

## Humanitarian implications of mine contamination

### OVERVIEW

Ukraine is currently considered one of the countries most contaminated with landmines and explosive remnants of war (ERW) in the world. The Government of Ukraine (GoU) estimates that 174,000km<sup>2</sup> (or nearly 29%) of Ukraine’s territory needs to be surveyed for contamination (GoU 20/04/2023; SIPRI 16/11/2023; HALO et al. 13/11/2023). Landmine contamination in Ukraine was already a concern even before the conflict started in 2014. The conflict escalation since February 2022 has resulted in the more widespread use of landmines and other explosive ordnance (EO), contaminating new territories, including agricultural regions in the south and east (LCMM 02/02/2011; HRW 13/06/2023; Ukrinform 25/05/2023; SIPRI 16/11/2023).

Russia’s armed forces have been extensively using antipersonnel mines (APMs) on Ukrainian territory. Russia has used at least 13 different APM types since 2014, including a recently developed variant with a sensor fuse that is exceedingly difficult to clear safely. Russian forces have also sown improvised mines upon retreating from occupied territory (HRW 13/06/2023 and 30/06/2023).

Ukraine also used APMs in 2022, specifically in Iziium city while it was under Russian control, but the Ukrainian authorities cleared some of the contamination soon after. In the same year, Ukraine disposed of several thousand pieces of EO, including landmines, and pledged to investigate its use of APMs (HRW 13/06/2023 and 30/06/2023).

Mines and EO pose a threat to civilian lives and wellbeing, causing injuries and deaths and preventing people from accessing infrastructure, homes, land, and roads (SIPRI 16/11/2023). According to Save the Children, in the year of conflict following the February 2022 escalation, approximately 12% of verified mine and EO casualties were children (STC 04/04/2023). The number of people in need of prosthetics since February 2022 is unavailable, but estimates suggest that at least 15,000 people have lost their limbs, with numbers continuing to grow (BBC 21/09/2023). Landmine contamination also contributes to agricultural losses (UCAB 22/03/2023; EPravda 07/03/2023). As at April 2023, 10% of agricultural land in Ukraine was contaminated, preventing the sowing of five million hectares of land (SIPRI 16/11/2023; Landlord 07/01/2023; KSE 08/2023).

### About the report

**Aim:** this report aims to improve awareness and understanding of the extent and impact of EO contamination in Ukraine, the response to it, and the challenges that responders are facing.

**Methodology:** this report is based on a secondary data review and analysis of the ACAPS Ukraine Access Events dataset and ACLED data, complemented by six key informant interviews conducted between August–September 2023 with responders in Chernihiv, Kharkiv, Mykolaiv, and Sumy oblasts.

**Limitations:** because this report uses secondary information, it is constrained by the limitations of those sources. This means ACAPS was only able to analyse incidents reported in existing datasets and sources. The interviews provided additional insights but were limited to the oblasts where the respondents were located. Information gaps remain for other contaminated areas not covered in this report, particularly those under Russian military control.

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## KEY FINDINGS

- Since the February 2022 conflict escalation, the number of EO casualties has significantly increased. There were nearly as many casualties between February 2022 and July 2023 as between 2014–2021 (OHCHR 07/07/2023 and 27/01/2022).
- EO contaminates 11 of Ukraine's 27 oblasts. In Kharkiv, Kherson, and Mykolaiv oblasts, contamination prevents access to agricultural lands and key transport routes. It also hinders humanitarians' ability to effectively reach affected populations, as EO presence along roads can limit the delivery of food, medicine, and shelter materials (OCHA 15/02/2023; OCHA, accessed 01/10/2023; KII 01/09/2023; KII 31/08/2023; KII 03/09/2023).
- More than ten million people in Ukraine live in areas in need of mine action assistance. As at October 2023, assistance had reached only around 845,000 of the three million targeted for the year (UNDP 10/05/2023; OCHA accessed 11/12/2023; Mine Action AoR accessed 13/12/2023; OCHA, Accessed 11/11/2023/).
- Populations living in areas not properly cleared of contamination, such as in Kharkiv, Kherson, and Mykolaiv oblasts, require temporary evacuation when information regarding areas to avoid is not clear (KII 01/09/2023; KII 02/09/2023).
- Humanitarian mine action responders face particular challenges in areas close to active hostilities where Ukraine has regained control, such as Kharkiv and Kherson, because of increased shelling and contamination upon the retreat of Russian troops (OCHA 15/02/2023).
- The lack of funding and demining experts deployed to Ukraine because of legal, bureaucratic, and financial hurdles hinders effective clearance (CSIS 08/06/2023). Current priority needs include clearance and EO risk education (GLOBSEC 04/04/2023; UNICEF 14/08/2023).
- Landmine contamination is expensive, affecting Ukraine's agricultural and dairy sectors with billions of USD in losses. Floating sea mines also block port exits, hindering goods exportation.
- Demining challenges include scope and scale, cost, certification, and access. Demining is expensive, and current efforts remain underfunded. Adequate funding could address these challenges (except access), the failure to attain which will significantly affect both people's safety and wellbeing and Ukraine's economy.

## DEFINITIONS

**Accreditation** pertains to when a designated mine action body provides status to a mine action organisation, formally recognising its competency to respond (IMAS, Accessed 30/11/2023).

**Clearance** involves tasks or actions ensuring the safe removal or destruction of all EO in a specified area to a specified depth or other parameter, as stipulated by the national mine action authority or designated tasking authority.

**Contaminated areas** are areas known or suspected to contain mines or EO (IMAS, Accessed 30/11/2023).

**Confirmed hazardous areas** are areas where evidence of contamination is established (IMAS, Accessed 30/11/2023).

**EO** includes landmines, **cluster munitions**, **unexploded ordnance (UXO)**, **abandoned ordnance (AXO)**, booby traps, and **improvised explosive devices (IEDs)**.

Note: UXO and AXO are also collectively referred to as **ERW** (IMAS, Accessed 30/11/2023).

**Humanitarian demining** involves mine action activities that lead to demining, such as technical surveys, mapping, clearance, and response coordination. Accredited NGOs, commercial companies, national teams, and military units can all perform demining (IMAS, Accessed 30/11/2023). The clearance process is complex and rigorous, involves large groups of experts, and culminates in land release (IMAS, Accessed 30/11/2023).

**Land release** is the process of removing all present and suspected EO through non-technical survey, technical surveys, or clearance leading to satisfactory decontamination (IMAS, Accessed 30/11/2023).

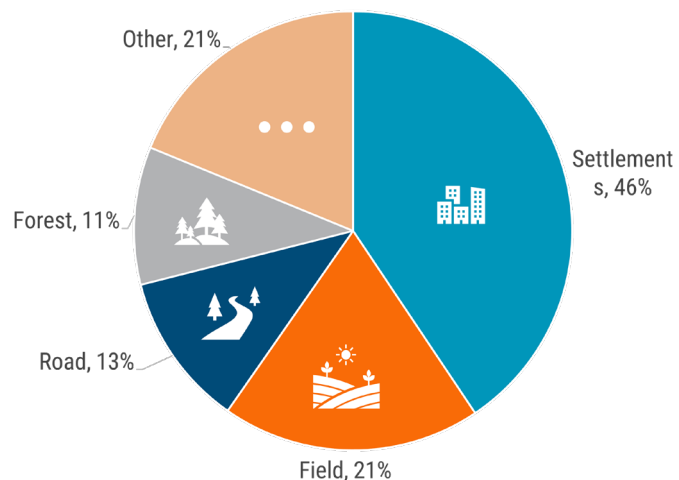
## SCOPE OF MINE CONTAMINATION

Landmines and other EO contaminate an estimated 174,000km<sup>2</sup> (or nearly 29%) of Ukraine’s territory (HALO et al. 13/11/2023; HSC 01/09/2023). Nearly 20% of Ukraine’s territory also remains under Russian control. Active hostilities in frontline areas and extremely constrained humanitarian access in areas under Russian control hinder proper contamination assessments (Reuters 02/06/2022; OCHA, Accessed 23/11/2023). Kharkiv, Kherson, and Mykolaiv are among the most contaminated oblasts. Other contaminated areas include Chernihiv, Donetsk, Kyiv, Sumy, and Zaporizhzhia (HALO et al. 13/11/2023; Suspihne 13/04/2023).

Most accidents occur in areas where Ukraine has regained control since September 2022. Between 1 September 2022 to 31 August 2023, 53% of civilians injured by EO were in Kharkiv oblast and 39% in Kherson oblast (ACLEd accessed 20/10/2023). The reason is that upon retreating, Russian troops mine streets, cars, forests, and residential buildings to slow down the advance of Ukrainian armed forces (Reuters 28/07/2023; HALO et al. 31/11/2023). Some accidents have also occurred in western Ukraine (DRC/Hi 08/08/2023; HALO et al. 31/11/2023).

From 1 September 2022 to 31 August 2023, most mine accidents occurred in residential areas (46%), followed by agricultural fields (21%), roads (13%), and forested areas (11%) (ACAPS accessed 11/10/2023). The deliberate targeting of residential and agricultural areas along with critical infrastructure (including health facilities) and roads affects the overall civilian wellbeing and safety and hampers agricultural production (HRW 13/06/2023).

Figure 1. Locations where most mine accidents occurred 1 September 2022 to 31 August 2023



Source: ACAPS’ Access Events Dataset (accessed 11/10/2023)

## Most affected regions by number of accidents



REGION	NUMBER OF ACCIDENTS	PERCENTAGE
Kharkivska	123	53%
Khersonska	68	29%
Mykolaivska	17	7%
Sumska	8	3%
Chernihivska	6	3%
Kyivska	4	2%
Donetska	3	1%
Luhanska	1	0%
Zhytomyrska	1	0%
Zaporizka	1	0%

Source: ACLEd (accessed 20/10/2023)

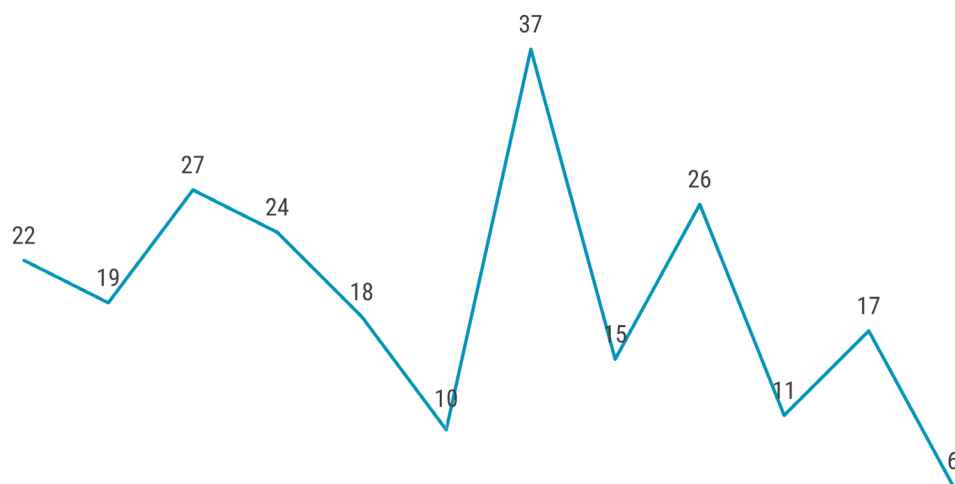
## IMPACT OF MINE CONTAMINATION

### Most affected groups and their needs

Rural populations, rescue workers, deminers, and humanitarian volunteers are among the groups most affected by contamination (KII 03/09/2023; KII 04/09/2023b). Men are most at risk, making up more than 80% of all casualties (DRC/HI 08/08/2023). Children are also at risk of injury or death should they step on a landmine or pick up part of a munition. Between February 2022 and August 2023, EO, including landmines, injured (8.7% compared to 3.3%) and killed (5.2% compared to 0.4%) more boys than girls (STC 04/04/2023; DRC/HI 08/08/2023).

Between February 2022 and July 2023, the number of reported civilian casualties from EO, including landmines, was almost the same as between 2014–2021. From 24 February 2022 to 1 July 2023, the UN OHCHR recorded over 900 civilian casualties, with 293 people killed and 612 injured (OHCHR 07/07/2023). From 2014–2021, it reported 1,242 casualties (OHCHR 27/01/2022).

Figure 2. Number of EO accidents monthly from September 2022 to August 2023



Source: ACLED (accessed 20/10/2023)

Most EO accidents (75%) recorded between February 2022 to August 2023 were from landmines (DRC/HI 08/08/2023). The highest number was from March 2023, coinciding with the start of seasonal sowing, land clearing, and electrical infrastructure repair (ACLED accessed 20/10/2023; DRC/HI 08/08/2023). Clearance technicians report that almost all agricultural fields near the frontlines are contaminated, leading to casualties among farmers (UHHRU 20/03/2023; SIPRI 16/11/2023). Driving over mines (22%), agricultural activity in contaminated fields (19%), and clearing contamination (18%) caused most casualties from 1 September 2022 to 31 August 2023.

Humanitarians often require military administrative support to deliver aid to civilians in border areas (KII 01/09/2023). There is a high need to secure safe routes for humanitarians to reach people in need, including in Chernihiv, Kharkiv, and Mykolaiv oblasts (KII 03/09/2023; KII 31/08/2023). Walking in residential areas and accessing critical infrastructure facilities is often unsafe given the presence of booby traps (KII 04/09/2023a).

The Kakhovka dam explosion amplified mine risks for Ukrainians residing in the area. It dislocated landmines and rendered them extremely difficult to find and remove after getting buried under soil and debris or stuck in fields, gardens, and roads. Mines laid during the Second World War also resurfaced once the floodwater receded (Reuters 07/06/2023 and 08/06/2023).

### Identified priority needs include the following:

- More demining personnel and equipment (KII 31/08/2023; KII 01/09/2023; KII 02/09/2023; KII 03/09/2023; KII 04/09/2023 a; KII 04/09/2023 b).
- Visual information, such as maps of contaminated areas to avoid. Such information is currently unavailable to the public because of conflict-related security concerns. The absence of such information and the lack of necessary demining personnel require the temporary evacuation of people in some of the most contaminated areas, such as Izium city in Kharkiv oblast, to prevent potential casualties (KII 04/09/2023 a; KII 02/09/2023).
- Support ensuring a steady supply of goods and safe transportation. People are in need of food, wood for heating, shelter materials, and other essential daily products, along with safe transportation to essential services, such as medical facilities.
- Activities for children to prevent them from wandering into high-risk areas (KII 31/08/2023; KII 01/09/2023; KII 03/09/2023; KII 04/09/2023 b).
- Prioritisation of demining routes for humanitarians to access people in need in contaminated areas (KII 03/09/2023).
- Employment opportunities and financial assistance. Because of the disruptive impact of contamination on key livelihoods, such as agriculture, people in affected areas require

additional financial support. This is especially true in border areas, such as Sumy oblast, where insecurity prevents decontamination within 20km of the border (KII 01/09/2023). More than ten million people in Ukraine require mine action assistance, including to help them restore their livelihoods (DRC Accessed 01/10/2023; Mine Action AoR accessed 13/12/2023).

- Financial assistance for mine and EO accident survivors for support during recovery, unemployment through and after rehabilitation, and livelihood restoration. Cash assistance available through the Ministry of Social Policy is a one-time payment intended to support recovery only (GoU accessed 18/12/2023; DRC/HI 08/08/2023).
- Additional support to IDPs and people returning to their places of origin who likely lack knowledge about where EO, including landmines, is located and who may be forced to lodge in abandoned and mined residential complexes (OCHA 15/02/2023).
- Winterisation assistance. During winter, contamination poses a high physical safety risk for people seeking firewood to heat their houses. Russian military attacks affect even houses with electrical heating since the targeting of energy infrastructure disrupts home heating and electricity systems (KII 31/08/2023). Snow and ice also make it more difficult for people looking for firewood to visually detect landmines or EO (ICRC 02/12/2022). Mine contamination also impedes the swift repair of critical infrastructure, such as water pumping stations (UNHCR 02/04/2019).
- Medical care. The large-scale destruction of healthcare facilities and high contamination levels, especially in areas previously under Russian military control, severely impede the healthcare system (MSF 23/03/2023; Reuters 28/07/2023). An increasing number of injuries do not receive proper medical care. EO contamination has also created a demand for specialised medical professionals, but the conflict makes it difficult to attract specialists to conflict-affected areas, transport necessary equipment, and conduct training on its use (MSF 23/03/2023).
- Prosthetics. The loss of limbs from EO accidents is common (HRW 31/01/2023; BBC 21/09/2023). The number of people in need of prosthetics since the 2022 escalation is unavailable, but estimates suggest that at least 15,000 people have lost limbs, and the numbers grow with the continued hostilities (BBC 21/09/2023).
- Mine safety awareness in education. In 2023, the GoU began implementing an online mine safety course co-developed by UNICEF and the Ministry of Education and Science of Ukraine, designed for primary and secondary schools (Mine Action Center 20/08/2023; UNICEF 03/08/2022). Other organisations and UN agencies also conduct mine safety awareness, but more is needed (UNDP 10/05/2023).

## Impact on food security and agriculture

As at April 2023, the conflict had contaminated 10% of agricultural land in Ukraine, halting the sowing of five million hectares of land. Farmers close to active ground conflict and areas previously controlled by Russia require funding to carry out clearance activities on their lands (SIPRI 16/11/2023; Landlord 07/01/2023; KSE 08/2023).

In 2023, the GoU prioritised 470,000 of 2.6 million hectares of contaminated agricultural land across Cherkasy, Chernihiv, Dnipropetrovsk, Kharkiv, Kherson, Kyiv, Mykolaiv, Sumy, and Zaporizhzhia oblasts for demining (ME 05/04/2023). Another six million contaminated hectares remained under Russian military control as at 7 March 2023. Clearance does not guarantee the return of farmers to work, as the land also needs to be levelled and recultivated to restore soil fertility (UCAB 22/03/2023; EPravda 07/03/2023).

Landmine contamination is expected to continue affecting the already conflict-afflicted economy. Each year of land inactivity could result in production losses totalling USD 800 million (UCAB 22/03/2023; EPravda 07/03/2023). By mid-2023, agricultural damage alone amounted to USD 4.3 billion, while replacing and repairing damaged machinery cost USD 926 million (The HALO Trust 19/06/2023).

Dairy farms in contaminated areas struggle to afford demining, resulting in production losses. According to the Ukrainian Milk Production Association, dairy farms in areas previously under Russian control lost between 30–70% of their livestock from March and December of 2022. Kharkiv oblast alone lost half of its dairy farms (Ukrinform 17/04/2023).

Floating sea mines also challenge the exportation of goods from Ukraine's ports (Euronews 11/06/2022). Sea mines interfere with port approaches, and sunken barges block port exits. The presence of sea mines also poses a risk of grain-carrying ships exploding as they leave ports, affecting global food supply chains (The Guardian 09/08/2023).

## MINE LEGISLATION COMPLIANCE

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Ukraine is party to the 1997 Mine Ban Treaty that bans APMs and to the 1980 Convention on Certain Conventional Weapons and its Amended Protocol II on landmines and Protocol V on ERW, covering unexploded artillery shells, airdropped bombs, grenades, and cluster munitions (HRW 15/06/2022).

Russia is not a signatory to the 1997 Mine Ban Treaty but is bound by the provisions of the Amended Protocol II of the UN Convention on Certain Conventional Weapons and the First Additional Protocol to the Geneva Convention prohibiting deliberate, indiscriminate, and disproportionate civilian attacks (HRW 15/06/2022).

Russian forces have used at least 13 APM types in Ukraine since 2022. With the indiscriminate nature of mines, their extensive use by Russia in the conflict is considered a violation of its obligation under international law (HRW 13/06/2023; ICBL 14/11/2023). Russian troops have also planted victim-activated booby traps when retreating from areas under their control (HRW 31/01/2023). These booby traps can operate as APMs if a person unintentionally activates the fuse and detonates the mine mechanism.

Both Russia and Ukraine have used at least 13 different anti-tank mines during the conflict to damage or destroy vehicles, including tanks and armoured vehicles (HRW 13/06/2023). Ukraine's army has also fired rockets with APMs into Russian-controlled areas and near Russian military facilities in Iziom city, Kharkiv oblast. This is a direct violation of the 1997 Mine Ban Treaty (HRW 31/01/2023).

The Ukrainian authorities cleared some of the contamination soon after their use and, as at the end of 2022, had disposed of several thousand pieces of EO, including landmines. They have also pledged to investigate the use of APMs (HRW 13/06/2023 and 30/06/2023).

## MAIN CHALLENGES

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Demining is an integral part of economic recovery. Clearance continues, but active hostilities and the presence of Russian troops, along with insufficient demining experts, prevent larger-scale activities from being carried out. A best-case scenario estimates several more decades of clearance, even with additional national and international mine action responders and innovative technology accelerating the process (ME 05/04/2023; UNDP 11/10/2023; The Kyiv Independent 11/04/2023; HSC 01/09/2023).

**Scope of contamination:** the GoU estimates that 174,000km<sup>2</sup> of Ukraine's territory needs to be surveyed for contamination (GoU 24/04/2023; SIPRI 16/11/2023; HALO et al. 13/11/2023). As at 10 May 2023, mine action responders in humanitarian demining had cleared approximately

580,000m<sup>2</sup> (less than 1km<sup>2</sup>) (UNDP 10/05/2023). As at 14 December 2023, Ukraine's Ministry of Defence had cleared 2,600km<sup>2</sup>, with another 45,000km<sup>2</sup> estimated to be accessible for humanitarian demining on the same day (Korrespondent, Accessed 14/12/2023).

**Cost:** clearance is expensive. According to the GoU, clearance costs between USD 2–8 per square metre or about USD 37.4 billion in the next ten years (UN 08/07/2023; Suspilne 27/09/2023). The GoU depends on international financial assistance for demining, as the state budget deficit has increased since the 2022 full-scale invasion, reaching 20% of the country's GDP in 2023 (GLOBSEC 04/04/2023; Wilson Center 12/12/2023). Clearance efforts are underfunded and underresourced (CSIS 08/06/2023; OCHA 15/12/2023). Only 24% of all the funding needed for humanitarian mine action was provided in 2022 (OCHA 15/02/2023). As at 2023, tariffs for private demining operators ranged between USD 650–4,050 per hectare and are a significant financial burden for affected farmers (Ukrinform 17/04/2023; EPravda 02/10/2023).

**Certification and standards:** all clearance operators must follow international mine action standards and are subject to additional certification from the GoU. The process takes between 6–12 months (EPravda 07/03/2023; GLOBSEC 04/04/2023). Humanitarian demining generally ends in land release, but in Ukraine, responders must undergo an additional step requiring government inspection, which severe staff shortages within the inspection authority can delay. In 2023, the Interagency Working Group on Humanitarian Demining simplified permits for explosive work in demining during martial law and adopted a measure to speed up the government certification process for mine action responders (IMAS, Accessed 30/11/2023; GLOBSEC 04/04/2023).

**Access constraints:** newly accessible areas have a higher demand for clearance efforts to secure access for humanitarian activities and to aid early recovery, including the safe management of mine risks during rubble cleaning and reconstruction efforts (OCHA 28/12/2022; GLOBSEC 04/04/2023). Active hostilities continue to challenge clearance activities and access to border areas.