BRIEF REPORT

Key factors for civilian injuries and deaths from exploding landmines and ordnance

Amber B Surrency, Philip L Graitcer, Alden K Henderson

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Objective: To identify risk factors for death or injury from landmines and ordnance in Kabul City, Afghanistan, so programs can target preventive actions.
Methods: Active surveillance in hospitals and communities for injuries and deaths from landmine and ordnance explosions in Kabul City.
Results: Of the 571 people the authors identified during the 25-month period, 161 suffered a traumatic amputation and 94 were killed from a landmine or ordnance explosion. Of those asked, 19% of victims had received mine awareness education before the incident, and of those, the majority was injured while handling or playing with an explosive device. Most victims were young males with a few years of education. The occupation types most at risk were students and laborers, and unemployment was common among the victims. Collecting wood or paper and playing with or handling an explosive were the most frequent activities associated with injuries and deaths.
Conclusions: From May 1996 to July 1998, explosions from landmines and ordnance claimed 571 victims and were an important preventable cause of injury and death among people in Kabul City. Prevention strategies should focus on high-risk groups and changing risky behaviors, such as tampering with explosive devices.

After two decades of war and conflict, Afghanistan has one of the highest density of landmines in the world.[1] Twenty seven of the country's 29 provinces contain 10% of the world's 100 million landmines.[2] The most heavily mined provinces are along the Pakistan border and the provinces containing the cities Kandahar and Kabul. Over 50 different kinds of mines are present in almost every type of terrain. These devices range from simple pressure mines with metal casings that were buried decades ago to devices with electronic sensors and plastic explosives and housings that were dropped by aircraft, lie on the ground, and can distinguish animal and human steps. Maps of mine fields are often inaccurate because new mines have been laid and because flooding often moves mines.

Another explosive device that causes trauma is ordnance. These are bombs, grenades, missiles, rockets, and mortar or artillery shells that have been fired or dropped and failed to detonate. Ordnance contains explosive material in a metal shell and is found on the ground or partially buried. Although many of the ordnance are stable, some are sensitive to vibration and can detonate.

The International Committee of the Red Cross (ICRC) reported in 1992 that 26 000 people in the world are maimed or killed by explosions from landmines and ordnance each year.[3] This number does not fully represent the impact of these devices. In addition to the injuries and deaths, landmines reduce the amount of land available for living, grazing domestic farm animals and growing crops.[4] Landmines also close roads to agricultural fields, healthcare facilities, and schools. As a result, economic growth is depressed, unemployment levels rise, housing becomes scarce and the incidence of malnutrition and infectious and waterborne diseases increases.[5]

Landmines and ordnance were left behind after the wars and conflicts in Afghanistan. Despite landmine-awareness programs and de-mining activities, these devices still cause many injuries and deaths to civilians as well as limit use of the land.[6] In this paper we will describe the characteristics of people who were injured or killed by an explosion from a landmine or ordnance in Kabul City during May 1996 to July 1998 and identify risk factors for these injuries and deaths.

METHODS

Data collection began when the mine action program of Save the Children was established in May 1996 and ended when Save the Children programs in Kabul City were suspended in mid July 1998 because of restrictions set by the Taliban. Survey teams consisted of two local health workers who visited each hospital and large clinic in Kabul City on a semi-weekly basis to identify victims of landmine and ordnance explosions. Most victims were interviewed within a few days of admission to the hospital or clinic. Those who were released were interviewed in their homes within a week after their release. We excluded the military hospital from this survey because the activities of injured soldiers differed from activities of injured civilians. In addition to surveillance in medical care facilities, we created teams of local community members called bike boys. They patrolled specific regions of the city at least once a week to identify victims. As the bike boys often lived in the community they patrolled, nearby residents often informed the bike boys about any explosions. Consequently, the bike boys were able to identify victims who did not seek medical care in the hospitals or clinics or were killed on site by the explosion. The bike boys reported the names and locations of people injured or killed by an explosion to the survey team once a week.

If a landmine or ordnance explosion resulted in death or if a victim was a young child, a family member or an informant familiar with the circumstances of the incident was interviewed. Proxy interviews were done on the 94 people who died and the 31 children who were under 8 years of age. Interviews were conducted in Dari, the local language. We obtained informed consent before interviewing any victim or proxy.

The survey questionnaire contained questions on basic demographic and social characteristics as well as risk factor variables on the place and circumstances of the injury. Although the questionnaire was revised several times during the study to include additional factors of interest, the key risk factors and demographic questions remained unchanged. If "missing" or "unknown" was the fourth or more frequent response, that variable was not reported. Univariate analysis and tests of significance were conducted with the EpiInfo 6.0 statistical software.[7]

Abbreviation: ICRC, International Committee of the Red Cross

Table 1 Characteristics of people injured or killed by a landmine or ordnance explosion: May 1996–June 1998, Kabul City, Afghanistan

Characteristic	Landmine (278)	Ordnance (293)	Total (571)
Sex			
Female	36 (6.3%)	36 (6.3%)	72 (12.6%)
Male	241 (42.2.%)	253 (44.3%)	494 (86.5%)
Unknown	1 (0.2%)	4 (0.7%)	5 (0.9%)
Mean age in years (SD)	24.3 (15.7)	14.6 (11.9)	19.3 (14.7)
Mean years education (SD)	4.0 (4.8)	2.1 (2.5)	2.7 (3.5)
Primary occupation			
Farmer	8 (1.4%)	2 (0.4%)	10 (1.8%)
Housewife	11 (1.9%)	6 (1.1%)	17 (3.0%)
Laborer	41 (7.2%)	18 (3.2%)	59 (10.3%)
Shepherd	12 (2.1%)	16 (2.8%)	28 (4.9%)
Student*	30 (5.3%)	77 (13.5%)	107 (18.7%)
Teacher	7 (1.2%)	0 (0%)	7 (1.2%)
Unemployed	58 (10.2%)	40 (7.0%)	98 (17.2%)
Other	33 (5.8%)	31 (5.4%)	64 (11.2%)
Unknown	78 (13.7%)	103 (18.0%)	181 (31.7%)
Completed landmine awareness program			
Yes	34 (6.0%)	38 (6.7%)	72 (12.6%)
No	148 (25.9%)	156 (27.3%)	304 (53.2%)
Unknown	96 (16.8%)	99 (17.3%)	195 (34.2%)

The analysis was conducted while one of the authors participated in an internship with Save the Children USA. The surveillance was part of her duties and she was responsible for the study design, data collection, analysis, interpretation of data, writing of the report and decision to submit the paper for publication.

RESULTS

During the 25-month study period, the surveillance system identified 590 people who were injured or killed by an explosion in Kabul City. Of these, we excluded two reports of people who were injured before the study began and 17 reports of people injured or killed by an antitank or an unknown explosive device. The major risk factors for injury or death for the remaining 571 people were gender, age, education and occupation (table 1). Almost seven times as many males as females were injured or killed. Victims were young (mean age 19.3 years) and had little education (mean 2.7 years). The occupations with the most victims were student and laborer and many victims were unemployed. About a fifth of the victims completed a landmine awareness program.

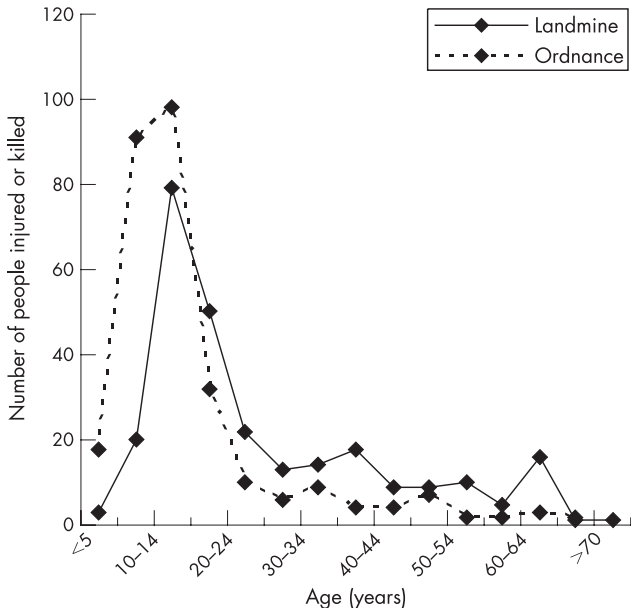

Figure 1 Age distribution of people killed or injured by landmine or ordnance explosions in Kabul City, Afghanistan, 1996–8.

Victims of landmine and ordnance explosions differed in several ways. The mean age in years at time of injury or death and years of education was lower in people injured or killed by ordnance explosions than by those injured or killed by landmine explosions (table 1). Both devices injure or kill younger people with injuries and deaths peaking at ages 5–15 years, decreasing rapidly after age 20 years, and remaining low and stable after age 35 years (fig 1). The rise in number of victims starts at an earlier age for ordnance victims. The victims' occupation differed strikingly among the two groups. The most common occupations for a landmine victim were laborer or student while ordnance victims were most commonly students (table 1). Unemployment was common for victims of both devices.

The type and circumstances of injury differed among the victims of these two devices (table 2). Landmine explosions killed more and caused more amputations than ordnance. The most common sites of injury from landmine explosions were the leg or foot; ordnance caused more injuries to the head, arm or hand. The most common areas where landmines detonated were on a mountain or hill or on land used for grazing or agriculture. For ordnance, the most common areas were in a residential neighborhood, an inside yard or building, or land for grazing animals. The most common activities just before the explosion were, for landmines, collecting wood, tending an animal or walking and, for ordnance, handling the device, playing, collecting metal or standing near the explosion. Ordnance caused all the injuries resulting when a person was using the explosive materials to make a fire. Explosions injured 312 people other than those who triggered the device. Landmines typically killed or injured 1–2 people, and ordnance killed or injured 2–4 people.

When looking at the fatalities, more men (74/96, 79.8%) died than women and half of the deaths occurred below 18 years of age. People who died from an ordnance explosion were younger (mean 14.6 years) than a landmine explosion (mean 21.4 years).

Table 2 Type of injury from a landmine or ordnance explosion: May 1996–June 1998, Kabul City, Afghanistan

Characteristic	Landmine (%)	Ordnance (%)	Total (%)
Outcome of victim			
Fatal	57 (10.0)	37 (6.5)	94 (16.4)
Non-fatal	210 (36.8)	234 (41.0)	444 (77.8)
Unknown	11 (1.9)	22 (3.9)	33 (5.8)
Type and location of non-fatal injury			
Amputation	124 (47.5)	37 (14.2)	161 (61.7)
Blindness	6 (2.3)	3 (1.1)	9 (3.4)
Head	28 (10.7)	48 (18.4)	76 (29.1)
Trunk	4 (1.5)	11 (4.2)	15 (5.7)
Extremity			
Arms/hands	31 (6.5)	106 (22.1)	137 (28.5)
Legs/foot	140 (29.2)	39 (8.1)	179 (37.3)
Entire body	1 (0.2)	4 (0.8)	5 (0.1)
Unknown	74 (15.4)	85 (17.7)	159 (33.1)
Region detonated			
Agricultural	33 (5.8)	10 (1.8)	43 (7.5)
Bazaar	2 (0.4)	13 (2.3)	15 (2.6)
Canal/stream	8 (1.4)	2 (0.4)	10 (1.8)
Cemetery	7 (1.2)	1 (0.2)	8 (1.4)
Inside yard or building	4 (0.7)	36 (6.3)	40 (7.0)
Land for grazing animals	42 (7.4)	30 (5.3)	72 (12.6)
Mountain or hill	61 (10.7)	23 (4.0)	84 (14.7)
Residential neighborhood	18 (3.2)	55 (9.6)	73 (12.8)
Road, track or footpath	18 (3.2)	16 (2.8)	34 (6.0)
Other	0 (0)	2 (0.4)	2 (0.4)
Unknown	85 (14.9)	105 (18.4)	190 (33.3)
Activity at time of detonation			
Collecting wood or paper	118 (20.7)	16 (2.8)	134 (23.5)
Collecting metal	10 (1.8)	34 (6.0)	44 (7.7)
Collecting water	11 (1.9)	1 (0.2)	12 (2.1)
Collecting grass	6 (1.1)	3 (0.5)	9 (1.6)
Digging	4 (0.7)	3 (0.5)	7 (1.2)
Handling device	9 (1.6)	85 (14.9)	94 (16.5)
Making fire	0 (0)	12 (2.1)	12 (2.1)
Playing	6 (1.1)	75 (13.1)	81 (14.2)
Standing near explosion	5 (0.9)	24 (4.2)	29 (5.1)
Tending an animal	18 (3.2)	2 (0.4)	20 (3.5)
Walking or running	45 (7.9)	2 (0.4)	47 (8.2)
Other	22 (3.9)	7 (1.2)	29 (5.1)
Unknown	24 (4.2)	29 (5.1)	53 (9.3)

Care of the victims was available on only 78 (13.7%) victims because this question was added late in the survey. Victims who went to a health facility had more non-fatal injuries, were younger, male, more educated and employed (table 3). Victims who did not receive care were more likely to die from the explosion, be female, and unemployed. The top activities for both groups were handling the device, collecting wood, playing or being next to the explosion.

Table 3 Comparison of victims of explosions by treatment in a health facility

	Seen in health facility?	
Outcome or trait	Yes (54)	No (24)
Fatal	4 (5.1%)	16 (20.5%)
Non-fatal	50 (64.1%)	8 (10.3%)
Age (years)	16.4	20.4
Sex (male)	32 (59.2%)	4 (16.7%)
Top 3 activities at time of detonation	Handling device Collecting wood Playing	Handling device Collecting wool Near explosion
Education		
None	35 (44.9%)	16 (20.5%)
Some	19 (24.3%)	0 (0.0%)
Unknown	0 (0.0%)	8 (10.3%)
Employed (yes)	47 (94.0%)	3 (6.0%)

Students (11.4%) were the largest group of victims that completed a landmine awareness course. The main activities at time of detonation were collecting wood or paper, handling the device, and playing. Completing this course did not reduce the risk of injury or death from these devices (table 4).

The case-fatality rate for children (21.1%) was significantly higher than that for adults (10.7%); four times as many children as adults died from ordnance. The activities most frequently associated with fatalities in children from landmine explosions were collecting wood and paper and, for ordnance, collecting metal and handling the device.

DISCUSSION

The primary risk factors for injuries and deaths from landmine and ordnance explosions were sex, age and occupation. Men were injured and killed more than six times more frequently than women. One reason is that men spent more time outside the house because the Taliban regime forbade women to work outside their homes. The most common activities at time of detonation were collecting wood, paper or metal, handling the device or playing. As a result of extreme poverty, which can be attributed to the war, Afghanis had to collect firewood, grow crops and graze animals on land that had not been cleared of landmines or land that had been marked as dangerous. Dire economic conditions caused Afghans to salvage metal from ordnance or use the explosive materials to provide heat for cooking and warmth. Because of extreme poverty and few

Table 4 Characteristics of victims by landmine education

Characteristics	Completed landmine awareness education	
	Yes (%)	No (%)
Sex (male)	68 (93.1)	275 (86.5)
Age (in years)		
0–11	29 (39.7)	119 (37.3)
12–29	30 (41.1)	121 (38.1)
30–45	11 (15.1)	46 (14.5)
Over 45	3 (4.1)	32 (10.1)
Outcome		
Fatal	9 (16.3)	39 (15.4)
Non-fatal	46 (83.6)	214 (84.6)
Occupation		
Laborer	4 (7.7)	37 (22.1)
Housewife	0 (0.0)	12 (7.1)
Shepherd	2 (3.8)	13 (7.7)
Student	39 (75.0)	56 (33.3)
Unemployed	7 (13.5)	50 (29.8)
Activity at time of detonation		
Collecting wood or paper	18 (24.7)	78 (22.6)
Collecting metal	3 (4.1)	24 (7.0)
Collecting water	1 (1.4)	10 (2.9)
Collecting grass	0 (0.0)	8 (2.3)
Digging	0 (0.0)	7 (2.0)
Handling device	16 (21.9)	69 (20.0)
Making a fire	2 (2.7)	10 (2.9)
Playing	11 (15.1)	33 (9.6)
Standing near explosion	4 (5.5)	16 (4.6)
Tending an animal	2 (2.7)	10 (2.9)
Walking or running	4 (5.5)	31 (9.0)
Other	4 (5.5)	29 (7.2)
Unknown	8 (11.0)	24 (7.0)

income-generating opportunities in Kabul City, people undertook risky behavior such as salvaging metal from landmines and unexploded ordnance.

Children were often victims of explosive-related injuries. Children in Kabul City often worked to support themselves or to contribute to their family income. Collecting wood and paper for fuel and grazing animals were common tasks for boys in Kabul City. Some children collected ordnance for salvaging the metal. Children who were not in school had time to experiment with explosive devices. Even though many child victims were taught to recognize the dangers of explosives, one out of five were injured while playing with the devices.

Our findings reflect those reported in two articles based upon data from the ICRC Mine Data Collection Program in Afghanistan.[2 8] In the 2000 article, the ICRC collected information on 1114 people injured from landmine and ordnance explosions that were treated at one of their health facilities. The report concluded that most victims were males injured during fighting or traveling, that ordnance was a bigger threat to civilians and especially children, and that dangerous behavior persists even among Afghans who completed mine awareness training. In the 2003 article, scientists from the Centers for Disease Control and Prevention analyzed ICRC data and reported that most of the people injured were civilians and males. Children were most likely to be injured by unexploded ordnance while adults by landmines. The most common risk behavior for children was playing and tending animals while for adults risk behaviors were military activity or activities of economic necessity. However, these articles used data from ICRC clinics and hospitals and did not capture people that did not go to an ICRC facility. This unaccounted population (30.1% in our study) included those who died at the explosion site, those who could not afford to travel to the hospital, those who had minor injuries, and those who were female.

An advantage of conducting active surveillance in the community is the inclusion of victims who did not go to a medical facility or who died from their injuries. Most of the reports on injuries and deaths from landmine or ordnance explosions use medical records and do not include victims who do not go to a medical clinic. For example, of the 78 people with information about transport to hospital, 10 people died at the site of the explosion and 14 people did not go to a medical facility. These events are not in the hospital records. Another item of interest is that more people were injured or killed in areas unmarked for landmines than areas that were cleared or marked as dangerous. However, 35 people were killed or injured in areas marked as cleared or dangerous.

Our study had several limitations. Because research activities were briefly suspended in October 1996 during intense fighting in the city, the surveillance system may not have been able to identify people injured or killed during this period. Although most of the victims treated at the hospital were interviewed because most victims have prolonged stays in hospitals, some people who had minor injuries or died may have not been captured by the surveillance system. We revised the questionnaire several times, so information on the newer variables was not available on the earlier victims. The newer variables include residency, familiarity with the area where the device was detonated, whether the area was cleared of mines or marked as dangerous, status in family and access to medical care. In this report we included the variables that did not have ''unknown'' or ''missing data'' as one of the three most frequent responses. Because an accurate count of the residents of Kabul and the number of people who completed landmine awareness training were not available, we could not calculate injury and death rates or evaluate the prevention effect of landmine awareness training. There was no non-injured comparison group to compare the characteristics of victims.

The liberation of Afghanistan in 2002 brought humanitarian funding for economic recovery to the country and created one of the world's most comprehensive landmine action programs. The United Nations' Mine Action Program for Afghanistan combined the efforts of mine action centers and local non-governmental organizations to provide mine action programs. This program includes landmine and ordnance clearance, quality assurance for their activities, surveillance and education. Although funding mine action programs that remove landmines and ordnance and increase mine awareness will decrease the number of injuries and deaths from these devices, increasing economic opportunities will also reduce the risky behaviors that lead to detonations of these devices. A more

Key points

- Explosions from landmines and ordnance are an important cause of preventable injury and death among people living in Kabul City.
- Of the 571 victims identified between May 1996 to July 1998, 161 suffered a traumatic amputation and 94 were killed from a landmine or ordnance explosion.
- Most people injured were young males with only a few years of education.
- The occupations with the most victims were student or laborer, and unemployment was common.
- Collecting wood or paper for fuel and playing with or handling a landmine or ordnance were the most frequent activities associated with injuries and deaths.

comprehensive surveillance system can monitor the number of injuries and identify risk factors so effective interventions can be implemented. The use of community members, as exemplified by this report, shows how additional reports of injuries and deaths can be collected to obtain a fuller picture of their impact. Landmine awareness training should be based on identified risk factors and behaviors that are strongly associated with injury and death from these devices.[8] Culturally- and socially-appropriate education strategies must be used to encourage behavioral changes that will result in the reduction of landmine- and ordnance-related incidents.

Authors' affiliations
A B Surrency, Save the Children, Pakistan/Afghanistan Field Office
P L Graitcer, Center for Injury Control, Rollins School of Public Health, Emory University, Atlanta, Georgia, USA
A K Henderson, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

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The corresponding author, Dr Henderson, had full access to all the data in the study and has final responsibility for the decision to submit for publication.

Correspondence to: Dr A Henderson, Centers for Disease Control and Prevention, Mail Stop E-31, 1600 Clifton Road, Atlanta, GA 30333, USA; ahenderson@cdc.gov

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LACUNAE

The trick is to look the barman in the eye and give a short, emphatic nod as you order a Coke. Discreetly, the rum tumbles in and, discreetly, you toast the barman, your accomplice in crime. The Venezuelan president, Hugo Chavez, has banned alcohol in the week leading up to Easter Day to try to cut the number of drink-driving-related accidents, which soar during the holiday exodus for the beach. For Venezuelans, by some measures Latin America's biggest boozers, the edict has resounded like a clap of thunder. ''Revolution? Fine. But with this Chavez has gone too far. This is just crazy, it's extremism,'' said a 55-year-old who asked not to be named. Normally the motorcycle courier embraced the president's efforts to usher in a socialist revolution, including land reform, the nationalization of certain industries, and rhetorical assaults against the US. When it came to the dry law, however, this self-professed ''Chavista'' was a counter-revolutionary. ''It's the holidays and if I want to drink I'll drink.'' Many view the ban as bold and enlightened. ''I've never liked Chavez but this is a good move. Driving at this time of year is to take your life in your hands,'' said Veronica Castejon, 32, a Caracas saleswoman. Others across the region urged their governments to follow suit. ''I wish we could adopt the same measure in Colombia,'' one Medellín resident told the BBC. The sale of alcoholic beverages is prohibited on Holy Thursday, Good Friday and Easter Day and between now and then it is illegal to sell alcohol after 5pm. Obtaining a drink after sunset, however, is not so hard. Many of the bars and restaurants still open this week continue service as usual, though with a wink. The police, who also seem to have been surprised by the ban, have ensured that off-licences shut at 5pm, but otherwise seem to have turned a blind eye to clandestine consumption. In bars, wine and beer are liable to be served in coffee mugs or polystyrene cups. The atmosphere echoes the Prohibition-era US ''speakeasies''. Venezuela was the world's seventh biggest Scotch importer last year, according to the Scotch Whisky Association, and it is common to see motorists and pedestrians sipping beer in the morning. The flip side is carnage on the roads and drink-fuelled violence which leaves dozens dead at weekends. That can rise to hundreds over public holidays.

From *Guardian* (London, UK). Contributed by John Langley.