



REHUMANIZING THE MISSING: HARNESSING AI AND DIGITAL TECHNOLOGIES TO PREVENT MIGRANT DISAPPEARANCES AT THE MOROCCAN-SPANISH BORDERS

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Introduction

In 2018, border enforcement and surveillance had intensified at the Morocco-Spain border, around Ceuta and Melilla, pressuring the Western Mediterranean migration route. Research suggests that, as one route became harder to cross, migratory journeys towards Spain shifted to more dangerous route along the Atlantic, towards the Canary Islands (Vives, 2021). These journeys often take place in environments where migrant disappearances may go unobserved and where bodies can be irrecoverable –particularly in the Atlantic Ocean and Saharan Desert–making both search and identification difficult and contributing to persistent undercounting. The year 2024 saw a dramatic increase in migrant loss. According to the IOM's Missing Migrants Project, the estimate of death and disappearance tolls along the Atlantic route alone rose to above 1,000. For the same year and route, however, the Spanish NGO Caminando Fronteras counted 9,757 border fatalities (Caminando Fronteras, 2024). While this may speak to the conflicting performances of data collection (Stierl, 2025), in both cases, the count of migrant deaths and disappearances remains, at its core, an undercount—owing largely to the hostile and difficult to reach environments where such fatalities take place. Along sea and desert routes, most deaths occur out of sight, and bodies of migrants are simply irrecoverable, making the search and identification procedures impossible. These conflicting numbers reflect the methodological conundrum of collecting data on migrant disappearance.

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Against this backdrop, analysts and civil-society actors have raised concerns that the expansion of surveillance, deterrence, and border-management technologies, including AI-enabled tools, may prioritise detection and exclusion over timely rescue, accountability, and identification (Amoore, 2024). This brief examines how the increased resources used to strengthen border surveillance and digital technologies along the Morocco-Spain border can be reoriented to reduce deaths and disappearances on the Atlantic route to the Canary Islands, by strengthening transparency and accountability, and post-mortem identification.

In so doing, this brief first introduces the new technologies at the Moroccan-Spanish borders, exploring the correlation between the investments focused on hardening border controls with such technologies and broader patterns of migrant route shifting, and the associated increase in migrant life loss. Next, the brief examines how the securitisation and modernisation of the search and identification processes are often oriented toward identifying criminal networks of smugglers, while migrant loss of life and justice for the families seeking truth and accountability are regarded as a secondary matter. Then, it sets out the forensic scene of Morocco, and analyses medico-and legal constraints that shape post-mortem management and identification to prevent and respond to migrant deaths and disappearances. Finally, the brief concludes with policy recommendations aimed at centring humanitarian outcomes –such as improving rescue decision chains, transparency, and post-mortem identification– alongside any continued use or increase of digital and AI technologies in border management control.

The Ever-Shifting Routes of Migrant Deaths and Disappearances

Irregular migration routes to Spain are not fixed. When enforcement, surveillance, or bilateral control measures intensify along one corridor, crossings may shift toward alternative routes that can be longer, more expensive, and more dangerous. The two main migratory routes into Spain are the Western Mediterranean Route and the Atlantic Route.

The Western Mediterranean Route spans land and maritime pathways for irregular migration from Morocco and Algeria to Spain. Land entries of irregular migrants are channelled through the two Spanish autonomous cities of Ceuta and Melilla on the Moroccan border. Maritime crossings are either steered towards mainland Spain or the Balearic Islands (Grant, Forin, & Frouws, 2025). Forming the only land borders between Europe and Africa, Ceuta and Melilla are the protagonists in the Western Mediterranean Route, with a longstanding history of irregular fence crossings into the EU. Now, both cities have been fortified with sensors, cameras, and patrol systems to detect and deter illegal crossings. This hardening approach of land border securitisation is more palpable in Melilla, following the deadly events on 24 June 2022, which came to be known as “the Melilla massacre” and reportedly claimed the lives of at least 27 migrants from East Africa while dozens went missing. Since the closures and restrictions introduced at the border between Melilla and Nador, the land border between Ceuta and Fendiq has seen repeated stampedes, mainly by Moroccan minors. In 2024 alone, Morocco reported more than 14 border stampedes, with a total of 4,290 attempted crossings (Moreno, 2025). According to FRONTEX, migrant flows and crossings are steadily increasing

again along the Western Mediterranean Route, reaching 17,964 as of November 2025, indicating a growth of 15% (FRONTEX, 2025).

The Atlantic Route covers pathways of irregular migration from Morocco, Mauritania, and West African countries (e.g., Senegal, The Gambia, and Guinea). In 2024, nearly 47,000 reached the Canary Islands, which is the highest record on this route. As of November 2025, arrivals plummeted to 16,829, marking a -60% drop (FRONTEX, 2025). High levels of migrant deaths and disappearances remain the hallmark of the Atlantic Route. In its report, Caminando Fronteras documented a total of 9,757 migrant deaths along the Atlantic Route. The same reporting also notes more than 10,400 migrant deaths attempting to reach Spain from Africa, via the Atlantic Route accounting for a large share of these fatalities. In response to growing arrivals, Spain has expanded operational cooperation with Mauritania and Senegal through bilateral arrangements that observers describe as contributing to the securitisation of this route (Statewatch, 2025).

Spain saw a sharp decrease in migrant arrivals in 2025 (36,775) compared to 2024 (64,019). This appears to coincide with heightened border enforcement and cooperation measures affecting the West African Atlantic Route in Morocco, Mauritania, and Senegal. As arrivals along the Atlantic Route declined, the Western Mediterranean Route has shown signs of reactivation. A sharp increase has recently been observed in the number of arrivals into the Balearic Islands from the Algerian shores, as smuggling networks switch routes (Faus, 2025).

The Algerian route remained active throughout the year of 2025, making it the busiest route to Spain and, according to civil-society reporting, among the most dangerous part of the Western Mediterranean Route. The Human Rights Observatory of Caminando Fronteras documented 1,037 migrant deaths in 121 maritime tragedies along this Algerian route leading to the Balearic Islands. Delay in mobilising search and rescue operations are highlighted in the same reporting as a key contributing factor to this increase in fatalities. According to the same report, a total of 139 migrants lost their lives along the Strait of Gibraltar-Ceuta part of the Western Mediterranean Route.

These shifts in routes and enforcement measures coincide with significant investments in border management and surveillance cooperation between Spain, Morocco, and the EU. Estimates suggest that around 80% of EU migration-related funding to Morocco since 2014 has been disbursed into securitising and modernising its borders (European Commission, 2023). Morocco is a longstanding partner of the EU and Spain in migration governance (Ferdaoussi, 2022). In 2023, the European Union Trust Fund (EUTF) allocated around 152 million euros to upgrade Morocco's border systems and readmission incentives. Civil-society actors have raised concerns regarding the human costs of this financial and logistical support to Morocco's border fortification and digitalisation and the EU's border externalization plans (Alarm Phone, 2025).

Taken together, these trends illustrate a recurring policy dilemma: intensified controls can coincide with route displacement, while deaths and disappearances remain concentrated in corridors where rescue, recovery, and identification are hardest to carry out.

Border Technologies at the Moroccan-Spanish Border

Significantly more resources have been directed toward border management and migration control than toward Search and Rescue (SAR) operations or other humanitarian measures aimed at identifying, rescuing, and supporting the families of missing migrants.

Despite the geopolitical differences between Morocco and Spain, there has been cooperation on surveillance and digitised border management in Ceuta, Melilla, and the maritime route to the Canary Islands. Among the cutting-edge technologies of border control deployed at the land border in Ceuta and Melilla are drones, thermal cameras, facial recognition systems, and the Integrated External Surveillance System (SIVE) (Bellio et al., 2024).

The integrated Surveillance system consists of five Fixed Surveillance Stations (EFV), each of which is remotely controlled from the Operations and Services Centre (COS). Along these five surveillance stations, drones are deployed by the Guardia Civil (Bellio et al., 2024). Purchased from the company DJI (a private non-military company), such drones are geared to detect and identify “targets of interest”, including irregular migrants approaching the fences. Drones equipped with AI technology include the Matrice 300 RTK, AI Spot-Check, and Eagle One. The expansion of surveillance infrastructure with AI tools seems to be part of a larger border control strategy that aims to detect attempted fence crossings and improve the monitoring of vessels at sea.

The intensification of surveillance and border infrastructure at the Nador-Melilla border has been particularly visible following the deadly events of 24 June 2022 (AMDH-Nador, 2023). Among other AI-driven equipment are security cameras with thermal sensors and laser illuminators, emplaced along the perimeter of Melilla to identify the presence of migrants.

The operationalisation of such technologies also relies heavily on manpower and cross-border cooperation. In this context, Moroccan patrols play a substantial role in day-to-day border control, which reveals asymmetries in the acquisition, distribution and use of such technologies along the Morocco-Spain border and within broader EU border externalisation arrangements. At the same time, deaths, disappearances, and detention remain persistent features of this border context, particularly when routes shift toward environments where rescue and recovery are harder to conduct, such as the Saharan Desert or the Atlantic Ocean.

One additional technology of border control, intended to be fully operational by April 2026, is the Entry-Exit System (EES) (European Commission, 2025). The EES will be assigned to the border police, and it will collect real-time biometric data on travellers when entering and exiting the Schengen area. As designed, the EES is primarily a border-management and enforcement tool rather than a mechanism focused on deaths and disappearances. Its direct relevance to humanitarian identification is therefore limited. Nonetheless, it raises the question of whether and how some biometric and identity-management capabilities could be connected to post-mortem identification and missing-person processes, with the aim of reducing prolonged uncertainty for families.

The Right Way to Identification

The above-listed technologies are primarily designed to detect, classify, and manage cross-border mobility, and their identification functions tend to serve border enforcement and security objectives more than humanitarian ones. In recent years, the concept of 'identification' has recently gained traction in migration governance. Identifying and tracking people deemed to be in an irregular situation, monitoring their movements, tracing and detaining criminal networks facilitating irregular migration have been the focus of the EU's approach to border management. This raises a key question for this brief: to what extent can the resources put towards identification infrastructures –digital and AI-enabled– be reoriented toward humanitarian outcomes, particularly when people go missing and families seek truth, accountability, and dignified identification?

Harnessing the humanitarian potential of digital and AI technologies requires distinguishing between enforcement-oriented identification and humanitarian identification. Enforcement-oriented identification often relies on prediction, risk scoring, and pre-emption to detect and deter unauthorised crossings or identify perceived security threats. Proponents of such cutting-edge technologies argue that "it has improved efficiency by enabling faster traveller screening and facilitating better identification of potential threats" (ICMPD, 2025). Detractors, on the other hand, "highlight the potential for such systems to feed into discriminatory practices, as well as potential violations of fundamental rights like data protection and privacy" (ICMPD, 2025).

At the same time, so many of the EU's resources are geared towards surveillance border systems and supporting law-enforcement objectives. Currently, biometric screening, biometric matching, and electronic surveillance are largely harnessed to identify and track "targets of interest" for enforcement purposes, including suspected facilitators of irregular migration. The EU's new information database, European Criminal Records Information System—Third Country Nationals (ECRIS), for example, is presented as a mechanism to support criminal justice cooperation and the identification of individuals with criminal records, including in cases linked to migrant smuggling. Similarly, technologies and infrastructures used to secure cross-border mobility—such as document verification systems, biometric matching tools, and other forms of electronic identification—are typically designed for border processing and enforcement rather than for missing-person identification. This produces an imbalance: identification systems are comparatively well developed for screening, control, and prosecution, while humanitarian identification—post-mortem processes, family notification, tracing protocols, and cross-border data pathways for missing persons—often remains limited, fragmented, or procedurally inaccessible.

This imbalance is reinforced by policy narratives that foreground the figure of the smuggler. In such framings, responsibility for deaths and disappearances is frequently individualised and attributed primarily to criminal facilitators, rather than treated as a systemic outcome of dangerous migratory routes and constrained pathways to access legal migration. In its Proposal for the Directive on migrant smugglers, for example, the European Commission made a direct link between the "activities of ruthless migrant smugglers" and "the staggering death toll of over

2,800 people since 2014" (European Commission, 2023). This enduring logic in migration management is also enshrined in Morocco's Law 02-03, which aims to regulate illegal entry and exit through the country.

The enforcement-oriented approach to border security is imported into contexts of disappearance and justice for missing migrants. That is, when migrants go missing and families demand truth and justice regarding the fate and whereabouts of their missing relatives, the prosecution of suspected smugglers may be presented to families as a form of justice. Yet this does not necessarily translate into sustained search, recovery, and identification procedures for the missing themselves. Hence, the smuggler can become the primary the subject of identification, while the missing person becomes secondary. Accounts documented through field engagement with families of disappeared migrants in Morocco point to persistent gaps between enforcement action and the procedures needed for identification, notification, and dignified post-mortem management. For these reasons, a counter-forensic approach that centres the dignity of the missing and the demands of families should be the subject of investments and increased resources.

Setting the Forensic Scene in Morocco

This section looks at the jarring disparity between the cutting-edge technologies mobilized to control the Moroccan-Spanish border and the legal and technical aspects of forensics in Morocco. It examines the legal, administrative, technical, and environmental challenges that shape migrant death and disappearances in Morocco.

The Legal Challenges

In Article 23, the Moroccan Constitution of 2011 recognizes enforced disappearance as a grave crime, punished with severe penalties. Moreover, Morocco is a signatory to the International Convention for the Protection of All Persons from Enforced Disappearance (EuroMed Rights, 2025). And yet, no implementation has been carried out to enforce its provisions. Article 77 of the Moroccan Penal Code sets the general framework for managing dead bodies. However, it lacks specific provisions that relate to the management of migrant bodies.

In Morocco, Forensic pathology has long been a medico-legal field that received little to no state interest. No ministerial body has properly overseen the sector, leaving its personnel to work under meagre financial and infrastructure conditions, according to a migration lawyer¹. The Ministry of Health has largely distanced itself, while the Ministry of Justice has never delivered on its promises² to revise the outdated Law No. 23-86, which concerns *frais de justice* (justice costs) — promulgated on 27 June 1986 (CEJA, 2013). Examining a decomposed cadaver and preparing a court report can only earn 30 dirhams (less than three euros), and an autopsy just 100 dirhams (under ten euros), fees that date back to the 80s. Any bodies found dead outdoors are required to go for autopsies and external examinations—particularly following the infamous terrorist attack of 16 May 2003 in Casablanca. The dead bodies of foreigners should go for autopsies³. This

¹ Interview, migration lawyer, 23 February 2025

² Interview, forensic pathologist, 2 January 2025

³ Interview, forensic pathologist, 2 January 2025

security logic is particularly enshrined in Law 02-03, regulating the illegal entry and exit of migrants as well as the punitive aspects of anti-smuggling. This law is the penal system used to punish smugglers and facilitators in the event of migrant deaths and disappearances.

Administrative Challenges

The lack of a legal framework regarding the management of deaths and disappearances in migratory contexts set in administrative hurdles when families seek to report the disappearance of a loved one. Oftentimes, families find it difficult to report their loss, owing to the fear of being criminalized for assisting in, or not reporting, the illegal entry of their relatives. Judicial police or royal gendarmerie collect information about the missing and the smugglers who facilitated their sea crossing. Some families reach out to local NGOs before going to local authorities. Amid this administrative challenge, a handful of NGO actors mediate this process to reporting loss between Moroccan authorities, consulates and international organizations. Moreover, lack of a standardized protocol.

The Technical and Operational Aspects

In March 2020, Parliament promulgated Law No. 77-17 (Dahir n° 1-20-08 du 11 rejab 1441), which organises the profession of forensic pathology to ramp up the technical and judicial aspects of forensic pathology. Yet the law included no provisions for the human or infrastructure capacities of the sector. Moreover, in May 2024, the then Health Minister, Khaled Ait Taleb, warned that the profession of forensic pathology was at risk of “disappearing” altogether (Kasraoui, 2024). The number of forensic pathologists plummeted from 23 in 2013 (CNDH, 2013) to 6 forensic pathologists in the country as of 2024. According to a recent report by EuroMed Rights on the legal framework of managing missing migrants in Morocco noted that Morocco has “fewer than 60 active forensic doctors across the country” (EuroMed Rights, 2025), without specifying how many are trained forensic pathologists.

When unidentified migrant bodies wash ashore, the nearest forensic pathologist is in Agadir city. Yet most morgues with forensic pathologists are concentrated in big cities, far from border towns, like Tan Tan, Boujdour, and Tefaya, where bodies of migrants are washed up. Even in practice, however, unidentified migrant bodies are taken to the morgue for a short period to conduct external examination or autopsy, only to quickly be transported back to the hospital near where they were initially found. Hospitals then request a burial order from the Public Prosecutor. The inconsistency in managing unidentified migrants is evident in the random selection of bodies sent for autopsy, while others are not depending on the instructions received by the Public Prosecutor. The absence of a coherent framework thus leaves the management of migrant deaths and disappearances at the behest of local authorities. In such a legal and policy vacuum, the management of washed-up bodies on the Moroccan shores is handled through instructions of the local authorities and the Public Prosecutor⁴. This approach reflects the arbitrariness of managing migrant deaths and disappearances (EuroMed Rights, 2025).

If ever, DNA samples are not systematically taken and stored, due to the absence of antemortem data or the physical presence of families of the missing. On the other hand, families' demands in courts for DNA tests are declined, on account of not knowing the cadavers or suspecting a cadaver. *Prima facie*, many families are not allowed to see the cadavers, or the latter being too decomposed to be visually identified. DNA samples are taken at the discretion of the Public Prosecutor. However, since the DNA costs are paid from the court's

⁴ Interview, Moroccan migration lawyer, 17 April 2023

funds, families of missing migrants have consistently been rejected. Instead, their demands to know the fate and whereabouts of their loved ones are met with intimidation, inhibition, and sometimes criminalization. The Ministry has made calls to create a DNA database. Still, such efforts are more geared to tracking criminals than addressing the country's forensic shortage for humanitarian purposes or redressing political violence.

To fill this policy vacuum, some borderland activists honour the missing dead through dignified burial; sometimes, they even manage to identify the missing body and reach out to families through social media, migrant communities, and consular assistance. International Organizations, such as EuroMed Rights, also help frame civil society actors and mobilize multi-stakeholder engagements on migrant disappearance in the Euro-African region. A coherent strategy for addressing and preventing migrant disappearance is needed.

Meanwhile, the fragile infrastructure of forensic work in Morocco is thus compounded by systemic blame avoidance. Yet, in the Moroccan context, this goes beyond mere avoidance—there is a deliberate erasure. Not only is responsibility deflected, but the very issue of migrant disappearance is suppressed in the official discourse of Morocco's *Nouvelle Politique Migratoire* (New Migration Policy). To sustain a narrative of successful migrant integration (Migliarini and Ferdaoussi, 2025), the state effectively brushes aside migrant death and disappearance—a form of "issue avoidance" in which the "problem" itself is invisibilised and depoliticised.

Environmental Challenges

Apart from legal and operational challenges, environmental factors also induce this erasure. As complex as it is, migrant disappearance poses a set of challenges to national and supranational actors (e.g., Morocco, Spain, and the EU), as it mostly takes place at the outer fringes of the state's territorial borders, which can easily lead to the evasion of legal and moral responsibility. At the same time, migrant disappearances occur along hostile environmental terrains (De Léon, 2015), such as seas and deserts, which often make it difficult to trace, recover, and identify migrant bodies (Ferdaoussi, 2024). As such, no legal or policy framework standardizes the management of dead and missing bodies in Morocco. This results in a strategic policy and legal void (Kovras and Robins, 2016), which gives way to arbitrariness, indifference, inaction, and erasure as modes of managing migrant disappearance (Basaran, 2015).

Centering the Human: Policy Recommendations

Embracing a human-centred, preventive approach to migrant disappearance is essential one that can put an end to human loss. A preventive approach to migrant disappearance should open legal pathways to African migrants who risk their lives, not only to narrow economic categories of skilled and unskilled. Prevention should go beyond the disciplinary approach of charging smugglers—who outsmart technologies of border control—with hefty prison sentences. The logic of "less smugglers, less migrant deaths" should not exempt the state from assuming its responsibility towards the disappeared, their families, and communities that are mired in social death. These illegal, deadly pathways are directly tied to the closure of legal pathways for migration. As such, establishing, promoting, and facilitating legal

pathways that target the youth who are prone to take dangerous journeys is key to preventing migrant disappearance beyond the normative security approach.

The Ministry of Interior, taking the lion's share in migration governance, is the primary institutional actor. Its political will is important in shaping migration governance in the country, and how the rest of the state and non-state actors engage with migrants on the ground. At the same time, however, this security approach is not unique to Morocco or Spain; it's deeply embedded in the EU's migration policies. Chief among such policies is death as a prevention measure (see Kovras and Robins, 2016). In this regard, the Ministry of Interior should work earnestly on its humanization of border control by promoting multi-stakeholder collaborations to enhance legal pathways.

Humanize forensic identifications, where collective efforts are geared to tracing and identifying missing and dead migrants, and include their families in the search process, not only as victims but as central agents. Create firewalls that protect the data and privacy of families during the journeys to tracing and identifying missing migrants. As to identification, the state should increase Interpol's identification tools, such as the Yellow and Black and the DNA database I-FAMILIA. Moreover, training more forensic pathologists, particularly in digital pathology (PD), to enhance accuracy, efficiency, and accessibility in post-mortem evaluation.

Morocco should integrate migrant disappearance efforts for AI and new technologies in the creation and digitization of interagency databases, such as those from the Ministry of Justice and the Ministry of Health, with existing databases. Establishing a central, national database of migrant disappearances is essential, where sensitive data of missing migrants and their families is protected and not used against them, or used in any unauthorized way. Enhance data sharing between African countries and European countries to activate interoperable databases to maximize the identification not only of criminals but also of dead and missing migrants—creating matching possibilities with their families.

The EU and Spain should reconsider the unequal distribution, acquisition, and use of new technologies in border control, in a way that doesn't only outsource physical border control but also the management of deaths and disappearances. In this regard, Morocco and Spain, overseen by the EU, should collaborate on the humane prevention of migrant disappearance in their SRRS and exchange technologies and capacities, and experiences on a more humane ground.

Collaborate with International Organizations, already advanced in the use of new technologies to identify missing migrants, such as ICRC's Trace the Face, IOM's Missing Migrants Projects. In particular, the work of EuroMed Rights and the EAAF team is important, and states can build on and engage meaningfully with the work that has been done in other geographical contexts, like the US-Mexico border (EuroMed Rights, 2025). Collaborate with borderland activists who possess databases of missing migrants and embrace their projects to digitize their databases for interoperability into national and regional databases.

Establishing a holistic, end-to-end approach to engaging with migrant disappearance. Migrant disappearance is not a state problem alone; it's embedded in a global historical ecosystem of marginalization. In other words, an effective approach to managing migrant disappearance should bring all stakeholders to work under one standardized approach. An end-to-end approach should prioritize the prevention of migrant loss, extending well beyond the search and recovery of the dead to include practices of reparation to the affected families.

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