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Impact of explosive weapons by gender and age – Iraq 2003-2011

This paper considers the impact of different weapon types on civilians in data collected by Iraq Body Count (IBC)[2] from 20 March 2003 to 31 December 2011.[3] The impact of different weapons is looked at as it affects females of all ages, and children (aged 17 or younger) both male and female.

Main findings and recommendations

This paper concludes that:

- *Documentation of deaths and injuries from acts of armed violence presents important data for analysis of the impact of different weapon types.*
  This conclusion supports further efforts by civil society to press states and other actors to acknowledge and act on their responsibility to record, identify and acknowledge victims of armed violence.

- *Although gunfire killed the greatest number of people, of the broad violence types analysed, the proportion of females and children amongst those killed and injured was significantly higher for explosive weapons than it was for firearm incidents and other forms of assault.*
  This conclusion supports the general recognition that the effects of explosive weapons are more difficult to apply accurately and to contain than are the effects of other weapon types. Although the analysis here does not allow for distinction regarding the context of use this finding resonates with the development of policy concerns around the use of explosive weapons in populated areas.

- *Tank fire, artillery, aircraft bombs, missiles and mortars all tended to present higher proportions of female and child casualties than the other explosive weapon types.*
  These weapons may be used against targets at greater distance and/or may produce wider area effects due to greater explosive yield. By contrast, grenades and rockets, which may be fired or projected directly at a target and that have a relatively small area of effect, presented the lowest proportion of female and child casualties within the broad category of explosive ordnance. The sample sizes for some of the most problematic categories were relatively small however, which makes it difficult to draw strong conclusions. This finding supports the call by the UN Secretary-General,

ICRC and INEW for states and other parties to avoid the use of explosive weapons with wide area effects in populated areas.

Introduction: gender, age and explosive weapons

It is widely recognised that different patterns of violence can affect different populations in different ways. Whilst certain patterns of violence can be deliberately gendered, for example, in their targeting, in other cases differential demographic impacts can point to underlying issues either regarding patterns of behaviour in society or regarding the violence itself.

This paper is particularly concerned with understanding the impact of explosive weapons. Explosive weapons have been defined elsewhere as including both explosive ordnance and improvised explosive devices, weapons that use blast and fragmentation to kill and injure people in the area around the point of detonation.[4] Because they affect an area, and because they often need to be projected to a target (which produces risks of inaccuracy), it has been shown that explosive weapons are prone to causing high levels of civilian harm when used in populated areas. Such weapons have the capacity to harm multiple people within their area of affect, and have effects that are difficult to limit or apply with precision.

It should be noted that this paper is only concerned with direct deaths and injuries from armed violence and doesn't consider the wider impacts that results from destruction of property and damage to infrastructure related to schools, healthcare, water and sanitation etc. These impacts may also present patterns of harm that are shaped by issues of gender and age.

When looking broadly at the impact of explosive weapons by gender and age, the specific impact of these weapons on women and on children can be taken as indicators of:

   a. a lack of control over the weapons effects;
   b. a particular moral problem regarding the effects of these weapons.

These two indicators are slightly different in their implications. The first simply serves to reinforce the general concern that explosive weapons kill and injure the 'wrong' people. In many contexts women and children are less actively engaged in fighting than are adult men and so are more readily identifiable as civilians. As a result, the impact of violence on women and children is illustrative of people being killed and injured despite them being identifiable as civilians (and so requiring protection). Different patterns of such impact can therefore illustrate either an intention to target such groups, or an inability to target weapons effectively.

The second approach considers women and children to warrant special protection. This is reasonably straight-forward in the case of children. However, with respect to gender the issue is more complex and has implications for the characterisation of men that can be problematic. For the purposes of this paper we consider both of these approaches to be significant but it is important to bear this caveat in mind, and recognise that in treating females and children as two focal groups for analysis we are not suggesting that these different groups have the same standing as each other.

In general, there is very little available data that allows for a detailed analysis of the impact of explosive weapon attacks by gender or age.[5] In a 2011 report, Save the Children UK highlighted that "the use of explosive weapons in populated areas has a devastating impact on

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[4] See: www.inew.org
[5] For the impact of unexploded ordnance and landmines on women and children much more data exists.

children."[6] However, they noted that there is very little age-disaggregated information about civilian deaths. Amongst the particular data they note:

Country / context	Statistics	Original source
Occupied Palestinian Territories, Operation Cast Lead, January 2009	"1,172 civilians had been killed. Nearly one-third of the civilian deaths were of children, and a further 860 children were injured. Of the 353 children who were killed, 66% were killed by missile attacks (air and ground), half of which were carried out by drones, and 16% of the children died as a result of artillery shelling."	Defence for Children International and Al Mezan Center for Human Rights: 'Bearing the Brunt: Child Rights Violations during Operation Cast Lead', September 2009
Somalia	"In the Dayniile hospital run by Medicins Sans Frontieres on the outskirts of Mogadishu, women and children under the age of 14 made up 38% of those treated for war injuries, with 64% of war-wounded patients having sustained serious blast injuries.	www.savethechildren.org.uk/assets/images/Devastating_Impact_low_res_(3).pdf
Yemen, August 2009	"Artillery, drones and IEDs have killed 189 children and injured 155; 71% of these child casualties resulted from direct shelling of civilian areas by both sides."	No source given

Methodology

This paper draws on the approach used by Hicks, Dardagan, Serdán et. al. in their article for *The New England Journal of Medicine*.[7] The methodology in this paper is similar to theirs but does not contain the same exclusions from the data set, including for long-period incidents.[8] This means that the approach taken here may be subject to certain biases in the data that were removed from their study. However, the findings of this paper mirror those of the original very closely, suggesting that the differences of methodology do not substantively change the broad conclusions.

In the IBC data, records on individual civilian victims are coded to weapon types where this information is available. From this weapon-type coding it is possible to create a typology that allows comparison of different types of explosive weapons alongside firearms, other forms of assaults, vehicle accidents etc. For this paper two sets of weapon categories are used to describe the mechanism of injury. The first category we describe as 'broad incident/weapon type' and it is broken down as follows:

Explosive weapons
- Explosive ordnance – includes both air-dropped and ground-launched machine manufactured explosive weapons, such as aircraft bombs, artillery, mortars etc.
- Improvised explosive device – includes roadside bombs, car bombs, suicide bombs etc.
- Unexploded ordnance – explosive ordnance that has failed to detonate as intended but explodes later.
- Ammunition explosion – incidents where explosive ordnance detonates in storage;
- Landmine – includes both anti-vehicle and anti-personnel mines.

Not explosive weapons
- Gun – includes handguns, machine guns, sniper fire etc.
- Other (assault etc.) – includes knife attacks, blunt force trauma, torture etc.
- Vehicle 'accident' – incidents where civilians are killed by military vehicles

For analysis by 'detailed incident/weapon type' the categories of 'explosive ordnance' and 'improvised explosive devices' are further subdivided as follows:

Explosive ordnance
- Mortar
- Rocket
- Grenade
- Artillery

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[6] Save the Children, 2011, *Devastating Impact: Explosive Weapons and Children*, online at: www.savethechildren.org.uk/resources/online-library/devastating-impact-explosive-weapons-and-children
[7] Hicks, Dardagan, Serdán et. al., The New England Journal of Medicine*, The Weapons That Kill Civilians – Deaths of Children and Noncombatants in Iraq, 2003-2008*, N ENGL J MED 360;16: 1585-1588
[8] ibid. p.1586.

- Missile
- Aircraft bomb
- Tank fire

Improvised explosive devices

- IED – roadside bomb
- IED – vehicle bomb
- IED – general bomb
- IED – vehicle suicide bomb
- IED – general suicide bomb

These more detailed classifications are based on the classifications already in place within the IBC data set. Within these classifications the item 'tank fire' is rather ambiguous because it cannot be clearly determined if this relates to the use of explosive weapons or firearms, such as tank-mounted machine guns. However, tank fire was only recorded as a mechanism of death or injury in 29 of the 30,521 incidents under scrutiny.

These mechanisms of death or injury can be compared by their impact on females and on children. Not all individual victims are coded by gender or by age, but comparative analysis can be undertaken by looking, by weapon-type, at the proportion of female casualties amongst the records where gender is recorded, and at the proportion of child casualties amongst the records where age group is recorded.

Such an analysis does not produce a picture of which weapons killed or injured the most females or children, but does indicate when these groups make up a greater or lesser *proportion* of casualties by weapons types. Such an analysis allows us to make suggestions regarding the extent to which certain weapon types can be used in a way that allows effective discrimination between civilians and combatants.

Summary of the data set

This analysis draws on data from 30,521 incidents, in which 121,532 civilian people were killed and 128,013 people were injured.[9]

Analysis by broad incident/weapon type

Persons killed
Of the total killed, information was available regarding the gender of victims for 49,017 individuals (40%) and regarding the age group for 52,728 individuals (43%).

Broad incident/weapon type	No. of incidents	Total killed	Avg. killed per incident	Killed where gender reported	Killed where age group reported
Gun	16,439	59,845	3.64	28,515 (48%)	29,885 (50%)
Improvised explosive device	6,744	32,225	4.78	9,724 (30%)	11,166 (35%)

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[9] This initial sample is drawn from the period 01 Jan 2003 to 31 Dec 2011. It includes all incidents in the IBC data set that could be attributed to certain types of weapons or attacks. From this were excluded: aircraft where the broad type of weapon was not clear (all except B-52 bombers, which were classified under bombs); illumination rounds (2 incidents, classified in IBC under air attack missiles); firebombs and incendiary bombs (2 incidents, classified in IBC under ground attack bombs); percussion grenades, sound grenades, stun grenades and thermal bombs (7 incidents, classified in IBC as ground attack missiles). These items were excluded because it was either not clear that they were explosive weapons, or they are not explosive weapons but were otherwise in a category made up of explosive weapons.

Other shifts in categorization were undertaken to produce a more rational analysis of the data: incidents involving B-52 bombers were coded to 'air attack bombs'; the category of 'ground attack bombs' was disaggregated to produce 'IED – general', 'IED – roadside bomb', 'IED – vehicle bomb' and 'landmine.' Sub-items 'artillery', 'mortars' and 'tank fire' were removed from the category 'gunfire', to leave gunfire as a category for firearms rather than explosive weapons. 'Artillery' and 'mortars' were amalgamated with sub-items from 'ground attack missiles.'

Other (assault etc.)	5,330	18,760	3.52	7,891 (42%)	7,908 (42%)
Explosive ordnance	1,656	9,600	5.80	2,522 (26%)	3,284 (34%)
Unexploded ordnance	68	462	6.79	71 (15%)	146 (32%)
Vehicle 'accident'	222	424	1.91	223 (53%)	257 (61%)
Ammunition explosion	17	117	6.88	42 (36%)	42 (36%)
Landmine	45	99	2.20	29 (29%)	40 (40%)
Total	30,521	121,532	3.98	49,017 (40%)	52,728 (43%)

As can be seen in the table above, gunfire killed the most people, followed by improvised explosive devices. Explosive weapons, with the exception of landmines, tended to produce higher numbers of deaths per incident.

Persons injured
Of the total injured, information was available regarding the gender of victims for 18,213 individuals (14%) and regarding age group for 22,814 individuals (18%).

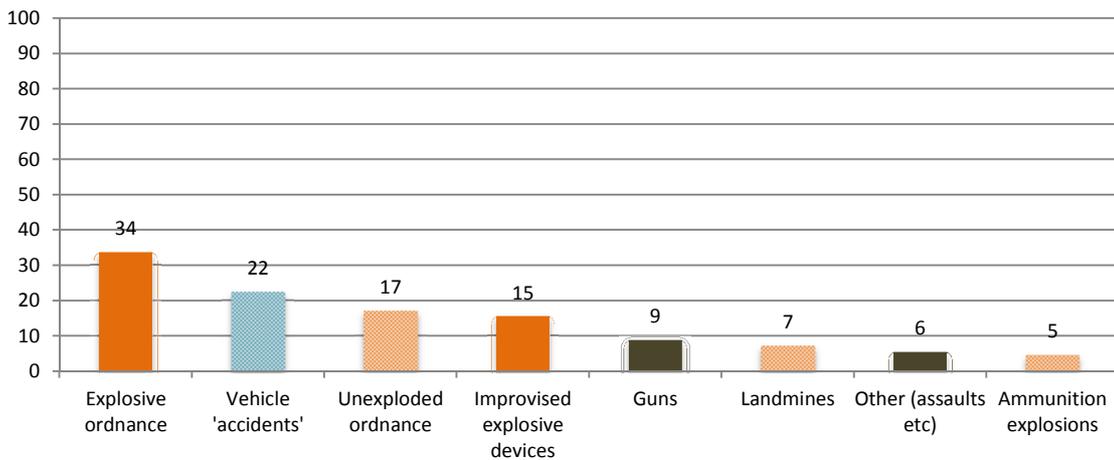| Broad incident/weapon type	No. of incidents	Total injured	Avg. injured per incident	Injured where gender reported	Injured where age group reported
Improvised explosive device	16,439	80,648	11.96	11,527 (14%)	14,303 (18%)
Explosive ordnance	6,744	26,796	16.18	1,866 (07%)	2,805 (10%)
Gun	5,330	16,672	1.01	4,536 (27%)	5,187 (31%)
Other (assault etc.)	1,656	2,498	0.47	106 (04%)	125 (05%)
Vehicle 'accident'	68	585	2.64	86 (15%)	139 (24%)
Ammunition explosion	222	331	19.47	44 (13%)	44 (13%)
Unexploded ordnance	17	310	4.56	35 (11%)	148 (48%)
Landmine	45	173	3.84	13 (08%)	63 (36%)
Total injured	30,521	128,013	4.19	18,213 (14%)	22,814 (18%)

By contrast with the data on deaths, improvised explosive devices and explosive ordnance were responsible for the greatest number of injured. As with the data on deaths, explosive weapons produced significantly higher numbers of injured per incident. This reflects the capacity of explosive weapons to affect an area around the point of detonation, rather than being used simply to strike a targeted individual.

It is noticeable that more detailed information is available regarding the dead. For both those killed and injured, incidents involving 'guns' and 'vehicle accidents' consistently have comparatively high levels of detail.

Proportion of the killed and injured were female
Continuing our analysis within these broad categories, the chart below illustrates the proportion of those that were female amongst the people killed and injured for whom gender was recorded.

% killed and injured were female

Bar chart showing % killed and injured were female by incident type: Explosive ordnance 34, Vehicle 'accidents' 22, Unexploded ordnance 17, Improvised explosive devices 15, Guns 9, Landmines 7, Other (assaults etc) 6, Ammunition explosions 5.
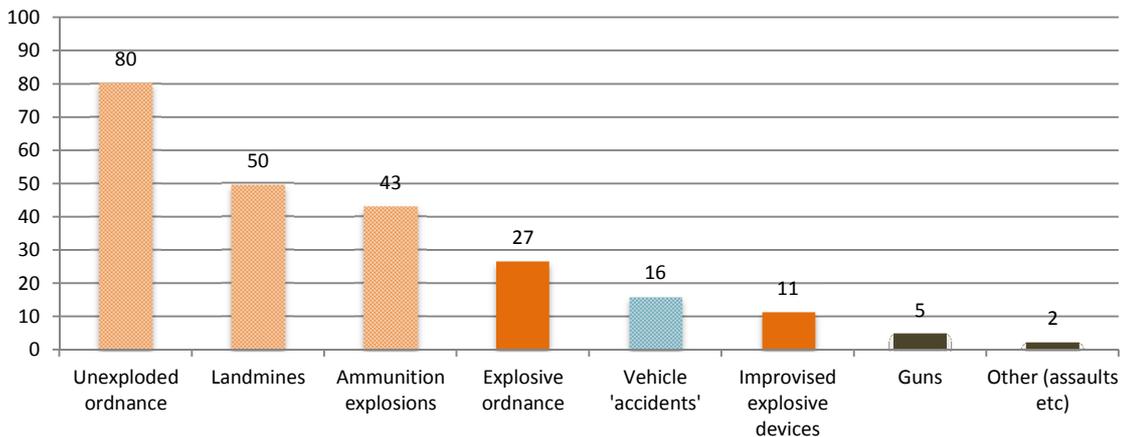
Note: Orange shading indicates explosive weapons, dark grey shading guns and direct assaults and blue vehicle accidents. The light orange shading indicates that these incidents may have been accidents rather than direct 'attacks'.

Generally, females made up a relatively low proportion of those killed and injured where gender was known (i.e. males made up a significantly greater proportion of the casualties.) The greatest proportion of females killed and injured was found in incidents involving the use of explosive ordnance, followed by vehicle 'accidents', unexploded ordnance and improvised explosive devices.

Proportion of the killed and injured that were children
The chart below illustrates the proportion of those that were children amongst the killed and injured for whom an age group was recorded.

% killed and injured were children

Bar chart showing % killed and injured were children by incident type: Unexploded ordnance 80, Landmines 50, Ammunition explosions 43, Explosive ordnance 27, Vehicle 'accidents' 16, Improvised explosive devices 11, Guns 5, Other (assaults etc) 2.

Note: Orange shading indicates explosive weapons, dark grey shading guns and direct assaults and blue vehicle accidents. The light orange shading indicates that these incidents may have been accidents rather than direct 'attacks'.

For certain incident types, children made up a very significant proportion of those killed and injured, where the age group was known. In incidents involving unexploded ordnance, children made up the majority of those killed and injured. This resonates with analysis

elsewhere that has highlighted the particular vulnerability of children to this threat.[10]
Amongst violent incidents types, children tend to make up a greater proportion of those killed
and injured by explosive weapons than they do of those killed and injured by guns or other
forms of direct assault.

Analysis by detailed incident/weapon type

The analysis presented above can be taken further by considering the more detailed weapon
classifications that constitute the broad categories. This allows a disaggregation of the two
broad explosive weapon categories – explosive ordnance and improvised explosive devices.
A summary of the incidents and proportions of females and children amongst those killed and
injured **where such information is recorded** is presented below:

| Type of incident	No. incidents	% killed female	% killed children	% injured female	% injured children
Gunfire	16,439	8	4	15	9
Other (assault etc.)	5,330	5	2	33	4
IED - roadside bomb	3,069	11	10	8	7
IED - vehicle bomb	1,383	27	18	27	12
IED - general bomb	1,224	14	12	17	22
Mortar	1,063	33	29	30	21
IED - vehicle suicide bomb	706	11	14	13	10
IED - general suicide bomb	362	15	11	18	10
Rocket	286	17	16	15	20
Vehicle 'accident'	222	26	18	14	12
Grenade	135	12	13	9	5
Unexploded ordnance	68	17	76	17	84
Missile	67	29	30	43	35
Aircraft bomb	49	68	45	69	50
Mine	45	10	33	0	60
Tank fire	29	68	41	38	39
Artillery	27	54	45	64	17
Ammunition explosion	17	7	29	2	57

The low numbers of incidents for some of these more detailed categories raise questions
regarding sample sizes and hence the validity of findings for those weapon types.

Proportion of those killed and injured were female
The chart below illustrates the proportion of females amongst those killed and those injured
where gender was recorded.

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% killed and injured were female by detailed incident type
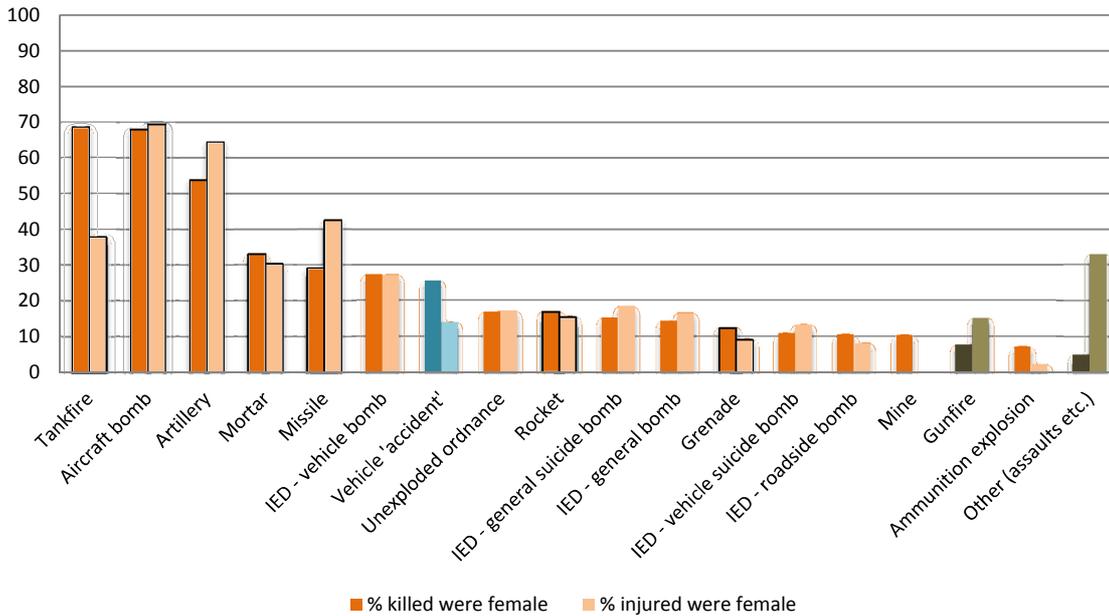
Note: Orange shading indicates explosive weapons, grey shading guns and direct assaults and blue vehicle accidents. Weapons in the category of 'explosive ordnance' (disaggregated here) have a dark border.
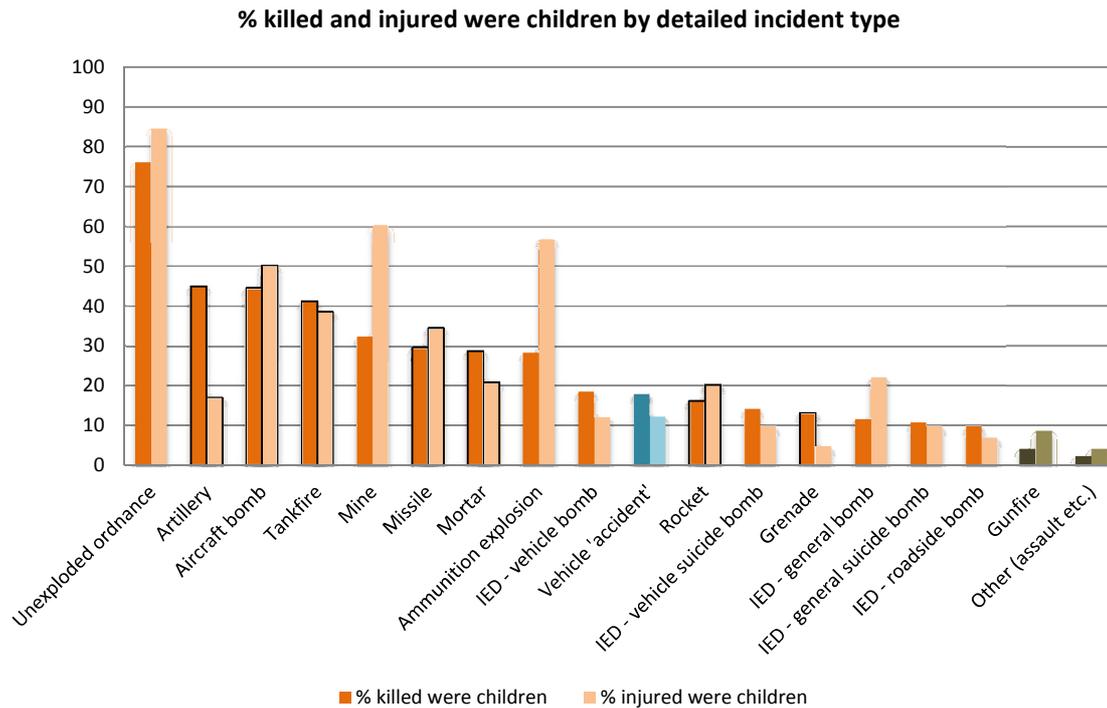
Here the disaggregation of the category of 'explosive ordnance' allows us to see tank fire, aircraft bombs, artillery, mortars and missiles claiming a higher proportion of female deaths and injuries than rockets and grenades. The category of tank fire is somewhat ambiguous here because it could refer to explosive ordnance or non-explosive weapons. Also very significantly, analysis of tank fire, artillery and aircraft bombs all derive from a very limited sample of incidents (less than 50 incidents each, by comparison with over 1,000 incidents for mortars).

Disaggregating the category of 'improvised explosive devices' we see 'vehicle bombs' producing a significantly higher proportion of female casualties than resulted from the other IED sub-categories. 'Roadside bombs' present the lowest proportion of female casualties from within the IEDs.

Gunfire and assaults both present lower proportions of females amongst those killed than all of the individual explosive weapon categories.

Proportion of those killed and injured were children
The chart below illustrates the proportion of children amongst those killed and those injured where age group was recorded.

% killed and injured were children by detailed incident type

Legend: ■ % killed were children ■ % injured were children

Note: Orange shading indicates explosive weapons, grey shading guns and direct assaults and blue vehicle accidents. Weapons in the category of 'explosive ordnance' (disaggregated here) have a dark border.

The disaggregation of the category of 'explosive ordnance' shows artillery, aircraft bombs, tank fire, missiles and mortars presenting the highest proportions of child casualties, with rockets and grenades again presenting a more limited pattern of impact. The same qualifications need to be borne in mind regarding the lower sample size underpinning this representation of artillery, aircraft bombs and tank fire in particular.

Amongst the improvised explosive weapons it is again 'vehicle bombs' that present the highest proportion of child casualties and 'roadside bombs' that present the lowest proportion of child casualties.

Gunfire and assault again present a lower proportion of children killed than any of the individual explosive weapon categories.

Conclusions

A number of key points can be brought out as conclusions from this analysis:

- Documentation of deaths and injuries from acts of armed violence presents important data for analysis of the impact of different weapon types;
- Explosive weapons tend to kill, and in particular injure, greater numbers of people per incident than results from gunfire or forms of direct assault;
- Although gunfire killed the greatest number of people of the broad violence types analysed, the proportion of females and children amongst those killed and injured was significantly higher for explosive weapons than it was for firearm incidents and other forms of assault;
- Within the broad categories of explosive ordnance and improvised explosive devices, specific sub-categories of explosive weapons can present different patterns of impact by gender and by age group.

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- In this dataset, grenades and rockets, which may be fired or projected directly at a target and that have a relatively small area of effect, presented the lowest proportion of female and child casualties within the broad category of explosive ordnance.
- Tank fire, artillery, aircraft bombs, missiles and mortars all tended to present higher proportions of female and child casualties – whilst recognising certain qualifications for some these sub categories. These weapons may be used against targets at greater distance and/or may produce wider area effects due to greater explosive yield.