

# Thematic Report: A review of how flooding can exacerbate civilian vulnerabilities to the ERW threat in Yemen

August 2022

In March 2022, the conflict in Yemen entered its eighth year. Years of hostilities across the country have brought with them the enduring threat posed by explosive remnants of war (ERW). ERW, including landmines, UXO and IEDs, have resulted in thousands of civilian casualties in Yemen since the start of the conflict.

One environmental factor known to exacerbate the ERW threat in war-afflicted countries across the world is flooding, due to issues including devices drifting, warning signs being washed away, and populations being displaced into unsafe areas. With two rainy seasons each year, this threat is also pertinent in Yemen. This report provides an overview of the geographic spread of the ERW threat in Yemen. The report then discusses how heavy rainfall during the country's rainy seasons could heighten this threat, and highlights specific civilian vulnerabilities to the ERW threat in Yemen, including IDPs and children. Civilians living in IDP sites that are located in districts facing a high risk of both ERW and flooding are assessed to be especially vulnerable.

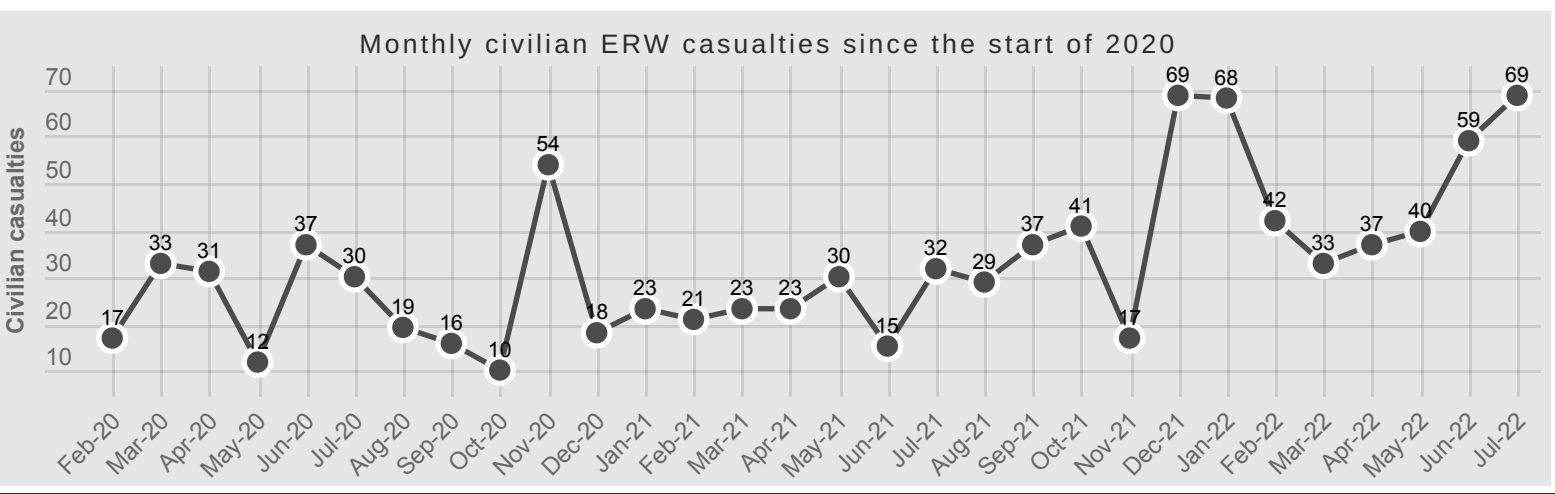
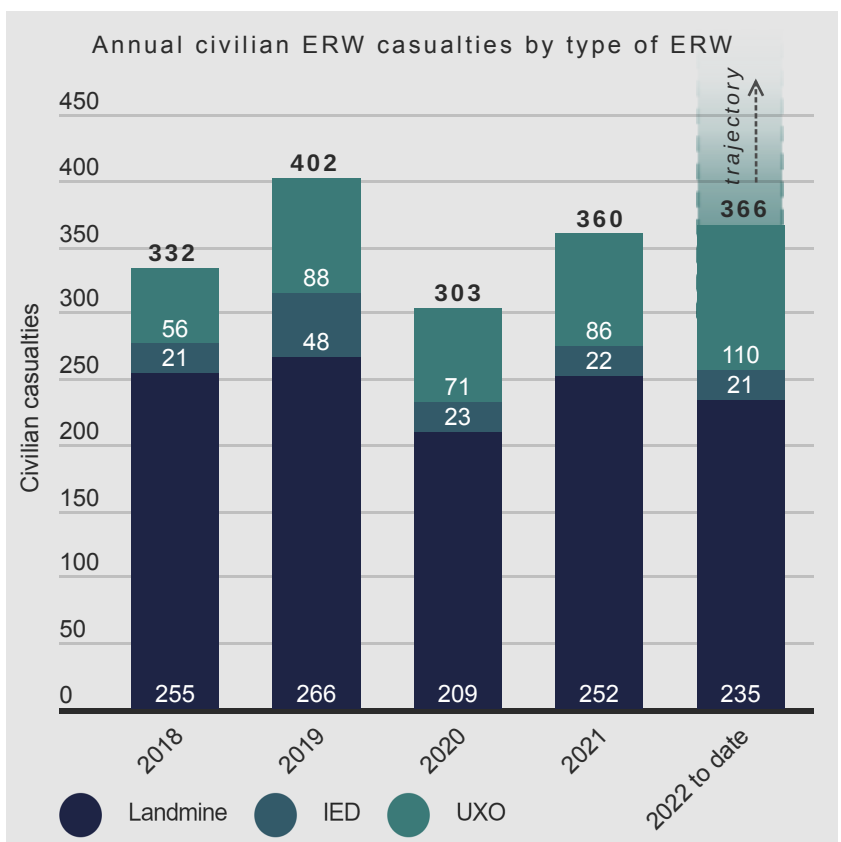
Please note, all information and numbers included in CIMP reporting are based on information publicly available in open sources, and have not been independently verified. Data correct as of 17 August 2022.

## Overview

Since CIMP commenced at the start of 2018, ERW has resulted in 1,763 reported civilian casualties, including 712 fatalities. Civilian casualties dropped in 2020, but the numbers rose again in 2021, with 360 civilian casualties reported on account of ERW, up 19% from the year before. Moreover, with 366 civilian ERW casualties already having been reported in the first half of 2022, the annual total is set to be the highest on CIMP records. The monthly average number of civilian ERW casualties to date in 2022 is 50, 43% higher than the 2021 monthly average of 35.

Landmine incidents have been responsible for the highest numbers of ERW casualties since the start of 2018, at 1,217, accounting for 69% of the total, followed by 411 civilian UXO casualties, and 135 IED casualties.

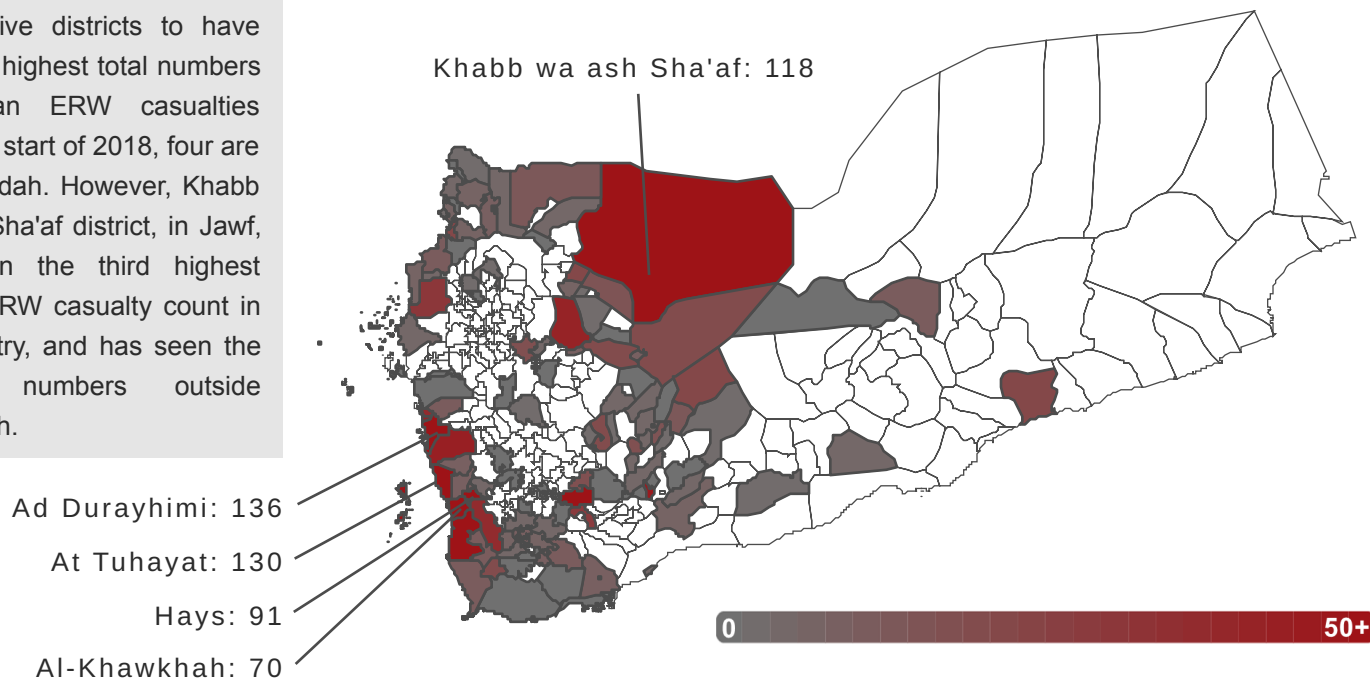
It should be noted that the IED casualty figures include only those as a result of incidents understood to have been the result of remnant improvised devices detonating, and exclude civilian casualties as a result of targeted IED attacks, such as civilian bystanders who have been injured as a result of IED attacks targeting security personnel, sites and vehicles.



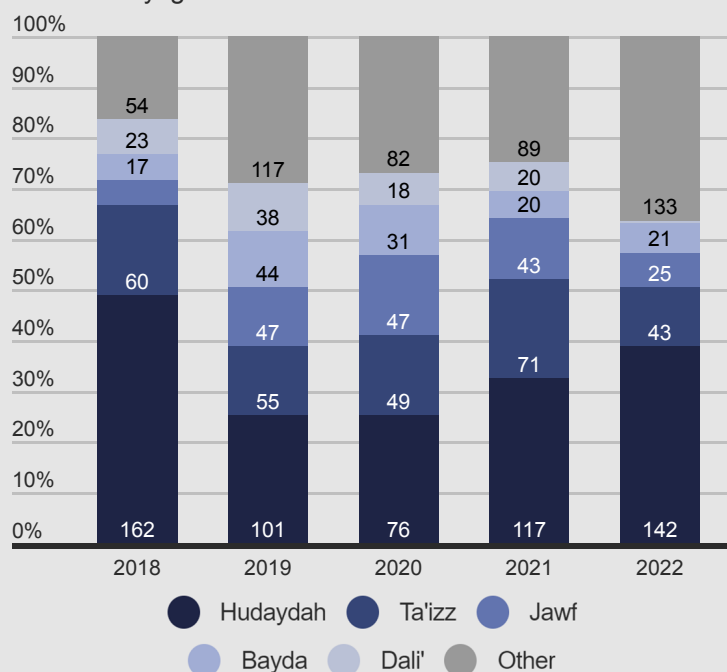
# The geography of the ERW threat in Yemen

Heatmap to show number of civilian ERW casualties reported in each district since the start of 2018

Of the five districts to have seen the highest total numbers of civilian ERW casualties since the start of 2018, four are in Hudaydah. However, Khabb wa ash Sha'af district, in Jawf, has seen the third highest civilian ERW casualty count in the country, and has seen the highest numbers outside Hudaydah.



Proportion of civilian ERW casualties by governorate on an annual basis



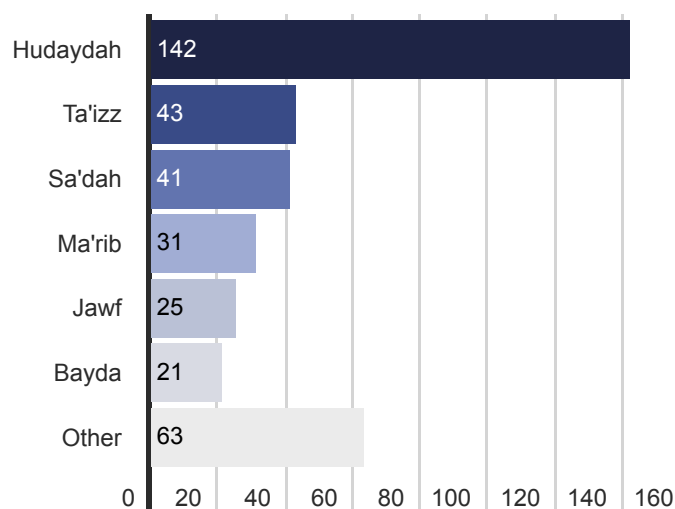
Since the start of 2018, governorates hosting active or recently active frontlines have typically seen the highest civilian ERW casualty numbers. Hudaydah has consistently seen among the highest numbers of civilian ERW casualties in the country, totaling 598 since the start of 2018. Ta'izz has seen 278 civilian ERW casualties in the same time period, while Jawf, Bayda and Dali' have each seen more than 100 civilian ERW casualties.

In the frontline areas, the majority of ERW incidents reported are on account of UXO and landmines. Hudaydah, Ta'izz, Jawf and Bayda have seen the highest numbers of civilian casualties reported as a result of landmine incidents, while the highest UXO casualty numbers have been recorded in Hudaydah, Sa'dah, Sana'a and Ma'rib.

The IED threat, meanwhile, appears more prevalent in urban areas such as Aden, Ta'izz and Al-Mukha cities, as well as in flashpoints in several of the southern governorates.

Since the start of 2022, the five governorates to have seen the most civilian ERW casualties are Hudaydah, Ta'izz, Sa'dah, Ma'rib and Jawf, with Hudaydah seeing exponentially higher numbers; of the 598 civilian ERW casualties to have been reported in Hudaydah since the start of 2018, 185 (31%) have been in the nine months since the frontlines in the governorate shifted in November 2021. The 142 civilian casualties reported in Hudaydah so far in 2022 already exceeds the 2021 annual total of 117. In Sa'dah, numbers have already more than doubled from 2021, when 18 civilian ERW casualties were reported in the governorate. Another to have seen an increase is Ma'rib, where the 31 civilian ERW casualties reported so far this year constitutes a third of the total 92 civilian ERW casualties recorded in the governorate since the start of 2018.

2022 ERW casualties by governorate

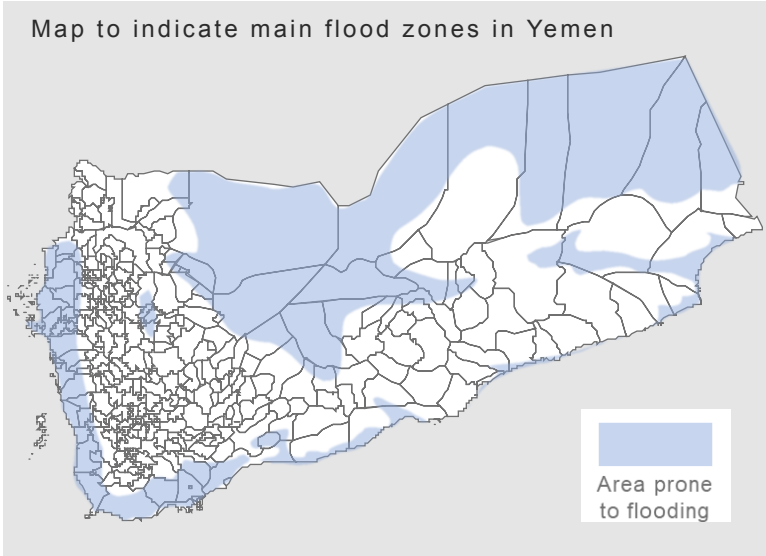


The flood risk in Yemen is likely to exacerbate the ERW threat, particularly for IDPs

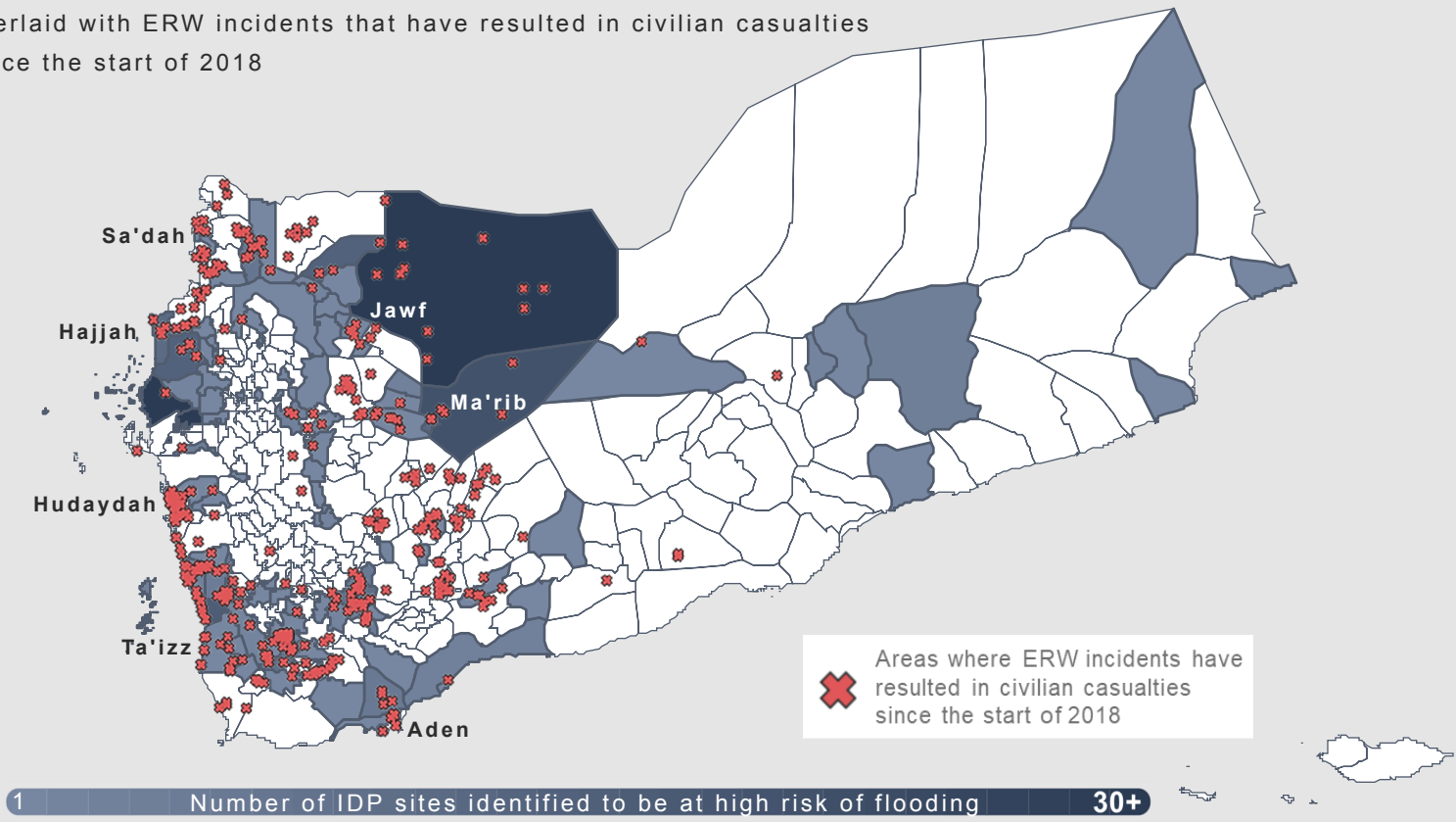
Yemen has two rainy seasons, the first of which occurs from April to May each year, and the second from July to September. Flash flooding is a frequent occurrence, particularly when the rains fall on hard ground after prolonged periods of dry weather. Areas that are typically susceptible to flooding in Yemen include low-lying coastal plains, areas of open, sparsely-vegetated desert, and steep valleys in mountainous areas, which are also vulnerable to rainfall-induced landslides and mudslides.

Flooding can exacerbate the ERW threat in a number of ways, not least through causing devices to drift and shift. For example, devices may move through saturated ground, be carried in mudslides, landslides and flash floods, or be swept into waterways, along which they can drift for several kilometres while remaining active, particularly in areas where devices have been planted or fallen close to rivers.

The western coastal zone, including western parts of Hajjah, Hudaydah, Ta'izz and Lahij, and central and northern parts of Yemen, including large swathes of Ma'rib, Jawf and Shabwah, are all susceptible to flooding. The southern coastal zone, predominantly Aden, but also parts of Abyan, Shabwah, Hadramawt and Mahrah, also face a high flood risk. Many of the floodzones also correspond with frontline areas, and therefore also with areas already facing a heightened ERW threat.



Heatmap to show number of IDP sites in each district assessed to be at high risk of flooding, overlaid with ERW incidents that have resulted in civilian casualties since the start of 2018



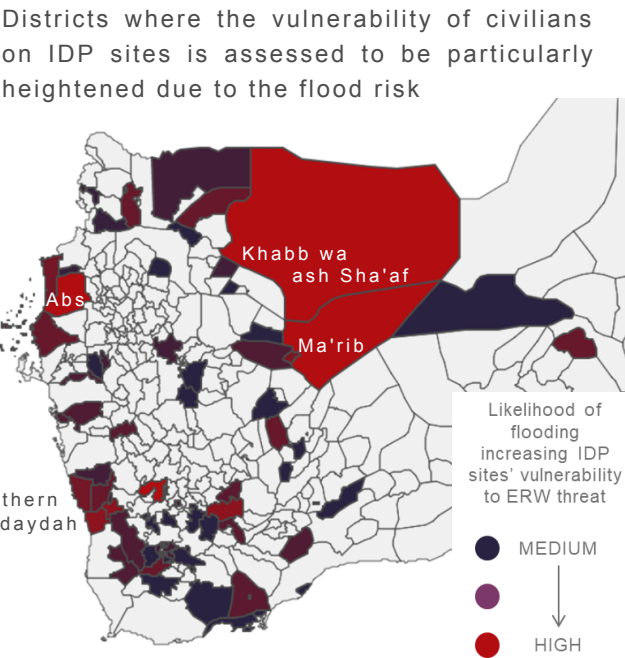
Across Yemen, 428 IDP sites have been identified as facing a high risk of flooding, across 96 districts, in 19 governorates. These sites are estimated to host 68,270 households, totaling 383,590 individuals (CCCM Cluster). Over a quarter of the districts in the country host IDP sites that are at high risk of flooding. When compared to the district-level heatmap of civilian ERW casualties on the previous page, it is swiftly apparent that many of these districts also face a significant ERW threat. Of the 96 districts hosting high-flood-risk IDP sites, over half (53) have seen reports of civilian ERW casualties since the start of 2018, resulting in 932 civilian casualties.

53% of civilian ERW casualties on CIMP records have been reported in districts that are also hosting IDP sites that are assessed to be at high risk of flooding. Moreover, since the start of 2022, 20 districts hosting high-flood-risk IDP sites have seen reports of ERW casualties, resulting in 149 casualties. Due to the overlap between areas consistently seeing reports of civilian ERW casualties while also hosting IDP sites at high risk of flooding, the ERW threat may be particularly exacerbated for IDPs, as explored on the next page.

IDPs face heightened vulnerability to ERW incidents, especially in high flood risk areas

Although not always specified in open source reporting, at least 50 IDPs have been among the civilian ERW casualties on CIMP records. This number is likely to be significantly higher in reality. IDPs' vulnerability to ERW is heightened for several reasons:

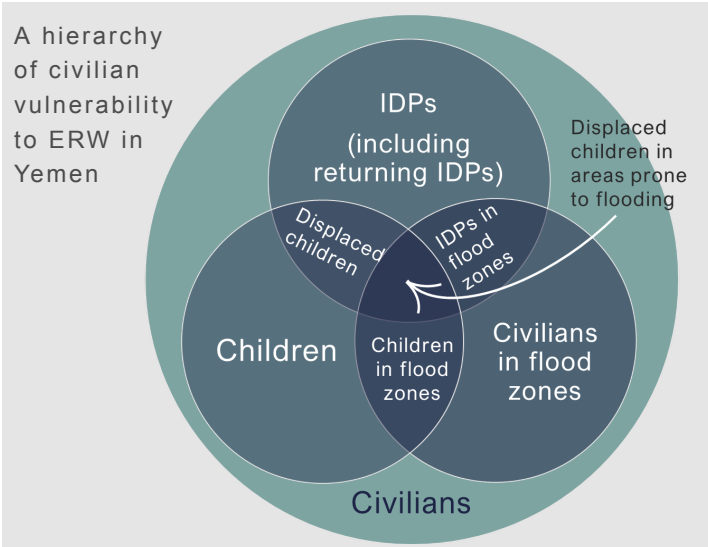
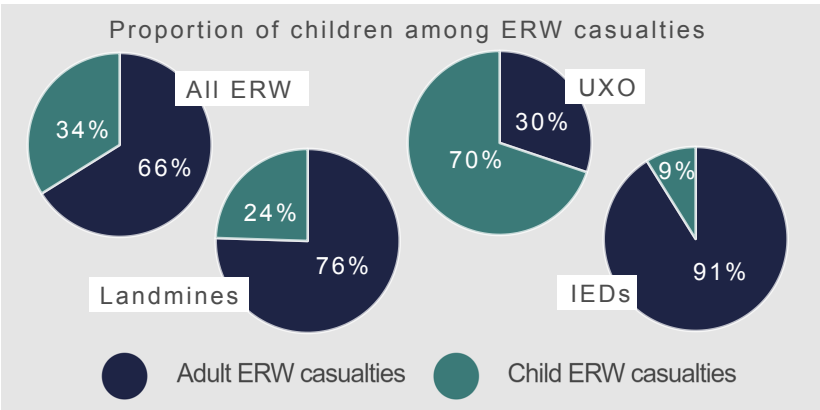
- IDPs may have limited awareness of any possible ERW risk in areas they have been displaced to, compared to local inhabitants who are likely to have greater familiarity with the threat landscape, areas to avoid, safe routes, and actions to take upon encountering unfamiliar devices.
- Floods may also drive further displacement, due to damage to homes and property, forcing people to relocate to areas where the risk is unknown. Temporary shelters, such as those on IDP sites, are likely to be more susceptible to flood damage, increasing the likelihood of IDPs having to relocate again, risking increasing susceptibility to negative coping mechanisms due to loss of livelihoods, loss of livestock, and the breakdown of social fabric and community cohesion.
- Limited resources and space may result in IDP sites being established in areas far removed from basic services and infrastructure, including education, which may result in less exposure to awareness-raising material regarding the ERW threat. Moreover, a lack of alternatives may see IDPs relocate to areas that are more prone to landslides, mudslides and flash floods, which may place them at greater risk of ERW incidents, or of further relocation.
- Globally, it is not uncommon for civilians to mark areas known or suspected to be contaminated by ERW, particularly in the absence of official identification. However, if informal markings established by local communities are washed away by heavy rains and flooding, anyone unfamiliar with the area, such as IDPs, will be at a greater disadvantage.
- Those who are displaced, whether as a result of conflict or natural disaster, may be forced to move through potentially dangerous areas; there are at least three instances on CIMP records of IDPs being killed and injured in ERW incidents while fleeing from hostilities.



A third of civilian ERW casualties have been children, who are disproportionately vulnerable to UXO

Over a third (34%) of all civilian ERW casualties on CIMP records have been children, totalling 597, including 199 fatalities. The five districts to have seen the highest child ERW casualties are all in Hudaydah.

The proportion of children among the casualties is significantly greater for UXO incidents specifically. Of 411 civilian UXO casualties reported in Yemen over the past four and a half years, almost three quarters (287, 70%) have been children. By contrast, 24% of civilian landmine casualties on CIMP records have been children.



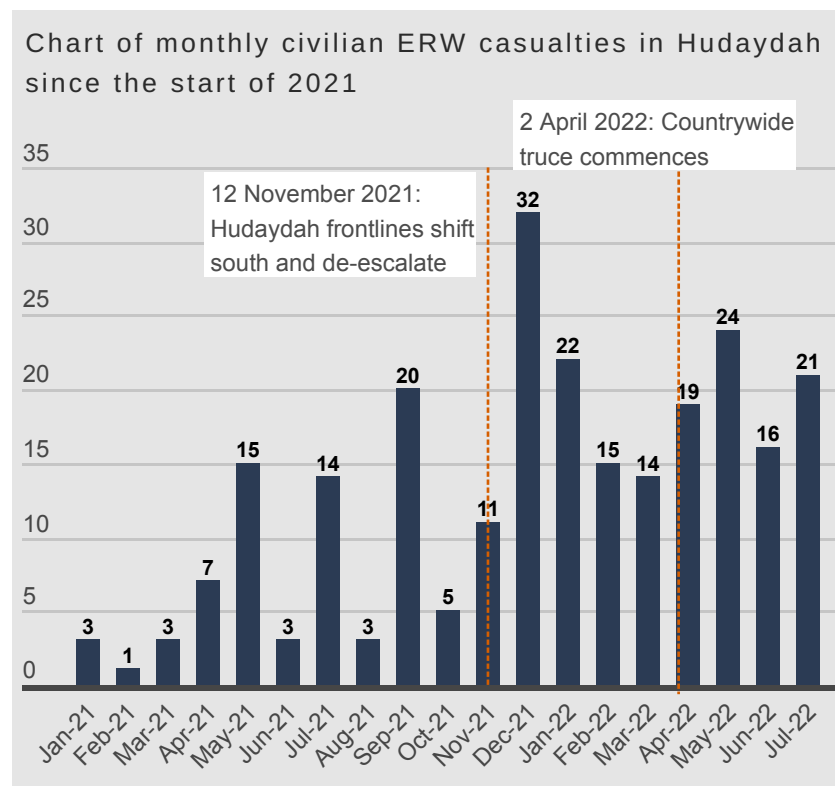
Children appear to be at heightened risk from UXO, likely due to greater mobility, including in less well-trodden areas which are less likely to have been cleared, coupled with a generally more inquisitive nature and therefore higher propensity to tamper with unfamiliar devices. These are compounded by a lack of awareness of the threat. Reporting indicates that some situations during which children have been exposed to the ERW threat include while they have been playing, while collecting firewood, and while tending to livestock, predominantly in rural areas. There have also been a number of instances of children being impacted while travelling with adults in cars and on motorbikes.

As a high proportion of IDP site residents are children, children on IDP sites in areas facing both a high flood risk and a high ERW risk are likely to be a particularly high-risk group, especially those facing limited access to education as a result.



## Case Study 1: Hudaydah

In December 2018, following an offensive that pushed rapidly north up the west coast, displacing thousands, the Hudaydah Agreement entered into force. The frontlines became fixed in place, but despite the accompanying ceasefire, intermittent hostilities persisted in all frontline areas in the governorate, including on the outskirts of Hudaydah city, and along the lines of control to the south, in Bayt Al-Faqih, Ad Durayhimi, At Tuhayat and Hays districts, driving further displacement. However, almost three years later, in November 2021, a sudden withdrawal saw fighting de-escalate as the frontlines shifted to the south of the governorate, enabling IDPs to start returning, particularly to areas on the outskirts of Hudaydah city. Since then, however, numbers of civilian ERW casualties have risen significantly.



December saw the highest monthly civilian ERW casualty count in Hudaydah on CIMP records, at 32. It appears the ERW threat increased in the governorate as the November shift in frontlines and de-escalation facilitated heightened mobility among civilians, including former IDPs, by giving people greater confidence to return to areas where hostilities had deescalated, but which remained contaminated with ERW. The start of the countrywide truce in April 2022 may have further added to this, with 51 civilian ERW casualties reported in Hudaydah during the first three months of the year, rising to 61 in the three months after the truce started. Since the November shifts, 185 civilian ERW casualties have been reported in the governorate, including 49 in Hudaydah city, 45 in At Tuhayat and 35 in Hays.

In a governorate already seeing the highest numbers of ERW casualties in the country, the additional risk flooding may pose is particularly pertinent, especially given both the former and current frontline areas overlap with areas deemed to be at high risk of flooding; tens of thousands of families are reported to have been impacted in the latest floods, including in the coastal lowlands in Hudaydah.

## Case Study 2: Southern Jawf and Northern Ma'rib

For years, the Ma'rib frontlines have seen among the fiercest hostilities in the country. Ma'rib hosts more IDPs than any other governorate in Yemen, and as fighting escalated in 2021, pushing towards Ma'rib city, frontlines came close to several IDP sites, in some cases subsuming them; at least 12 sites were impacted directly by armed violence, predominantly in Sirwah and Ma'rib districts, increasing the risk of ERW contamination in those areas. Moreover, of 198 IDP sites across the governorate, 41 are at high risk of flooding. In April 2022, over 1,000 IDPs were impacted by torrential rain and ensuing flash floods that hit IDP sites in Ma'rib, sweeping away tents and leaving inhabitants without shelter. The second rainy season brought heavier rains, more widespread flooding, and more severe implications for the IDP population. At least 10,000 people were displaced by flooding in Ma'rib and parts of Jawf during the rains of July 2022, and as many as 16,700 IDP households were impacted in Ma'rib.

Hostilities in central Yemen have also pushed large numbers of IDPs across the border from Ma'rib into Jawf, where Khabb wa ash Sha'af district alone hosts another 57 IDP sites, 41 of which (home to over 24,000 inhabitants) are deemed to be at high risk of flooding. Moreover, throughout 2021, sporadic hostilities were reported between the warring parties near the border with Ma'rib. Amid the latest rains, there were reports of remnant active devices being washed into residential and agricultural areas, as well as being swept across the unpaved desert roads between the two governorates, prompting warnings to be issued to truck drivers in the area by local authorities. Throughout 2021, Khabb wa ash Sha'af saw more civilian ERW casualties than any other district, at 37, the majority of whom were reported along the unpaved desert roads, particularly near the frontlines.

So far in 2022, although not as high as Hudaydah, Ma'rib and Jawf have seen the fourth and fifth highest number of civilian ERW casualties per governorate at 31 and 25 respectively. **In the aftermath of weeks of torrential rain, the ERW threat in northern Ma'rib and southern Jawf is likely to be significantly heightened, with recently flooded IDP sites in the area, and IDPs who have been forced to again relocate, especially vulnerable.**



The Civilian Impact Monitoring Project is a service under the Protection Cluster for the collection, analysis and dissemination of open source data on the civilian impact from armed violence in Yemen, to inform and complement protection programming.

For more information, please visit  
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