THE HUMANITARIAN AND DEVELOPMENTAL IMPACT OF ANTI-VEHICLE MINES

GLOBAL MAPPING AND ANALYSIS OF ANTI-VEHICLE MINE INCIDENTS IN 2018

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Global mapping and analysis of anti-vehicle mine incidents in 2018, GICHD–SIPRI, Geneva, June 2019
ISBN: 978-2-940369-76-8

This publication was supported by Irish Aid, Department of Foreign Affairs and Trade of Ireland. The ideas, opinions and comments therein are entirely the responsibility of its authors and do not necessarily represent or reflect Irish Aid policy.

GLOBAL MAPPING AND ANALYSIS OF ANTI-VEHICLE MINE INCIDENTS IN 2018

KEY FINDINGS

199 incidents

↗ 18% increase compared with 2017

related, or suspected to be related, to AVMs in

23 states and territories

569 casualties

↗ 17% increase compared with 2017

On average

2.9 casualties per incident

343 were injured

226 were killed

53% of casualties were civilians

- In 2018, the GICHD and SIPRI recorded 199 incidents related, or suspected to be related,[1] to anti-vehicle mines (AVMs)[2] in 23 states and territories, an increase of 18 per cent compared with 2017. These incidents caused a total of 569 casualties[3] including 343 injured and 226 killed, an increase of 17 per cent in comparison with the previous year.

- Yemen, Mali, Ukraine and Pakistan were the four states with the most recorded AVM incidents in 2018, followed by Chad, *Western Sahara*[4] and Cambodia. Yemen and Mali alone account for 64 per cent of total incidents globally. Despite the reduced number of incidents in 2019, Ukraine still features among the top three affected states for the fourth consecutive year.

- Mali, Yemen, Pakistan and Ukraine were the states with the highest number of casualties, representing 82 per cent of global numbers in 2018. Mali recorded the highest number with 254 casualties.

- In 2018, almost half of the casualties in AVM incidents with civilian vehicles died. Conversely, the lethality ratio of incidents with non-civilian vehicles (ratio of those killed to overall casualties) was 32 per cent. The lethality ratio of incidents involving civilian, humanitarian, national security force and other combatant-related vehicles was significantly higher than in 2017.[5] In contrast, no fatalities were recorded for incidents with peacekeeping and international security force vehicles.[6]

Mali, 2017

ACKNOWLEDGEMENTS

The GICHD and SIPRI wish to extend sincere thanks to their internal reviewers as well as all partner organisations that responded to the survey and provided data, in particular:

- United Nations Children's Fund
- United Nations Development Programme
- United Nations Human Rights Monitoring Mission in Ukraine
- United Nations Mine Action Service
- Organization for Security and Co-operation in Europe Special Monitoring Mission to Ukraine
- Action on Armed Violence
- Ambassadors for Development without Borders
- APOPO
- "Dales voz a las víctimas" platform
- Deminers Concept Nigeria Ltd.
- Landmine Monitor
- Mines Advisory Group
- Norwegian People's Aid
- Norwegian Refugee Council
- Peace Sharing Association/Korean Campaign to Ban Landmines
- Sustainable Peace and Development Organization, Pakistan
- Syrian Network for Human Rights
- The HALO Trust
- To Be Foundation for Rights & Freedoms, Yemen

The following mine action programmes and ministries also provided valuable responses and data:

- Albanian Mines and Munitions Coordination Office
- Azerbaijan National Agency for Mine Action
- Bosnia and Herzegovina Mine Action Centre
- Cambodian Mine Action and Victim Assistance Authority
- Center for Humanitarian Demining and Expertise, Armenia
- Centre national d'action antimines au Sénégal
- Centro Peruano de Acción contra las Minas Antipersonal
- Comisión Nacional de Desminado Humanitario, Chile
- Comissão Nacional Intersectorial de Desminagem e Assistência Humanitária, Angola
- Direction de l'Action Humanitaire contre les Mines et Engins non explosés, Burundi
- Dirección para la Acción Integral contra Minas Antipersonal - Descontamina Colombia
- Directorate of Mine Action Coordination, Afghanistan
- Department for Non-Proliferation and Arms Control, Ministry of Foreign Affairs, Russian Federation
- Directorate for Mine Action, Iraq
- Haut Commissariat National de Déminage, Chad
- Iraqi Kurdistan Mine Action Agency
- Kosovo Mine Action Centre
- Lebanon Mine Action Center
- Ministry of Defence, Cameroon
- Ministry of National Defence, Algeria
- National Mine Action Center, Sri Lanka
- Palestine Mine Action Centre
- Sahrawi Mine Action Coordination Office
- South Sudan National Mine Action Authority
- STC Delta, Georgia
- Sudan National Mine Action Center
- Thailand Mine Action Center
- The National Committee for Demining and Rehabilitation, Jordan
- Yemen Executive Mine Action Centre
- Zambia Mine Action Centre
- Zimbabwe Mine Action Centre

BACKGROUND

PURPOSE AND OBJECTIVES

A study on the humanitarian and developmental impact of AVMs, jointly conducted by the GICHD and SIPRI in 2014, indicated the clear need for more systematic data collection on AVM incidents.[7] Since 2015, the two organisations have been collecting global data on AVM incidents with the aim of increasing evidence for and identifying trends in the direct humanitarian impact of AVMs.

This report summarises data and analyses of AVM incidents in 2018. It follows up on similar reports published by the GICHD and SIPRI examining AVM incidents in 2015, 2016 and 2017.[8] This collection of data over four consecutive years allows for an initial comparative analysis of, and identification of trends in, the humanitarian impact of AVMs on a global scale. The report also contains several case studies placing AVM impact in its specific context. Detailed and geo-referenced data for each incident are available on interactive online maps.[9]

Mali, 2018

The purpose of this report is to shed light on incidents and casualties related or suspected to be related to AVMs. Recorded incidents in a state or territory do not imply any conclusion whatsoever on the origins of devices, and on the perpetrator, period and intention of such mine laying (see methodology in Annex 1).

RESEARCH METHODOLOGY

This document draws on field reports provided by states, mainly national mine action authorities/centres, as well as mine action and other humanitarian organisations. Media reviews were conducted in Arabic, English, French, Portuguese, Russian, Spanish, Ukrainian and Urdu, to complement these reports.

FIGURE 1 SOURCES OF AVM INCIDENTS[10]

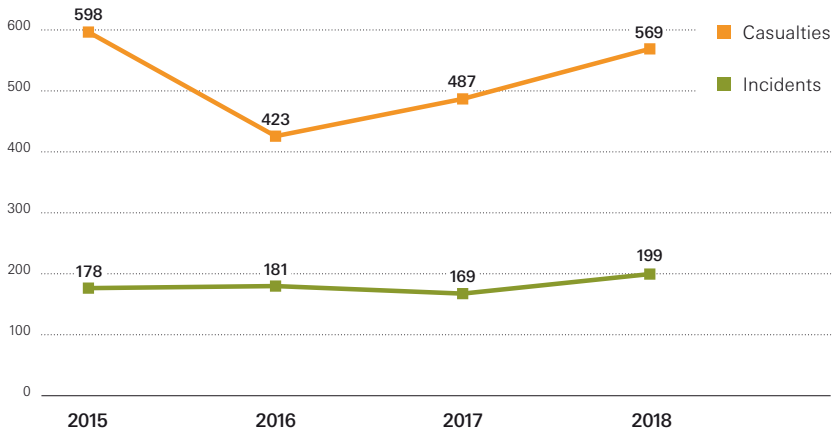
In 2018, 140 out of 199 recorded incidents (70 per cent) were reported by 50 mine action programmes and organisations; the remainder were retrieved from media sources. As in 2017, the higher prevalence of field reports in 2018, in comparison with the years 2015 and 2016, suggests a greater level of data accuracy.

Furthermore, the research scope was slightly broadened in 2018, in an effort to capture incidents stemming from AVMs of an improvised nature, when reported by mine action organisations. The specific attention to these devices had limited effect in most contexts and on the overall findings of the present report. A more detailed description of the methodology of this research and of its limitations is available in Annex 1.

GLOBAL TRENDS IN 2018

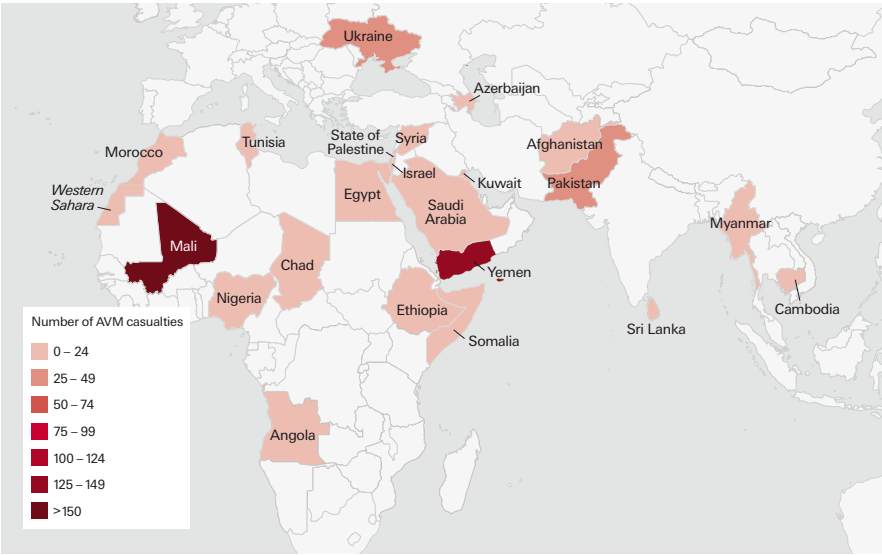
In 2018, the GICHD and SIPRI recorded 199 incidents that were related, or suspected to be related, to AVMs in 23 states and territories.[11] The number of AVM incidents represents an 18 per cent increase compared with 2017 and is the highest total since GICHD¬-SIPRI data collection began in 2015 (see Figure 2).

FIGURE 2 NUMBER OF INCIDENTS AND CASUALTIES, 2015–2018



The highest number of incidents in 2018 were found in Yemen, Mali, Ukraine and Pakistan. These four states accounted for 82 per cent of all AVM casualties recorded in 2018. The global total amounted to 569 casualties, including 226 killed and 343 injured—an increase of 17 per cent in comparison with the year before.[12] The increase in both incidents and casualties may in large part be explained by considerably higher records for Mali and notably Yemen.

FIGURE 3 ALL STATES AND TERRITORIES WITH RECORDED INCIDENTS IN 2018



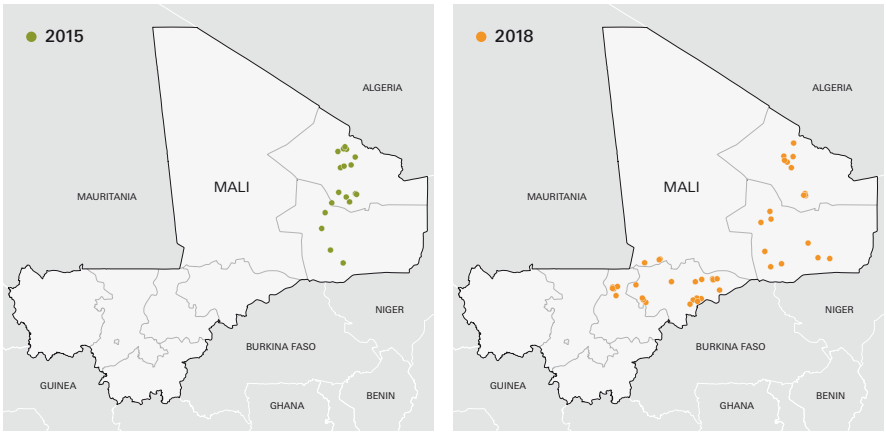
Absolute numbers of casualties are: Mali 254, Yemen 142, Pakistan 35, Ukraine 34, Syria 14, Chad 13, Ethiopia 11, *Western Sahara* 10, Azerbaijan 7, Israel 7, Cambodia 6, Myanmar 6, Egypt 6, Afghanistan 5, Angola 5, Nigeria 5, Saudi Arabia 4, Morocco 3, Kuwait 1, Somalia 1, Sri Lanka 0, State of Palestine 0, Tunisia 0

Mali ranks highest with 254 casualties recorded in 2018, which is considerably more than the level reached in 2017.[13] Notably, civilian casualties increased more than threefold from one year to the next.[14] Part of the overall spike may be due to statistical effects stemming from the slightly broadened GICHD–SIPRI methodology[15] and to several incidents that caused a large number of casualties.[16] Yet, it also reflects the worsening security situation in Mali.[17] When comparing GICHD–SIPRI data from 2015 with latest records from 2018, a dramatic increase in yearly incidents (24 in 2015 to 52 in 2018) and casualties (76 to 254) can be observed. Similarly, incidents in 2018 tended to result in more casualties per incident (from 3.17 to 4.88) and be more lethal (lethality ratio from 9 per cent to 41 per cent) than in 2015. The percentage of civilian vehicles involved in incidents increased by two thirds during this period.[18]

Data for Mali also indicate an evolving incident landscape, in line with the general observation of violence that was initially prevalent in the north of the country, in particular between 2012 and 2015, and is progressively expanding into central Mali and beyond.[19]

Whilst AVM incidents were exclusively recorded in the Kidal and Gao regions in the north in 2015, 44 per cent of the incidents in 2018 (23 out of 52) occurred in the Mopti and Ségou regions in the centre of the country (see Figure 4). Incidents in the centre, being more densely populated, tended to affect civilians to a greater extent than in the north—85 per cent of civilian casualties were found in central Mali in 2018. Incidents in the Mopti and Ségou regions were also characterised by significantly more casualties per incident.[20] Meanwhile, all of the 47 peacekeeper casualties occurred in the northern regions.

FIGURE 4 INCIDENTS IN MALI, 2015 AND 2018[21]



Pakistan, which experienced the largest number of casualties in 2017, dropped to 35 casualties in 2018[22]—a notable decrease of 74 per cent.[23] Although it is premature to conclude that 2017 may have been a mere statistical outlier, it is noteworthy that civil society organisations and research institutions documented lower levels of landmine incidents and explosive violence more generally for 2018, and that Pakistan also officially reported a general decrease of incidents involving explosive devices of an improvised nature in the same period.[24]

For its part, Ukraine has witnessed a constant decline in the number of both AVM casualties and incidents over two consecutive years.[25] In 2018, the number of casualties was more than halved compared with the previous year.[26] This tendency may be understood in the light of a drastic fall in the number of victims of mine-related incidents between 2017 and 2018 more generally, as documented by the United Nations Human Rights Monitoring Mission in Ukraine.[27]

BOX 1 CASE STUDY YEMEN

Mine contamination in Yemen is the result of the conflicts of 1962-1969 and 1970-1983, mines laid in border areas between North and South Yemen before unification in 1990, and successive conflicts that have erupted since 1994.[28] Institutions such as Conflict Armament Research or Human Rights Watch have documented the widespread use of landmines by armed groups in the current non-international armed conflict that started in 2014, in which the Houthis oppose the Aden-based Yemeni Government.[29] Beyond anti-personnel mines, naval mines and improvised explosive devices (IEDs), conventional AVMs (such as TM-57, PRB ATK-M3 or VS-1.6) and artisanal AVMs were identified.[30]

Major mine-contaminated areas include northern governorates bordering Saudi Arabia, southern-central governorates and central-western governorates.[31] However, the extent of contamination remains unknown and data on mine casualties are scarce, yet improving. Between 2015 and 2017, the GICHD–SIPRI recorded 139 casualties related or suspected to be related to AVMs, mostly retrieved from open sources.[32] This number covering three years, was surpassed in 2018 alone (142 casualties in 75 incidents).[33] For its part, the Yemen Executive Mine Action Centre (YEMAC) reported 72 incidents with 129 casualties, believed to be related to artisanal AVMs,[34] for one single governorate—Taiz governorate—where relevant data could be collected.[35]

Yemen, 2019

Due to improved data collection, it is possible to better understand the demographics of those affected. What stands out, for instance, is the comparatively high impact on children last year: nearly 30 per cent of casualties were below the age of 18. Considering ongoing hostilities and ensuing difficulties with access and data collection, multi-year trend analysis may still be of limited value. The data for 2018, however, might provide a partial glimpse of the actual magnitude of the issue at stake.

The current armed conflict has led to what is widely considered the world's worst humanitarian and food security crisis.[36] In addition to thousands of civilians killed and injured, by the end of 2018 about 14 million remained at risk of starvation and death due to repeated outbreaks of disease.[37] As of February 2019, 80 per cent of the population—24.1 million people—were reported to be in need of humanitarian assistance.[38] The use of AVMs—and landmines more broadly—has exacerbated this dire situation.[39]

Yemen, 2018

The impact of AVMs is illustrated by a recent incident, where a vehicle driven by a Norwegian Refugee Council (NRC) contractor hit an AVM in Lahij governorate in February 2019, resulting in injury to two contractor employees.[40] The vehicle was travelling on a contaminated road along which YEMAC had cleared a narrow pass to enable access to villages, hitting the mine while going off the cleared path. The organisation was delivering high-energy biscuits as part of a school feeding programme for 1,717 children in four schools in the Karish area of Al Qabita district, a district which is classified as "emergency" under the Integrated Food Security Phase Classification. Almost half of the 120,000 district residents are in need of immediate food assistance.[41]

As a result of the incident, NRC temporarily suspended activities to ascertain the facts and took further security measures.[42] In addition to poor physical road conditions or direct hostilities, the presence of AVMs is a major factor impeding access for the delivery of such critical humanitarian assistance, thereby magnifying their humanitarian impact far beyond the immediate loss of lives.

In 2018, Myanmar, Ethiopia, Saudi Arabia, Kuwait, Sri Lanka and the State of Palestine recorded AVM incidents for the first time since GICHD–SIPRI data collection began.[43]

As in previous years, the states and territories with higher numbers of AVM casualties in 2018 tend to have had their last conflict more recently—or may still be in active conflict. This is, for instance, illustrated by the mere fact that Mali and Yemen rank highest for casualties. Similarly, this is also testified to by AVM incidents in Mali reflecting the geographical spread of the conflict. However, GICHD–SIPRI data also reveal that a number of states and territories which experienced armed conflict years or decades ago still suffer from AVM casualties.

Over the four years between 2015 and 2018, the GICHD and SIPRI recorded 727 AVM incidents that caused 2,077 casualties—519 people were killed or injured on average every year. This figure is significantly higher than the average of 357 AVM casualties from 2011 to 2014 (reported by the Landmine Monitor).[44] The highest numbers of casualties recorded by the GICHD and SIPRI between 2015 and 2018 occurred in Mali, Ukraine, Pakistan, Yemen and Syria (see Table 1). These states alone account for 72 per cent of the global four-year total.

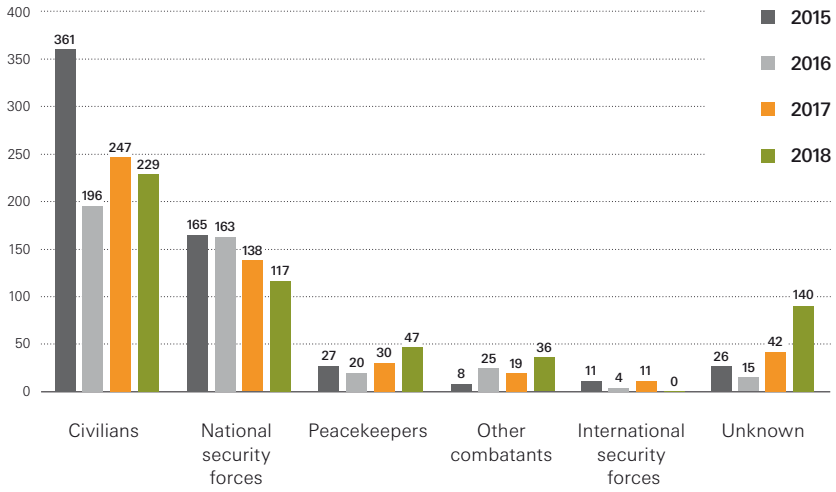
TABLE 1 STATES AND TERRITORIES WITH HIGHEST NUMBERS OF CASUALTIES, 2015–2018

State/ territory	Number of casualties 2015	Number of casualties 2016	Number of casualties 2017	Number of casualties 2018	Total number of casualties 2015–2018	Per cent of global casualties 2015–2018
Mali	76	55	62	254	447	21%
Ukraine	97	101	74	34	306	15%
Pakistan	74	52	135	35	296	14%
Yemen	65	32	42	142	281	13%
Syria	90	38	18	14	160	8%
Afghanistan	34	34	21	5	94	5%
Chad	7	7	47	13	74	4%
Western Sahara	26	12	12	10	60	3%

CATEGORIES OF CASUALTIES

In previous years, a trend was observed that where disaggregated data were available, civilian casualties recorded the highest numbers among all categories of casualties, followed by national security forces (see Figure 5). Between 2015 and 2018, civilians accounted for 55 per cent of the total casualties where the category was known, while non-civilians made up for the remainder. The noticeable increase in casualties with an "unknown" status of late (from 42 in 2017 to 140 in 2018) mainly results from large numbers of casualties from Yemen without information on the types of casualties.

FIGURE 5 CATEGORIES OF CASUALTIES, 2015–2018



Casualty demographics, 2015–2018

55%
Civilian

45%
Non-civilian

This overall trend continued in 2018 (see Figure 6). Where disaggregation was possible, the majority of casualties were civilians (229 out of 429), followed by national security forces (117 out of 429).[45] This represents a slight decrease for both categories in relative terms compared with the previous year.[46] This notwithstanding, the two categories together account for 81 per cent of the yearly total. In turn, recorded casualties from peacekeepers and other combatants went up by more than 1.5 times in relative terms in the 2017-2018 biennium.

FIGURE 6 CATEGORIES OF CASUALTIES IN 2018

= 10 people

53% Civilians

27% National security forces

11% Peacekeepers

8% Other combatants

Absolute numbers are: civilians 229 (incl. 6 humanitarian personnel), national security forces 117, peacekeepers 47, other combatants 36. In addition, 140 casualties of an unknown category were recorded.

Percentages may not add up to or may exceed 100% due to rounding.

CASUALTIES BY SEX AND AGE

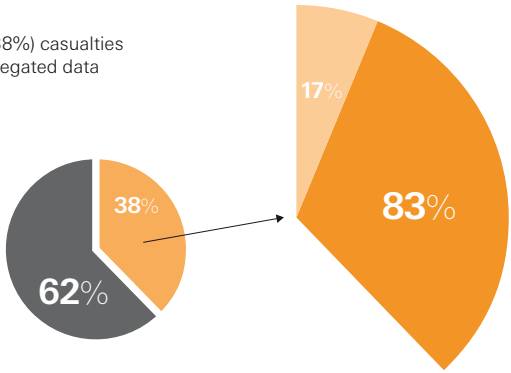
Only 38 per cent of the total records included sex-disaggregated data in 2018 (see Figure 7), which is in stark contrast to 58 per cent in 2017. In this sample, the ratio of male casualties exceeds that of female casualties by almost five to one. Yet, the 17 per cent of female casualties in 2018 is considerably higher than in 2017 (6 per cent).

An identical sample provides information on the age of casualties. A remarkable increase is noted for the proportion of child casualties, increasing from 8 per cent in 2017 to 23 per cent in 2018. Accounting for 39 out of 51 casualties, the overwhelming majority of children killed or injured by AVMs were reported from Yemen.

FIGURE 7 CASUALTIES BY SEX AND AGE IN 2018

Sex disaggregation

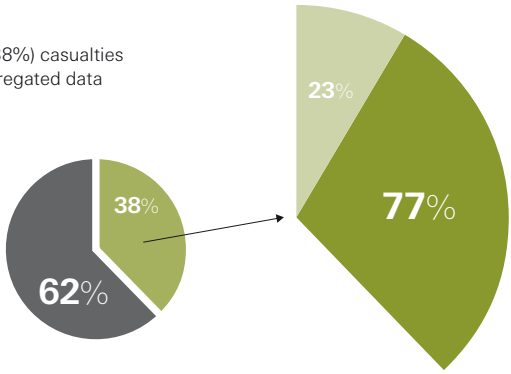
219 out of 569 (38%) casualties with sex-disaggregated data



Absolute numbers are: male 182, female 37

Age disaggregation

218 out of 569 (38%) casualties with age-disaggregated data

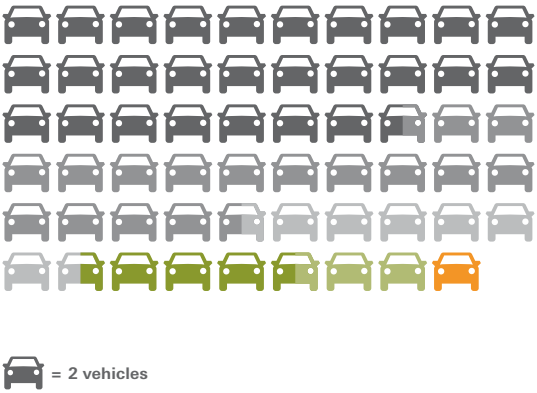


Absolute numbers are: adults 167, children 51

CATEGORIES OF VEHICLES

Figure 8 depicts the types of vehicles involved in AVM incidents in 2018. Where such information was available,[47] civilian vehicles (excluding humanitarian) triggered AVMs most frequently compared with other categories, accounting for 55 out of the 118 vehicles involved in incidents.[48] This finding is similar to 2017.

FIGURE 8 CATEGORIES OF VEHICLES IN 2018



47% Civilian (excl. humanitarian)

29% National security forces

12% Peacekeeping

7% Other combatants

4% Humanitarian

2% International security forces

Absolute numbers are: civilian 55, national security forces 34, peacekeeping 14, other combatants 8, humanitarian 5, international security forces 2. In addition, 77 vehicles of an unknown category were recorded.

Percentages may not add up to or may exceed 100% due to rounding.

Breakdown of the civilian vehicle subcategories (55 vehicles in total)

Agricultural

Commercial

Other civilian

Absolute numbers are: agricultural 9, commercial 4, other civilian 42

Percentages may not add up to or may exceed 100% due to rounding.

The ratio of peacekeeping vehicles damaged by AVMs notably increased by 4 per cent whereas that of affected international security forces vehicles was almost halved in the same period.

Although the absolute number of agricultural vehicles causing incidents was halved between 2017 and 2018, AVM impact on agricultural activities was still prominent in some states. In Cambodia for instance, tractors triggered AVMs in 4 out of 6 incidents, causing all reported casualties in that state. Similarly, 22 per cent of the recorded incidents in Ukraine (4 incidents) were due to agricultural activities.

Among the civilian vehicles that triggered AVMs, 76 per cent were not related to either agricultural practice or commercial purposes (i.e. categorised as other civilian). 14 of the total 42 impacted vehicles in this subcategory were reported in Mali alone, 10 of which were in the Mopti and Ségou regions. In central Mali, vehicles of this type were the most struck by AVMs out of all civilian vehicles, both in absolute and relative terms. To the contrary, no AVM incident triggered by agricultural and commercial vehicles was reported.

BOX 2 CASE STUDY *WESTERN SAHARA*

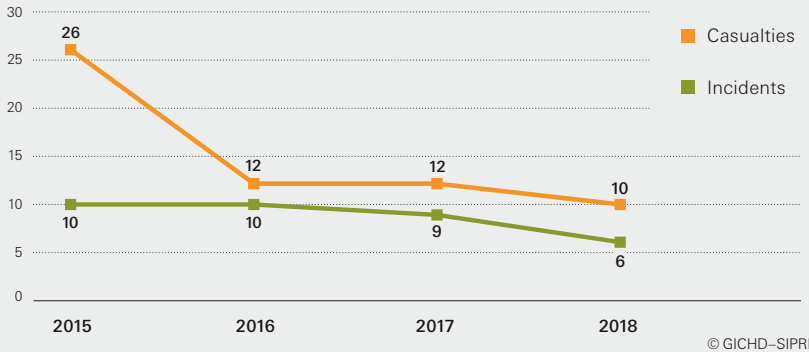
An expanse of desert located on the north-western coast of Africa, *Western Sahara* was a Spanish protectorate, included in the United Nations list of Self-Non-Governing Territories in 1963.[49] The withdrawal of Spain in 1975[50] initiated a 16-year conflict for independence fought by the Frente Polisario *(Frente Popular de Liberación de Saguía el Hamra y Río de Oro)*—a national liberation movement set up in 1973—that proclaimed the Sahrawi Arab Democratic Republic in 1976.[51]

In September 1991, the Government of Morocco and the Frente Polisario eventually signed a ceasefire ending active confrontation, yet tensions still arise intermittently.[52] A 1,700-mile-long sand wall—the Berm—was constructed by Morocco as a separation line. The Berm is one of the world's most densely contaminated minefields, especially on its eastern side and in particular with AVMs.[53] TMA4 mines are particularly prevalent.[54] Where the location is explicit, GICHD–SIPRI data between 2015 and 2018 indicate that a large majority of recorded incidents occurred west of the Berm.[55]

Since 2008, the United Nations Mine Action Service has managed a mine action programme within the United Nations Mission for the Referendum in Western Sahara to reduce the threat from mines and unexploded ordnance.[56]

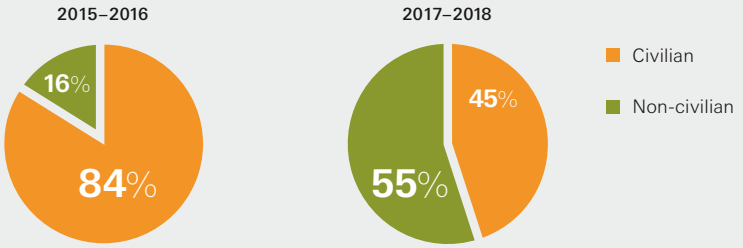
For the period from 2015 to 2018, the GICHD–SIPRI recorded a total of 35 AVM-related incidents and 60 casualties.[57] This places *Western Sahara* among the top eight states and territories with the highest AVM casualties. Since 2016, casualty levels have remained more or less constant (see Figure 9).

FIGURE 9 INCIDENTS AND CASUALTIES IN *WESTERN SAHARA*, 2015–2018



GICHD–SIPRI data also reveal a considerable proportional spike in non-civilian casualties in 2017–2018 (55 per cent of total casualties) as compared with the marked prevalence of civilian casualties (84 per cent) during the previous biennium (see Figure 10).

FIGURE 10 CASUALTY DEMOGRAPHICS IN *WESTERN SAHARA*, 2015–2018



Absolute numbers are: civilians 32, non-civilians 6 (2015–2016); civilians 10, non-civilians 12 (2017–2018)

CASUALTIES PER INCIDENT AND LETHALITY RATIO

AVMs are designed to be triggered by the presence, proximity or contact of vehicles and to incapacitate or destroy them due to their large explosive charge, thereby tending to cause multiple casualties in one incident. While the average casualties per AVM incident recorded in 2018 reached roughly 2.9—a similar level to 2017—a significant difference is noticeable across states and territories, ranging from 1 casualty per incident on average in Cambodia to more than 4 in Mali (see Table 2).

TABLE 2 CASUALTIES PER INCIDENT AND LETHALITY RATIO IN 2018

State/ territory	Recorded incidents	Number of casualties	Average number of casualties/ incident	Per cent of casualties that were civilians	Per cent of casualties that were killed
Yemen	75	142	1.89	100%	32%
Mali	52	254	4.88	42%	41%
Ukraine	18	34	1.89	38%	44%
Pakistan	9	35	3.89	86%	49%
Chad	6	13	2.17	23%	77%
Western Sahara	6	10	1.67	50%	30%
Cambodia	6	6	1.00	100%	17%
Syria	4	14	3.50	75%	57%

Mali, 2018

In 2018, while Yemen recorded the highest number of incidents, Mali experienced most casualties. Mali's peak number of casualties per incident (4.88) is considerably higher than the global average. Besides consideration of the specific context in Mali where conflict has spread to the centre of the country (see above), four incidents had a particularly high toll of 79 casualties, impacting both overall casualties and the average number per incident.[58]

The type of vehicle triggering the device logically impacts the number of casualties per incident. Where disaggregation was possible, incidents involved civilian vehicles most frequently in 2018 (see Table 3). The average number of casualties per civilian vehicle-related incident reached 3.87, higher than the average of 3.07 in 2017. The difference between the two years is attributable to a smaller sample of incidents with civilian vehicles in 2018, which nevertheless caused a similar number of casualties to those in 2017. It can also be observed that there is not a particularly striking difference in the number of casualties per incident between civilian and non-civilian vehicle categories. In fact, incidents with vehicles of national security forces, peacekeepers and other combatants resulted in at least three casualties per incident on average.

TABLE 3 CASUALTIES PER INCIDENT AND LETHALITY RATIO PER CATEGORY OF VEHICLE IN 2018

Category of vehicle	Recorded incidents involving vehicles[59]	Number of casualties	Average number of casualties/ incident	Per cent of casualties that were killed
Civilian	55	213	3.87	48%
National security forces	34	116	3.41	37%
Peacekeeping	14	47	3.36	0%
Other combatants	8	36	4.50	56%
Humanitarian	5	6	1.20	50%
International security forces	2	0	0.00	0%

A more pronounced difference appears in the lethality ratio of incidents—i.e. the ratio of killed to overall casualties—since different types of vehicles presumably protect their passengers to varying degrees. In this light, almost half of the casualties in incidents with civilian vehicles (excluding humanitarian) died, which represents a higher level than in 2017. Conversely, the lethality ratio of incidents with non-civilian vehicles only reached 32 per cent. This difference was especially dramatic in the case of peacekeeping and international security forces, which experienced no AVM-related fatalities. This notwithstanding, the lethality of incidents with vehicles of national security forces and other combatants almost doubled over the last two years.

CONCLUSION

In 2018, the GICHD and SIPRI collected evidence of 199 incidents related, or suspected to be related, to AVMs in 23 states and territories. A total of 569 casualties, including 343 injured and 226 killed, were recorded from these incidents, of which 53 per cent were civilians. These figures represent an increase in recorded incidents of 18 per cent and of casualties of 17 per cent compared with 2017. An increase was observed particularly in Yemen and Mali.

Since 2015, the GICHD and SIPRI have recorded 727 AVM incidents that have caused 2,077 casualties. Mali, Ukraine, Pakistan, Yemen and Syria were the states with the most recorded casualties over this four-year period, together accounting for 72 per cent of the global total.

Efforts made by the GICHD and SIPRI to include data of AVMs of an improvised nature this year, indicate once again the difficulty found in disaggregated reporting. Whilst acknowledging the operational challenges in assessing the functionality of and weight needed to activate an improvised landmine, further attention is needed better to understand, record and disaggregate artisanal devices that function as AVMs—and landmines more generally—in accordance with definitions contained in international law and the International Mine Action Standards. Furthermore, "clearance evidence" may also provide a useful first indication regarding the items present and their functioning in a specific context, in particular in states and territories where little technical information on contamination is available.

For four consecutive years, the GICHD and SIPRI have consolidated evidence on the extent, geography and patterns of the direct humanitarian impact of AVMs. However, as the Yemen case study in this report illustrates, the indirect humanitarian impact of AVMs on the effective and efficient delivery of critical assistance in the context of a humanitarian crisis—a crisis which affects the lives of millions of people—is staggering. Similarly, it is noticeable that a number of states and territories which experienced armed conflict years or decades ago, still suffer from AVM casualties. While evidence on the direct humanitarian impact of AVMs has been strengthened in recent years, their indirect humanitarian impact as well as their long-term consequences for development prospects remain under-documented. A better understanding thereof may serve policymakers in their efforts to enhance the protection of civilians from the effects of AVM use, in support of sustaining peace and advancing the Sustainable Development Goals.

ANNEX 1: RESEARCH METHODOLOGY

Research methodology

This research draws on data from states, typically national mine action authorities/centres, as well as from mine action and other humanitarian organisations. These reports were complemented by media reviews conducted in Arabic, English, French, Portuguese, Russian, Spanish, Ukrainian and Urdu.

Press articles were included either because an incident was specially identified as AVM-related, or because an incident corresponded to a set of criteria that strongly indicated an AVM-related incident. These criteria included incidents such as those on roads outside of a city involving a vehicle, and often causing multiple casualties. Open source media were considered only if there was sufficient indication that the landmine was activated by the victim. This research therefore excludes all instances of remotely or time-detonated devices and suicide bombs. In cases where the criteria strongly suggest an AVM-related incident, the incident is referred to as a suspected AVM incident.

The research acknowledges certain limitations of open source media. These were mitigated to the extent possible by applying stringent selection criteria. In some states and territories, it appeared to be unfeasible to include data due to the absence of reliable information on incidents or clearance evidence of devices present in a given environment. Whenever possible, mine action authorities/centres and organisations were requested to assess the relevance and accuracy of retrieved press articles.

Two established datasets, namely those provided by Action on Armed Violence (AOAV) and the Armed Conflict Location & Event Data Project (ACLED) were also reviewed.[60] Data from these sources were included only if their categorisation and description met the specific GICHD–SIPRI media criteria.

Incidents with an unknown number of casualties were categorised as incidents that resulted in casualties, but without specifying any absolute number. For incidents referring to a minimum number of casualties ("at least [number] casualties"), this minimum number was retained in this research. Furthermore, unless clearly attributed in the source, the vehicle category for incidents involving other combatants was defined as "unknown".

In line with legal definitions and the International Mine Action Standards, a mine is defined as a "munition designed to be placed under, on or near the ground or other surface area and to be exploded by the presence, proximity or contact of a person or a vehicle."[61] In this report, AVMs are considered as landmines designed to detonate by the presence, proximity or contact of a vehicle.[62] As a result of being so designed, an

improvised explosive device[63] may meet the definition of an AVM and may be referred to as an improvised, artisanal or locally manufactured anti-vehicle mine. As in previous years, this report focuses on industry-made AVMs used in a conventional manner. For the first time since the beginning of research in 2015, it also includes incidents caused by AVMs of an improvised nature if specifically assessed and reported as such by mine action organisations, as per the above working definition. The impact of this slightly broadened scope on the findings and comparability with data from previous years remains limited overall: only 1 confirmed improvised AVM incident was recorded in 2018 (see below). 85 further incidents were recorded as either industry-made or improvised, due to uncertainty by mine action organisations, and may have been included in many instances under the former methodology.[64]

The GICHD and SIPRI do not claim that the statistics presented in this report are complete and acknowledge possible under-reporting of casualties, nor do they claim responsibility for the accuracy and reliability of incident and media records used for this report.

Data collection challenges

Data reported by states and organisations remain insufficient for a number of reasons. In some instances, states with suspected AVM incidents do not release information on mine contamination or incidents. In other cases, data remain incomplete due to the inability of national mine action authorities/centres or organisations to access certain areas of the territory. This is often a challenge in conflict areas where data collection and verification are particularly difficult. The nature of these weapons also make their reporting challenging, specifically regarding the exact location of incidents.

Reports from states and organisations generally provide much more accurate and disaggregated information than media reports. Since the disaggregation of data is, to a large extent, dependent on reports from states and organisations, data collection becomes sensitive to the inactivity or closure of programmes due to a lack of funding or security concerns. This may, therefore, impact the ability to access detailed data from certain areas and to analyse trends and differences over years. The GICHD and SIPRI are continually engaging with new stakeholders specifically in conflict areas, in order to ensure the most complete and long-term data collection.

GICHD–SIPRI data indicate the difficulty in reporting on incidents related to AVMs of an improvised nature. First, the Landmine Monitor states that "available information indicates that the fusing of most improvised mines […] allows them to be activated by a person".[65] In Afghanistan for instance, the Directorate of Mine Action Coordination considers all victim-operated improvised mines as improvised anti-personnel mines.[66] Second, this difficulty might also be due in part to the operational challenge in assessing

the threshold pressure required for a specific device to explode. In different contexts, the security situation does not allow mine action organisations, if present in the country, to gather "clearance evidence" regarding the items present or to conduct post-blast investigations. A further challenge stems from operational practice, whereby certain mine action programmes record devices that may be *de facto* AVMs subsumed into other categories such as improvised mines, IEDs or victim-operated IEDs, without further disaggregation.

More generally, disaggregation of collected data based on the type of device is also a challenging task. It is often difficult to identify an AVM after detonation, in particular if specific circumstances, resources and the security situation do not allow a proper investigation to take place. In 2018:

- 30 incidents (15 per cent) were categorised as confirmed industry-made AVM incidents with an identified or likely mine type;
- 21 incidents (11 per cent) were categorised as confirmed industry-made AVM incidents with an unknown device type;
- 85 incidents (43 per cent) were categorised as confirmed AVM incidents but not specified whether industry-made or improvised;
- 1 incident (0.5 per cent) was categorised as a confirmed improvised AVM incident;
- 62 incidents (31 per cent) were categorised as suspected AVM incidents.

Finally, collecting disaggregated data on the sex and age of casualties still remains a challenge. In 2018, it was only possible to access data disaggregated by sex and by age in the case of 38 per cent of casualties, which is lower than in 2017.

Mali, 2018

ANNEX 2: NOTES AND REFERENCES

1 Incidents considered as related to AVMs include those incidents that were either reported and/or confirmed by national mine action authorities/centres, mine action organisations or other humanitarian organisations, or for which open source media clearly indicated an AVM as the device in the incident. Incidents suspected to be related to AVMs are considered to be those incidents for which there is a strong indication in open source media that an AVM was the device triggering the incident and which meet specific GICHD–SIPRI criteria (see Annex 1 for more details). Due to the nature of media articles, only four incidents from open source media were considered as confirmed AVM incidents.

2 In this report, AVMs are defined as landmines designed to detonate by the presence, proximity or contact of a vehicle. It covers a wide range of vehicles that operate on land including tanks. AVMs are also commonly known as anti-tank mines as well as mines other than anti-personnel mines. AVMs may be industry-made or of an improvised nature.

3 Casualties refer to individuals who were physically injured or killed.

4 The definition of territory relies on the United Nations definition of Non-Self-Governing Territories. Territories falling under this definition are in italics in this report.

5 In this report, the term "national security forces" refers to national military, police and border guard personnel.

6 In this report, the term "international security forces" refers to international armed forces who are present in a conflict outside the mandate of a peacekeeping mission.

7 Stockholm International Peace Research Institute and the Geneva International Centre for Humanitarian Demining (2014), *The Humanitarian and Developmental Impact of Anti-Vehicle Mines* (Geneva: GICHD and SIPRI).

8 Stockholm International Peace Research Institute and the Geneva International Centre for Humanitarian Demining (2016), *Global Mapping and Analysis of Anti-Vehicle Mine Incidents in 2015* (Geneva: GICHD and SIPRI); Stockholm International Peace Research Institute and the Geneva International Centre for Humanitarian Demining (2017), *Global Mapping and Analysis of Anti-Vehicle Mine Incidents in 2016* (Geneva: GICHD and SIPRI). Stockholm International Peace Research Institute and the Geneva International Centre for Humanitarian Demining (2018), *Global Mapping and Analysis of Anti-Vehicle Mine Incidents in 2017* (Geneva: GICHD and SIPRI).

9 GICHD–SIPRI interactive maps are available at http://www.gichd.org/avm (Accessed: 22 May 2019).

10 Figures in this report are subject to rounding up/down.

11 See endnote 4.

12 In 2017, the GICHD and SIPRI recorded 169 incidents related, or suspected to be related, to AVMs in 24 states and territories that caused 487 casualties (321 injured and 166 killed). The Landmine Monitor reported 488 casualties. Due to the GICHD and SIPRI undertaking a more focused and disaggregated data collection on AVM incidents and due to varying methodologies, comparison with Landmine Monitor findings might only be possible to a limited extent.

13 Data for Mali stem from reports provided by mine action partners, mainly UNMAS Mali, on the one hand, and from open source media articles on the other. The latter were submitted to stakeholders for an assessment of their relevance and accuracy. Incidents from open source articles were retained by the GICHD–SIPRI if in-country partners recorded these incidents, although—for various reasons—categorising them as "other" (e.g. unknown) and not as "IED/mine", and for which an AVM could not be excluded. The GICHD–SIPRI consider the latter as suspected AVM incidents. In total, the 52 incidents in Mali recorded by the GICHD–SIPRI consist of 27 confirmed and 25 suspected AVM incidents.

14 The GICHD–SIPRI recorded 27 and 107 civilian casualties related or suspected to be related to AVMs in 2017 and 2018 respectively. For its part, UNMAS Mali reported 233 civilian casualties from IEDs/mines in 2018 compared with 66 the year before, representing an increase of 3.5 times. 37 per cent of incidents categorised by UNMAS Mali as "IED/mine" in 2018

were victim activated (other categories include "command operated", "complex attack" and "other"). In total, UNMAS Mali reported 593 casualties from 201 "IED/mine" incidents in 2018. See UNMAS Mali (2019), *Mali Explosive Threat Overview. April 2019*, p. 1 and p. 4.

15 A certain statistical effect of the broadened GICHD–SIPRI data collection methodology arises from the addition, in 2018, of the category of improvised AVMs (see also Annex 1). Due to the difficulty of disaggregating between industry-made and improvised AVMs (and, at times, improvised explosive devices more generally), the GICHD–SIPRI categorised 13 incidents, causing 59 casualties, as incidents related to industry-made/improvised AVMs. Some of the incidents may not have been included under the previous methodology that did not take into account improvised AVMs. As a result, overall yearly figures for Mali before 2018 may present some under-reporting in contrast with the broadened methodology, and comparison between 2017 and 2018 is therefore to be read with this methodological caveat in mind.

16 In 2018 in Mali, two incidents recorded 26 and 25 casualties respectively and two other incidents resulted in 14 casualties each. These incidents had a much higher human toll than the average number of casualties per incident for Mali (4.88 casualties/incident). These incidents also represent those with the highest recorded number of casualties globally in 2018.

17 Tobie A. and Chauzal G. (2018), *State services in an insecure environment: Perceptions among civil society in Mali*, SIPRI Insights on Peace and Security, No. 2018/7. December 2018; UN Security Council (2019), *Joint Force of the Group of Five for the Sahel: Report of the Secretary-General*, UN Doc. S/2019/371, 6 May 2019.

18 Where such information was available, 17 per cent of incidents involved civilian vehicles in 2015. In 2018, this proportion rose to 28 per cent (incl. humanitarian vehicles).

19 There is no established definition of "central Mali" among the different stakeholders involved in the country. This report considered the regions of Ségou and Mopti as being "central Mali", in line with the Malian Government's Integrated Security Plan for the Central Regions. On the geographical spread of violence, see for instance UN Security Council (2018a), *Security Council Press Statement* (19 October 2018) or UN Security Council (2018b), *Situation in Mali. Report of the Secretary-General*, UN Doc. S/2018/866. For an animated illustration of AVM incidents recorded by the GICHD–SIPRI from January 2015 to September 2018, see Hofmann Ursign and Jung Yeonju, "Anti-vehicle mines risk sliding off UN agenda despite increasing humanitarian impact: The case of Mali", *WritePeace blog*, https://www.sipri.org/commentary/blog/2018/anti-vehicle-mines-risk-sliding-un-agenda-despite-increasing-humanitarian-impact-case-mali (Accessed: 3 May 2019).

20 96 casualties from 28 incidents were recorded in northern Mali (Gao, Kidal and Timbuktu regions) and 149 casualties from 23 incidents in central Mali (Mopti and Ségou regions). The average casualty number per incident in northern Mali and central Mali is 3.43 and 6.48 respectively. The remaining 1 incident and 9 casualties were recorded in Ménaka region.

21 Some incidents might appear as one on the maps, due to their geographical proximity and the scale of the maps. Incident locations are approximated to the greatest extent possible.

22 Under Amended Protocol II of the United Nations Convention on Certain Conventional Weapons (CCW), Pakistan reported that, at present, it faces no problem of uncleared mines. It also indicated that "casualties have, however, occurred due to Improvised Explosive Devices (IEDs) used by the terrorists." In total, Pakistan reported 438 IED attacks in 2018, 232 of which exploded and caused casualties. See Pakistan (2019), *National Annual Report 2018 under Article 13, paragraph 4 of CCW Amended Protocol II*, Form B. From these figures, it was not possible for the GICHD–SIPRI to disaggregate how many instances were the result of victim-operated devices, for instance those designed to be detonated by the presence, proximity or contact of a vehicle that fall under the scope of the present research. All incidents recorded by the GICHD–SIPRI in Pakistan for 2018 were categorised as suspected AVM incidents.

23 The GICHD and SIPRI recorded 74, 52 and 135 casualties in Pakistan in 2015, 2016 and 2017 respectively.

24 For instance, the Sustainable Peace and Development Organization recorded 69 incidents and 289 casualties from explosive devices in 2018 against 100 incidents with 469 casualties the year before. See Sustainable Peace and Development Organization (2018), *Casualties Database 2017*;

Sustainable Peace and Development Organization (2019), *Casualties database 2018 (draft)*. Similarly, Action on Armed Violence recorded 1,215 civilian deaths and injuries from explosive weapons in 2018 compared with 2,255 in 2017. See AOAV (2019), *Explosive Violence Monitor 2018* (London: AOAV), p. 18. Finally, under CCW Amended Protocol II, Pakistan reported 438 attempted IED incidents (232 IED attacks which exploded) for 2018, but 518 (262 IED attacks which exploded) for 2017. See endnote 22 and Pakistan (2018), *National Annual Report 2017 under Article 13, paragraph 4 of CCW Amended Protocol II*, Form B.

25 Of the 18 incidents recorded in Ukraine, 3 were confirmed as AVM incidents by the Organization for Security and Co-operation in Europe Special Monitoring Mission to Ukraine (OSCE SMM), for another 3 incidents information was not complete. The United Nations Human Rights Monitoring Mission in Ukraine (HRMMU) reported 3 additional incidents. A difference in methodology between GICHD–SIPRI data collection and that of the OSCE SMM and HRMMU respectively should be noted. According to its working methodology, the OSCE SMM corroborates every case "by consulting [triangulating] at least three independent sources, gathering accounts from victims and witnesses, speaking with medical workers, law enforcement officials, military personnel, members of armed formations and other interlocutors. […] The corroboration process depends on the operational environment. In order to carry out its mandated tasks, the [OSCE] SMM's freedom of movement is critical." Restrictions to its freedom of movement undermine the OSCE SMM's ability to access incident sites, hospitals and morgues. Furthermore, "the corroboration process can take time [weeks, months] and the Mission reviews the status of cases as information becomes available. When information is unclear, the Mission does not record a case as confirmed until more satisfactory or reliable information is obtained." See Organization for Security and Co-operation in Europe Special Monitoring Mission to Ukraine (2017), *Thematic Report: Civilian casualties in eastern Ukraine 2016* (OSCE SMM, September 2017), pp. 2-3. On the other hand, "based on OHCHR fact-finding methodology, the standard of proof applied by HRMMU is that there are 'reasonable grounds to believe' that a particular incident occurred or that a given pattern of violations prevailed. If this threshold was not met, the incident was not included in a report/update. HRMMU verified all information on civilian casualties by obtaining corroborating information from other (preferably two) independent and reliable sources. Where information was obtained from primary sources this requirement was lowered. Accounts and reports on civilian casualties were also evaluated on their consistency with what was generally known about the incident, and whether the incident revealed a pattern that was consistent with other similar incidents." E-mail from Uladzimir Shcherbau, Human Rights Officer, UN Human Rights Monitoring Mission in Ukraine, 11 February 2019.

26 In 2018, 34 casualties from 18 incidents were recorded, against 74 casualties from 31 incidents in 2017.

27 United Nations Human Rights Monitoring Mission in Ukraine (2019), *Conflict-related casualties in Ukraine,* 4 February 2019.

28 Landmine Monitor (2018a), "Yemen Country Profile. Mine Action, page updated on 12 November 2018", http://www.the-monitor.org/en-gb/reports/2019/yemen/mine-action.aspx (Accessed: 3 May 2019).

29 Conflict Armament Research (2018), *Mines and IEDs employed by Houthi forces on Yemen's West Coast* (London: Conflict Armament Research); Human Rights Watch (2017), "Yemen: Houthi-Saleh Forces Using Landmines, page updated on 20 April 2017", https://www.hrw.org/news/2017/04/20/yemen-houthi-saleh-forces-using-landmines (Accessed 3 May 2019); Human Rights Watch (2019), "Yemen: Houthi Landmines Kill Civilians, Block Aid, page updated on 22 April 2019", https://www.hrw.org/news/2019/04/22/yemen-houthi-landmines-kill-civilians-block-aid (Accessed: 3 May 2019).

30 Field research conducted by Conflict Armament Research revealed the extensive use of an improvised AVM which loosely resembles a TM-46 or TM-57 AVM. In addition, heavy vehicle-operated pressure plates were also discovered. See Conflict Armament Research (2018), *op. cit.*, p. 11 and p. 26.

31 Landmine Monitor (2018a), *op. cit.*

32 This includes 65 casualties in 2015, 32 in 2016 and 42 in 2017. See Stockholm International Peace Research Institute and the Geneva International Centre for Humanitarian Demining (2018), *op. cit.*, p. 10.

33 In addition to the reports from YEMAC for Taiz governorate, the GICHD–SIPRI retrieved a further 13 casualties in 3 incidents in 2018 from open source media from Al Hudaydah and Taiz governorates (2 incidents classified as suspected).

34 E-Mails from Stephen Bryant, UNDP Yemen, 25 February 2019 and 26 February 2019; e-mail from Nasser Al-Heead, UNDP Yemen, 6 March 2019.

35 Under Article 7 of the Anti-Personnel Mine Ban Convention, Yemen reported 1,087 casualties from landmines and explosive remnants of war from Aden, Abyan, Taiz, Shabwah, Lahij, Hadramaut, Al Jawf, Al Bayda, Al Hudaydah and Marib governorates in 2018. This number is not further disaggregated by type of device. See Republic of Yemen (2019), *National report under Article 7 of the Anti-Personnel Mine Ban Convention 2018*, Form G. At the time of writing the present report, the GICHD–SIPRI had received disaggregated data on AVM casualties for Yemen that were limited to the Taiz governorate.

36 United Nations International Children's Emergency Fund (2019), "Yemen crisis, data updated in April 2019", https://www.unicef.org/emergencies/yemen-crisis (Accessed: 3 May 2019); Human Rights Watch (2019), *op. cit*.

37 Human Rights Watch (2018), "Yemen, Events of 2018", https://www.hrw.org/world-report/2019/country-chapters/yemen (Accessed: 3 May 2019).

38 United Nations Office for the Coordination of Humanitarian Affairs (2019), "Yemen, data updated on 19 February 2019", https://www.unocha.org/yemen (Accessed: 3 May 2019).

39 Human Rights Watch (2019), *op. cit*.

40 This incident occurred in February 2019 and was therefore not included in the statistical analysis of this report.

41 E-Mail from Mohamed Addum, NRC Yemen, 28 April 2019.

42 *Ibid.*

43 Previously, the Landmine Monitor recorded AVM incidents in Myanmar in 2017 and Sri Lanka in 2016. Due to varying methodologies, comparison with Landmine Monitor findings might only be possible to a limited extent.

44 Between 2011 and 2014, the Landmine Monitor reported 218 AVM casualties for 2014, 212 for 2013, 320 for 2012 and 677 for 2011 (in total 1,427 for 2011-2014). See International Campaign to Ban Landmines (2017), *Landmine Monitor 2017*, p. 58; International Campaign to Ban Landmines (2016), *Landmine Monitor 2016*, p. 51; International Campaign to Ban Landmines (2015), *Landmine Monitor 2015*, p. 28; International Campaign to Ban Landmines (2014), *Landmine Monitor 2014*, p. 35; International Campaign to Ban Landmines (2013), *Landmine Monitor 2013*, p. 42. Note: Since 2015, the GICHD and SIPRI have shared, cross-referenced and compared data with the Landmine Monitor. GICHD–SIPRI and Landmine Monitor methodologies used to enter data may differ, resulting in differences in reported annual casualties.

45 When including the category "unknown", the ratio per category of casualties (the absolute number of casualties) is as follows: civilians 40% (229; incl. 6 humanitarian workers), unknown 25% (140), national security forces 21% (117), peacekeepers 8% (47) and other combatants 6% (36).

46 In 2017, excluding the category "unknown" (42 casualties), the percentages per category of casualties are as follows (out of 445 casualties): civilians 56%, national security forces 31%, peacekeepers 7%, other combatants 4% and international security forces 2%.

47 77 incidents had no data on the type of vehicle and 6 incidents did not involve any vehicle. Two incidents comprised two different types of vehicle each, thereby raising the sample of vehicles involved in incidents to a total of 118.

48 When including the category "unknown", the ratio per category of vehicles (the absolute number of vehicles) is as follows: unknown 39% (77), civilian 28% (55), national security forces 17% (34), peacekeeping 7% (14), other combatants 4% (8), humanitarian 3% (5), and international security forces 1% (2).

49 UN General Assembly (1963), *Report of the Committee on Information from Non-Self-Governing Territories*, UN Doc. A/5514, Annex III.

50 Declaration of Principles on Western Sahara by Spain, Morocco and Mauritania, entered into force on 19 November 1975, 1975 UNTS 259.

51 Geneva Academy Rule of Law in Armed Conflicts project, "Military occupation of Western Sahara by Morocco, page updated on 21 March 2019", http://www.rulac.org/browse/conflicts/military-occupation-of-western-sahara-by-morocco#collapse2accord (Accessed: 3 May 2019).

52 UN General Assembly (2018), "Rising Unrest in Sahel Spells Need to Resolve Long-Standing Western Sahara Dispute, Say Delegates as Fourth Committee Concludes Decolonization Debate", *Meeting coverage of the United Nations General Assembly 4th Committee, 73th Session, 8th Meeting (AM) of 16 October 2018*.

53 Landmine Monitor (2018b), "Western Sahara Country Profile. Mine Action, page updated on 15 November 2018", http://www.the-monitor.org/en-gb/reports/2018/western-sahara/mine-action.aspx#ftn3 (Accessed: 3 May 2019).

54 TMN46, PRB-M3, M19, MAT-62B, PT-MI-BA III were also found.

55 Over the past four years, 25 cases out of a total of 35 incidents (71%) included information on the exact location. 7 incidents were reported to have occurred east of the Berm, 18 incidents west of the Berm.

56 United Nations Mission for the Referendum in Western Sahara (2019), "Mandate", https://minurso.unmissions.org/mandate (Accessed: 3 May 2019); United Nations Mine Action Service (2019a), "Territory of Western Sahara, page updated in March 2019", https://unmas.org/en/programmes/westernsahara (Accessed: 3 May 2019).

57 Figures are composed of the following: 9 confirmed/1 suspected incidents in 2015, 10 confirmed incidents in 2016, 9 confirmed incidents in 2017 and 5 confirmed/1 suspected incidents in 2018. Figures for the territory of *Western Sahara* do not include numbers recorded for Morocco.

58 These four incidents caused 26 civilian, 25 civilian, 14 civilian and 14 peacekeeper casualties respectively.

59 In 2018, the number of vehicles exceptionally exceeds the number of incidents by 2 units, since two incidents comprised two different vehicles each. For ease of reading, the number of incidents in Table 3 represents the number of vehicles. The effect of this difference of 2 units on the average number of casualties/incident is marginal.

60 E-mail from Jennifer Dathan, Researcher, AOAV, 24 February 2019; Raleigh Clionadh, Linke Andrew, Hegre Håvard and Karlsen Joakim (2010), "Introducing ACLED-Armed Conflict Location and Event Data", *Journal of Peace Research*, 47(5), pp. 651-660.

61 United Nations Mine Action Service (2019b), *International Mine Action Standards 04.10: Glossary of mine action terms, definitions and abbreviations*, art. 3.175.

62 *Ibid.*, art. 3.16.

63 There is no universally accepted definition of an IED. However, the North Atlantic Treaty Organization for instance defines an IED as "a device placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic or incendiary chemicals and designed to destroy, incapacitate, harass or distract. It may incorporate military stores but is normally devised from non-military components." See North Atlantic Treaty Organization (2010), *Glossary of Terms and Definitions*, NATO document AAP-6(2010), p. 2-I-2.

64 See also endnote 15 on Mali, where the broadened research scope is likely to have had a statistical effect.

65 Landmine Monitor (2018c), *Improvised Mines: Casualties*.

66 E-mail from Abdul Qudos Ziaee, Operations Manager, Directorate of Mine Action Coordination, 20 February 2019.

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Design: paperplane.ch

Published with the kind contribution of Irish Aid, Department of Foreign Affairs and Trade of Ireland.

Irish Aid
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