

GLOBAL MAPPING AND ANALYSIS OF ANTI-VEHICLE MINE INCIDENTS IN 2015



GICHD



GENEVA INTERNATIONAL CENTRE FOR HUMANITARIAN DEMINING

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KEY FINDINGS



178
incidents

related or
suspected to
be related to
AVMs in



25
states and
territories

598
casualties



On average



3.4
casualties/
incident

320
were injured

278
were killed



60%
of casualties
were civilians

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- In 2015, GICHD and SIPRI recorded 178 incidents related, or suspected to be related, to AVMs in 25 states and territories. These incidents caused 598 casualties.
- Cambodia, Mali, Syria, Ukraine and Yemen were the five states with most recorded AVM incidents.
- Mali, Pakistan, Syria, Ukraine and Yemen were the five states with most recorded casualties due to AVMs. 97 casualties were reported in Ukraine alone.ⁱ
- 100 per cent of recorded casualties in Cambodia were civilians. This proportion drops to 36 per cent in Ukraine.
- Collected data on the humanitarian and developmental impact of AVMs remain incomplete. Actual casualty figures (versus recorded casualty figures) are likely to be significantly higher.



ACKNOWLEDGEMENTS

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- United Nations Development Programme
- United Nations Mine Action Service
- APOPO
- Danish Demining Group
- HALO Trust
- Handicap International
- Landmine Monitor
- Mines Advisory Group
- Norwegian People's Aid
- Sustainable Peace and Development Organization Pakistan
- Swiss Foundation for Mine Action
- To Be Foundation for Rights & Freedoms Yemen
- Zamin Pak Persia International Company

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

- Albanian Mines and Munitions Coordination Office
- Bosnia and Herzegovina Mine Action Centre
- Cambodian Mine Action and Victim Assistance Authority
- Centre National de Déminage Tchad
- 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 Inter-Sectorial de Desminagem e Assistência Humanitária Angola
- Croatian Mine Action Centre
- Dirección para la Acción Integral contra Minas Antipersonal Colombia
- Direction de l'Action Humanitaire contre les Mines et Engins non explosés Burundi
- Executive Secretariat for the Demining and Development of the North West Coast Egypt
- Iraqi Kurdistan Mine Action Agency
- Kosovo Mine Action Centre
- Lebanon Mine Action Center
- Mine Action Coordination Centre of Afghanistan
- National Committee for Demining and Rehabilitation Jordan
- Mine Action Centre of the Republic of Serbia
- South Sudan Mine Action Authority
- Sri Lanka National Mine Action Center
- STC Delta Georgia
- Sudan National Mine Action Center
- Tajikistan Mine Action Centre
- Thailand Mine Action Center
- Yemen Executive Mine Action Center
- Zimbabwe Mine Action Centre

BACKGROUND

PURPOSE AND OBJECTIVES

In October 2014, GICHD and SIPRI jointly published a study on the humanitarian and developmental impact of anti-vehicle mines (AVMs).ⁱⁱ This 2015 report is a result of follow-up work carried out by the two organisations to continue collecting data on AVM incidents. It aims to improve the evidence base for assessing the humanitarian and developmental impact of AVMs. This work includes the monitoring and mapping of AVM incidents, which are available on an interactive online map.ⁱⁱⁱ



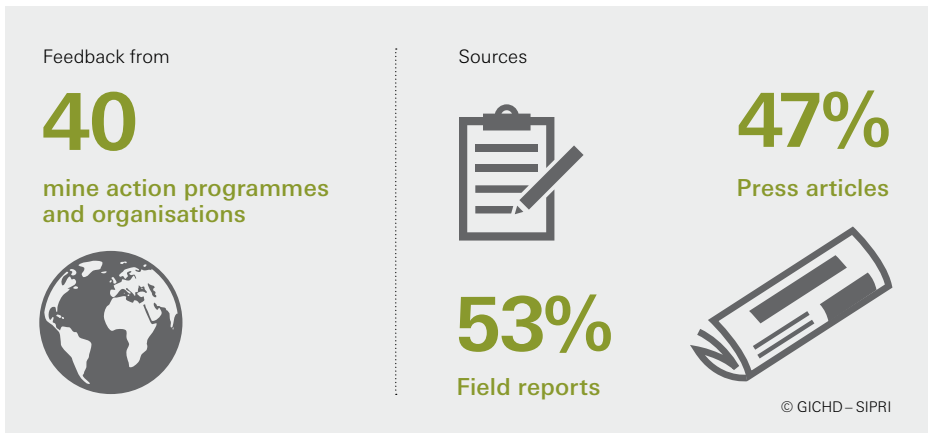
An armoured vehicle of a MINUSMA convoy set off an AVM on the road between Kidal and Tessalit, Mali, in May 2015.

This report summarises findings and provides trends of disaggregated AVM incident data collected in 2015. These data represent the first step towards regular, on-going data collection to support a long-term comparative trend analysis of the humanitarian and developmental impact of AVMs.

RESEARCH METHODOLOGY

The data presented in this report come from field reports (typically from mine action programmes) as well as from mine action and other humanitarian organisations. A media review was conducted in Arabic, English, French, Portuguese, Russian, Spanish and Urdu to complement the field reports.

FIGURE 1 SOURCES OF AVM INCIDENTS ^{iv}

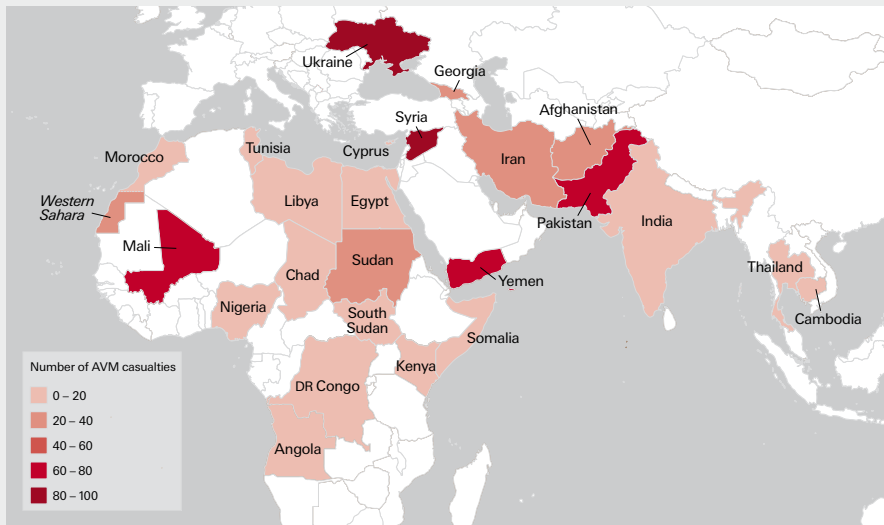


94 of the 178 recorded AVM incidents in 2015 are based on responses from 40 mine action programmes and organisations, while 84 originate from media sources. A full description of the research methodology, including limitations and challenges, is contained in Annex 1.

GLOBAL TRENDS 2015

In 2015, GICHD and SIPRI recorded 178 incidents related, or suspected to be related, to AVMs in 25 states and territories.^v Ukraine, Mali, Yemen, Syria and Cambodia accounted for the highest numbers of incidents (see Table 1). These 178 incidents caused 598 casualties, including 278 dead and 320 injured.^{vi} While AVM casualties were recorded in several post-conflict states, the vast majority of global casualties were suffered in states in recent or protracted conflicts.

FIGURE 2 HEAT MAP OF ALL STATES AND TERRITORIES WITH RECORDED INCIDENTS ^{vii}



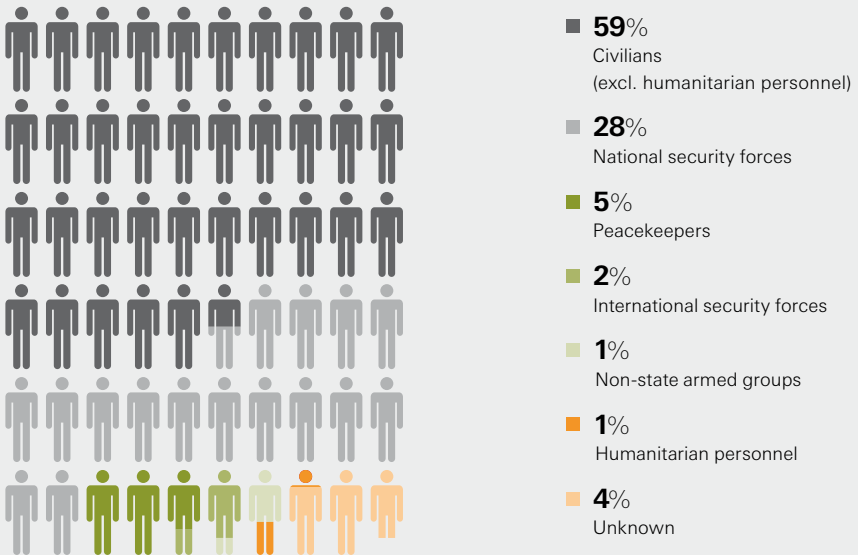
Absolute numbers are: Ukraine 97, Syria 90, Mali 76, Pakistan 74, Yemen 65, Afghanistan 34, *Western Sahara* 26, Sudan 26, Cambodia 17, South Sudan 16, Morocco 14, Somalia 8, Tunisia 8, Chad 7, Nigeria 7, Iran 6, Libya 6, Kenya 5, Egypt 4, Georgia 4, India 4, Angola 2, Cyprus 1, Thailand 1, DRC 0


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CASUALTIES BY CATEGORIES

Categories of reported casualties (killed and injured) are presented in Figure 3. 60 per cent (361 casualties) of the 598 recorded casualties were civilians (humanitarian workers and other civilians). National security personnel comprised 28 per cent (165 casualties) of the total.^{viii} Other categories such as peacekeepers, non-state armed groups and international security forces accounted for smaller fractions of casualties.^{ix}

FIGURE 3 CASUALTIES BY CATEGORIES



 = 10 people

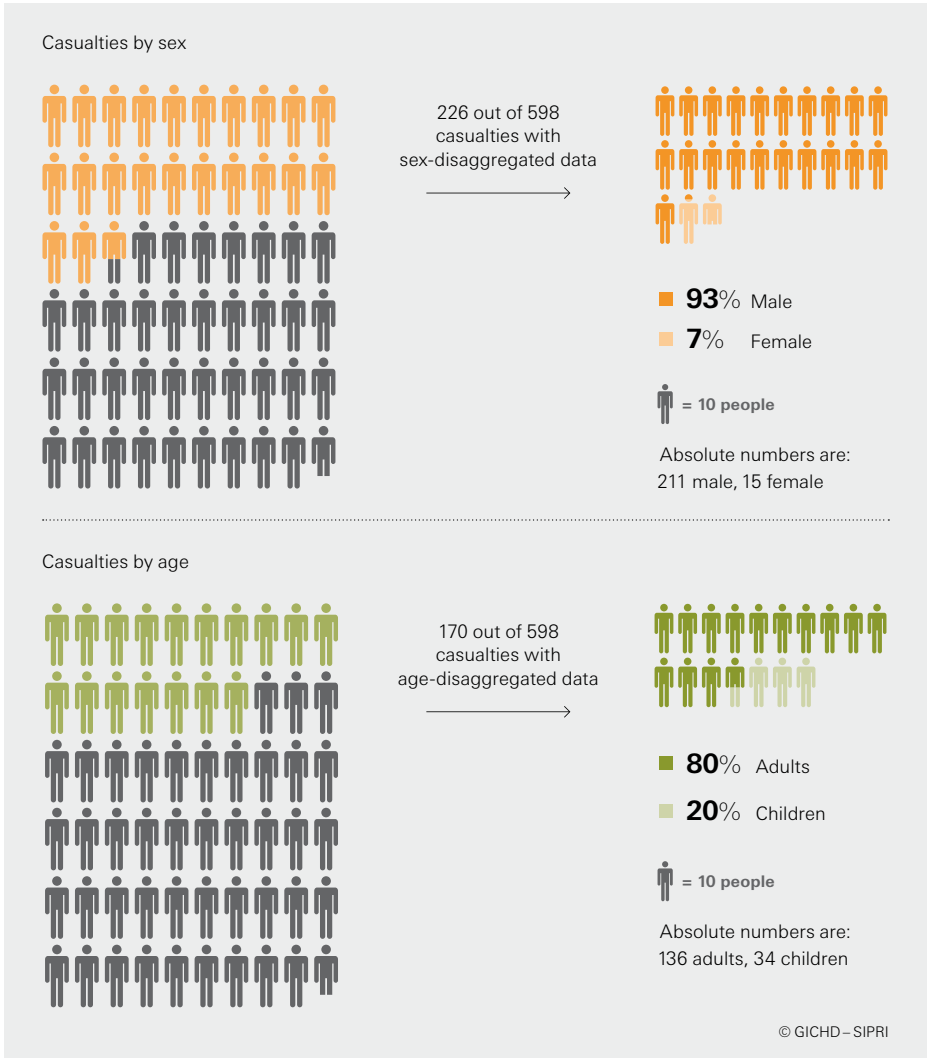
Absolute numbers are: 355 civilians (excl. humanitarian personnel), 165 national security forces, 27 peacekeepers, 11 international security forces, 8 non-state armed groups, 6 humanitarian personnel, 26 unknown

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CASUALTIES BY SEX AND AGE

It was only possible to disaggregate the data by sex for 226 casualties (38 per cent of total casualties) in 86 incidents and by age for 170 casualties (28 per cent) in 65 incidents. This highlights the need for improved sex and age-disaggregated data.

FIGURE 4 CASUALTIES BY SEX AND AGE



2015 data show that the vast majority of casualties were men, where sex-disaggregated data were available. They comprised 93 per cent of victims (211 casualties). This might be expected due to traditionally high male representation among security forces, peacekeepers and non-state armed groups. The proportion of male victims decreases slightly when considering only civilian casualties. When data are disaggregated by age, four out of five casualties were adults. Children represented approximately 20 per cent of casualties for which the age was known.

CASUALTIES PER INCIDENT

In most cases an AVM detonation causes several casualties. In 2015, the average was 3.4 casualties per incident, but varied between states and territories (see Table 1). Cambodia accounted for the lowest number with less than one casualty per incident. Syria, at the other extreme, had 4.7 casualties per incident. This difference can, in part, be explained by the type of vehicle and the victim's activity when the incident occurred.

In Cambodia, 89 per cent of recorded AVM incidents involved an agricultural vehicle. The use of small tractors called rotavators is common in Cambodia. They are used both in farming (by attaching a plough) and for local transportation of people and goods (by attaching a trailer bed instead of a plough). Accordingly, if a single farmer is driving a rotavator, then only one casualty is likely. However, evidence from previous years indicates that a single incident may also cause multiple casualties, especially if the tractor is being used for local transportation and is carrying several passengers (see Box 1).^x



Three AVMs lie at the side of a road in Aden Governorate, Yemen, in October 2015.

Cambodia is one of the world's most mine-affected states and has a significant number of mine survivors.^{xi} This is due to the protracted regional and internal conflicts that engulfed it for over 30 years. The highest level of contamination can be found along the border between Cambodia and Thailand, which explains the concentration of recorded AVM incidents in 2015 in that region (see Figure 5). As a result, Cambodia is one of only a few states with a comparable and, in recent years, often higher, number of casualties from AVMs than those from anti-personnel mines.^{xii}

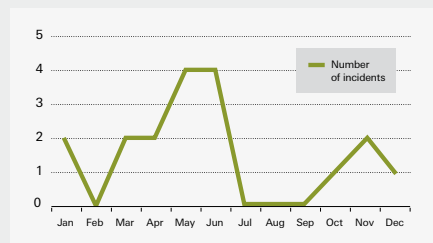
Cambodia is no longer experiencing active conflict and has had over two decades of survey and clearance work. Despite this, mines, including AVMs, remain a considerable humanitarian and developmental challenge. In 2015, 18 AVM incidents caused 17 casualties with three people dead and 14 injured. All of the casualties were civilians. Mechanised farming activities triggered the explosion in 16 out of 18 instances. This finding consolidates previous analyses that an increasingly-mechanised agricultural sector is vulnerable to AVMs which affect farmers disproportionately, including in areas where traditional (non-mechanised) farming did not previously reveal AVM contamination.^{xiii}

Figure 6 illustrates a seasonal fluctuation of AVM incidents. While incidents peaked in May and June, there were no incidents reported in the period of July-September, which can be mainly attributed to the end of the planting season. While the planting season requires use of tractors and ploughing, less mechanised agricultural work is undertaken during the growing season which starts in July.

FIGURE 5 MAP OF AVM INCIDENTS IN CAMBODIA



FIGURE 6 SEASONAL FLUCTUATION OF AVM INCIDENTS IN CAMBODIA



LETHALITY OF INCIDENTS

The lethality of an AVM incident is understood as the ratio of killed to overall victims. It varies greatly among contexts (see Table 1). The difference may relate to the vehicle involved and the situation in a given state or territory.

Incidents in Mali were characterised by a particularly low lethality rate of 9 per cent. This is likely to be because the majority of incidents in Mali involved armoured peace-keeping and military vehicles (see Box 2). Cambodia also had a relatively low lethality rate of 18 per cent: a common pattern in AVM incidents with rotavators is that the driver is injured but survives the explosion because the driver's seat is in the front of the trailer and relatively far from the back wheels, which often trigger the mine. By contrast, incidents in Syria (83 per cent lethality rate) or Yemen (60 per cent) generally involved unprotected civilian vehicles, often with several passengers.



Injured man in Cambodia

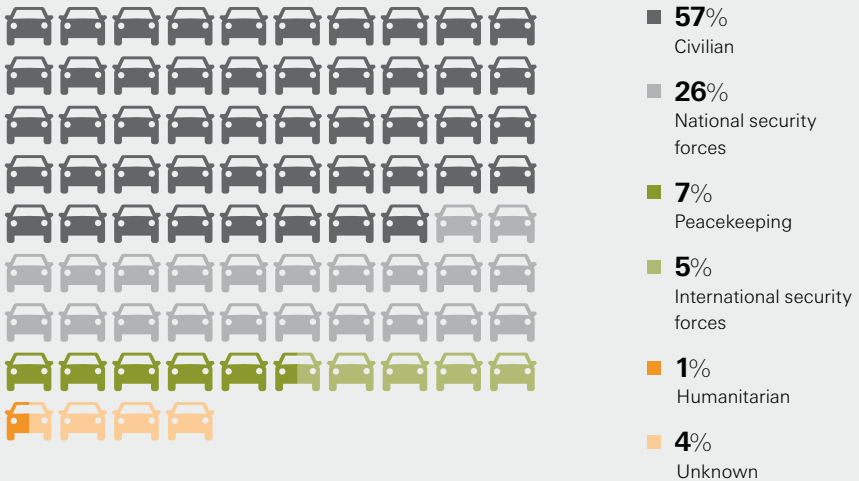
TABLE 1 CASUALTIES PER INCIDENT

	Country/ Territory	Recorded incidents	Number of casualties	Average nr. Casualties/ incident	Per cent of casualties that were civilians	Per cent of casualties that were killed
1	Ukraine	25	97	3.9	36 %	45 %
2	Mali	24	76	3.2	50 %	9 %
3	Yemen	19	65	3.4	74 %	60 %
4	Syria	19	90	4.7	93 %	83 %
5	Cambodia	18	17	0.9	100 %	18 %
6	Pakistan	16	74	4.6	41 %	54 %
7	Afghanistan	11	34	3.1	35 %	56 %
8	<i>Western Sahara</i>	10	26	2.6	88 %	27 %

VEHICLES BY CATEGORIES

Figure 7 below shows data which are disaggregated according to the category of vehicles. In 57 per cent of AVM incidents involving a vehicle (96 incidents), the AVM was detonated by a civilian vehicle, including agricultural and commercial vehicles.

FIGURE 7 VEHICLES BY CATEGORIES



= 2 vehicles

Absolute numbers are: 96 civilian, 44 national security forces, 11 peacekeeping, 9 international security forces, 1 humanitarian, 7 unknown

Breakdown of the civilian vehicle sub-categories (96 incidents in total)^{xiv}



Absolute numbers are: 33 agricultural, 11 commercial, 52 other civilian

In 32 per cent (53 incidents), a military vehicle belonging to national or international security forces triggered the AVM. For 4 per cent (7 incidents) data on the vehicle category were unavailable. The prevalence of civilian vehicles in incidents reflects casualty patterns. While disaggregated data for civilian casualties are not available, farmers and their families seem to be disproportionately at risk. This is indicated by the high number of agricultural vehicles which were involved in approximately a fifth of vehicle-related incidents.

AVMs are designed to be triggered only by pressure similar to that of a vehicle. However, 10 of the recorded incidents did not involve a vehicle. AVMs can also be detonated by large animals (e.g. cows, camels and horses) or by someone who tries to tamper with the mine or removes it from the ground.^{xv} In 2015, three incidents were reported in which livestock detonated AVMs. Although relatively rare at a global level, the material loss of domestic livestock may represent a significant economic strain for the affected individual farmer or family.

BOX 2

TRENDS IN AVM INCIDENTS IN MALI

Since the outbreak of the armed conflict in 2012, Mali has suffered AVM contamination, especially in the northern and central regions. Figure 8 locates recorded AVM incidents in these areas.

Mali had the second-highest number of AVM incidents in 2015, after Ukraine. GICHD and SIPRI recorded 24 incidents, which killed seven and injured 69 people. In contrast to other states, Mali's peacekeeping and international security forces had a particularly high toll: 83 per cent (or 20 incidents in total) involved peacekeeping forces of the United Nations Multidimensional Integrated Stabilization Mission in Mali (MINUSMA) or international security forces of Operation Barkhane (see Figure 9). This high burden can be explained by the deployment of MINUSMA and the Barkhane in insecure areas. Their operations are targeted daily by insurgent groups.

FIGURE 8

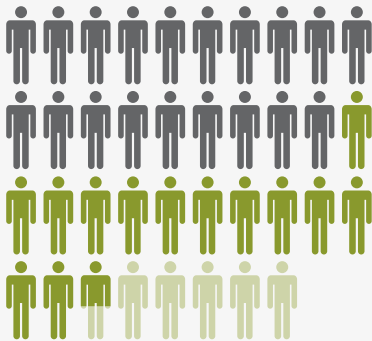
MAP OF AVM INCIDENTS IN MALI




In these 20 incidents in Mali no peacekeeper or soldier was killed (38 were injured) and in more than half of the incidents, no casualty at all was reported. The use of armoured vehicles by MINUSMA and the Barkhane seems to reduce the lethality of AVMs significantly. Although civilian vehicles triggered the explosion in only 13 per cent of incidents, half of the casualties were civilians. As a striking example, a civilian bus detonated an AVM near the village of N'Tillit in April 2015. This resulted in 32 civilian casualties, of whom four were killed and 28 injured.

FIGURE 9 CASUALTIES AND VEHICLES BY CATEGORIES IN MALI

Casualties by categories

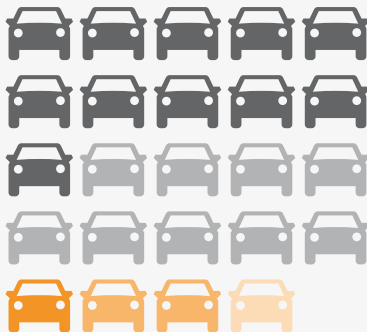


- **50%** Civilians
- **36%** Peacekeepers
- **14%** International security forces

 = 2 people

Absolute numbers are: 38 civilians, 27 peacekeepers, 11 international security forces

Vehicles by categories



- **46%** Peacekeeping
- **38%** International security forces
- **4%** Commercial
- **8%** Other civilian
- **4%** Unknown

Absolute numbers are: 11 peacekeeping, 9 international security forces, 1 commercial, 2 other civilian, 1 unknown

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CONCLUSION

In 2015, GICHD and SIPRI recorded 178 incidents related, or suspected to be related, to AVMs in 25 states and territories. These incidents caused 598 casualties of which 60 per cent were civilians. Data collected in 2015 indicate that, while AVM casualties were recorded in some post-conflict situations, the vast majority of casualties were suffered in current conflicts.

The report also illustrates the context-specific nature of the humanitarian and developmental impact of AVMs. For example, all reported incidents in Cambodia involved civilians while 83 per cent of reported incidents in Mali involved peacekeeping forces or international security forces. These differences may, in part, be explained by the character of the on-going conflict in Mali and the development context in Cambodia respectively.

Reporting of AVM casualties remains insufficient. Actual casualty figures are expected to be considerably higher than recorded casualties in this report, especially in conflict situations. Improving the availability of data is crucial to supporting further analysis of the impact of AVMs. This report is a first step in developing a robust evidence base on AVM incidents. A long-term commitment to regular data collection is needed, however, in order to identify trends in the humanitarian and developmental impact of AVMs.



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ANNEX 1: RESEARCH METHODOLOGY

Research methodology

News items on AVM incidents were collected through a media review in Arabic, English, French, Portuguese, Russian, Spanish and Urdu (press articles). This was to complement data from states, typically mine action programmes, as well as mine action and other humanitarian organisations (field reports). Casualty news items were included either because the reporter specifically identified the incident as AVM-related or because it corresponded to a set of criteria that strongly indicates AVM-related incidents. These included incidents such as those on roads outside of a city involving a vehicle, but excluding remotely-detonated bombs, and causing multiple casualties. In the case of criteria strongly indicating an AVM-related incident, incidents are referred to as suspected AVM incidents. In some instances, mine action authorities and organisations were able to assess the relevance and accuracy of retrieved press articles on AVM incidents.

Data collection challenges

The reporting of AVM-related casualties by states and organisations remains insufficient for a number of reasons. In some instances, states with suspected AVM casualties release no information at all. In other cases, state reporting remains incomplete due to an inability to cover or access all areas of the territory. Reporting may also be incomplete owing to the nature of national data collection procedures.

Therefore, while collected data provide an important indication of the humanitarian and developmental impact of AVMs, they remain incomplete. Actual casualty figures (versus recorded casualty figures) are likely to be significantly higher. This caveat applies in particular to current conflicts for which data collection and verification are challenging. Secondly, incident locations were recorded as accurately as possible but, in the absence of confirmed coordinates, an approximate location was given.

Disaggregation of collected data on the device type also proved challenging. It is often difficult to determine the mine type after detonation, in particular if specific circumstances and the security situation do not allow for a proper investigation to take place. As a result, the AVM type was known or likely to be known in only 20 per cent of recorded incidents, whereas in another 50 per cent of AVM incidents the device model remained unknown. In 30 per cent of recorded incidents, research strongly suggests that a (suspected) AVM caused the incident.

Similarly, sex and age disaggregation of AVM casualties remains a challenging task. It was only possible to determine sex disaggregation in 86 incidents (55 per cent of incidents with casualties) and age disaggregation in 65 instances (42 per cent). It was

possible to identify sex-disaggregated data in 76 per cent of the field reports involving casualties compared to only 37 per cent sex disaggregation in press articles with casualties. The same pattern was identified for age-disaggregated data. 61 per cent of field reports had age-disaggregated data compared to 24 per cent of press articles. This result emphasises the importance of field reports, which tend to offer more detailed data compared to press articles. Missing disaggregated data impact on the ability to analyse gender and age patterns of AVM incidents. Data should be used with caution.

Finally, if vehicles initiate improvised explosive devices (IEDs), these IEDs may function *de facto* as AVMs.^{xvi} AVMs might also be used as energetic charges of an IED. This report focuses on industrial AVMs that were used in a traditional manner. It does not therefore include data on vehicle-activated IEDs.

ANNEX 2: NOTES AND REFERENCES

- i Casualties refer to individuals who were physically injured and/or killed.
- ii 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.
- iii The GICHD-SIPRI interactive map is available at <http://www.gichd.org/avm> (accessed: 9 March 2016).
- iv Figures in this report are subject to rounding.
- v The definition of territory rests on the United Nations definition of non-self-governing territories.
- vi The Landmine Monitor publishes data on anti-vehicle mine casualties every year. For 2014, it recorded 218 casualties in 16 states and territories. Due to GICHD and SIPRI undertaking a more focused and disaggregated data collection on AVM incidents, comparison with Landmine Monitor data might only be possible to a limited extent. The Landmine Monitor 2014 can be accessed at http://the-monitor.org/media/2152583/Landmine-Monitor-2015_finalpdf.pdf (accessed: 9 March 2016).
- vii All maps in this report are for illustrative purposes and do not imply the expression of any opinion on the part of GICHD/SIPRI concerning the legal status of any country or territory, or concerning the delimitation of frontiers or boundaries.
- viii The term 'national security forces' refers to national military, police and border guard personnel.
- ix The term 'international security forces' refers to international armed forces who are present in a conflict outside the mandate of a peacekeeping mission.
- x SIPRI and GICHD (2014), *The humanitarian and developmental impact of anti-vehicle mines*, pp. 73-74.
- xi As of 2013, at least 64,314 mine and ERW casualties, including 19,684 killed, have been recorded in Cambodia since 1979. See Landmine Monitor, *Cambodia Country Profile. Casualties and Victim Assistance, page updated as of 18 October 2014*, at http://the-monitor.org/en-gb/reports/2015/cambodia/casualties-and-victim-assistance.aspx#_ftnref2 (accessed: 9 March 2016).
- xii In 2014, for instance, 24 casualties from AVMs and the same number of casualties from anti-personnel mines were recorded. See *Ibid*; SIPRI and GICHD (2014), *The humanitarian and developmental impact of anti-vehicle mines*, p. 72.
- xiii SIPRI and GICHD (2014), *The humanitarian and developmental impact of anti-vehicle mines*, p. 79.
- xiv Due to rounding, percentages of this breakdown figure may not add up to 100 per cent.
- xv SIPRI and GICHD (2014), *The humanitarian and developmental impact of anti-vehicle mines*, p. 18.
- xvi There is no universally accepted definition of an IED. However, NATO 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 NATO (2010), *Glossary of Terms and Definitions*, NATO document AAP-6(2010), p. 2-1-2.

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