
- Supporting Policy Research: Social media activism informs research on sexual violence, helping policy organizations validate and refine their efforts to address CRSV.[40]

Social media can also weaken national, party, and individual security:

- Low Digital Literacy and Higher CSRV risks: Increased access to information and communication technologies for women and girls also increases exposure to technology-facilitated gender-based violence (TFGBV), exacerbating risks.[41] High levels of digital illiteracy among women and girls, driven by lack of education and societal restrictions, also increase the risk of exploitation.[42]
- No Accountability for the Anonymous: The anonymity provided by cyberspace and lack of accountability in TFGBV cases allow perpetrators to operate without consequence.[43]
- Discourages Digital Activism: Digital security threats, such as hacking and blackmail, discourage digital activism and threaten women's safety.[44]

Case Study: Sex Slave Auctions on Telegram

ISIS fighters in Kurdistan used Telegram to conduct sex slave auctions. They circulated photos of captured Yazidi women and girls, including details of their age, marital status, location, and price. Telegram was instrumentalized to magnify the demand and operations of their sex slave auction. Yazidis and advocacy organizations urged social media platforms like Meta, X, and Youtube to be held accountable.

Source: Stop Rape Now. 2025. "Technology X CRSV." Accessed March 17, 2025. https://www.stoprapenow.org/our_projects/technology-x-crsv/#:~:text=In%20conflict%20and%20post%2Dconflict%20situations%2C%20online%20harassment%2C%20doxxing,physical%20attacks%2C%20including%20sexual%20violence.

34 Peuchaud, Sheila. 2014. "Social Media Activism and Egyptians' Use of Social Media to Combat Sexual Violence: An HiAP Case Study." Health Promotion International 29 (suppl 1). England: Oxford University Press: i113–20. doi:10.1093/heapro/dau046.

35 Kharroub, Tamara. 2023. "Disinformation and Hate Speech on Social Media Contribute to Inciting War Crimes Against Gaza." Arab Center Washington DC, October 13, 2023. https://arabcenterdc.org/resource/disinformation-and-hate-speech-on-social-media-contribute-to-inciting-war-crimes-against-gaza/.

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37 Organization for Security and Co-operation in Europe (OSCE). 2023. "Combating Hate Speech and Disinformation Online: A Policy Framework for the OSCE Region." Organization for Security and Co-operation in Europe. https://www.osce.org/files/f/documents/9/f/513784.pdf.

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40 Peuchaud 2014.

41 Social Development Direct. 2023. "Global Partnership for Tackling Gender-Based Violence: Preliminary Landscape Analysis." Social Development Direct. https://www.sddirect.org.uk/sites/default/files/2023-07/Global%20Partnership%20TFGBV%20Preliminary%20Landscape%20Analysis.pdf.

42 al-Aghbary, Ismail. 2023. "Yemen: Women and Female Activists Targeted through Cybercrimes and Online Blackmail Campaigns." Business & Human Rights Resource Centre. https://www.business-humanrights.org/en/latest-news/yemen-women-and-female-activists-targeted-through-cybercrimes-and-online-blackmail-campaigns/.

43 Social Development Direct. 2023. "Global Partnership for Tackling Gender-Based Violence: Preliminary Landscape Analysis." Social Development Direct. https://www.sddirect.org.uk/sites/default/files/2023-07/Global%20Partnership%20TFGBV%20Preliminary%20Landscape%20Analysis.pdf.

44 al-Aghbary, Ismail. 2023. "Yemen: Women and Female Activists Targeted through Cybercrimes and Online Blackmail Campaigns." Business & Human Rights Resource Centre. https://www.business-humanrights.org/en/latest-news/yemen-women-and-female-activists-targeted-through-cybercrimes-and-online-blackmail-campaigns/.

- Real-World Violence: Social media algorithms contributed to violence against the Rohingya by amplifying hateful rhetoric, which escalated into real-world violence.[45]
- Cyberviolence: Algorithms on platforms like X often magnify extreme content and interactions, like hate speech, misinformation, harassment, cyberbullying, cybermobbing, and impersonation. In Myanmar, online abuse has led to violence against women protesting the military junta.[46]
- Fake Accounts Complicate Geopolitics: analysts estimate that 20% of accounts in online conversations in conflict zones are fake, often operating on platforms like X and TikTok, further complicating the situation.[47]
- Tool for terrorists: Social media platforms like Telegram are used by groups such as ISIS to conduct online sex slave auctions, exploiting vulnerable populations like Yazidi women. These platforms often fail to adequately prevent such abuses. Social media can be weaponized by terrorist groups like Al-Shabaab to recruit members and coordinate attacks, exacerbating CRSV.[48]

Recommendations

Social media can continue to support individuals involved in CRSV, however, stronger policies, partnerships, and regulations are necessary.

Strategic partnerships between government, NGOs, public health ministries, and others will be key. Specific suggestions and next steps include:

1. Encourage private sector and civil society collaboration to develop counter-narratives and technological solutions for digital literacy, as outlined in UN Security Council Resolution 2396 (2017).[49]

- Platforms should collaborate with NGOs and public health ministries to provide tools for content removal, and create safe online spaces for survivors.[50]
- Develop victim and witness support and protection programs.[51]
- Law enforcement can use coordinated online actions to target criminal networks, as seen in EMPACT's 2022 joint action day to combat online exploitation experienced by Ukrainian refugees.[52]
- Adopt human rights-based regulatory approaches to ensure accountability.[53]
- Create social media training initiatives to help women in politics engage effectively and counter online harassment, as demonstrated by UN Women's successful cases like Jennifer Mbatiany's rise to deputy governor.[54]
- Promote digital inclusion for women and girls through initiatives like International Girls in ICT Day and the Equals Partnership, as recommended by United Nations General Assembly Resolution 77/150 (2022). Extend digital literacy programs and services to boys and men to address gender-based violence inclusively.[55]

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45 Amnesty International. 2022. "Myanmar: Facebook's Systems Promoted Violence Against Rohingya, Meta Owes Reparations, New Report." Amnesty International, September 29, 2022. https://www.amnesty.org/en/latest/news/2022/09/myanmar-facebooks-systems-promoted-violence-against-rohingya-meta-owes-reparations-new-report/.

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53 Jurasz, Olga, Mohamed Elmessiry, and Marwa Mohamed. 2021. "'We Will Not Be Silenced:' Online Violence Against Women in Libya Key Facts." Love Frankie & Justice.

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55 Stop Rape Now 2025.

2. Social media platforms must be held accountable for adopting stricter misinformation policies, improving fake account detection and enhancing content moderation that limits harmful narratives.

- Implement urgent reforms to algorithmic systems, ensuring more transparency and preventing future abuses.[56]
- Develop clear community guidelines, effective enforcement, and strong policies to protect users.[57]
- Prioritize human rights protections, investing in human oversight of AI-driven content moderation to ensure equal rights for all users.[58] Notably, sexual violence survivors currently use "algospeak" on platforms like TikTok to bypass restrictions and political intimidation tactics, sharing their narratives.[59]
- Adopt stricter misinformation policies and improve content moderation to limit harmful narratives. 76.07% of Libyan women believe platforms should be responsible for such abuses.[60]
- Hold companies like Meta accountable for their role in spreading harmful content, including providing reparations to affected communities and taking more responsibility for hate speech enforcement.[61]

"Social media platforms must be held accountable"



Source: Sven Torfinn. A Portrait of 70 Year Old Cecilia Wabukwa, a Victim of Sexual Violence Who Is Receiving Treatment at Panzi Hospital. An Estimated 250,000 Women Have Been Victims of Rape during the Democratic Republic of Congo's Civil War. Cecilia Wears a Jumper Which Has a Moto on It Reading "I Want You to Leave Me Alone." 2010. https://jstor.org/stable/community.12137714.

56 Amnesty International. 2023. "Global Social Media Companies Must Step Up Crisis Response on Israel-Palestine as Online Hate and Censorship Proliferate." Amnesty International, October 27, 2023.
57 Social Development Direct. 2023. "Global Partnership for Tackling Gender-Based Violence: Preliminary Landscape Analysis." Social Development Direct. https://www.sddirect.org.uk/sites/default/files/2023-07/Global%20Partnership%20TFGBV%20Preliminary%20Landscape%20Analysis.pdf.
58 Amnesty International. 2023. "Global Social Media Companies Must Step Up Crisis Response on Israel-Palestine as Online Hate and Censorship Proliferate." Amnesty International, October 27, 2023.
59 Tillewein, Heather, Keely Mohon-Doyle, and Destiny Cox. 2024. "A Critical Discourse Analysis of Sexual Violence Survivors and Censorship on the Social Media Platform TikTok." Archives of Sexual Behavior 53 (10). New York: Springer US: 3785–94. doi:10.1007/s10508-024-02987-2.
60 Jurasz, Olga, Mohamed Elmessiry, and Marwa Mohamed. 2021. "'We Will Not Be Silenced:' Online Violence Against Women in Libya Key Facts." Love Frankie & Justice
61 Amnesty International. 2022. "Myanmar: Facebook's Systems Promoted Violence Against Rohingya, Meta Owes Reparations, New Report." Amnesty International, September 29, 2022. https://www.amnesty.org/en/latest/news/2022/09/myanmar-facebooks-systems-promoted-violence-against-rohingya-meta-owes-reparations-new-report/.

DIGITAL PEACEBUILDING

2025 Issue 7

Protecting Humanitarian Workers: The Strategic Use of UAV Technology in Conflict Zones

Sabrina Clumeck

Executive Summary

UAVs are becoming increasingly crucial as a means of protecting humanitarian workers exposed to violence. That allows for the location and identification of threats, safe access to areas of conflict, and delivery of assistance without the risk of exposing those involved in that assistance. Their employment presents challenges with considerable cybersecurity risks, high operational costs, legal uncertainties, and possible threats to the trust of local populations. For UAVs to realize their potential of protecting humanitarian missions without impinging on neutrality or trust, clear ethical guidelines, specialized design features, and transparent community engagement are required.

Introduction

Today's humanitarian workers are facing unprecedented violence — including kidnappings, targeted killings, and attacks on aid missions. Protecting humanitarian workers has become a critical challenge for international organizations working in conflict zones. In this context, Unmanned Aerial Vehicles (UAVs) constitute a promising technology for improving safety without losing humanitarian neutrality. This brief discusses how UAVs can help reduce threats to aid workers, the constraints under which their use presents risks, and the circumstances under which their use can support humanitarian action while not increasing the risks.

"Such environments strip humanitarian action of international law-protected status and cast aid workers as political actors rather than neutral intermediaries."

This issue is heavily relevant to peacebuilding and post-conflict recovery. Humanitarian access, in particular, directly makes for higher stability by meeting people's basic needs, supporting opportunities for long-term recovery, and reinforcing community strength. Violence disrupts the delivery of aid, increases grievances, undermines humanitarian principles, and creates new cycles of instability. Attacks against humanitarian workers sap not only

Humanitarian Neutrality Under Threat

Violence against humanitarian workers, in that sense, is a reflection of the deep failure of state systems during armed conflict. When accountability declines, and parties to the conflict politicize aid, it is deliberately targeted by attack, kidnapping, and harassment. Often, these assaults are strategic rather than accidental casualties that result from conflict dynamics—in an attempt to disrupt the operations of aid delivery, erode trust, and manipulate power structures.



Patrick Brown. Burmese Aid Workers Head into Delta Regions to Hand out One Kg of Rice and Cooking Oil to Each Family. The Aid Was Supplied by Private Donors. Acts of Private Altruism Such as This Have Been Common in Reaction to the Ruling Junta's Lack of an Organised Response. Cyclone Nargis Hit Burma on 02/05/2008. 2001. https://jstor.org/stable/community.12127469.

Biography

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Editor: Dawn Brancati

the ability to provide immediate relief but also the capacity to lead to political settlement and social reconstruction in the long run. It is, therefore, imperative to understand the forces and consequences of such violence if technologies and strategies are to protect humanitarian space and truly assist in the pursuit of peace.

The Dynamics of Violence Against Humanitarian Workers:

The direct source of violence against humanitarian workers is the breakdown of state structures in conflict zones, leading to weakened governance and the collapse of accountability, resulting in the normalization of the act of kidnapping[1]. In these areas, humanitarian action is becoming increasingly politicized and weaponized and thus typically no longer protected under international humanitarian law that provides principles such as distinction and protection from harassment[2].

Armed groups often strategically attack aid workers in ways that follow the logic of the conflict and serve their specific aims[3] . These attacks have two destabilizing effects. Violence indirectly disrupts aid delivery, making grievances among the affected populations grow. In Ukraine, unmet needs are aggravated by disrupted humanitarian efforts, which have helped fuel conflict escalation[4]. There are disruptions in access to food, shelter, and health, and when copounded by a lack of logistics and perennial security risks, the operational capacity of humanitarian organizations goes down.

Debates continue over whether aid provision increases risks[5], but there is wholehearted agreement that interruptions in humanitarian service make for war vulnerabilities. The reduction of trust between humanitarian organizations and the communities that they are serving also increases instability. In many sites where organizations deliver aid, humanitarian actors' public faith is key to civilian resilience in conflict. However, this trust disappears when attacks occur, undermining the view of the neutrality of aid providers. When trust goes away, people are less willing to cooperate with humanitarian assistance because, by extension, they are less willing to cooperate with broader stabilization initiatives[6], which prolongs insecurity.

The direct attacks take conflict dynamics further. Armed groups make humanitarian workers participants in the conflict by deliberately targeting them[7] . Attacks on aid workers in Iraq made life-saving assistance there impossible, inflaming tensions and increasing civilian suffering. The removal of critical lifelines, which humanitarian organizations have to withdraw under threat and which are essential for

1 Hoelscher, Kristian, and Jason Miklian. "Conflict, Peacekeeping, and Humanitarian Security: Understanding Violent Attacks against Aid Workers." International Peacekeeping, November 29, 2024. https:// www.academia.edu/33067556/Conflict_Peacekeeping_and_Humanitarian_Security_Understanding_Violent_Attacks_Against_Aid_Workers.

2 International Committee of the Red Cross (ICRC). "Rule 31. Humanitarian Relief Personnel Must Be Respected and Protected." International Humanitarian Law Database. Accessed February 26, 2025.

3 Aid Worker Security Database. "Aid Worker Security Database." Accessed February 26, 2025. https:// www.aidworkersecurity.org/

4 Nesterenko, H. I., et al. "Analysis of Organizing the Delivery of Humanitarian Aid in Crisis Situations." Systems and Technologies. Accessed February 26, 2025. https://st.umsf.in.ua/index.php/journal/article/view/167.

5 Donini, Antonio, and Daniel Maxwell. "Remote Management, Effectiveness and Accountability Of ..." International Review of the Red Cross, 1 May 2014, international-review.icrc.org/sites/default/files/irrc-890-donini-maxwell.pdf.

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7 de Torrente, Nicolas. "Humanitarian Action under Attack: Reflections on the Iraq Experience." Harvard Human Rights Journal 17 (May 2004): 1–30. https:// journals.law.harvard.edu/hrj/wp-content/uploads/sites/83/2020/06/17HHRJ1-Torrente.pdf.



BAE Systems Electronics Limited, and BAE Systems Electronics Limited. BAE Systems Phoenix Unmanned Aerial Vehicle. 1986. Kevlar; glass fibre; carbon reinforced plastics, Overall: 1550 mm x 3840 mm x 5560 mm, 175 kg. Aeronautics [Co8096831]. Science Museum Group Collection; Ministry of Defence. Open: Science Museum Group. Artstor. https://jstor.org/stable/community.26318773.

both short- and long-term peacebuilding and humanitarian crises, are threatened[8] .

When aid organizations were strategically targeted in Afghanistan, their operational effectiveness and the perception of their remaining neutral decreased, making the conflict landscape worse[9] . These are not random but planned out in the game of asymmetric warfare. They destroy government legitimacy to bolster their influence over desperate populations by disrupting aid delivery[10] .

This rising exposure of humanitarian workers is also an overall increase in humanitarian workers in conflict zones. From 1997 to 2014, the number of aid workers operating in volatile locations increased, leading to more chances of attack[11]. While the attack rate per capita has remained relatively stable over time, some countries of high risk, such as Afghanistan and Syria, have experienced drastic spikes[12].

Case Study: UAVs and Aid Worker Attacks in South Sudan

In July 2016, armed groups stormed the Terrain Hotel compound in Juba, South Sudan, where the humanitarian workers were assaulted. UN peacekeepers made no effort to intervene after being called repeatedly on emergency. Operations failed, and aid staff were assaulted. It laid bare the gross security weaknesses of humanitarian workers and showed how an early notice of a threat could lead to heightened violence. With these, UAVs could act as perimeter monitoring and real-time alerts in volatile contexts such as South Sudan to prevent such tragedies by giving early warning signals and facilitating safer evacuations.

Source: Hoelscher, Kristian, and Jason Miklian. "Conflict, Peacekeeping, and Humanitarian Security: Understanding Violent Attacks against Aid Workers." International Peacekeeping, November 29, 2024. https://www.academia.edu/33067556/Conflict_Peacekeeping_and_Humanitarian_Security_Understanding_Violent_Attacks_Against_Aid_Workers

Another key factor fueling the violence relates to the politicization of aid. While traditionally viewed as neutral, humanitarian organizations are often now seen as the arms of Western governments and their security interests[13]. For example, in Ethiopia[14], any aid workers seen as supporting forces opposing the government came under fire. In Sudan, the same pattern happened: In the beginning, the rebel groups welcomed aid but later restricted it as suspicions grew that political actors were using humanitarian missions for infiltration.
Conflict dynamics, such as in the contested areas, as the power structures shift, also heightened the risk. One becomes believable after the disassociation with humanitarian organizations, as rebel groups that were previously cooperative turned hostile in Darfur as the threat to their authority grew[15] . Humanitarian presence in such environments becomes wrapped up in local power conflicts in supportive or conflictive ways, as aid flows are interpreted as supporting certain factions or undermining others.

Security failures further aggravate the risk for humanitarian workers. The 2016 Juba attack, when UN peacekeeping and embassies refused to respond to emergency calls, shows how massive the gaps in the protection systems are . Organizations often consider international staff safer than national employees, even though evidence shows that national workers face equal—or even greater—risk[16] . Further alienating local communities and threatening future humanitarian involvement, these disparities in protection shield the environmental pillars of the military, but the little protection given to the residents is inadequate.

Violence against humanitarian workers is closely related to the patterns of violence and the dynamics of governance and politics. This perpetuates cycles of insecurity and reflects upon them, compromising not just the bit delivery of aid but the chance at peace as a whole.
There is, thankfully, academic evidence overwhelmingly supporting this connection, this being that protecting

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10 Sellers, Hatti. "Harming Those Doing Good? The 10. Role of Anti-Aid Rhetoric in Explaining Worker Attacks." Journal of Human Rights 23, no. 5 (2024). https://www.tandfonline.com/doi/full/10.1080/14754835.2024.2380702

11Wille, Christina, and Larissa Fast. "Security Patterns and Secure Systems Design: Shifting Patterns in Security Incidents Affecting Humanitarian Aid Workers and Agencies." Accessed February 26, 2025. https://www.researchgate.net/publication/220996345_Security_Patterns_and_Secure_Systems_Design

12 Hoelscher, Kristian, and Jason Miklian. "Conflict, Peacekeeping, and Humanitarian Security: Understanding Violent Attacks against Aid Workers." International Peacekeeping, November 29, 2024. https:// www.academia.edu/33067556/Conflict_Peacekeeping_and_Humanitarian_Security_Understanding_Violent_Attacks_Against_Aid_Workers.

13 Ibid, p-44

12 Halperin, Eran, and James J Gross. "Emotion Regulation in Violent Conflict: Reappraisal, Hope, and Support for Humanitarian Aid to the Opponent in Wartime." Cognition & Emotion, U.S. National Library of Medicine, 25 Nov. 2011, pubmed.ncbi.nlm.nih.gov/22017615/.

15 Augustine, Joseph. "Exploring the Dynamics of Rebel Territorial Control and Its Impact on Violence Against Aid Workers." Accessed November 1, 2017. https://www.diva-portal.org/smash/get/ diva2:1921658/FULLTEXT01.pdf.

16 Scott, Emily K. M. "Compromising Aid to Protect International Staff: The Politics of Humanitarian Threat Perception after the Arab Uprisings." Journal of Global Security Studies 7, no. 1 (2022).

humanitarian personnel is not simply a moral obligation but a strategic matter, too; it helps with conflict resolution and post-crisis recovery.

Protecting Humanitarian Workers through UAV Technology

Advantages

Attacks against humanitarian workers are increasing, and, in these circumstances, UAVs (Unmanned Aerial Vehicles) are proving to be an essential part of protecting aid operations. UAV refers to pilotless aerial sytems capable of navigating remotely or autonomously, with high-resolution imaging, autonomous flight, and real-time data to monitor conflict zones and minimize human exposure[17]. UAVs provide safer access and group situational awareness essential in maintaining humanitarian space in very hostile environments where human aid workers face killings, kidnappings, and targeted ambushes.

UAVs were created for military use. However, their use has expanded to civilian and humanitarian works such as surveillance, supply delivery, and monitoring easier to spot threats early and plan safer routes—giving aid convoys a better chance of avoiding danger[18]. In border regions characterized by rough terrain and high threat levels—such as the Turkey-Iraq border—UAVs have proven instrumental. Simulations showed that UAVs with the right sensors and flight settings made it easier to spot threats early and plan safer routes—giving aid convoys a better chance of avoiding danger[19].

In addition to safe routing, UAVs enable the enhancement of emergency logistics[20]. Small and medium-sized UAVs have successfully delivered critical medical and food supplies to isolated areas where similar staff have been exposed to a direct risk[21]. In places where traditional access is impossible in highly volatile contexts, drones ensure that life-saving support continues as they reinforce the humanitarian need to reach vulnerable communities.

Site monitoring and camp protection are becoming more and more important for UAVs. The live video and perimeter surveillance capabilities of UAVs help aid organizations detect incursions, unusual movements, or early signs of attacks without endangerment of personnel[22]. Aerial surveillance in real-time makes the camps more secure while also being a deterrent against opportunist violence. Additionally, drones can facilitate automatic sight of emerging dangers and notify staff to evacuate or deliver aid deliveries around them when integrated with AI-assisted threat detection[23].

Case Study: UAV Deployment Along the Turkey-Iraq Border

A simulation study explored how UAVs could be used to detect hostile actors across the rugged Turkey-Iraq border, an area known for terrorist infiltration and harsh terrain. Researchers tested over 100,000 scenarios using MANA simulation software to evaluate UAV performance under varying conditions. They found that classification range, sensor strength, and flight speed were critical. UAVs flying slower than 250 km/h and equipped with high-resolution sensors were more effective in identifying threats. The analysis also showed that deploying at least three UAVs improved coverage and reduced detection variance. Civilian communication with hostile actors negatively impacted UAV success, suggesting that ISR strategies should be paired with electronic warfare tools. The case highlights how tailored UAV deployment can significantly enhance situational awareness in conflict zones.

Source: Ozcan, Begum Y. "Effectiveness of Unmanned Aerial Vehicles in Helping Secure a Border Characterized by Rough Terrain and Active Terrorists." Calhoun: The NPS Institutional Archive DSpace Repository, June 2013. https://calhoun.nps.edu/bitstream/handle/10945/34717/13Jun_Ozcan_Begum.pdf

15 Mohsan, Syed Agha Hassnain, et al. "Towards the Unmanned Aerial Vehicles (Uavs): A Comprehensive Review." MDPI, Multidisciplinary Digital Publishing Institute, 15 June 2022, www.mdpi.com/2504-446X/6/6/147.

18 Laghari, Asif Ali, et al. "Unmanned Aerial Vehicles: A Review." Cognitive Robotics, Elsevier, 30 Dec, 2022, https://www.sciencedirect.com/science/article/pii/S2667241322000258

19 Ozcan, Begum Y. "Effectiveness of Unmanned Aerial Vehicles in Helping Secure a Border Characterized by Rough Terrain and Active Terrorists." Calhoun: The NPS Institutional Archive DSpace Repository, June 2013, https://calhoun.nps.edu/bitstream/handle/10945/34717/13Jun_Ozcan_Begum.pdf

20 Coifman, Benjamin. "Ugpti." Surface Transportation Surveillance from Unmanned Aerial Vehicles, 2004, www.ugpti.org/smartse/research/citations/downloads/Coifman-Surface_Transport_Surveillance_from_UAV-2004.pdf.

21 Borthakur, Anwesha, and Pardeep Singh. "Drones: New Tools for Natural Risk Mitigation and Disaster Response ." Calhoun NPS, May 2013, https://bit.ly/3Z7e4w9

22 Nintanavongsa, Prusayon. (PDF) Performance Analysis of Unmanned Aerial Vehicles (UAV) for Improved Aerial Surveillance, www.researchgate.net/publication/370549671_Performance_Analysis_of_Unmanned_Aerial_Vehicles_UAV_for_Improved_Aerial_Surveillance. Accessed 18 Mar. 2025.

23 Luo, Hao, et al. "Traffic Collisions Early Warning Aided by Small Unmanned Aerial Vehicle Companion - Telecommunication Systems." SpringerLink, Springer US, 3 Mar. 2016, l

Disadvantages

However, UAV capabilities remain limited. Operations of drones are restricted by dense forests, urban slums, and heavy infrastructure[24] that interrupts the GPS signal and presents navigation hazards. These, by nature, are environments in which maintaining stability is difficult for drones, and they lack the human negotiation[25], trust-building, and local relationship management to replace ground-based humanitarian engagement. These are tools to support—not substitute—the human presence.

Another barrier is cost. Because of the expense of UAVs, training, and maintenance, drone benefits are implemented by larger organizations with logistical support[26]. Cybersecurity vulnerabilities further complicate matters. UAVs are still prone to hacking, GPS spoofing, and signal jamming, and their lightweight designs can hardly support robust encryption onboard. This sensitive data about humanitarian positions or operations can compromise workers and beneficiaries if UAVs are captured.

Backfires

The challenge is also legal and ethical. Many countries do not have clear regulations on which civilian UAVs can be differentiated from military-grade systems, thus leaving the question of law in humanitarian drones unanswered[27]. In addition, UAVs have often been linked to war, airstrikes, or surveillance and might occasionally be feared as a threat rather than a tool for assistance[28] . Since surveys favor using unarmed drones to deliver aid instead of armed military convoys[29], confusion between humanitarian and military UAVs could lead to losing neutrality and access.

There have also been ethical considerations related to privacy. Unauthorized aerial surveillance with UAVs may intrude with the dignity and privacy of displaced populations if UAVs are viewed as devices of foreign intelligence, particularly in humanitarian contexts[30]. For such life-saving missions, transparency, consent, and data protection are all important factors for public acceptance of UAVs.

However, much about UAV integration in humanitarian settings remains unknown. The long-term effect of drones in those communities is increased psychological stress in already traumatized communities. It also features operational risk in sophisticated, electronically aware environments, i.e., signal jamming and drone takeovers, as of yet unknown[31] (Ahmed et al., 2022). These vulnerabilities question the reliance on UAV technology in conflict recovery operations.

Although these are all uncertainties, UAVs are a revolutionary step in protecting humanitarian workers and aid delivery in violent contexts. They help strengthen the principles of impartiality and access by providing logistics support, lowering physical risks, and enabling threat detection. However, their use must be done with care, thought, and understanding of the systems' technical capabilities and the social realities of the groups the systems are meant to benefit.

Recommendations:

• *Deploy Only Unarmed, Clearly Marked UAVs*

To ensure the UAV parties are not misidentified with military assets, UAVs used for humanitarian purposes must be marked and strictly unarmed. These clear markings will help maintain the humanitarian principle of neutrality and reduce tensions among populations affected by conflict.

• *Minimize Data Collection and Integrate Auto-Delete Features*

Only essential operational data should be collected by UAVs. If UAVs are lost or hacked; and data protection is to be maintained; they must have automatic

built in data deletion protocols to prevent otherwise sensitive data from being captured for misused by hostile actors.

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24 Silva, Lucas, et al. "Photo-Realistic and Labeled Synthetic UAV Flight Data Generation Using ROS and Gazebo." IEEE, May 2024, https://ieeexplore.ieee.org/document/10786455.

25 Zieliński, Tadeusz. "Challenges for Employing Drones in the Urban Transport Systems." Safety & Defense, 15 Dec. 2022, https://sd-magazine.eu/index.php/sd/article/view/179.

26 Shafik, Wasswa, et al. "Cybersecurity in Unmanned Aerial Vehicles: A Review." Sciendo, Sciendo, 18 Oct. 2023, sciendo.com/article/10.2478/ijssis-2023-0012.

27 Rejeb, Abderahman, et al. "Humanitarian Drones: A Review and Research Agenda." Internet of Things, Elsevier, 22 July 2021, www.sciencedirect.com/science/article/pii/S2542660521000780.

28 "Hovering Threats: The Challenges of Armed Drones in Humanitarian Contexts, January 2025 - Myanmar." ReliefWeb, 14 Jan. 2025, reliefweb.int/report/myanmar/hovering-threats-challenges-armed-drones-humanitarian-contexts-january-2025.

29 Soesilo, Denise, and Kristin Bergtora Sandvik. "Drones in Humanitarian Action – A Survey on Perceptions and Applications." FSD, 9 Sept. 2016, blog.werobotics.org/wp-content/uploads/2016/09/Drones-in-Humanitarian-Acion-Survey-Analysis-FINAL21.pdf.

30 Finn, Rachel L., and David Wright. "Privacy, Data Protection and Ethics for Civil Drone Practice: A Survey of Industry, Regulators and Civil Society Organisations." Computer Law & Security Review, Elsevier Advanced Technology, 2 June 2016, www.sciencedirect.com/science/article/abs/pii/S0267364916300887.

31 Ahmed, Faiyaz, et al. "Recent Advances in Unmanned Aerial Vehicles: A Review - Arabian Journal for Science and Engineering." SpringerLink, Springer Berlin Heidelberg, 25 Apr. 2022, link.springer.com/article/10.1007/s13369-022-06738-0.

• *Prioritize Community Transparency and Engagement*
Before drone deployment, humanitarian organizations should interact with local communities to inform them about the purposes of drones, schedules of drone flights, and protective measures they take to safeguard the privacy of people. Transparency breeds trust, removes the fear of drones, and guarantees consent of the community to drone activities.

• *Advocate for Global Standards for Humanitarian Drone Use*
International frameworks regulating the use of UAVs for aid missions have to be established involving humanitarian actors to clearly distinguish humanitarian UAVs from military drones. These frameworks should be promoted at global forums to protect humanitarian space.

• *Adapt UAV Technologies Specifically for Aid Worker Protection*
Drone designs for today are centered on logistics and surveillance. Features such as real time threat alerts, geofencing to no fly areas, secure communications and lighter frames affordable to small NGOs need to be built in such dedicated models.

• *Expand UAV Access for Smaller Humanitarian Organizations*
Support initiatives should fund the development and distribution of low-priced, easy-to-use UAV models for smaller humanitarian groups to take up without enormous financial or technological burdens to ensure equitable protection for all organizations.

• *Conduct Further Research on UAV Impacts in Conflict Settings*
The long-term effects of UAV presence on community psychology, the trust of humanitarian actors, and operational risks in electronic warfare will have to be investigated in future studies. The evidence-based adjustments will guarantee safe and ethical drone integration.

DIGITAL PEACEBUILDING

2024 Issue 2

Combatting Violence Against Women using Blockchain Technology

Noël Bartley

Executive Summary

Violence Against Women (VAW) poses a significant global challenge affecting approximately one in three women worldwide. VAW intersects with geopolitical conflict by exacerbating structural violence and supporting violent extremism. Additionally, high levels of VAW can destabilize economies by impeding development efforts and undermining social welfare programs, potentially leading to both intra- and interstate violence. Blockchain technology is a promising tool for addressing VAW through secure, transparent platforms for recording incidents, sharing data, and empowering victims. Its potential lies in collecting and integrating targeted data into early warning systems, promoting financial inclusion, and utilizing digital identities to empower marginalized women. However, challenges like complexity, cost, and privacy concerns must be addressed. This approach necessitates gender sensitivity, considerations of accessibility, and implementation of robust security measures.

Introduction

Elevated rates of VAW can result in both domestic and cross-border conflicts. Employing blockchain technology can help identify these trends and support victims. To prevent this type of violence, the World Health Organization and United Nations (UN) Women have created a framework based on the most successful interventions that stresses prioritizing the safety of women and challenging unequal gender power dynamics.[1] Even with their insight and interventions, prevalence of VAW is still alarmingly high. Throughout history, we have relied on new and innovative technologies to solve our most complex problems. Over the last decade technology has fundamentally changed the way we live, work, and interact with the world around us, helping to shape the future of our society and economy. To date, one emerging technology still holds untapped potential as a transparent, trustworthy, efficient, and secure method to track, share, and exchange resources and data. This report focuses on how blockchain, commonly known as the foundation behind cryptocurrency, can help combat the major global concern of VAW. Blockchain technology offers unique solutions to track incidents or precursors of VAW and empower women through economic opportunities and community building. Careful consideration and proactive measures for implementation, however, are necessary to maximize its benefits and mitigate risks.

Violence Against Women

Violence Against Women (VAW) is "any act of gender-based violence that results in, or is likely to result in physical, sexual, or mental harm or suffering to women, including threats of such acts, coercion, or arbitrary deprivation of liberty, whether occurring in public or in private life."[2] Worldwide analysis shows nearly 1 in 3 women have experienced physical and/or sexual violence by an intimate or non-intimate partner or both. In 2018, that equat-

1 "Violence Against Women Prevalence Estimates, 2018." World Health Organization Department of Sexual and Reproductive Health and Research, March 5, 2021. https://iris.who.int/bitstream/handle/10665/341604/WHO-SRH-21.6-eng.pdf?sequence=1.

2 United Nations General Assembly. *Declaration on the Elimination of Violence Against Women*. 1993. https://www.un.org/en/genocideprevention/documents/atrocity-crimes/Doc.21_declaration%20elimination%20vaw.pdf.

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ed to 736 million women aged 15 years or older.[3]

The UN has identified a need to stop VAW and ensure a universal application of equality, security, liberty, and dignity of all human beings.[4] VAW is a hindrance of nations achieving not only these goals but also in development and peace. Some factors associated with experiencing VAW according to the World Health Organization are:

- lower levels of education;
- harmful masculine behaviors, including having multiple partners or attitudes that condone violence;
- community norms that privilege or ascribe higher status to men and lower status to women;
- low levels of women's access to paid employment; and
- low levels of gender equality (discriminatory laws, etc.).[5]

> ***"The best predictor of a country's peacefulness is its level of VAW."***[6]

VAW and Geopolitical Conflict

Violent Ideology

VAW, rooted as a societal norm, perpetuates a culture of structural violence that is not only tolerated but also legitimized. This normalization allows violence to permeate daily life, often becoming an accepted means of conflict resolution. Consequently, this environment fosters both intra- and interstate violence.[7] Additionally, endorsing VAW has been identified as a key indicator of support for violent extremism.[8][9] While Rottweiler, Clemmow, and Gill (2024) contend VAW itself does not directly cause violent extremism, they argue it significantly increases one's susceptibility to exposure to and involvement in violent extremist activities. For instance, in Asia, individuals who endorse VAW are three times more likely to support violent extremism.[10] Conversely, those who support gender equality tend to exhibit a more positive attitude towards diplomacy and a willingness to compromise.[11]

Economic Instability

Increased investment in human capital, greater job opportunities, and higher levels of education—all aspects of economic stability—are believed to reduce susceptibility to conflict.[12] However, these areas are often lacking sufficient resources or attention in nations with high rates of VAW. This is due to limitations of women's participation in the workforce, disruption of livelihoods, and the diversion of resources away from productive activities. A case study examining the impacts of VAW in Vietnam determined the economic loss can counteract the positive impact of government spending on social welfare programs, thereby acting as an internal destabilizing force.[13] VAW imposes both direct and indirect costs on communities and governments which could also lead to economic instability. Direct costs include providing services for survivors and investing in prevention programs, while indirect costs stem from reduced tax revenue due to lower household incomes and decreased economic output for businesses. These economic impacts extend to various societal functions such as healthcare, criminal justice, women's shelters, victim support centers, social services, and social insurance systems.[14]

Democratic Erosion

Democracy is key in preventing conflict and VAW can quickly erode democracy. One of the fundamental aims of democracy is to safeguard and uphold human rights.[15] When women are not adequately protected, it can undermine trust in institutions and the rule of

3 "Violence Against Women Prevalence Estimates, 2018."

4 United Nations, "Declaration."

5 "Violence Against Women Prevalence Estimates, 2018."

6 Sara Davies et al. "Bridging the Gap: Early Warning, Gender, and the Responsibility to Protect." *Cooperation and Conflict* 50, no. 2 (2015): 230. https://doi.org/10.1177/0010836714545689.

7 Mary Caprioli "Primed for Violence: The Role of Gender Inequality in Predicting Internal Conflict." *International Studies Quarterly* 49, no. 2 (2005): 165. https://doi.org/10.1111/j.0020-8833.2005.00340.x.

8 Melissa Johnston and Jacqui True. "Misogyny & Violent Extremism: Implications for Preventing Violent Extremism." *Monash Gender, Peace, & Security* (2019).

9 Elin Bjardnegard et al. "Women, Peace, and Security: The Sexism and Violence Nexus." *UN Women* (2020). https://www.unwomen.org/sites/default/files/Headquarters/Attachments/Sections/Library/Publications/2020/New-insights-on-WPS-The-sexism-and-violence-nexus-en.pdf.

10 Johnston and True, "Misogyny & Violent Extremism."

11 Mary Caprioli and Mark Boyer. "Gender, Violence, and International Crisis." *Sage Journals* 45, no. 4 (2001): 509. https://doi.org/10.1177.002202701045004005.

12 Macartan Humphreys. "Economics and Violent Conflict." *Harvard University* no. 2 (2003). https://hhi.harvard.edu/sites/hwpi.harvard.edu/files/humanitarianinitiative/files/economics_and_conflict.pdf?m=1615499917.

13 Srinivas Raghavendra et al. "The Macroeconomic Loss due to Violence Against Women: The Case of Vietnam." *Feminist Economics* 23, no. 4 (2017): 62-89. https://doi.org/10.1080.13545701.2017.1330546.

14 Elis Envall and Annika Eriksson. "Cost of Violence Against Women." *National Board of Health and Welfare*, Sweden 2006.

15 "About Democracy and Human Rights." OHCHR and Democracy. Accessed March 8, 2024. https://www.ohchr.org/en/about-democracy-and-human-rights.

law. The Syrian uprising in 2011 highlighted the systematic use of VAW by governmental security and military forces as a tactic of political suppression and intimidation against communities and political activities.[16] VAW in the realm of politics detracts from the integrity of democratic processes that are meant to be free, equitable, and inclusive. It restricts women's engagement as voters, advocates, and election officials, thus detracting from the principles of democracy.[17]

Blockchain Technology

A blockchain is a highly secure, reliable, and dispersed network that allows people to record transaction activity, store data, and exchange value in a distributed record book (ledger) that cannot be modified. It is not controlled by any central authority, but instead maintained by all computers within the network.[18] It revolutionizes the way transactions are recorded, verified, and executed, offering a secure, transparent, and decentralized alternative to traditional centralized systems. Blockchain platforms can be public (fully viewable by anyone) or private (viewable only to certain individuals or groups). Permission settings can also be adjusted to allow anyone to edit or require permission to do so.[19] Private, permission controlled blockchains do not move far from the current centralized models, however while this technology is still piloted and tested, it prioritizes the safety and privacy of users. Generally, when speaking broadly of blockchain, a public system is being referenced.



BonkersArt. n.d. Blockchain types- public, private, hybrid and consortium vector illustration. https://stock.adobe.com/images/blockchain-types-public-private-hybrid-and-consortium-blockchain-icons-and-infographics-vector-illustration/530893417?prev_url=-detail.

Advantages

One major advantage of this technology is its increased trust with its users due to its immutable nature. All changes are documented within the blockchain, and any unauthorized changes are revoked. Blockchain also provides great transparency. Because there is no central authority, data is maintained on every computer within the network allowing all parties to engage with the data. Additionally, if data on one computer is compromised, it will remain intact on all other computers. Blockchain is also very secure. It uses both asymmetric encryption and hash functions to protect its data. It allows for streamlined processes, faster transactions, and is accessible to anyone with an Internet connection.

Disadvantages

The intricacies of blockchain technology pose significant challenges for individuals outside the field to understand.[20] This could potentially hinder governments and humanitarian organizations from embracing its potential due to misconceptions and a lack of trust. Moreover, the development and implementation can be prohibitively expensive. Factors such as scalability, interoperability, and high data storage costs have prevented widespread adoption.[21] Additionally, while blockchain utilizes a robust public and private key encryption system (asymmetric encryption) for transactions, ensuring high levels of security, the absence of a mechanism to provide additional security in cases of private key loss or accidental publication is a notable concern.[22] Latency issues may also arise due to the nature of blockchain storing a complete record of all information and updates on all nodes as new blocks are added.[23] This can be frustrating for users and delay services. Final-

16 Khuloud Alsaba and Anuj Kapilashrami. "Understanding Women's Experience of Violence and the Political Economy of Gender in Conflict: The Case of Syria." *Reproductive Health Matters* 24, no. 47 (2016): 5-17. https://doi.org/10.1016/j.rhm.2016.05.002.

17 Garielle Bardell. "Violence Against Women in Politics: IFES Submission to the OHCHR Special Rapporteur." *International Foundation for Electoral Systems* (2018).

18 "What is blockchain technology?" Chainlink, May 24, 2023. https://chain.link/education-hub/blockchain.

19 Theresia Thylin and Maria Fernanda Novela Duarte. "Leveraging Blockchain Technology in Humanitarian Settings – Opportunities and Risks for Women and Girls." *Gender and Developmen*t 27, no. 2 (2019): 317-336. https://doi.org/10.1080/13552074.201627778.

19 Ibid.

21 Yujie Zheng and Wai Fong Boh. "Value Divers of Blockchain Technology: A Case Study of Blockchain-enabled Online Community." *Telematic and Informatics* 58 (2021). https://doi.org/101563.

22 Laurie Hughes et al. "Blockchain Research, Practice, and Policy: Applications, Benefits, Limitations, Emerging Research Themes and Research Agenda." *International Journal of Information Management* 49 (2019): 114-129. https://doi.org/10.1016/j.ijinfomgt.2019.02.005.

23 Fran Casina et al. "A Systematic Literature Review of Blockchain-based Applications: Current Status, Classification, and Open Issues." *Telematics and Informatics* 36 (2019): 55-81. https://doi.org/10.1016/j.tele.2018.11.006.

ly, worldwide regulation is needed as this technology knows no boundaries. Code written in one country under one set of laws and regulations may impact citizens of another with a different set of laws and regulations.[24] To effectively implement this technology, we need mass adoption and worldwide regulation.

Recommendations

Track Incidents of VAW

Blockchain technology can provide platforms to help with data collection on VAW for early warning systems, providing aid, and intervention. Integrating data on a country's level of VAW into existing early warning frameworks can significantly enhance the predictive capacity for a range of systematic VAW and other crimes, including genocide, war crimes, ethnic cleansing, and crimes against humanity.[25] Blockchain technology holds promise as a secure and tamper-resistant platform for recording incidents of VAW.[26] By reducing the risk of unauthorized alterations and providing a complete audit trail,[27] blockchain instills confidence in women that their information will remain intact and confidential. Additionally, the immutable nature of blockchain allows victims to capture data as time-stamped evidence, which could be instrumental in legal proceedings.[28] Furthermore, blockchain applications facilitate secure and transparent data-sharing platforms, enabling national and international organizations, as well as other stakeholders, to share anonymized data on VAW, trends, and resources. This collective sharing fosters a better understanding of the prevalence and impact of VAW, thereby informing evidence-based interventions.

Economic Stability

Blockchain technology can be utilized for monetary benefits by both individuals impacted by VAW as well as donors sending aid for VAW. This technology enables individuals without bank accounts to access financial services using only a cellphone.[29][30] This offers independence and privacy to those facing financial abuse, a common form of VAW. It can provide immediate access to funds when needed[31] and facilitates peer-to-peer transactions and remittances, providing opportunities for seamless financial interactions.[32] By eliminating the need for third-party intervention, blockchain enables lower-cost cash transfers.[33] This promotes financial inclusion, maximizes the impact of cash transfers, and reduces the administrative burden on both the senders and recipients of funds. Donors can similarly utilize blockchain to support specific causes, such as healthcare for victims of VAW, with increased transparency in fund allocation.[34] This allows for better-targeted aid disbursements and social investments.[35]

Community Building

Blockchain technology can support systems for digital identities as well as community support networks to help victims of VAW. Digital identity allows refugees, stateless women, or women in countries in which their right to be recognized is not protected by law, the ability to participate as members of society.[36]

> ***"As technologists, when we look at blockchain what we are promising is that you will have an identity. And if you're a refugee and you are stateless, it doesn't matter where you are, your identity travels with you."***
>
> -Atefeh Riazi, assistant secretary-general for the UN's Office of Information and Communications Technology

Having an identity is vital for political, economic, and social opportunity.[37] Blockchain can furthermore facilitate the creation of a decentralized community support network for victims of VAW to share their

24 Cathy Mulligan. "Blockchain and Sustainable Growth." *UN Chronicle*. United Nations, December 2018. https://www.un.org/en/un-chronicle/blockchain-and-sustainable-growth.

25 Davies et al. "Bridging the Gap."

26 Mulligan, "Blockchain and Sustainable Growth."

27 "Blockchain—What does it mean for the UN?" Emerging Technologies whitepaper series. *Unite* (2018). https://unite.un.org/sites/unite.un.org/files/emerging-tech-series-blockchain.pdf.

28 "Blockchain Technology Is Fighting Abuse & Exploitation." Mandated Reporter, November 18, 2022. https://mandatedreporter.com/blog/blockchain-technology-is-fighting-abuse-and-exploitation/.

29 Mulligan, "Blockchain and Sustainable Growth."

30 "Blockchain—What does it mean for the UN?"

31 "Blockchain Technology Is Fighting."

32 Thylin and Duarte. "Leveraging Blockchain."

33 Ibid.

34 "Blockchain—What does it mean for the UN?"

35 Thylin and Duarte. "Leveraging Blockchain."

36 Reshma Kamath. "Blockchain for Women Next Generations Sustainable Development Goal 5." *Asian Development Perspective* 9, no. 1: 92. https://doi.org/10.22.681/ADP.2018.9.1.88.

37 Ibid.

Case Study 1: Blockchain enabled Online Community Sensay

Sensay is a blockchain enabled online Q&A community that utilizes an AI-powered chat bot to help connect you to an expert based on the question you ask. It utilizes a cross-platform knowledge repository meaning it extracts data from various apps, such as Reddit, using OAuth. OAuth enables end users' account information to be used by a third-party without exposing account credentials. The data is still owned and controlled by its users. Sensay records the extracted data on the blockchain and its immutability allows users to prove they are the authors of the data. It offers incentives to maintain an active community by compensating its contributors for their input. It provides decentralized messaging support and protects data ownership increasing its trustworthiness with its users. This type of platform would provide victims of VAW a safe place to connect and find resources to assist them. Women with similar experiences can help each other find aid, discuss methods for moving forward, and provide emotional support through shared experience while also being compensated for their insights.

Source: Zheng and Boh. "Value Drivers of Blockchain Technology."

experiences, access resources, and provide mutual support in a secure environment. It can empower victims and amplify their voices in efforts to combat VAW. Due to its decentralized structure, there is no central authority to censor or suppress content allowing women to freely express their experiences without fear of censorship or reprisal.[38] Case study 1 by Thylin and Duarte revealed that because blockchain communities lack a central authority to decide how data is used, individual contributors are notably more engaged.[39] With no fear their data could be altered, deleted, or used in a way in which it was not intended, it instills confidence in the participants to engage.

Considerations

The implementation of blockchain technology requires specific considerations when it comes to equality, accessibility, and data privacy. Blockchain is an emerging technology and new technologies do not inherently benefit all equally.[40] It will be important to ensure inequalities are not being exacerbated by blockchain by including a gendered perspective when creating solutions utilizing this technology. This relates strongly to the creation of smart contracts as they automatically execute when agreed upon conditions are met. The predefined conditions need to be free from bias and discrimination.[41] Additionally concerning smart contracts, is the cost and time implications. If a solution that provides aid and resources to VAW needs an amendment for a smart contract, an entirely new block in the chain will likely be required.[42] This could prevent victims from receiving immediate assistance and thus losing trust in the system.

It's also important to note that blockchain technology generally requires access to smartphones and connectivity. Women experiencing violence and unequal treatment may be prevented from this luxury. Healthcare workers, law enforcement, and other community services may be an available resource for women to utilize to report their violence however, this could still prevent them from gaining monetary assistance or capturing real-time evidence against their abuser. Case study 2, blockchain technology helping refugee women in Jordan, highlighted on the following page, shows there are unique solutions to help with this limitation. It is also crucial to recognize anonymity ends when an owner of cryptocurrency needs to use it for a service or product given that providing personal information is often required for legal and practical purposes.[43] This could lead to women being targeted or re-victimized. Current studies on security breaches within blockchain have been tied mostly to wallet security, specifically for cryptocurrency. This indicates a requirement for better protective measures at the end user device and interface.[44] Vulnerability scans, penetration testing, and regular audits can assist in better securing this technology.

Blockchain technology's transparency also rais-

38 Walid Al-Saqaf and Nicolas Seidler. "Blockchain Technology for Social Impact: Opportunities and Challenges Ahead." *Journal of Cyber Policy* 2, no. 3 (2017): 338-354. https://doi.org/10.1080/23738871.2017.1400084.

39 Zheng and Boh, "Value Divers of Blockchain Technology."

40 Thylin and Duarte. "Leveraging Blockchain."

41 Al-Saqaf and Seidler. "Blockchain Technology for Social Impact."

42 Hughes et al. "Blockchain Research, Practice, and Policy."

43 Al-Saqaf and Seidler. "Blockchain Technology for Social Impact."

44 Meiran Galis. "Council Post: Blockchain and Data Privacy: The Future of Technology Compliance." Forbes, February 20, 2024. https://www.forbes.com/sites/forbestechcouncil/2024/02/15/blockchain-and-data-privacy-the-future-of-technology-compliance/?sh=281bee2d74f8.

Case Study 2: Helping Refugee Women in Jordan with Blockchain Technology

The UN and World Food Program partnered in 2018 to implement a solution where funds were delivered to supermarkets for women to access. An iris scan linked to the UN High Commissioner for Refugees's biometric identity system and blockchain allowed women to have their identities validated without the need for connectivity or a cellphone. Both a virtual wallet and bank account identity were created on blockchain for every beneficiary. The blockchain provided a record of the money owed, what was withdrawn, and subsequently, what the agency would now owe the supermarket. This created an environment where the formal banking system only needed to settle with the supermarkets resulting in much lower transaction costs and quicker, more secure transactions for the women.

Source: Thylin and Duarte. "Leveraging Blockchain."

es data privacy concerns. Violence-related data on a public blockchain could be accessed by unwanted users, which includes abusers, and could lead to further abuse, intimidation, or retaliation against survivors. Posts and reports on blockchain would be anonymous, but the detail of the content could inadvertently reveal private information about individuals allowing abusers to target them. Additionally, if open community platforms are used for victims of VAW, malicious members could take up network capacity with useless contributions.[45] This could prevent other members from making contributions and diminish an individual contributor's sense of belonging within the group. Blockchain based platforms are also vulnerable to false reporting which could lead to aid being misdirected to fraudulent claims. The lack of central oversight could allow for abusive content to be shared with an inability to remove it leading to further normalization of VAW in the digital environment.

Conclusion

VAW represents a significant global challenge, affecting millions of women worldwide and undermining fundamental principles of equality, security, and dignity. The intersection of VAW with geopolitical conflict through violent ideology, economic instability, and democratic erosion highlights the urgency of addressing this pervasive issue. Blockchain technology offers promising avenues for combatting VAW by providing secure, transparent platforms for recording incidents, sharing data, and empowering victims. However, the implementation of blockchain solutions requires careful consideration of factors such as equality, cost, and privacy concerns. Recommendations for leveraging blockchain in the fight against VAW include providing a safe, anonymous platform for women to report their abuse, promoting financial inclusion, and fostering community building platforms. It is essential to adopt a gender-sensitive approach to blockchain implementation, ensuring that inequalities are not exacerbated, and to address accessibility issues and security concerns. Further research is needed on its effectiveness, but this technology has great potential. Governments and organizations such as Women, Peace, and Security should consider piloting blockchain programs to assist in combatting VAW.



Ralisetdes. n.d. Stop violence against women illustration. https://stock.adobe.com/images/stop-violence-against-women-illustration/466230867?prev_url=detail.

45 Zheng and Boh, "Value Divers of Blockchain Technology."

DIGITAL PEACEBUILDING

2025 Issue 3

Surveillance to Solidarity: Peacebuilding for Economic Migrant Protection Through Mobile Platforms

Ulviya Narmin Hoque Chisty

Executive Summary

- Economic migrants contributed an estimated $840 billion USD in remittances in 2023, yet face significant violence and exploitation.
- Mobile platforms can reduce these risks by improving access to support, legal aid, and reporting mechanisms.
- Challenges such as unequal access, offline vulnerabilities, and data security risks limit the effectiveness of these platforms.
- Recommendations include expanding affordable mobile access for migrant workers, building public-private support systems, enforcing data protection, and updating platforms for multilingual accessibility.

Introduction

164 million international economic migrants contribute significantly to global supply chains. Yet, between December 2022 and November 2023, 613 human rights abuse allegations were recorded against them.[1] These abuses, spanning sectors like renewable energy, hospitality, and agriculture, expose workers to exploitation and discrimination. As François Crépeau, Special Rapporteur on the human rights of migrants, notes, many are forced into dangerous, low-wage jobs due to precarious residence status.[2] This brief explores how mobile platforms can empower workers, provide resources, improve solidarity, and mitigate these vulnerabilities, with actionable recommendations for improvement.[3]

Note: Throughout this brief, the terms "economic migrant" and "migrant worker" are used interchangeably.

Economic Migration

According to the UN OHCHR, a "migrant worker" is defined as "a person who is to be engaged or has been engaged in a remunerated activity in a State of which he or she is not a national." Economic migration refers to the movement of people primarily motivated by the pursuit of better economic opportunities.[4] Migrants often seek employment in low-wage, labour-intensive sectors such as agriculture, construction, and manufacturing. Despite their contributions to host economies, economic migrants frequently face precarious working conditions, exploitation, low wages, and minimal legal protections.[5] Social stigmas and xenophobia further compound their vulnerability, leading to marginalisation and exclusion from social support systems.[6]

Mobile Platforms in Economic Migration

Given these vulnerabilities, mobile platforms have have emerged as a promising tool for improving mi-

1 Business & Human Rights Resource Centre, Migrant Workers' Rights: Global Analysis 2023, https://www.business-humanrights.org/en/from-us/briefings/migrant-workers-2023/migrant-workers-rights-global-analysis-2023/.

2 François Crépeau, The Human Rights of Migrants, OHCHR, n.d., https://www.ohchr.org/sites/default/files/Documents/HRBodies/CMW/Discussions/2014/FrancoisCrepeau.pdf.

3 Anni Alexander and Sophie Otiende, "Social Media & Rescuing Trafficked Migrants: A Case Study," Mixed Migration Centre, March 30, 2015, https://mixedmigration.org/social-media-rescuing-trafficked-migrants/.

4 European Commission. "Migration." European Migration Network Asylum and Migration Glossary. Accessed February 24, 2025. https://home-affairs.ec.europa.eu/networks/european-migration-network-emn/emn-asylum-and-migration-glossary/glossary/migration_en.

5Amarjit Kaur, "Malaysia: Labour Migration, Irregular Movements and Regional Policies," in Migration and Integration in Europe, Southeast Asia, and Australia, ed. Juliet Pietsch and Marshall Clark (Amsterdam: Amsterdam University Press, 2015), 75–98, http://www.jstor.org/stable/j.ctt16f986x.9.

6 Ibid.

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grant worker protections. Digital infrastructures such as *LabourLink* and Ulula allow economic migrants to access legal information, report abuse anonymously, and connect to peer support networks. Mobile platforms offer a means of empowerment, helping to reduce isolation and foster solidarity among migrants. By facilitating early intervention and enhancing transparency, mobile technologies play a critical role in peacebuilding efforts aimed at reducing the risk of violence and exploitation against migrant workers.

Economic Migrants and Violence

Economic migration exposes workers to systemic and direct forms of violence through legal precarity, social exclusion, and barriers to protection. Structural factors, including restrictive labour policies, economic dependency on employers, and sexism create environments where violence becomes probable, while direct abuse at worksites and along migration routes remains a persistent threat.

Structural Vulnerability and Legal Precarity: Migrant workers are frequently trapped in precarious legal statuses that deepen their exposure to violence. Many migration systems tie workers' visas to their employers, limiting their freedom and discouraging them from reporting abuse. Mullally (2017) highlights how dejuridification—the creation of legal exceptions that exclude migrant workers from standard protections—intensifies their vulnerability.[17] Case studies from Singapore show that economic migrants, particularly those in the construction industry, often remain silent about abuse to avoid retaliation or deportation.[2] Similar patterns appear in Malaysia, where temporary migration schemes reinforce dependency and suppress worker rights.[3,4]

The academic evidence in this area is detailed and consistent across different contexts, though it relies heavily on qualitative research. Broader quantitative studies would further strengthen claims about how systemic legal precarity drives violence against economic migrants.

Labour Exclusion and Social Hostility: Restrictive employment laws not only make migrant workers vulnerable to employer abuse but also contribute to their social marginalisation. It is argue that exclusionary labour policies fuel resentment among local workers, who perceive migrants as competitors for scarce jobs and services.[5] In environments of economic strain, migrant workers are cast as outsiders and economic threats, increasing their exposure to hostility and discrimination. Migrant workers often face daily racism and xenophobia, shaped by political narratives that frame them as destabilising forces.[6] While much of this evidence is qualitative and policy-oriented, its consistency across diverse national settings reinforces the link between exclusionary policies, social mistrust, and increased violence.

rodrigoandrade3880. Hand Worker Constructions. Photograph. Published August 1, 2015. Pixabay. https://pixabay.com/photos/hand-worker-constructions-869322/.



Barriers to Reporting and Access to Protection: Migrant workers who face abuse are often unable or unwilling to seek help. Fear of deportation, language barriers, and a lack of trust in official systems silence many workers. Cases have highlighted how Bangladeshi construction workers in Singapore intenalise silence as a necessary survival strategy under a punitive migration regime.[7] Even where legal aid services exist, they are frequently inaccessible due to limited outreach, language incompatibility, or employer surveillance.[8]

These barriers are even more severe for women and girls working as domestic migrant workers. In many countries, domestic workers are not legally recognised as "workers" and are therefore excluded from basic labour protections. Without enforceable

1Siobhán Mullally, "Migrant Domestic Workers and Continuums of Exploitation: Beyond the Limits of Antitrafficking Laws," AJIL Unbound 111 (2017): 498–503, https://doi.org/10.1017/aju.2018.24

2 Chuanfei Chin, "Precarious Work and Its Complicit Network: Migrant Labour in Singapore," Journal of Contemporary Asia 49, no. 4 (2019): 533–535, https://doi.org/10.1080/00472336.2019.1572209.

3 Chuanfei Chin, "Precarious Work and Its Complicit Network: Migrant Labour in Singapore," Journal of Contemporary Asia 49, no. 4 (2019): 533–535, https://doi.org/10.1080/00472336.2019.1572209.

4 Amarjit Kaur, "Malaysia: Labour Migration, Irregular Movements and Regional Policies," in Migration and Integration in Europe, Southeast Asia, and Australia, ed. Juliet Pietsch and Marshall Clark (Amsterdam: Amsterdam University Press, 2015), 75–98, http://www.jstor.org/stable/j.ctt16f986x.9.

5 Kalleberg and Hewison (2013) and the International Labour Organization (2011)

6 Jorge A. Bustamante, "Extreme Vulnerability of Migrants: The Cases of the United States and Mexico," Migraciones Internacionales 6, no. 1 (2011): 97–118.

7 G. Baey and B. Yeoh, "Migration and Precarious Work: Negotiating Debt, Employment, and Livelihood Strategies amongst Bangladeshi Migrant Men Working in Singapore's Construction Industry" (Brighton: Migrating Out of Poverty Consortium, University of Sussex, 2015), Working Paper 26.

8 International Labour Organization (ILO), "COVID-19 Has Made Life Even More Precarious for Migrant Workers," International Labour Organization, https://www.ilo.org/resource/news/covid-19-has-made-life-even-more-precarious-migrant-workers.

rights to minimum wage, annual leave, or regulated working hours, domestic workers face heightened risks of violence and abuse. The absence of formal protections not only increases their vulnerability but also instils a deeper fear of reporting exploitation, as legal systems often fail to recognise or defend their rights.

Direct Experiences of Violence: Beyond structural precarity, migrant workers often experience direct violence. Abuse at worksites, including physical mistreatment, withheld wages, and hazardous conditions, remains widespread.[1] Research in sectors such as fisheries documents migrant workers facing psychological, physical, and even sexual abuse linked directly to their economic vulnerability.[2]

These findings, grounded in qualitative case studies and sector-specific investigations, offer compelling evidence that economic migrants' work status exposes them to systemic violence. However, the research often focuses on particular industries or migration corridors, suggesting a need for broader comparative studies.

"***Applications and platforms available on mobile devices can help women migrant workers organize, access information on their rights, and access support services, including in response to violence.***"

Conditions That Exacerbate Violence:

Certain conditions increase migrant workers' exposure to violence. Economic downturns heighten competition for low-wage jobs, deepening resentment toward migrant labourers.[3,4] Political polarisation and exclusionary narratives worsen social divisions, increasing the likelihood of both institutional neglect and interpersonal violence against workers.[5] Women and LGBTQI migrant workers face disproportionate risks of gender-based violence, especially when legal protections are weak.[6]

Strengths and Gaps in the Evidence

The evidence linking economic migration to violence is robust, particularly regarding legal precarity and social exclusion, with case studies from Singapore and Malaysia and ILO investigations offering valuable insights. However, the reliance on small sample sizes and qualitative data limits generalisability. Additionally, fear of reporting and lack of accessible channels for grievances contribute to gaps in research. Mobile platforms could help bridge this gap by providing safer, more accessible reporting options.

Despite these gaps, the scholarship clearly shows that economic migrants face heightened risks of violence due to legal vulnerabilities, social exclusion, and barriers to protection, making addressing these structural

Case Study: LaborLink- Enhancing Protection through Phone-Based Communication

LaborLink, a mobile platform by ELEVATE, has reached over 3 million workers in 20 countries, integrating a phone-based Worker Sentiment Survey to facilitate two-way communication between workers, employers, and community organizations. In Bangladesh's informal garment sector, LaborLink is customized to collect data on child and forced labor. This anonymous tool allows workers in informal factories, particularly in Keraniganj and Narayanganj, to report abuses like verbal mistreatment and wage theft. Despite challenges such as limited access to phones and complex survey methods, over 1,200 workers received educational messages via IVR. The project also saw factory owners showing a willingness to improve conditions but noted that more education and guidance were needed to foster systemic change. The initiative highlights the potential of mobile platforms to provide vulnerable workers with a voice, though broader efforts are needed to ensure accessibility and overcome barriers like phone access.

Source: ELEVATE. "Worker Engagement." https://www.elevatelimited.com/services/advisory/worker-engagement/

1 International Labour Organization (ILO), "COVID-19 Has Made Life Even More Precarious for Migrant Workers," International Labour Organization, https://www.ilo.org/resource/news/covid-19-has-made-life-even-more-precarious-migrant-workers.

2 Ibid.

3 Uri Dadush and Mona Niebuhr, "The Economic Impact of Forced Migration," Carnegie Endowment for International Peace, April 22, 2016, https://carnegieendowment.org/posts/2016/04/the-economic-impact-of-forced-migration?lang=en.

4 Paolo Verme, "Theory and Evidence on the Impact of Refugees on Host Communities," World Bank Blogs, March 28, 2023, https://blogs.worldbank.org/en/dev4peace/theory-and-evidence-impact-refugees-host-communities

5 Kars de Bruijne, Minke Meijnders, and Lauriane Héau, "Migration," New Dots on the Security Horizon: Results from the Clingendael Expert Survey (Clingendael Institute, 2017), http://www.jstor.org/stable/resrep17335.5

6 International Organization for Migration (IOM), "Addressing Gender-Based Violence," Migrant Protection Platform, https://migrantprotection.iom.int/en/about/addressing-gender-based-violence.

drivers crucial for peacebuilding.

Mobile Platforms as Peacebuilding Tools for Economic Migrant Protection

Digital platforms are online systems that connect users, facilitate information exchange, and build trust.[7] A subset, mobile platforms, are designed specifically for smartphones and tablets.[8] They include mobile operating systems and application environments that support the development of mobile apps.[9] Tools such as LabourLink and Ulula deliver information to workers and collect feedback through mobile phones, offering rapid, accessible communication even in restrictive environments.



shouravsheikh, They See My Disability, I See My Ability, photograph, published November 2, 2020, Pixabay, https://pixabay.com/photos/person-disabled-wheelchair-posing-5660429/.

Mobile platforms help migrant workers overcome barriers such as lack of union access, social isolation, and exploitation. They allow workers to assert their rights and seek better working conditions where tra ditional support systems are weak.[10] In peacebuilding, mobile platforms contribute to social cohesion by addressing inequality, empowering vulnerable workers, and fostering solidarity. By improving the safety and agency of migrant workers, these platforms can reduce violence and promote more stable, integrated societies in both host and origin communities.

Positive Contributions to Peacebuilding

Real-Time Reporting and Feedback: Mobile platforms enable migrant workers to report violations and provide feedback in real-time and anonymously, enhancing their protection against violence, particularly in contexts where social security and healthcare systems are weak.[11] Applications like LabourLink integrate phone-based Worker Sentiment Surveys, facilitating two-way communication between workers, employers, and community organisations to improve responses to early signs of abuse.[12]

Access to Labour Laws and Compliance Information: Mobile platforms provide workers with access to information about labour rights, grievance procedures, and legal aid.[13] This access helps workers identify and address misconduct early, reducing the risk of exploitation. However, in-person legal aid clinics remain crucial for workers facing language barriers or lacking digital access.

Social Connectivity and Grievance Mechanisms: Mobile technology also strengthens emotional resilience by enabling communication with family members and peer support groups. [14] These grievance mechanisms help workers take preventive action against abusive conditions and reduce feelings of isolation that can escalate conflict.

Transparency and Worker Empowerment: Worker reporting platforms like LabourLink offer comprehensive feedback to participants on survey results.[15] This transparency encourages worker agency and collec-

7 Awais Asadullah, Miguel Angel Malo, and Fernando L. F. Ribeiro, "Digital Platforms: Definitions and Economic and Legal Challenges in the European Union," European Journal of Privacy Law & Technologies 7, no. 1 (2018), https://universitypress.unisob.na.it/ojs/index.php/ejplt/article/view/1264.

8National University of Singapore, Mobile Platform (Singapore: School of Computing, National University of Singapore, 2017), https://www.comp.nus.edu.sg/~seer/book/2e/Ch09.%20Mobile%20Platform.pdf.

9Kars de Bruijne, Minke Meijnders, and Lauriane Héau, "Migration," New Dots on the Security Horizon: Results from the Clingendael Expert Survey (Clingendael Institute, 2017), http://www.jstor.org/stable/resrep17335.5.

10 World Bank, "Theory and Evidence on the Impact of Refugees on Host Communities," World Bank Blogs, accessed April 28, 2025, https://blogs.worldbank.org/en/dev4peace/theory-and-evidence-impact-refugees-host-communities

11 International Organization for Migration, "Addressing Gender-Based Violence," Migrant Protection Platform, accessed April 28, 2025, https://migrantprotection.iom.int/en/about/addressing-gender-based-violence.

12 Ibid.

13 U.S. Department of Labor, Bureau of International Labor Affairs, "Example in Action: Technology to Engage Migrant Workers," Steps to a Social Compliance System, U.S. Department of Labor, https://www.dol.gov/agencies/ilab/comply-chain/steps-to-a-social-compliance-system/step-2-assess-risks-and-impacts/example-in-action-technology-to-engage-migrant-workers

14 International Labour Organization (ILO), "COVID-19 Has Made Life Even More Precarious for Migrant Workers," International Labour Organization, https://www.ilo.org/resource/news/covid-19-has-made-life-even-more-precarious-migrant-workers

15 Bassina Farbenblum, Laurie Berg, and Angela Kintominas, Transformative Technology for Migrant Workers: Opportunities, Challenges, and Risks (New York: Open Society Foundations, 2018)

tive action to address workplace challenges, contributing to broader peacebuilding efforts.

Limitations and Challenges

Inequitable Access and the Digital Divide: Many migrant workers are digitally excluded due to low technological literacy, expensive devices, or lack of multilingual support.[16] Migrants using mobile platforms face challenges with poor internet connectivity, device incompatibility, and complex app navigation.[17] Additionally, employers may confiscate workers' phones, further restricting their ability to access digital tools.[18]

Digital Security and Privacy Risks: Data breaches, employer surveillance, and biometric data collection expose workers to heightened risks of retaliation, discrimination, and exploitation.[19,20] Ethical concerns regarding informed consent, confidentiality, and worker participation in technology design underscore the need for stronger data protection measures.[21]



Chiec_Dep. Man, Nature, Worker. Photograph. Published September 10, 2020. Pixabay. https://pixabay.com/photos/man-worker-buckets-salt-sunset-5557864/

Misinformation and Skewed Perceptions: Crowdsourced platforms like Transafe can sometimes produce misleading representations of workplace or community safety if reports are based on emotional or isolated experiences rather than verified patterns.[22] Inaccurate data can fuel unnecessary fear among workers and hinder employment opportunities.

Unknowns and Future Challenges

Case Study: Ulula's Customizable Worker Feedback Platform

Ulula's customizable platform enables real-time communication with workers across 100 countries, deploying surveys, alerts, and grievance mechanisms. Gildan, a major apparel manufacturer, partnered with Ulula to strengthen its grievance processes by enabling workers to report issues anonymously in their preferred languages. The mobile platform fostered better communication, with 962 cases opened and an 83.16% resolution rate. This case underscores the role of mobile technology in improving workplace conditions by enhancing transparency and trust between workers and management. By enabling workers to report concerns without fear of retaliation, Ulula empowered them to raise issues such as unsafe working conditions, contributing to stronger labour rights protections and better employer accountability.

Source: Ulula, "Gildan: Building Effective Grievance Mechanisms," https://ulula.com/resources/case-studies/gildan-effective-grievance-mechanisms/.

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While mobile platforms show strong promise for supporting migrant workers, significant gaps remain in understanding their long-term impacts. Few longitudinal studies exist to measure whether platforms sustainably reduce violence or improve economic outcomes over time.[23] Further research is needed to evaluate how mobile tools interact with broader social and legal structures in peacebuilding contexts.

Recommendations:

Mobile platforms can play a vital role in preventing extreme situations by providing a means for migrant workers to file complaints, access legal resources, and build a sense of community, particularly in isolated environments. However, these platforms should complement, not replace, in-person inspections and

16 UNHCR, Regional Information and Communication Needs Assessment: Understanding the Information and Communication Needs of Refugees and Migrants in the Venezuela Situation (November 2019)

17 Associated Press, "UN Shared Rohingya Data Without Informed Consent: Bangladesh Provided Myanmar Information That Refugee Agency Collected," AP News, November 10, 2023, https://apnews.com

18 Stephen A. Matlin et al., "Digital Solutions for Migrant and Refugee Health: A Framework for Analysis and Action," The Lancet Regional Health – Europe 50 (2024): 101190, https://doi.org/10.1016/j.lanepe.2024.101190.

19 DHS Overhauls Asylum Phone App for Self-Deportation," Border Report, March 2025, https://www.borderreport.com/immigration/dhs-overhauls-asylum-phone-app-for-self-deportation/

20 Amnesty International, CBP One – A Blessing or a Trap? (2024), https://www.amnesty.org/en/documents/amr51/7985/2024/en/

21 Stephen A. Matlin et al., "Digital Solutions for Migrant and Refugee Health: A Framework for Analysis and Action," The Lancet Regional Health – Europe 50 (2024): 101190, https://doi.org/10.1016/j.lanepe.2024.101190.

22 M. Hamilton et al., "Transafe: A Crowdsourced Mobile Platform for Crime and Safety Perception Management," SIGCAS Computers and Society 41, no. 2 (December 2011): 32–37, https://doi.org/10.1145/2095272.2095275.

23 Ibid.

support. Ensuring that grievances are properly addressed, without fear of exposure or limited access, requires a hybrid approach that includes both digital and offline solutions. To maximise the potential of mobile platforms for peacebuilding and protection, several actions should be prioritised:

Expand access to affordable mobile technology and the internet for migrants: Governments should offer subsidized mobile plans for migrant workers, similar to the U.S. "Lifeline" program, and increase internet access in migrant-heavy areas through public Wi-Fi or community center partnerships.[24] Public-private collaborations could also provide affordable smartphones preloaded with essential legal, grievance, and social services apps, similar to the RefugeeMobile program.[25]

Create public-private partnerships to support workers without reliable mobile access: Government agencies, telecom providers, and NGOs should develop multi-channel communication strategies (e.g., SMS and call centers) for migrant workers. Increasing workplace inspections can ensure access to mobile devices, or provide in-person grievance opportunities and anonymous surveys in areas with limited connectivity, supported by community liaison officers.[26]

"Lack of familiarity with local law and language difficulties frequently prevent migrants from being aware of specific hazards in their work."

Enforce data protection laws to safeguard migrant identities: Mobile platforms should implement secure data privacy protocols (authentication, encryption, anonymization) to protect migrant workers' information from misuse.[27] Regular audits and collaboration with privacy advocacy groups will ensure compliance. Governments should enforce regulations that hold companies accountable for migrant data protection.[28]

Update mobile platforms to include multiple languages: Current mobile platforms should be updated to support multiple languages to ensure they are accessible to migrant workers who may not speak English or the host country's language, improving their ability to access resources and report grievances effectively.[29]

24 Universal Service Administrative Company (USAC), "Get Started," Lifeline Support, accessed April 28, 2025, https://www.lifelinesupport.org/get-started/.
25 Vodafone Americas Foundation, "Backed by Data, the RefugeeMobile Smartphone Program Helps Refugees Assimilate," accessed April 28, 2025, https://vodafone-us.com/news-items/backed-by-data-the-refugeemobile-smartphone-program-helps-refugees-assimilate/.
26 François Crépeau, The Human Rights of Migrants, OHCHR, n.d., https://www.ohchr.org/sites/default/files/Documents/HRBodies/CMW/Discussions/2014/FrancoisCrepeau.pdf.
27 United Nations Network on Migration, "Reclaiming Digital Spaces to Counter Human Trafficking and Protect Its Victims," UN Migration Network, 2021, https://migrationnetwork.un.org/statements/reclaiming-digital-spaces-counter-human-trafficking-and-protect-its-victims
28 Ben Wolford, "What is GDPR?" GDPR.eu, accessed March 17, 2025, https://gdpr.eu/what-is-gdpr/
29 Ibid.

DIGITAL PEACEBUILDING

2025 Issue 2

Countering Digital Misinformation with Automatic Fact-Checkers

Sophia Campbell

Executive Summary

Digital misinformation increases political violence by inspiring retribution for fabricated wrongdoings and intensifying societal ideological polarization. Automatic fact-checkers (AFCs), computer programs with the capacity to detect false claims, can mitigate the spread of misinformation and therefore reduce the correlated acts of violence. AFCs are cost-effective and generally correct in their judgements. However, they can be manipulated by cyber attacks and may contain inherent algorithmic biases. Developers and regulatory powers must take steps to ensure accurate, impartial, and effective judgements of veracity.

Introduction

Digital misinformation can inspire acts of political violence by increasing ideological or political polarization within a society and propogating targeted mistruths to provoke retribution. Automatic Fact Checkers (AFCs) have the capacity to verify pieces of digital media in near-live time, potentially reducing users' belief in false claims and limiting their spread altogether. While this technology could decrease instances of political violence fueled or instigated by misinformation, it also raises new concerns of inaccuracy and bias in claim verification. In this paper, we explore the capacities, benefits, and risks of AFCs as applied to digital political misinformation.

Digital Misinformation

Most generally, digital misinformation is information on the internet that is not correct.[1,2] There are a few key stipulations. First, "misinformation" refers to the incorrect piece of information itself, not a user's misunderstanding of correct information. Second, it need only be incorrect based on the best available contemporary evidence.[3] If there is general consensus among subject experts that a claim is true, but a lack of absolute evidence supporting it, that claim is not considered misinformation. Third, misinformation is not necessarily created or spread intentionally.[4] Users may share false claims in good faith. (This differentiates it from "disinformation," which is spread knowingly.)

It should be noted that while scholarly works may differ in their interpretation of misinformation, this paper will use the definition described above. Also– while there are plenty of genres of misinformation on

1. M. Rulis, "The Influences of Misinformation on Incidences of Politically Motivated Violence in Europe," The International Journal of Press/Politics 0 (2024), https://doi.org/10.1177/19401612241257873.

2. C. H. Au, K. K. W. Ho, and D. K. Chiu, "The Role of Online Misinformation and Fake News in Ideological Polarization: Barriers, Catalysts, and Implications," Information Systems Frontiers 24 (2022): 1332, https://link.springer.com/article/10.1007/s10796-021-10133-9/.

3. Emily K. Vraga and Leticia Bode, "Defining Misinformation and Understanding Its Bounded Nature: Using Expertise and Evidence for Describing Misinformation," Political Communication 37, no. 1 (2020): 139, https://doi.org/10.1080/10584609.2020.1716494.

4. Pramukh Nanjundaswamy Vasist et al., "The Polarizing Impact of Political Disinformation and Hate Speech: A Cross-country Configural Narrative," Information Systems Frontiers 26 (2024): 664, https://doi.org/10.1007/s10796-023-10390-w.

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the internet–we will limit our discussion to false political, ideological, or large-scale cultural statements. Finally, we will use the term "user" to refer to anyone consuming digital information, whether they believe it or not, and "claim" to refer to unverified pieces of digital media, including images and videos.

Misinformation as a Cause of Violence

Misinformation fuels political violence through direct inspiration and ideological polarization. Most overtly, misinformation may include malicious claims about a specific person or persons. Users who believe the false claims might take violent actions with a sense of vigilante justice, believing that they are acting in retaliation for or prevention of a perceived wrongdoing.[5] For instance, the two-day anti-Muslim riots in Myanmar in August of 2018 were instigated by an unsubstantiated rumor, spread on Facebook, that a Muslim man had sexually assaulted a Buddhist woman.[6]

Misinformation can also inspire acts of violence indirectly by exacerbating ideological polarization. Misinformed claims that are partisan in nature tend to contain hyperbolic, provocative, or malicious statements which, when believed, can push users to more extreme versions of their existing partisan beliefs. The resulting polarization broadens ideological gaps between civilians and can contribute to increasing social frictions, which can result in acts of violence including political instability, protests, and even domestic terrorism.[7]

This intuitive relationship is supported by statistical evidence. Vasist, Chatterjee, and Krishnan used an expansive, cross-country database of manually collected data to examine correlations between instances of hate speech, misinformation, censorship, and indicators of societal polarization; they determined that online falsehoods carry a particular "central role" in polarizing societies.[8]

Through these mechanisms, misinformation increases political violence in a significant, observable pattern. By conducting statistical analysis on a fused dataset of confirmed pieces of misinformation and instances of political conflicts across Europe, Rulis found that the presence of translational digital misinformation on social media had a significant positive correlation with occurrences of (1) verbal and material conflict between citizens and government entities, and (2) material–but not necessarily verbal–conflict between civilians.[9]



TapTheForwardAssist, 2021.DC Capitol Storming. https://commons.wikimedia.org/wiki/File:DC_Capitol_Storming_IMG_7965.jpg via Wikimedia Commons.

Anecdotal evidence indicates that this relationship is not limited to Europe. For instance, the January 6th insurrection attempt in the United States, in which perpetrators enacted material violence on government property and expressed a desire to assault government personnel as a result of misinformation spread through social media, is a clear example of material and verbal violence from civilians to the government. Civilian-civilian material violence is evident in cases such as the mob lynchings of suspected child abductors–accused by unsubstantiated rumor on Whatsapp–in India in 2018.[10]

5. Sumitra Badrinathan, Simon Chauchard, and Niloufer Siddiqui, "Misinformation and Support for Vigilantism: An Experiment in India and Pakistan," American Political Science Review 118, no. 1 (2024): 1, https://doi.org/10.1017/S0003055424000790.

6. Claire Wardle and Hossein Derakhshan, Information Disorder: Toward an Interdisciplinary Framework for Research and Policy Making, Council of Europe Report, 2017, 41, https://firstdraftnews.org/wp-content/uploads/2017/11/PREMS-162317-GBR-2018-Report-de%CC%81sinformation-1.pdf.

7. Pramukh Nanjundaswamy Vasist et al., "The Polarizing Impact of Political Disinformation and Hate Speech: A Cross-country Configural Narrative," Information Systems Frontiers 26 (2024): 666, https://doi.org/10.1007/s10796-023-10390-w.

8 Ibid. 677.

9. Rulis, "The Influences of Misinformation...."

10. Rohit Chopra, "Misinformation and Violence," Santa Clara University Markkula Center for Applied Ethics, November18, 2021, https://

Misinformed and Patriotic: Public Support for the War on Terror

When the United States invaded Iraq, about 80 percent of the Americans who supported the invasion ranked "Iraq's connection with groups like Al-Qaeda" as the main reason for their approval. Only a few months prior, more than half the country was reported to believe that Iraq was colluding with terrorist organizations, or had weapons of mass destruction, or that the rest of the world would support an American invasion. This was not true.[I]

A research team at the University of Maryland's Program on International Policy Attitudes ran a multivariate analysis to determine the correlation between belief in the three misperceptions above and likelihood of supporting the invasion. The results: Those who believed at least othese myths were 4.3 times more likely to be supportive than those who had no misperceptions.[II] A study on the same subject by the American Psychological Association came to an equally blunt conclusion: "Dissemination and control of information are indispensable ingredients of violent conflict." [III]

This is interdisciplinary agreement that public support for the war was a function of widespread misperceptions. In this case, as in the case of conspiracy theories, belief in false claims fuels support for violence even among civilians.

I. Steven Kull, Clay Ramsay, and Evan Lewis, "Misperceptions, the Media, and the Iraq War," Political Science Quarterly 118, no. 4 (Winter 2003–2004): 569–598, https://doi.org/10.1002/j.1538-165X.2003.tb00406.
II. Ibid.
III. Lewandowsky et al., "Misinformation, Disinformation, and Violent Conflict..."

And, the agitating effect of misinformation is not limited to the violent actors alone: A study of conspiracy theories run by the Harvard Kennedy School found significant statistical evidence that, even if believers are not moved to acts of violence themselves, they are more they are more likely to support violence enacted by others.[11]

This relationship, too, may not be limited to within the test case. Lewandowsky et. al's study of public support for the American invasion of Iraq indicates that the correlation between misinformation support for violence extends to widespread beliefs as well as conspiracies.[12] (Misinformation does not necessarily have to be of civilian creation.)

"Dissemination and control of information are indespensible ingredients of violent conflict."

While cases of violent actors inspired by misinformation can be documented and evaluated, the effect of passive actors in quiet support of the violence cannot be quantified. The statistical and anecdotal evidence discussed here may actually underrepresent the actual relationship between misinformation and violence.

Automatic Fact-Checkers as a Countermeasure

Given the many negative aspects of political violence, it's decidedly important to mitigate the spread of misinformation. Automatic fact-checkers (AFCs) are an emergent technology with the capacity to detect digital misinformation. AFCs are both relatively new and usually proprietary, so their precise individual mechanics are continually evolving and typically unseen by the public.

Most generally, however, AFCs use two main approaches to detecting misinformation. First, they interrogate the claim itself. An AFC might find a logical fallacy within the claim, or even digital evidence

www.scu.edu/ethics/internet-ethics-blog/misinformation-and-violence/.

11. Adam M. Enders et al., "The Relationship between Conspiracy Theories and Political Violence," Misinformation Review, 2022, http://misinforeview.hks.

12. Stephan Lewandowsky et al., "Misinformation, Disinformation, and Violent Conflict: From Iraq and the 'War on Terror' to Future Threats to Peace," American Psychologist 68, no. 7 (2013): 487–501, https://doi.org/10.1037/a0034515.

of tampering.[13]AFCs can also be coded to find more subtle flags for misinformation. Their programming can include artificial intelligence structures, Natural Language Processing frameworks, or adjacent designs that permit them to "learn" complex patterns in media.[14] In development, the nascent AFCs are fed "training data," large datasets that include both true and false claims, from which they "learn" characteristics or digital footprints that correlate with misinformation.[15] For instance, an AFC might learn from its training data that false claims are more likely to include hyperbolic statements (eg, "greatest," "bestest," "of all time") than true claims. That AFC will be more likely to flag statements containing hyperbolics as misinformation.

Second, AFCs can utilize web-scraping techniques to compare claims to other data on the internet. When provided a textual claim–or image, or video–the AFC can search for supportive or contradictory evidence on other websites.[16]

AFCs using such language processing models are generally accurate in determining the truth or falsehood of claim when equipped to verify the data they handle.[17] A major benefit of these programs is their capacity to verify claims faster and cheaper than human fact checkers.[18, 19] This gives them market appeal and may make them more likely to be implemented among less affluent (or less truth-focused) companies. AFCs can effectively verify images, videos, and audial media–including AI-generated or "deepfake" material–as well as text.[20] And, critically, users tend to believe them: AFCs reduce a user's likelihood of believing false information in both the short-and long-term, and may even make them less likely to believe misinformation in future exposures.[21]

For each one of these capacities comes a limitation. For instance: If a claim is neither strictly true nor entirely false, an AFC geared toward a binary verdict cannot make an accurate judgement.[22, 23] Or, since AFCs are privately developed, different programs will operate with different metrics, be trained on different data, and potentially return different judgements of veracity on the same claim.[24]

Perhaps the most pervasive issue is intrinsic bias. Proponents of AFCs may claim that these programs, by virtue of being programs, eliminate the inherent judgement bias of human fact checkers. But, training datasets themselves can introduce an element of bias. If a disproportionate amount of the dataset's false claims contain the word "security," the AFC might be more inclined to label any claims containing that word as false. Or, in a more malicious scenario, an AFC developer could easily manipulate an AFC's go-to comparison sources to influence verification with a partisan or ideological slant.[25]

13. Mubashara Akhtar et al., "Multimodal Automated Fact-Checking: A Survey," in Findings of the Association for Computational Linguistics: EMNLP 2023, Association for Computational Linguistics, 2023, 5433, https://aclanthology.org/2023.findings-emnlp.361/.

14. H. Akin Unver, "Emerging Technologies and Automated Fact-Checking," SSRN Electronic Journal, 2023, 2, https://edam.org.tr/Uploads/Yukleme_Resim/pdf- 28-08-2023-23-40-14.pdf.

15. Liang Wu, Fred Morstatter, Kathleen M. Carley, and Huan Liu, "Misinformation in Social Media: Definition, Manipulation, and Detection," ACM SIGKDD Explorations Newsletter 21, no. 2 (2019): 87, https://doi.org/10.1145/3373464.3373475.

16. Akhtar et al., "Multimodal Automated Fact-Checking," 5434.

17. Dorian Quelle and Alexandre Bovet, "The Perils and Promises of Fact-Checking with Large Language Models," Frontiers in Artificial Intelligence 7 (2024): 3, https://www.frontiersin.org/journals/artificial-intelligence/articles/10.3389/frai.2024.1341697/full.

18. Ibid., 2.

19. Gionnieve Lim and Simon T. Perrault, "XAI in Automated Fact-Checking? The Benefits Are Modest and There's No One-Explanation-Fits-All," arXiv preprint, 2023, 1, https://arxiv.org/pdf/2308.03372.

20. Akhtar et. al, "Multimodal Automated Fact-Checking," 5438.

21. Jennifer Allen et al., "Evaluating the Fake News Problem at the Scale of the Information Ecosystem," Proceedings of the National Academy of Sciences 118, no. 15 (2021): e2104235118, https://pubmed.ncbi.nlm.nih.gov/32284969/.

22. Lasha Kavtaradze, "Challenges of Automating Fact-Checking: A Technographic Case Study," Emerging Media 2 (2024): 1365–1389, https:/www.researchgate.net/publication/

23. Quelle and Bovet, "The Perils and Promises..."

24. Sian Lee, Aiping Xiong, Haeseung Seo, and Dongwon Lee, "Fact-Checking Fact Checkers: A Data-Driven Approach," Harvard Kennedy School Misinformation Review 4, no. 5 (2023): 1–20, https://misinforeview.hks.harvard.edu/wp-content/uploads/2023/10/lee_fact-checking_fact_checkers_20231026.pdf.

25. Unver, "Emerging Technologies...," 3.

Snopes vs. PolitiFact: A Digital Disagreement[IV]
Snopes and PolitiFact are popular fact checkers broadly considered to be relatively reliable. In the case of AFCs, "reliable" might mean a consistent judgement of truth.

A team at the Harvard Kennedy School tested this theory by comparing the respective judgements that the two AFCs had made about differently-worded claims communicating the same concept. (Eg, Snopes might have verified that "Donald J. Trump is the current president," while Politifact may have judged, "The current US president is Donald Trump.") After examining the AFCs' judgements on 749 parallel claims, researchers found that Snopes and Politifact attributed only 69.6% of the pairs of parallel claims the same rating. Over 30% of the claims were judged to be differently truthful between the respective programs.

These different judgments were ultimately attributed to slight differences in the AFCs' rating systems and subtle semantic differences between the claims. This demonstrates a potential issue with the use of language processing frameworks: Judgements of veracity may be influenced by the way the claim is worded, not only its content.

IV. Lee et al., "Fact-Checking Fact Checkers...."

And, unlike human fact checkers, AFCs can be influenced by cyber attacks. "Planting," an ostensibly popular method, occurs when an attacker tampers with a source that AFCs use to verify claims. If an AFC was programmed to compare claims to a specified news source, for example, a hacker could alter the statements on that page to align with the misinformation they wish to promote. Planting can be effective when as low as one sentence is inserted.[26]

Alternatively, hackers could flood a social media site with AI-generated statements in support of the false claim, potentially causing the AFC to find that the claim is consistent with general consensus.

While this may seem like a lot of work to disrupt one claim verification, planting could theoretically change widespread public perception if the attacked AFC is being used on a large scale. In this way, AFCs can actually backfire by verifying misinformation that has been intentionally created by a malicious party.

Recommendations
AFCs can–and should–be used effectively to prevent the spread of digital misinformation. However, their vulnerabilities necessitate precautionary measures. Mitigating these risks calls for the participation of not only the developers, but any applicable regulatory power and the users themselves.

1. **Developers** should code AFCs with the capacity to disclose the external sources used to verify a claim to the user. Sites using AFCs often state when claims have been checked; those statements should include an option to view a list of the pages it was checked against. This is not a mechanically complex fix. However, it would assuage a few key issues: Any selection bias in sources used to verify would be immediately evident to the user; it would be evident if few sources were in agreement; and, in the case of cyber attack, it would be immediately clear which sources had been tampered with.

2. A **regulatory power** should commit to certifying the impartiality of privately-developed AFCs that will be used by the public. Before becoming available on the market, a qualified entity–be it governmental or otherwise–should review the AFC's hardcoding (relationships learned from training data, etc) and ensure no ingrained bias. This is a significantly more difficult recommendation to adopt. However, a company's own report of an unbiased product may not be reliable.

3. **Users** must understand that AFCs are not invulnerable. While their judgments are generally correct, statements supported by AFCs alone cannot be blindly accepted as fact.

26. Sahar Abdelnabi and Mario Fritz, "Fact-Saboteurs: A Taxonomy of Evidence Manipulation Attacks Against Fact-Verification Systems," in Proceedings of the 32nd USENIX Conference on Security Symposium (SEC '23), 2023, 6719–6736, https://www.usenix.org/conference/sec23/presentation/abdelnabi.

DIGITAL PEACEBUILDING

2024 Issue 3

Obfuscating Transparency: The Promises and Risks of Defusing Deepfake Disinformation through Blockchain

Annette Y. Lee

Executive Summary

Concerns are mounting over the threat of deepfake disinformation. Though the conversation is largely speculative so far, we have seen examples of deepfakes used for harmful or violent purposes. One solution, touted for its transparency and security, could be authenticating content through blockchain. However, there is still a long way to go before this technology is widespread and well-designed enough to be effective. Furthermore, proof-of-authenticity blockchain may backfire by marginalizing the most at-risk, perpetuating harmful power dynamics, and creating further confusion. I recommend that policymakers, scholars, and tech companies pay close attention to certain design aspects, and continuously research and reflect on potential for harm.

Introduction

Disinformation is evolving, and Americans are concerned: a 2019 Pew Research poll found that 91% of Americans believe that altered or fake videos and images create confusion.[1]

It is important to understand the risks deepfake disinformation presents to peace in order to combat it. To that end, blockchain technology that authenticates media may be a useful tool.

However, I argue that this approach comes with its own risks, which policymakers and tech companies alike should consider.

What are Deepfakes?

Deepfakes are realistic media created with machine-learning algorithms, encompassing videos, images, and audio. Several methods for creating deepfakes exist,[2] though many scholars focus on the use of generative adversarial networks (GANS) in which two algorithms are rapidly trained against each other.[3] Deepfakes, or at least that term, first surfaced in a 2017 Reddit post featuring face-swapped pornography of a female celebrity, and women continue to be disproportionately targeted by deepfakes.[4]

1 Sara Atske, "Many Americans Say Made-Up News Is a Critical Problem That Needs To Be Fixed," *Pew Research Center's Journalism Project*, June 5, 2019, https://www.pewresearch.org/journalism/2019/06/05/manamericans-say-made-up-news-is-a-critical-problem-that-needs-to-be-fixed/.

2 Jia Wen Seow et al., "A Comprehensive Overview of Deepfake: Generation, Detection, Datasets, and Opportunities," *Neurocomputing* 513 (November 7, 2022): 351–71, https://doi.org/10.1016/j.neucom.2022.09.135.

3 Robert Chesney and Danielle Citron, "Deepfakes and the New Disinformation War," *Foreign Affairs* 98, no. 1 (December 11, 2018), https://www.foreignaffairs.com/articles/world/2018-12-11/deepfakes-and-new-disinformation-war; Bryan C. Taylor, "Defending the State from Digital Deceit: The Reflexive Securitization of Deepfake," *Critical Studies in Media Communication* 38, no. 1 (2021): 1–17, https://doi.org/10.1080/15295036.2020.1833058; Kathryn A. Paradis, "Fighting Deep Fakes: The Inadequacy of Current Law for the Future War," *Naval Law Review* 68 (2022): 83–104, https://heinonline.org/HOL/P?h=hein.journals/naval68&i=89; Md Shohel Rana et al., "Deepfake Detection: A Systematic Literature Review," *IEEE Access* 10 (2022): 25494–513, https://doi.org/10.1109/ACCESS.2022.3154404.

4 Henry Ajder et al., "The State of Deepfakes: Landscape, Threats, and Impact" (Deeptrace, September 2019), https://enough.org/objects/Deeptrace-the-State-of-Deepfakes-2019.pdf; Sophie Maddocks, "'A Deepfake Porn Plot Intended to Silence Me': Exploring Continuities between Pornographic and 'Political' Deep Fakes," *Porn Studies* 7, no. 4 (October 1, 2020): 415–23, https://doi.org/10.1080/23268743.2020.1757499; Sam Gregory, "Deepfakes, Misinformation and Disinformation and Authenticity Infrastructure Responses: Impacts on Frontline Witnessing, Distant Witnessing, and Civic Journalism," *Journalism* 23, no. 3 (March 1, 2022): 708–29, https://doi.

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Deepfake Disinformation: Challenges to Peace

Current research on deepfakes' connection to violence is largely speculative. Indeed, recent deepfakes of Presidents Zelenskyy and Putin caused little material harm.[5] In the future, however, deepfake disinformation could be potent. Its realistic and evocative nature could make it difficult to debunk, widely spread, and widely believed.[6] As Danielle Citron and Robert Chesney write, "There is no doubt that deep fakes will play a role in future armed conflicts."[7]



World Economic Forum/Jakob Polacsek. 2020. A viewer is transformed into Michelle Obama at Pinscreen's Deep Fake Exhibition at the World Economic Forum Annual Meeting in Davos-Klosters, Switzerland. https://www.flickr.com/photos/worldeconomicforum/49425304693/in/photostream/
This image is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 2.0 Generic license, and has been cropped.

Deepfakes could lead to violence by:

- Depicting influential people doing something inflammatory, to incite violence or bolster support of violence.[8]
- Capitalizing on existing tensions or discrimination against a specific group.[9]
- Perpetuating conflict by legitimizing uprisings, falsifying orders, discrediting leaders, and dividing allies.[10]
- Being used by terrorist groups to incite violent reactions.[11]

Even the possibility that something is a deepfake could incite violence. In 2019, the allegation that a video of President Bongo of Gabon was a deepfake contributed to an attempted military coup.[12]

However, deepfakes are so new that their potential impact is still up in the air, influenced by several potential factors:

- *Technological advancement*: It is difficult for deepfake detection techniques to keep up with rapidly developing deepfake technology.[13] If detection technology struggles to keep up, this could magnify the harm of deepfake disinformation. Furthermore, as deepfake technology becomes more accessible, there are fewer barriers to using it for violent purposes.
- *Legislation and regulation*: Future regulations on deepfakes could curb their harmful use, but poorly crafted legislation could cause further damage by restricting or criminalizing free expression,[14] thus potentially facilitating further violence.
- *Education and training*: Increased opportunities for learning about deepfakes could raise audience awareness, mitigating the harmful impact of deepfake disinformation.[15]
- *Private sector policies*: Social media platforms' deepfake policies could curb potential harm.[16] Currently, platforms prioritize deepfakes affecting geopolitical conflict over deepfakes impact-

org/10.1177/14648849211060644.

5 Britt Paris, "Seeing Through the Fog of War: Assessing Epistemic Burden Around Cheapfakes and Deepfakes of Geopolitical Crisis," in *Re-Thinking Mediations of Post-Truth Politics and Trust* (Routledge, 2023).

6 Alisha Anand and Belen Bianco, "The 2021 Innovations Dialogue Conference Report: Deepfakes, Trust and International Security," *UNIDIR*, December 22, 2021, https://unidir.org/publication/the-2021-innovations-dialogue-conference-report/; Danielle Citron and Robert Chesney, "Deep Fakes: A Looming Challenge for Privacy, Democracy, and National Security," *California Law Review* 107, no. 6 (December 2019): 1753, https://doi.org/10.15779/Z38RV0D15J.

7 Citron and Chesney, "Deep Fakes."

8 Chesney and Citron, "Deepfakes and the New Disinformation War."

9 Maria Pawelec, "Deepfakes and Democracy (Theory): How Synthetic Audio-Visual Media for Disinformation and Hate Speech Threaten Core Democratic Functions," *Digital Society* 1, no. 2 (September 8, 2022): 19, https://doi.org/10.1007/s44206-022-00010-6.

10 Daniel L. Byman et al., "Deepfakes and International Conflict," *The Brookings Institution*, January 2023, https://www.brookings.edu/articles/deepfakes-and-international-conflict/.

11 Arije Antinori, "Terrorism and Deepfake: From Hybrid-Warfare to Post-Truth Warfare in a Hybrid World," in *ECIAIR 2019 European Conference on the Impact of Artificial Intelligence and Robotics* (Academic Conferences and Publishing Limited, 2019).

12 Ajder et al., "The State of Deepfakes: Landscape, Threats, and Impact."

13 Rana et al., "Deepfake Detection."

14 Tyrone Kirchengast, "Deepfakes and Image Manipulation: Criminalisation and Control," *Information & Communications Technology Law* 29, no. 3 (September 1, 2020): 308–23, https://doi.org/10.1080/13600834.2020.1794615.

15 Mika Westerlund, "The Emergence of Deepfake Technology: A Review," *Technology Innovation Management Review* 9, no. 11 (November 2019): 40–53, https://doi.org/10.22215/timreview/1282; Byman et al., "Deepfakes and International Conflict."

16 Ibid.

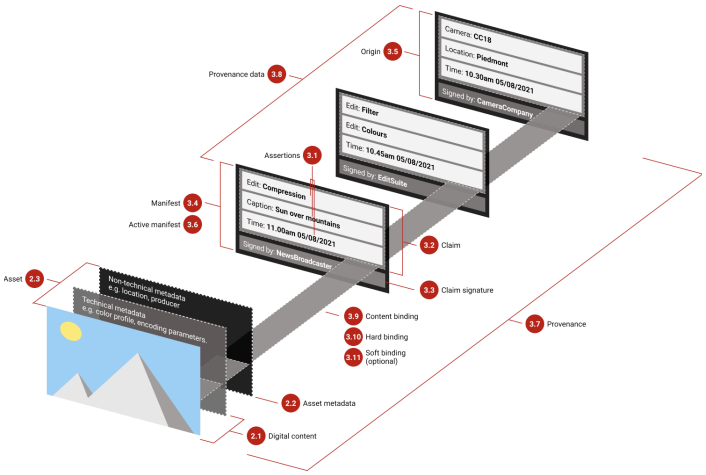
ing individuals, thus failing to address the root problem of truth decay and disproportionately neglecting women.[17]
- Political polarization: Deepfakes benefit from "a heated political context where false narratives are easily spread and easily believed online."[18] Decreased polarization could mitigate their potential violent impacts.

At present, it is still quite a leap from deepfake disinformation to actual kinetic violence.[19] Deepfakes could also indirectly contribute to violence by:
- Being used for sabotage, blackmail, or weakening diplomatic ties,[20] which could in turn help justify or incite violence.
- Contributing to lower trust and greater polarization, which can destabilize regimes, erode democracy,[21] and ultimately increase the likelihood of violence.
- Leading an increasingly skeptical audience to believe truths are falsehoods, in a phenomenon called the "liar's dividend."[22] Similarly, by casting doubt on anything that cannot be perfectly verified, deepfakes could harm vulnerable or prosecuted voices, which by their nature cannot disclose everything.[23]

How Blockchain Could Help or Hurt

Most strategies for fighting deepfake disinformation focus on detection, i.e., proving that media is fake. However, considering how rapidly detection must evolve in order to keep pace with deepfakes, proving that media is authentic may be more effective.[24]

Blockchain records data in a decentralized shared database, also known as a Distributed Ledger Technology (DLT). This data is stored in a fixed order in "blocks" that are functionally impossible to modify. In this way, blockchain allows information to be stored free of tampering. Many describe it as inherently transparent, equalizing, and secure. Blockchain could indicate proof of authenticity in multiple ways, which could be used in concern with one another:
- *Provenance and Origin*: Blockchain could store information about a piece of media's origin (i.e., metadata), helping people identify credible content.[25]
- *Traceability and History*: Blockchain could help trace media over time and across different sources. Users could see editing history and how content was used in various contexts.[26]
- *Watermarking*: Blockchain could pair with advanced watermarking, which companies like Google are developing.[27] Watermarks could embed unique identifiers in media, allowing one to look up corresponding metadata in blockchain.[28]



Coalition for Content Provenance and Authenticity (C2PA). 2022. Elements of metadata when following C2PA standards for storing and accessing cryptographically verifiable information about a piece of media. https://github.com/c2pa-org/public-draft/blob/2030be1978332cd8a8472f6b2fc831d94b7a79cd/docs/images/c2pa_visualglossary.png
This image is licensed under the Creative Commons Attribution-Share Alike 4.0 International license.

17 Paris, "Seeing Through the Fog of War."

18 John Fletcher, "Deepfakes, Artificial Intelligence, and Some Kind of Dystopia: The New Faces of Online Post-Fact Performance," *Theatre Journal* 70, no. 4 (2018): 455–71, https://doi.org/10.1353/tj.2018.0097.

19 Paradis, "Fighting Deep Fakes."

20 Citron and Chesney, "Deep Fakes."

21 Lindsey Wilkerson, "Still Waters Run Deep(Fakes): The Rising Concerns of 'Deepfake' Technology and Its Influence on Democracy and the First Amendment," *Missouri Law Review* 86, no. 1 (January 1, 2021), https://scholarship.law.missouri.edu/mlr/vol86/iss1/12.

22 Citron and Chesney, "Deep Fakes."

23 Gregory, "Deepfakes, Misinformation and Disinformation and Authenticity Infrastructure Responses."

24 For more information on the private sector's work to this end, see the Coalition for Content Provenance and Authenticity (C2PA) and Content Authenticity Initiative.

25 Haya R. Hasan and Khaled Salah, "Combating Deepfake Videos Using Blockchain and Smart Contracts," *IEEE Access* 7 (2019): 41596–606, https://doi.org/10.1109/ACCESS.2019.2905689.

26 Hasan and Salah; Christopher Chun Ki Chan et al., "Combating Deepfakes: Multi-LSTM and Blockchain as Proof of Authenticity for Digital Media," *IEEE*, 2020, 55–62, https://doi.org/10.1109/AI4G50087.2020.9311067; Abbas Yazdinejad et al., "Making Sense of Blockchain for AI Deepfakes Technology," *IEEE*, 2020, 1–6, https://doi.org/10.1109/GCWkshps50303.2020.9367545.

27 Josh A. Goldstein and Andrew Lohn, "Deepfakes, Elections, and Shrinking the Liar's Dividend," AI and Democracy, *Brennan Center for Justice*, January 23, 2024), https://www.brennancenter.org/our-work/research-reports/deepfakes-elections-and-shrinking-liars-dividend; Ryan Heath, "Google Joins Coalition to Label AI-Generated Content," *Axios*, February 8, 2024, sec. Technology, https://www.axios.com/2024/02/08/google-adobe-label-artificial-intelligence-deepfakes.

28 Adnan Alattar et al., "A System for Mitigating the Problem of Deepfake News Videos Using Watermarking," *Electronic Imaging* 32 (January 26, 2020): 1–10, https://doi.org/10.2352/ISSN.2470-1173.2020.4.MWSF-117.

Case Study: Reuters, Canon, and the Starling Lab for Data Integrity

Photo metadata today is easily stripped away or made inaccessible.[1] As part of the Content Authenticity Initiative (CAI), Reuters, Canon, and the Starling Lab for Data Integrity developed a system for storing information about photos in blockchain.[2] Their proof-of-concept in 2023 allowed metadata for a photograph to be digitally signed by a Canon camera at the point of capture, attaching authenticating information directly to the image. This information and the photo were registered onto a public blockchain.

Each subsequent modification from Reuters editors was logged until publication of the final photo, at which point the photo's metadata and blockchain registration information was embedded in the image file. This way, one could look up a photo in a public ledger to access metadata information and to check if the hash values match, i.e., that the image is authentic.

While this project shows the feasibility of using blockchain for proof of authenticity, it also demonstrates potential problems. Two main technical issues arose out of this project: 1) excessive processing time on the camera hindered photographing quality, and 2) difficulty permitting and capturing minor automated edits to photo metadata. Also, as the Starling Lab has observed, this technology carries risk if it "becomes an obligation, not a choice."[3] The lab has warned about the potential for image authentication to surveil or gatekeep journalists, photographers, and their sources. Much more work is necessary to make this technology feasible.

1 "Image Authentication," Starling Lab, 2021, https://www.starlinglab.org/image-authentication/.

2 "Preserving Trust in Photojournalism through Authentication Technology," Reuters, 2023, https://www.reutersagency.com/authenticity-poc.

3 "Image Authentication."

Proponents say such technology could usher in a "new era of digital trust."[29] Yet there's still a long way to go. A critical mass must adopt this technology for it to be effective; otherwise, content without proof of authenticity is just as likely to be authentic as not.[30] Currently, there is a huge amount of content without any provenance,[31] meaning bad actors do not stand out from the crowd.[32]

There are also potential technical limitations:

- *Scaleability*: Constraints around storage size limits, energy, and hardware costs—as well as environmental unsustainability—could affect scalability and uptake of this technology. Further technological advancement and well-designed data-storing frameworks could help.[33]
- *Lack of Transparency*: Many companies deploying this technology lack transparency on their processes, leaving room to doubt their effectiveness or trustworthiness.[34] Accountability structures are especially important for a technology touted for its apparently inherent transparency.
- *Lack of Confidentiality*: At the same time, blockchain's transparency with certain information may limit adoption among people uncomfortable with that information being public.[35] Careful design could permit anonymization of certain information.

Proof-of-authenticity blockchain could even make deepfake disinformation more harmful:

- *Marginalizing the Most At Risk*: Blockchain's extreme transparency could endanger voices that cannot afford to be so transparent. Dissenting activists who fear persecution, for instance, may be reluctant to use blockchain.[36] If they still take the risk of sharing information, they could

29 Agathe Laurent, "Blockchain Takes on Deepfakes: Ushering in an Era of Digital Veracity," *InCyber News*, January 22, 2024, https://incyber.org/en/article/blockchain-takes-on-deepfakes-ushering-in-an-era-of-digital-veracity/.

30 Goldstein and Lohn, "Deepfakes, Elections, and Shrinking the Liar's Dividend."

31 Brandon Khoo, Raphaël C.-W. Phan, and Chern-Hong Lim, "Deepfake Attribution: On the Source Identification of Artificially Generated Images," *WIREs Data Mining and Knowledge Discovery* 12, no. 3 (2022), https://doi.org/10.1002/widm.1438.

32 David Evan Harris and Lawrence Norden, "Meta's AI Watermarking Plan Is Flimsy, at Best," *IEEE Spectrum*, March 4, 2024, https://spectrum.ieee.org/meta-ai-watermarks.

33 Alattar et al., "A System for Mitigating the Problem of Deepfake News Videos Using Watermarking."

34 Hasan and Salah, "Combating Deepfake Videos Using Blockchain and Smart Contracts."

35 Laurent, "Blockchain Takes on Deepfakes."

36 Ibid.

Case Study: Verify from Fox Media and Polygon Labs

In August 2023, Fox Corporation and Polygon Labs first launched an open-source protocol called Verify, which would allow news outlets to register their original content on the blockchain.[1] It was publicly released at the beginning of 2024. Currently, the tool allows users to look up image files or article links, in order to check if there is a match with content registered in Verify.[2]

The site's FAQ states that this allows users to "verify the origin and provide traceability for digital content," allowing users to be "confident" that "the content they see attributed to a source that they trust actually was published by that source."[3]

As Variety noted, Fox's focus on authenticity can seem ironic, considering allegations that Fox News knowingly aired falsehoods about Dominion Voting Systems and Smartmatic during the 2020 U.S. presidential election.[4] But Verify's potential for trust-building is not the only promise; other coverage discusses its usefulness for business and licensing negotiations with artificial intelligence companies.[5]

Chief Technology Officer Melody Hildebrandt told Axios that they intend to have all Fox content—including news, sports coverage, and entertainment—go through the Verify protocol eventually.[6]

Since January, there haven't been any concrete updates on the progress Fox has made towards their several goals. It's unclear what their audience thinks of Verify, if they've noticed it at all. Nor have any other large media companies followed suit, though it is still early days. Overall, it remains to be seen whether this initiative is prescient, or a misstep.

1 Kyle Wiggers, "Fox partners with Polygon Labs to tackle deepfake distrust," *Techcrunch*, January 9, 2024, https://techcrunch.com/2024/01/09/2648953/.

2 "How to Use," Verify, 2024, https://www.verify.fox/how-to-use..

3 "FAQ," Verify, 2024, https://www.verify.fox/faqs.

4 "Fox Launches Tool to Verify Online Content as Authentic — and Not AI-Generated Fakes or Misinformation," Variety, January 9, 2024, https://variety.com/2024/digital/news/fox-verify-authentic-content-ai-misinformation-1235865243/.

5 Ibid.

6 Sara Fischer, "Exclusive: Fox Corp. launches blockchain platform to negotiate with AI firms," *Axios*, January 9, 2024, https://www.axios.com/2024/01/09/fox-corp-blockchain-platform-ai-licensing-verify.

suffer harsher retribution because they are forced to disclose information that is potentially identifying or sensitive;[37] if they share information outside the blockchain system, their testimony may seem less credible.

- *Exacerbating Oppression*: Technology is not neutral. Despite what some proponents say, blockchain's decentralization doesn't mean equality. As an example, evangelizing of blockchain in the Global South is often paternalistic and disregards potentially different values and interests. Thus, blockchain could perpetuate systemic oppression and harm.[38]
- *Creating Further Distrust*: Blockchain is technically opaque. Most people would have to take the word of others that it is trustworthy. Regardless of blockchain's robustness, a "leap of faith" is still required to gain trust.[39] This creates room for bad actors to casts doubt on blockchain's effectiveness.
- *Obscuring Weaknesses*: Blockchain's reputation for iron-clad credibility could obscure awareness of serious vulnerabilities, such as quantum computing attacks,[40] or security fixes that are slow to implement due to blockchain's decentralization.[41] This means that information verified through blockchain could be compromised, while still having the veneer of legitimacy.

Recommendations

Blockchain is not a silver bullet against deepfake disinformation and violence. Rather, it is one potential tool in critical engagement with information and media. Whether it will be a success depends on how future developers and purveyors of this technology approach their work.

Furthermore, emphasis on blockchain's technical

37 Johannes Sedlmeir et al., "The Transparency Challenge of Blockchain in Organizations," *Electronic Markets* 32, no. 3 (September 1, 2022): 1779–94, https://doi.org/10.1007/s12525-022-00536-0.

38 Syed Omer Husain, Alex Franklin, and Dirk Roep, "The Political Imaginaries of Blockchain Projects: Discerning the Expressions of an Emerging Ecosystem," *Sustainability Science* 15, no. 2 (March 1, 2020): 379–94, https://doi.org/10.1007/s11625-020-00786-x.

39 Johannes Bennke, "Media of Verification: An Epistemological Framework for Trust in a Digital Society," *Communication +1* 10, no. 1 (December 15, 2023), https://doi.org/10.7275/cpo.1878.

40 Paula Fraga-Lamas and Tiago M. Fernández-Caramés, "Fake News, Disinformation, and Deepfakes: Leveraging Distributed Ledger Technologies and Blockchain to Combat Digital Deception and Counterfeit Reality," *IT Professional* 22, no. 2 (March 2020): 53–59, https://doi.org/10.1109/MITP.2020.2977589.

41 Sunoo Park et al., "Going from Bad to Worse: From Internet Voting to Blockchain Voting," *Journal of Cybersecurity* 7, no. 1 (January 1, 2021), https://doi.org/10.1093/cybsec/tyaa025.

bona fides can overshadow the fact that technology and truth are not neutral. As scholars, governments, and tech companies alike continue to explore ways to deploy blockchain to fight deepfake disinformation, it must be accompanied by research of its social impact in the context of existing systems of power.

"With each project, we must question which values are encoded in the system, who controls it, which organizational structure is present to form consensus, and what are the political visions of the code" (Husain et al. 2020).

In order to make proof-of-authenticity blockchain more useful, I recommend that these parties:

- Adopt high standards of transparency for their methods and processes, to build credibility
- Increase public awareness of blockchain's function, as well as its vulnerabilities, to reduce the risk of confusion
- Accommodate authentic modifications like logos or closed captions to fulfill practical needs
- Expand to different types of media, not just images, to build a more comprehensive and practical system for authenticating content
- Explore ways to limit access to certain information to accommodate those for whom it would be a risk otherwise (see Sedlmeir et al. 2022 for further discussion)[42]
- Research and reflect on power dynamics, cultural context, and potential for harm
- Move away from claims to neutrality, which are rarely true in practice and may backfire, and instead make one's values and blind spots explicit

Lastly, research on deepfakes is rich but also new and scattered. Evidence relating to deepfakes is largely hypothetical or highly technical, lacking empirical grounding and diversity in topics investigated.[43] As this nascent field continues to grow, it is imperative that policymakers work closely with a range of interdisciplinary scholars and tech companies to design effective legislation for combatting deepfake disinformation.

The problem cannot be addressed by proof-of-authenticity blockchain alone. As with many difficult policy problems, a multi-pronged approach across sectors will likely be the most effective.

42 Johannes Sedlmeir et al., "The Transparency Challenge of Blockchain in Organizations."

43 Pramukh Nanjundaswamy Vasist and Satish Krishnan, "Deepfakes: An Integrative Review of the Literature and an Agenda for Future Research," *Communications of the Association for Information Systems* 51, no. 1 (November 16, 2022), https://doi.org/10.17705/1CAIS.05126.

DIGITAL PEACEBUILDING

2024 Issue 1

Use of Virtual Reality in Peacekeeping Operations

Maria Trifonova and Elliott Trendell

Executive Summary

Peacekeeping operations (PKOs) can prevent post-conflict violence by assisting countries with stabilization, policing, and capacity building, but face challenges in training, personnel protection, and local community trust. Virtual reality (VR) technology may mitigate some challenges presented to PKOs if integrated with conventional peacekeeping practices by streamlining training, improving mental health treatment, and potentially improving community relations. However, VR has significant limitations, especially in terms of feasibility, and it cannot address the underlying drivers of violence.

Introduction

Peacekeeping missions serve a vital role in preventing renewed violence in post-conflict countries but they face many challenges achieving this goal. Virtual reality can help peacekeepers overcome some of these challenges. It can facilitate military and police training and provide mental health services to persons recovering from trauma. However, virtual reality has significant limitations, especially in terms of building public support for peacekeepers. It also cannot address the underlying drivers of violence. In this brief, we discuss the arenas in which virtual reality is currently best suited to facilitate peacekeeping. We also discuss the areas where it is likely to be beneficial and provide recommendations for best practices regarding the use of virtual reality in peacekeeping.

Peacekeeping

Peacekeeping operations (PKOs) provide assistance to countries to "navigate the difficult path from conflict to peace."[1] PKOs provide various forms of assistance. At a minimum, PKOs provide security assistance to countries. They interpose military and police forces between opposition groups to deter violence between them. They also often train local forces to provide their own security.

PKOs can also provide assistance in peacebuilding. Peacebuilding, unlike traditional peacekeeping, aims to address the underlying reasons for violence. To build peace, PKOs can advise countries on building democratic institutions and in strengthening the rules of law.[2,3,4] PKOs can also help stabilize countries by directly and indirectly contributing to countries' economic development.[5]

1 United Nations Peacekeeping, "What Is Peacekeeping," 2024, https://peacekeeping.un.org.
2 Paul D. Williams, "International Peacekeeping: The Challenges of State-Building And Regionalization," *International Affairs* 81, no. 1 (2005): 169..
3 Virginia Page Fortna, "Does Peacekeeping Keep Peace? International Intervention and the Duration of Peace After Civil War," *International Studies Quarterly* 48, no. 2 (2004): 269–92.
4 "UNMIBH: United Nations Mission in Bosnia Herzegovina - Background," 2024.
5 Kathleen M. Jennings and Morten Bøås, "Transactions and Interactions: Everyday Life in the Peacekeeping Economy," *Journal of Intervention and Statebuilding*, 2015.

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The United Nations is responsible for more peacekeeping operations than any other organization. Since its first mission in the Middle East in 1948, the UN has initiated 71 operations.[6] It has 12 ongoing missions today. The North Atlantic Treaty Organization (NATO), the African Union, and the Organization of American States have also conducted peacekeeping operations in member states.

The UN is not only more active in peacekeeping, but it also conceives of its role in peacekeeping more broadly than many of these organizations. It often takes on responsibilities that address the underlying reasons for violence, faciliating reconciliation processes and helping to strengthen countries' political and legal institutions.

Technological innovations, such as virtual reality, may facilitate traditional peacekeeping as well as peacebulding.

Virtual Reality

Virtual Reality (VR) refers to the use of computer simulation to enable a person to interact with an artificial three-dimensional environment.[7] In recent years, VR has changed interpersonal and group communication in many fields, including health, engineering, education, and art.[8]VR engages its users through the visual output de vices, known as head-mounted devices (HMDs). The devices simulate sensory experiences and allers to interact in a generated virtual environment.[9]

VR offer several potential benefits to peacekeeping, broadly defined, including opportunities for training, treatment of PTSD and other mental health issues, as well as community building.

Military and Police Training

The fundamental way in which peacekeeping opera tions prevent small-scale violence from occurring is by deploying military and police forces to countries.



Harrison, Wallace K. (Wallace Kirkman), 1895-. 1949. United Nations buildings. Assembly, main auditorium. Interior views., Historic buildings., Office buildings., Public buildings., Auditoriums.. https://library-artstor-org.revproxy.brown.edu/asset/CARNEGIE_1260003.

These forces perform many functions: they create buffer zones that physically separate former combatants; advise and assist in programs that demobilize, disarm, and reintegrate former combatants into society; they deter crime through their physical presence; and they mediate disputes before they spiral into violence.[10]

Their success requires large numbers of personnel, sizeable budgets, and specially trained forces with knowledge of the local environments in which they operate.[11]

> *"VR can enhance the training of certain skills, such as situational awareness and decision-making in high-stress environments."*

Presently, virtual reality can facilitate the training of military and police forces in peacekeeping in several ways. VR can:

- lower costs and efficiency of training.[12]
- enhance the training of certain skills through its realism (e.g., situational awareness and decision-making in high-stress environments).
- improve cohesion and coordination across

6 "Our History," United Nations Peacekeeping. Accessed April 12, 2024. https://peacekeeping.un.org/en/our-history.

7 Henry E. Lowood, "Virtual Reality," in *Encyclopaedia Britannica* (Encyclopaedia Britannica, February 1, 2024), https://www.britannica.com/technology/virtual-reality...

8 Jonathan Steuer, *In Communication in the Age of Virtual Reality* (Routledge, 2013).

9 C. Anthes et al., "State of the Art of Virtual Reality Technology," in 2016 IEEE Aerospace Conference, 2016, 1–19. .

10 Virginia Page Fortna, "Interstate Peacekeeping: Causal Mechanisms and Empirical Effects," World Politics 56, no. 4 (2004): 481–519; Michael W. Doyle and Nicholas Sambanis, *Making War and Building Peace: United Nations Peace Operations* (Princeton: Princeton University Press, 2006); Princeton, NJ: Princeton University Press; Michael J. Gilligan and Ernest J. Sergenti, "Do UN Interventions Cause Peace? Using Matching to Improve Causal Inference," *Quarterly Journal of Political Science* 3 no. 2 (2008): 89-122.

11 Todd Sandler, "International Peacekeeping Operations: Burden Sharing and Effectiveness," *Journal of Conflict Resolution* 61 no. 9: 1875-1897; Jessica Di Salvatore and Andrea Ruggeri, "Effectiveness of Peacekeeping Operations." In Oxford Research Encyclopedia of Politics, 26 September 2017; Paul F. Diehl, "Peacekeeping Operations and the Quest for Peace," *Political Science Quarterly* 103 no. 4 (1988): 485–507, 494.

12 Bowen R. Loftin et al., "Training in Peacekeeping Operations Using Virtual Environments" (Virginia Modeling, Analysis, and Simulation Center, April 2004) 1

Russia-Ukraine War PTSD Treatment

Amid the ongoing Russian War in Ukraine, Israeli field hospital staff visited an internal Ukrainian refugee camp and met with local children and their parents. Staff brought VR equipment and immersed child refugees in scenes designed to distract them from their recent experiences in conflict. Staff administering treatment observed immediate improvements in the children's willingness to engage with others, showcasing the potential positive impact of VR as a complement to field medicine in conflict. Although this case shows anecdotal positive impacts, it also highlights the challenges of integrating VR for trauma rehabilitation in the field. Staff acknowledged that VR use required stable communications infrastructure, which may not be available in many conflict zones.

Source: "Israel's Field Hospital in Ukraine Using VR to Treat Refugees," *CTech*, April 10, 2022, https://www.calcalistech.com/ctechnews/article/skbbgulnc.

multinational forces by enabling joint training pre-deployment.[13]

Virtual reality has its limitations, however. VR cannot simulate aspects of peacekeeping missions that involves interpersonal relations well, such as intelligence gathering. The scenarios that are simulated are only as good as the human input used to develop them. Thus, VR requires deep knowledge of the local communities, norms, cultures, and so forth.



Paul Lowe. 1992. UN peacekeeping soldier in Sarajevo during the siege of the city. Around 250,000 people died in the civil war between Bosnian Muslims, Croats and Serbs in the years 1992-1995, part of the break-up of the former Yugoslavia.. https://library-artstor-org.revproxy.brown.edu/asset/APANOSIG_10313581678.

Virtual reality can also be exploited by peace spoilers for training.[14] The Islamic State in Iraq and Syria (ISIS) has adopted modified versions of virutal realty for training and recruitment.

VR poses other potential dangers. It is not known yet whether VR could accustom peacekeepers to disturbing levels of violence that make them more willing to use force. The careful monitoring of peacekeepers by mental health care professionals pre-deployment can hedge against this possibility.

PTSD

Peacekeeping personnel are at significant risk of developing post-traumatic stress disorder (PTSD).[15]

VR therapy ... cannot replace traditional psychological or psychiatric care (e.g., medication or intensive therapy).

PTSD is difficult to treat, especially in conflict zones due to a lack of infrastructure.[16]

Virtual reality can aid in the treatment of PTSD by:

- teaching skills for coping with stress.[17]
- providing mental health services in remote areas.[18]
- desensitizing peacekeepers to triggering

13 A. Walter Dorn and Peter F. Dawson, "Simulating Peace Operations: New Digital Possibilities for Training and Public Education," *Simulation & Gaming* 52, no. 2 (April 1, 2021): 228.

14 Matan Hasler and Beatrice Rubin, "Through Other's Eyes: How VR Can Transform Diplomacy," הריזה, September 28, 2018, https://www.eng.arenajournal.org.il/single-post/2018/09/28/through-the-other-s-eyes-how-vr-can-transform-diplomacy.

15 Brett Litz et al., "Posttraumatic Stress Disorder Associated with Peacekeeping Duty in Somalia for U.S. Military Personnel," *The American Journal of Psychiatry* 154 (March 1997): 178–84.

16 "Israel's Field Hospital in Ukraine Using VR to Treat Refugees." 2022. CTech. April 10, 2022. https://www.calcalistech.com/ctechnews/article/skbbgulnc.

17 Stéphane Bouchard et al., "Virtual Reality and the Training of Military Personnel to Cope with Acute Stressors," in *Advanced Computational Intelligence Paradigms in Healthcare 6. Virtual Reality in Psychotherapy, Rehabilitation, and Assessment*, ed. Sheryl Brahnam and Lakhmi C. Jain, Studies in Computational Intelligence (Berlin, Heidelberg: Springer, 2011), 109–28.

18 Bouchard et al., "Virtual Reality and the Training of Military Personnel."

United Nations Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO)

The United Nations Organization Stabilization Mission in the Democratic Republic of the Congo (MONUSCO) released a 360° VR-compatible video chronicling the daily activities of peacekeepers in the DRC. It follows three peacekeeper perspectives and aims to familiarize viewers with the "personal side of the women and men who have traveled far from their homes to contribute to stability." It also presents the experiences of Congolese civilians through their interactions with peacekeepers, providing a "virtual experience of solidarity in action." It illustrates how VR integration can benefit peacekeeping's public image by providing a viewing experience unmatched by conventional media. By collapsing the distance between the international public, peacekeepers, and Congolese civilians, it ultimately aims to boost public perceptions of peacekeeping operations. However, its impact on public peacekeeping awareness has not been evaluated.

Source: *Under the Blue Helmet: Life as a UN Peacekeeper in the Democratic Republic of the Congo (VR)*, 2018, https://www.youtube.com/watch?v=d-2uMYB-SL68.

events in a safe environment.[19]
- providing treatment tailored to individual needs and experiences.[20]

However, VR therapy has significant limitations. Presently, it *cannot*:

- replace traditional psychological or psychiatric care (e.g., medication or intensive therapy).[21]
- treat the broader public due to its high costs and technical requirements.

VR therapy may also impart additional trauma on people due to its vividness and, thus, must be utilized by skilled medical professionals. [22]

Community Building

Peacekeeping is more effective when communities welcome the presence of peacekeepers and engage in continued dialogue with opposing sides. These processes depend on peacekeepers having the trust of the communities in which they reside and locals having understanding and empathy for each other.[23] However, past offenses, socio-economic inequalities, cultural differences, and linguistic barriers can make this difficult.

Virtual reality can help build understanding, trust, and empathy among groups by simulating experiences that:

- enable seeing a situation through another's point of view.[24,25,26]

Virtual reality can also increase receptiveness to real-world mediation processes by:

- demonstrating successful cases of peacebuilding.[27]
- modeling successful narratives in mediation processes.[28]

Interest in VR itself may also increase participation in community building exercises.

For VR to be effective, however, participants must trust the technology itself and be willing to engage with it in good faith.[29] VR has further limitations. It is:

- costly to deploy on a mass scale.[30]
- technically demanding (e.g., electricity).
- dependent on the quality of the experiences sim-

19 Maryrose Gerardi et al., "Virtual reality exposure therapy using a virtual Iraq: Case report," Journal of Traumatic Stress 21, no. 2 (2008): 209–13.
20 M. Roy et al., "Initial Results from the ViRTICo Trial: Virtual Reality Therapy and Imaging in Combat Veterans," *Annual Review of CyberTherapy and Telemedicine* 6 (2008): 47–52..
21 Deborah C. Beidel et al., "Trauma Management Therapy with Virtual-Reality Augmented Exposure Therapy for Combat-Related PTSD: A Randomized Controlled Trial," *Journal of Anxiety Disorders, Virtual reality applications for the anxiety disorders*, 61 (January 1, 2019): 64–74.
22 Hasler and Rubin, "Through Other's Eyes.".
23 Diehl, "Peacekeeping Operations and the Quest for Peace," 498; Nicholas Sambanis, "The United Nations Operation in Cyprus: A New Look at the Peacekeeping□peacemaking Relationship," *International Peacekeeping* 6, no. 1 (1999): 79–108, 101-102.
24 Alexandra Ivanovitch, "Virtual Reality: The Frontier of Peacemaking" (Center for Empathy in International Affairs, October 2017), https://www.centerforempathy.org/virtual-reality-the-frontier-of-peacemaking/.
25 Julie A. Gregory, "Virtual Reality and the Future of Peacemaking," DiploFoundation Policy Papers and Briefs 14 (June 2020)..
26 Ruud Hortensius et al., "The Relation between Bystanders' Behavioral Reactivity to Distress and Later Helping Behavior during a Violent Conflict in Virtual Reality," *PLOS ONE* 13, no. 4 (April 19, 2018).
27 "Report of 'The Potential of Virtual Reality for Peace Mediation' Roundtable - Diplo," November 24, 2020, https://www.diplomacy.edu/blog/report-potential-virtual-reality-peace-mediation-roundtable/.
28 Ibid.
29 "Report of 'The Potential of Virtual Reality for Peace Mediation' Roundtable - Diplo;" Gregory, "Virtual Reality and the Future of Peacemaking," 4.
30 Béatrice S. Hasler et al., "Virtual Reality-Based Conflict Resolution: The Impact of Immersive 360° Video on Changing View Points and Moral Judgment in the Context of Violent Intergroup Conflict," *New Media & Society* 23, no. 8 (August 1, 2021): 2269. See this study for an instance of VR being tested for applicability in increasing Israeli civilians' empathy toward Palestinian refugees. The study concludes that VR did not lead to more empathy from the Israelis towards Palestinians, but rather increased Israeli civilians' hostile feelings towards Israeli military border guards.

ulated.
- potentially short-term in its effect
- not necessarily more useful than 2-dimensional videos.[31]
- unable to address underlying inequities that drive conflict.

Moreover, VR can be used to undermine community building through the spreading of propaganda or misinformation.

Recommendations

VR integration into peacekeeper training can increase training efficiency and impact. However, peacekeeping operations should not rely exclusively on VR to protect against unintended negative effects to peacekeepers and communities.

VR integration's potential positive impacts on conflict reconciliation and trust-building remain largely untested, and its overall benefits have not been systematically determined. However, when deployed in other contexts, VR has been shown to collapse social boundaries. VR cannot substitute in-person engagement, but it may help overcome barriers in community-building in post-conflict environments.

VR integration should be done with scalability and flexibility in mind. Other digital technologies should also be used and integrated alongside VR into a holistic peacekeeping approach.

Peacekeeping personnel who use VR simulation tools must be able to adapt VR on a case-by-case basis, and should not deploy VR in contexts where the anticipated benefits outweigh the potential risks.



Jeroen Oerlemans. 2006. The command centre of ISAF (International Security Assistance Force). ISAF is a peacekeeping mission affiliated to the United Nations (UN) and NATO. https://library-artstor-org.revproxy.brown.edu/asset/APANOSIG_10313575049

31 Ibid.

DIGITAL PEACEBUILDING

2026 Issue 3

The Role of Blockchain in Reducing Violence related to Humanitarian Aid in Conflict Settings

Jeanette Chang

Executive Summary

Humanitarian aid can contribute to violence in conflict settings due to weak institutions, resource scarcity, and political manipulation. Blockchain can mitigate these challenges by reducing corruption through improved transparency of spending, increasing administrative efficiency, and expanding access through digital identity systems. However, its effectiveness is limited by data privacy risks, reliance on external verification processes, and low accessibility in fragile, low-connectivity environments. While blockchain can enhance aid delivery, must be implemented with robust data protection, verification processes, and context-sensitive design.

Introduction

Humanitarian aid allocation in conflict environments often provokes violence due to resource scarcity in settings where weak bureaucracy and corruption are prevalent. This can lead to unequal distribution and inefficient delivery. Blockchain can help reduce this violence by increasing transparency, allocation efficiency, and accountability. In this brief, we examine how blockchain can improve humanitarian aid allocation in conflict settings. We identify where it is most effective, where limitations remain, and provide recommendations for its responsible and context-sensitive use.

Humanitarian Aid

Humanitarian aid is the mitigation of human damage caused by armed conflicts, natural disasters and other disaster situations through the provision of assistance, relief and protection.[1] This includes the delivery of food, medical supplies, shelter, and cash-based transfers to support basic needs.

As of 2024, conflict drove the need for 80% of humanitarian aid and is the focus of this brief.[2] When delivered effectively, humanitarian aid facilitates peacebuilding by alleviating suffering and stabilizing communities.

The challenges in distributing aid vary depending on the stage of conflict. In active conflict,

1. European Union, "Humanitarian Aid," EUR-Lex, Summary of EU Legislation, 2016 .

2 UNICEF, "Not the New Normal: 2024 One of the Worst Years in UNICEF's History for Children in Conflict," 2024,

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aid becomes a political tool to further the agendas of aid donors which can fuel grievances, and contribute to violence.[3] In post-conflict settings, aid is often coditional on maintaining peace, but weak enforcement allows these conditions to be inconsistently applied or politically manipulated. [4]

Blockchain

Blockchain is a secure, decentralized and open system for verifying transactions. It removes the need for thir-party involvement in payment transfers through hash-linked payment records.

Blockchain has three defining elements: a distributed consensus protocol, a full, public history of transactions, and openness to anonymous users.[5] Each block contains a timestamp, transaction data, and the hash of the previous block. In humanitarian aid, it is used to deliver digital cash transfers, track the distribution of goods, and link assistance to digital identities.

Humanitarian Aid: A Cause of Violence?

Violence is most acute where institutions are fragile, resources are scarce, and distribution systems lack transparency and accountability. Humanitarian aid is delivered within these violent environments. As a result, aid becomes a highly contested resource and a bargaining tool due to high-stakes power dynamics. Weak institutional capacity, corruption, and political incentives shape how aid is allocated, often tying access to international relationships and local elite interests. The result is exclusionary distribution and misallocation, which shows how humanitarian aid can intensify grievances and contribute to outbreaks of violence.

"With enormous pressures to deliver relief quickly, the risks of corruption increase. Greater transparency and accountability in the aid process will not only minimise corruption; it will make relief efforts more effective."
— Roslyn Hees, Transparency International

Humanitarian Aid is Poorly Managed

During conflict, bureaucratic and administrative systems breakdown and remain weak even once the fighting is over. This can limit oversight and enable elite capture of aid. For example, political actors or armed groups may divert aid toward favored constituencies or embed it within existing systems of power.[6] Large inflows of aid can distort local markets and create dependency, weakening productive sectors and reinforcing instability.[7] In fragile economies, this can exacerbate poor living conditions and deepen grievances, contributing to ongoing conflict.

Aid is most effective in post-conflict settings characterized by open power structures, where multiple groups compete for influence and no single actor fully controls the state. In these environments, external resources can shift incentives, allowing aid to reward compliance with peace agreements and strengthen actors committed to stabilization.[8] In closed power systems, where authority is concentrated within a dominant group, those actors can capture resources and restrict distribution to reinforce their control, excluding other populations. In highly fragmented systems with no clear authority, aid is often less effective because there are no stable or legitimate counterparts to coordinate with, making delivery inconsistent, difficult to monitor, and more vulnerable to diversion. As a result, the impact of aid in post-conflict settings depends heavily on the underlying institutional structure, with open systems offering greater potential for aid to support durable peace.

Humanitarian Aid Enables Corruption

In post-conflict settings, aid is often conditioned to reduce corruption and address power imbalances between citizens and emerging political leaders. It plays a central role in shaping political power dynamics, for example through targeted allocation to vulnerable groups or through peace conditionality, where aid is tied to the implementation or maintenance of peace agreements to incentivize cooperation. In practice, accountability mechanisms are weak, meaning these conditions are inconsistently applied and aid can be politically manipulated, undermining efforts to consolidate peace.[9] For example, aid can enable governments to reallocate extra resources toward military

3 P. Paul Collier and A. Anke Hoeffler, "Aid, Policy and Peace: Reducing the Risks of Civil Conflict," Defence and Peace Economics 13, no. 6 (2002): 435–450.
4 J. K. James K. Boyce, "Aid Conditionality as a Tool for Peacebuilding: Opportunities and Constraints," Development and Change 33, no. 5 (2002): 1025–1048.

5 Lorenzo Ghiro et al., "A Blockchain Definition to Clarify Its Role for the Internet of Things," in 2019 19th Mediterranean Communication and Computer Networking Conference (MedComNet) (IEEE, 2021)
6 J. Jonathan Goodhand, "Aiding Violence or Building Peace? The Role of International Aid in Afghanistan," Third World Quarterly 23, no. 5 (2002): 837–859.
7 Daniel Strandow, Michael G. Findley, and Joseph K. Young, Foreign Aid and the Intensity of Violent Armed Conflict, AidData Working Paper 24 (May 2016
8 J. K. James K. Boyce, "Aid Conditionality as a Tool for Peacebuilding: Opportunities and Constraints," Development and Change 33, no. 5 (2002): 1025–1048
9 Y. S. Andrew Tan and Johan von Schreeb, "Humanitarian Assistance and Accountability: What Are We Really Talking About?" Prehospital and Disaster Medicine 30, no. 3 (2015): 264–270.

spending, prolonging violence by sustaining war economies and reducing the pressures that might otherwise force the conflict to end.[10]As a result, aid continues to influence which groups gain resources and legitimacy in the post-conflict environment.

Humanitarian Aid is Politically Dependent and Leads to Exclusion

International and domestic political incentives have a significant influence on how aid is distributed; allocation often reflects strategic interests rather than need.[11] These dynamics are most acute in active conflict, because aid becomes a valuable and contestable resource. For example, evidence shows that aid is more likely to be directed toward regions aligned with political leaders or dominant ethnic groups rather than those in greatest need, with allocation often favoring leaders' birth regions and politically powerful groups, reinforcing existing power structures rather than addressing humanitarian need. Internationally, countries with strong economic allies tend to receive higher volimes of aid than those without. This can leave many people or countries underrepresented from receiving critical aid. This can lead to severe inequality which can increase tensions and sustain violence.

Case Study: Aid Distribution and Power Bias in Afghanistan

During the conflict in Afghanistan, humanitarian aid was delivered through local intermediaries, including regional commanders and political elites. This meant distribution was shaped by existing power structures rather than purely by need. Areas controlled by dominant factions or aligned with international actors received greater flows of assistance, while others were relatively excluded. Aid was frequently captured and redistributed by local elites to reinforce their authority, rewarding supporters and marginalizing rival groups. This allowed humanitarian resources to become embedded within the political economy of the conflict, functioning as a tool of influence rather than neutral relief.[12]

12 Goodhand, "Aiding Violence or Building Peace?"

Reducing Violence using Blockchain Technology

Blockchain can improve the quality of humanitarian aid by reducing the likelihood of corruption, streamlining administrative processes and enabling the inclusion of hard-to-reach groups. Improving these factors reduces the underlying causes of violence related to aid distribution in conflict zones.

Blockchain Reduces Corruption

Blockchain can reduce corruption by enabling more robust accountability measures through smart contracts. Smart contracts can have strict terms which only release funds when they are allocated towards pre-determined resources. This means that organizations and governments are held accountable if funds agreements are not honored.[13] Public ledgers enhance transparency by making transactions traceable. Once entries have been made, they are permanent which prevents information tampering. The ledger can be permissioned, allowing visibility to be restricted to certain actors which is important for maintaining data privacy protocols.

Despite these benefits, there is a clear trade-off: greater openness strengthens accountability, while restricted access may better protect sensitive data but weaken transparency.[14] This is problematic in humanitarian aid contexts because restricting ledger access can limit independent oversight, allowing powerful actors to control information, conceal misallocation of resources, and exclude vulnerable groups from receiving aid, which can reinforce existing inequalities and heighten tensions that contribute to violence.

Permanent ledger entries also make it difficult to correct mistakes or clearly link updates to original errors. Corrections are recorded separately rather than replacing incorrect data, which can create confusion, lock in misallocations, and make it harder to accurately redirect aid and risking the exclusion of vulnerable populations. Blockchain's technical capacity is still limited as blockchain itself cannot verify whether contract conditions are met – this still requires human verification meaning that corruption can shift to the verification stage. Local actors may falsify compliance, allowing diversion of aid to persist despite the appearance of transparency. Therefore, although blockchain can strengthen accountability mechanisms, it cannot solely, eliminate corruption risk.

10 Nathan Nunn and Nancy Qian, "US Food Aid and Civil Conflict," American Economic Review 104, no. 6 (2014): 1630–1666

11 Christian Bommer, Axel Dreher, and Marcello Perez-Alvarez. 2018. Regional and Ethnic Favoritism in the Allocation of Humanitarian Aid. CESifo Working Paper No. 7038. Munich: Center for Economic Studies and ifo Institute.

13 Aiste Rugeviciute and Afshin Mehrpouya, "Blockchain, a Panacea for Development Accountability? A Study of the Barriers and Enablers for Blockchain's Adoption by Development Aid Organizations," Frontiers in Blockchain 2 (2019)

14 Bernhard Reinsberg, "Blockchain Technology and the Governance of Foreign Aid," Journal of Institutional Economics 15, no. 3 (2019): 413–429

Blockchain Improves Administrative Systems
Blockchain systems can improve administrative efficiency related to aid allocation by preventing information asymmetry throughout the supply chain, enabling secure digital transfers and automation of fund allocation.[15] This eliminates the need for intermediaries, reducing transaction costs meaning that more money can be allocated to direct aid resources.[16]

Efficient systems reduce corruption which can reduce likliehood of political instability and the violence that this can cause. This cannot be implemented without risks, Blockchain will increase reliance on digital infrastructure which requires upskilling of staff, has high upfront costs to implement, introduces a need for secure data storage and increases exposure to cyberattacks.[17]

Blockchain Increases Inclusivity
Blockchain can increase inclusivity for hard-to-reach groups through decentralized digital identity systems, enabling access to financial services and aid where people lack traditional documents.[18] This is particularly beneficial for vulnerable populations such as women, who often face barriers to formal banking and documentation, and can also help prevent document falsification, reducing risks such as human trafficking and exclusion from aid.

While blockchain-based identity systems can improve inclusion, their effectiveness depends on careful design that balances accessibility, privacy, and security. Blockchain systems often store sensitive personal data in ways that are difficult to modify or delete, raising concerns about long-term data protection and misuse. In conflict environments, where data can be weaponized, exposure of identity or location information may increase vulnerability rather than reduce it. Aid recipients are frequently required to exchange personal data for access to services, creating risks of surveillance, misidentification, or exclusion if data is misused or misinterpreted. Effective use of blockchain-based identity systems depends on access to digital infrastructure which is often limited in crisis settings. Low digital literacy and lack of trust in digital systems can reduce uptake.

Blockchain: A Tool for Peace?
Overall, blockchain is best understood as a tool that improves the underlying systems through which aid is delivered rather than directly reducing violence itself. Its impact is indirect. It can reduce corruption, administrative efficiency and inclusion through enhanced accountability, automation, and service accessibility. While these improvements can help ease some of the pressures that drive conflict around aid distribution, they do not address the deeper political and economic dynamics at play. Blockchain can support more effective and equitable aid systems, but to meaningfully reduce violence, its success depends on careful implementation within broader governance frameworks.



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Recommendations:
There are four core recommendations to optimize the use of blockchain in humanitarian settings to lower the likelihood of violence.

- **Develop standardised verification protocols for blockchain aid systems:** Implement multi-actor validation processes in which NGOs, independent auditors, and trusted local partners verify that real-world conditions are met before transactions are recorded. This reduces reliance on single points of failure, strengthens accountability, and limits manipulation or false reporting within smart contract execution.

- **Establish robust data protection rules for recipients of aid and donors**: Implement clear

15 Moez Krichen et al., "Blockchain-Enabled Disaster Resilience: A Paradigm for Enhancing Transparency, Securing Funds, and Optimizing Aid Delivery," in 2025 International Conference on Applied Artificial Intelligence, Data Engineering and Sciences
16 Giulio Coppi and Larissa Fast, Blockchain and Distributed Ledger Technologies in the Humanitarian Sector (London: Overseas Development Institute, 2019)

17 Andrew M. Francis, Addressing the Ethics Concerns of Consent and Privacy in Humanitarian Cyberspace through Blockchain Technologies (Newport, RI: Naval War College, 2021)
18 Andrej Zwitter and Mathilde Boisse-Despiaux, "Blockchain for Humanitarian Action and Development Aid," Journal of International Humanitarian Action 3, no. 16 (2018)

governance frameworks defining who can access, store, and share data, with strict consent protocols and limits on data collection. Sensitive information should be encrypted, access should be permissioned rather than fully public, and systems should allow for data minimization to reduce exposure risks. This is particularly important in conflict settings, where misuse of personal or location data can increase vulnerability to surveillance, targeting, or exclusion.

- **Use blockchain to increase accountability in aid contracts** Smart contracts can create conditions for aid distribution which are appropriate based on the stage of conflict. Looser, rapid-disbursement mechanisms are best in active conflict to preserve humanitarian access. Stricter, conditional mechanisms in post-conflict settings e.g. peace clauses, support governance, reduce politicisation, and limit elite capture or diversion of funds.

- **Enable offline-capable, multi-channel ID and payment systems.** Combine blockchain-based digital IDs with traditional delivery mechanisms such as cash, vouchers, or physical cards to optimize inclusivity. This hybrid approach maintains access for digitally excluded populations but provides new options for vulnerable individuals such as those who do not have traditional identification documents or access to regular financial services.

Case Study: Blockchain payments in Jordan Azraq refugee camp

The World Food Programme's Building Blocks project, launched in 2017 in Jordan's Azraq refugee camp, is one of the largest blockchain applications in humanitarian aid. It was designed to make cash-based assistance to Syrian refugees more efficient by replacing traditional financial intermediaries. Instead of relying on external payment providers, refugees received aid through blockchain-linked digital accounts, accessed via biometric authentication (iris scans) at participating retailers. This enabled the processing of transactions to occur internally while maintaining a secure, tamper-resistant record of transfers which significantly reduced transaction fees and operational costs. The project demonstrates that blockchain can improve efficiency and transparency in aid delivery, particularly through streamlined transactions and reduced reliance on intermediaries. Its impact on corruption and power dynamics is uncertain, as it is dependent on centralized control, external verification, and raises ongoing concerns around data governance.[19]

19 Coppi and Fast, Blockchain and Distributed Ledger Technologies.