

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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exploit 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-enabled 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 depicting 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 positive 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 underreported 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.²²

- Trust erosion if ineffective — Failure to act on reports can undermine confidence and discourage 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 institu-

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.