ORIGINAL RESEARCH

Investigation of Health-Related Consequences of Landmine Explosions During the Past 4 Decades (1979-2016): A Retrospective Cross-Sectional Study, Kurdistan, Iran

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ABSTRACT

Objectives: Landmines remain a potential public health concern in the western and southern border regions of Iran. The aim of this study was to assess the health-related consequences of landmine explosions in Kurdistan Province during the past 4 decades.

Methods: This retrospective cross-sectional study was conducted in Kurdistan Province of Iran in 2016-2017. The data gathering process was questionnaire based. Survivors, or a member of the deceased's family, were interviewed, and 410 questionnaires were completed. Data analysis was performed by using descriptive or analytical tests in SPSS software V.22.

Results: Antipersonnel landmines caused death immediately after the explosion 32.1% of the time, and 67.9% survived with various disabilities, such as blindness, deafness, and limb amputation. Sixty-three percent of the injuries were related to limb amputation, which was the most prevalent injury among survivors. The adjusted regression test revealed a significant relationship between severity of injury and variables such as living in the villages, education, and occupation (P-value < 0.05).

Conclusions: Recognizing the mined areas and intensifying clearance measures are crucial for Kurdistan Province. Providing landmine awareness programs is likely to yield useful results in reducing casualties. Also, landmine survivors should have access to physical and social rehabilitation programs.

Key Words: landmines, explosion, health impact, casualties

Landmines are widely distributed throughout the world during armed conflicts. Antipersonnel landmines pose a threat to people's health in low- and middle-income countries.[1] Landmines are considered to be explosive remnants of war (ERWs), and casualties from them are death, severe injury, and disability.[2] In addition, direct and indirect losses from ERW contamination that affect inhabitants encompass social and economic threats, such as reduced tourism revenues and loss of agricultural land in the most mined areas.[3,4] According to statistics provided by the International Committee of the Red Cross (ICRC), women account for 10-15% of total victims of landmines worldwide.[5] Studies have shown that 1400 deaths due to landmines or ERW were recorded in Iran after the Iran and Iraq war from 1988 to 2003.[2] Also, unmapped dissemination, random dispersal, and long life span of antipersonnel landmines in the most northwest and southern regions of Iran make these man-made hazards very dangerous in these regions.[6,7]

Iran, a developing country, is one of the most landmine-contaminated countries in the world; a massive number of landmines are left over from the war with Iraq. Approximately 12-16 million landmines have been planted in more than 42,000 square kilometers of Iranian lands in the western and southern provinces of Iran.[8-12] Today, 3 decades after the end of the Iran-Iraq war, and even with demining activities in these provinces, the populations in these rural areas are still at risk of landmine explosions.[13] Demining activities in contaminated areas is not complete in Iran and other neighboring countries such as Iraq and Afghanistan.[14,15] A systematic review study revealed that 22% to 55% of casualties from landmines or ERWs were younger than 18 years of age.[1] Therefore, injury and mortality, especially in children and young people, caused by these man-made hazards is prevalent in these areas.

The literature showed that most studies of the first world war focused more on casualties in war fields and destruction of physical infrastructure to achieve military objectives. From 1948 and in the post second world war years, studies have examined the effects of wars on mortality and disability among the urban

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population, migration of refugees, reduction of access to social services, health, and treatment, and general health disruption.[9] In most studies, existing information on landmine explosions mainly relied on injuries based on hospital statistics, and there are only a few countries where there is a system for tracking and collecting information from the population.[16] Therefore, establishment of a system for monitoring and reporting deaths, injuries, and landmine-related injuries in the affected communities is considered an essential first step in the accurate identification of the victims and the health consequences associated with the incidents. Previous studies conducted in Iran on landmine explosions and the consequences of these are based more on the provision of pre-hospital and hospital services and type of injuries to victims, and there was no study on the health consequences of these incidents and constraints on daily activities of the victims.[5] To document the health-related effects of landmines and social conditions, more research is needed.

During 1998-2002, Kurdistan Province, 1 of 5 western provinces of Iran, had one-third of all landmine victims and more amputations caused by a landmine explosions.[17,18] This province has a 200-km border with Iraq, and is contaminated with ERWs placed during the Iran Iraq war and armed conflicts.[11] Among the mined areas in Iran, Kurdistan Province has been most affected by antipersonnel landmines. The adverse health, social, and economic consequences of land mine blasts have been imposed on individuals, families, the environment, the tourism industry, and agriculture in this province.

Therefore, in this study, Kurdistan Province was selected from the 5 provinces involved in landmine explosion events in Iran. The aim of this study was to investigate the health-related consequences of landmine explosions among identified victims in urban and rural communities of Kurdistan Province.

METHODOLOGY

This article is a retrospective descriptive-analytic cross-sectional study of a 37-year period, between 1979 and 2016. Landmine explosion factors in the urban and rural areas of Kurdistan Province were considered regarding the health-related consequences, such as death, injuries, and amputation. Also, the relationship between exposure to landmine blasts and risk factors, such as place of residence, type of occupation, and season, was investigated.

The data collection tool was a questionnaire consisting of 78 questions. It included questions related to the time and place of the incident, sites of injury, extent of injury, effects of the incident, and a checklist of daily activities of affected people. The data relevant to time and place of the incident and sites of injury were completed for both dead people and survivors. If the person had been killed by a landmine explosion, the other data, including kind of injury, affected limbs, and effects of the incident on doing daily activities, were not completed. Instead, 10 final questions were designed for measuring the variables age, education, and occupation in dead persons at the time of the incident. Also, these variables were measured pre-incident and post-incident in the survivors of landmine blasts. Pre-incident indicates the time before the landmine explosion occurred, and post-incident indicates the present time that the questionnaire was completed.

To improve the content validity of the questionnaire, expert views and opinions were taken. After finalization of the questionnaire, the face validity and reliability of the questionnaire were assessed by completing 40 questionnaires in the pilot study. Finally, the Cronbach alpha (as an index of reliability) and Content Validity Index (CVI) (as criteria of validity) scores of the questionnaire were calculated to be 0.89 and 0.78, respectively. After that, we included data from 410 victims in the main study. The interviewers were selected from the health staff of health centers in urban areas and health houses in rural areas under study and were trained. These interviewers conducted interviews with survivors of landmine explosions, or 1 first-degree relative of a person killed, and completed the questionnaires.

RESULTS

This study attempted to investigate all victims of landmine blasts in Kurdistan Province. Based on official statistics in the health system, as well as visits to health centers and health houses, the total number of registered victims was 410 during 1979-2016; of these, 133 the victims died immediately after the explosion due to the severity of their injuries and 277 of the victims survived with permanent injuries.

In this study, 10 cities of Kurdistan Province and a total sample size of 410 victims were examined and questionnaires were completed by interviewers. Of the total sample, 47 (11.5%) and 363 (88.5%) resided in urban and rural areas, respectively (Table 1). A total of 14.1% of incidents occurred in border areas, 33.4% in villages, and 1.2% in the outskirts of the cities. The highest percentage of incidents, 51.2%, occurred to non-resident areas outside the border, such as pastures, mountains, and roads. Most of the landmine explosions occurred in the spring, 44.9%; the fewest occurred in winter, 10.7%. The percentages of incidents in the summer and autumn were 26.1% and 18.3%, respectively. Overall, during the 37 years, the highest number of landmine explosions occurred in 1993, 1992, 2004, and 1991, respectively, accounting for 25% of the total incidents occurring during this period of study.

Regarding the use of vehicles at the time of an incident, 8.2% of the victims were in cars, 8.8% were in trucks, 3.7% were on agricultural machinery, and 20.6% were also riding on an animal.

The demographic characteristics of the population examined by gender, age, education, and occupation are described in detail in Table 2. The mean age of the victims was

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TABLE 1

Geographical Distribution of Mine Victims According to County

No.	County Name	Number of Villages Under Study	Number of Urban Victims	Number of Rural Victims	Total
1	Sanandaj	5	0	21	21
2	Marivan	25	11	83	94
3	Bijar	5	12	3	15
4	Kamyaran	10	5	48	53
5	Baneh	44	1	95	96
6	Dehgolan	1	0	1	1
7	Saghez	44	9	90	99
8	Sarvabad	10	2	22	24
9	Divandareh	3	7	0	7
10	Ghorveh	0	0	0	0
	Total	147	47	363	410

TABLE 2

Demographic Characteristics of Mine survivors in Kurdistan Province (n = 277)

Demographic Characteristics	Number (%)	
Sex		
Female	21 (7.6)	
Male	256 (92.4)	
Age Group (Year)		
<18	11 (4)	
18-28	29 (10.5)	
28-38	74 (26.7)	
38-48	72 (26)	
48-58	44 (15.9)	
>58	47 (16.9)	
Education	**Pre-incident**	**Post-incident (Present)**
Illiterate	86 (31)	79 (28.5)
Primary	152 (54.9)	134 (48.4)
Elementary	30 (10.8)	40 (14.5)
High school	6 (2.2)	7 (2.5)
Diploma	3 (1.1)	12 (4.3)
University	0 (0)	5 (1.8)
Occupation	**Pre-incident**	**Post-incident (Present)**
Student (school)	80 (28.9)	10 (3.6)
Student (university)	0 (0)	3 (1.1)
Housewife	9 (3.3)	16 (5.8)
Employee	0 (0)	9 (3.2)
Carrying goods*	7 (2.5)	2 (0.7)
Shepherd	57 (20.6)	15 (5.4)
Farmer and gardener	69 (24.9)	57 (20.6)
Retired	1 (0.4)	27 (9.7)
Unemployed	2 (0.7)	74 (26.7)
Practitioner (temporary)	30 (10.8)	53 (19.1)
Army occupations	7 (2.5)	1 (0.4)
Basiji volunteer	9 (3.2)	4 (1.5)
Handicraft	3 (1.1)	5 (1.8)
Others	3 (1.1)	1 (0.4)

*Those who make money by carrying and smuggling goods between the 2 sides of the border line in the harsh areas.

29.1 ± 23.4 years. In total, 32.4% of the victims died immediately after the explosion due to the severity of their injuries, and 67.6% of the victims survived with permanent injuries; 95.5% of the survivors were admitted to hospitals for medical and therapeutic services. Among them, only 76.5% received medical care in hospitals within the province, whereas 23.5% received medical treatment in hospitals outside the province.

The average daily hospital stay for survivors was 23 days. Of the survivors, 63.5% had at least 1 upper limb or lower limbs amputated, 9.8% were blind, 16.3% had low visual acuity, 1.5% were deaf, and 13.6% had impaired hearing.

In 63.7% of the cases, the victims of landmine explosions and their families stated that there were no obvious signs of danger in the area where the incident took place. A total of 52.9% of the victims mentioned that they were not aware of the dangerous situation in the area before the incident.

Meanwhile, 36.8% of the incidents occurred in the area of military bases. The interviewees added that they were not educated about landmine hazards or the necessary first aid measures required to deal with landmine injury victims. In the following, the results of impact of explosion on individuals in daily living activities are shown (Table 3).

In this study, the severity of injuries was estimated by the percentage of veteranary. Percentage of veteranary is the rate of physical or mental disability of persons participating in the war or related injuries in the years after the war, determined by the Medical Commission in accordance with Iran's laws. Individuals' salaries and benefits are based on the percentage of their veteranary. The highest score of injury was 100, and the lowest injury score was 0. Various studies have shown that a survivor will suffer permanent injuries as a result of a landmine explosion, in most cases. In this study, the mean score of an injury calculated in survivors was 30.62 ± 21.76. Then, the relationship between the severity of injury and the variables was considered, as the risk factors (Table 4) affect the degree of injury in the raw and adjusted regression model.Also, the effects of confounding variables were eliminated in this statistical model. The results of this statistical analysis showed that there was no significant relationship between the degree of injury with age group and sex (P-value >0.05).

The place of residence in the regression model was not significantly correlated with the amount of injury, but in the adjusted model, living in a village revealed a significant relationship with the severity of injury (P-value <0.05). Also, low level of education (primary and secondary school) was identified as a risk factor that significantly increased the degree of injury in the adjusted model (P-value < 0.05). Moreover, regarding the severity of injury and the 12 designated occupational categories, jobs such as carrying things, shepherds, and military

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TABLE 3

Affecting Life of Survivors on Doing Daily Activities Post-incident (n = 277)

No.	Activity	Having Ability to Do the Activity Alone Number (%)	Doing the Activity Needs Some Help Number (%)	Doing the Activity Needs Much Help Number (%)	Not Able to Do the Activity Alone Number (%)
1	Bathing or going to bed	205 (74)	53 (19.1)	15 (5.4)	4 (1.5)
2	Dressing	219 (79.1)	48 (17.3)	7 (2.5)	3 (1.1)
3	Combing	246 (88.8)	19 (6.9)	9 (3.2)	3 (1.1)
4	Brushing hair or arranging themselves	257 (92.8)	13 (4.7)	5 (1.8)	2 (0.7)
5	Going to the toilet	216 (78)	40(14.4)	15 (5.4)	6 (2.2)
6	Going from place to place or traveling	195 (70.4)	57 (20.6)	20 (7.2)	5 (1.8)
7	Walking	191 (69)	51 (18.4)	27 (9.7)	8 (2.9)
8	Climbing stairs	181 (65.3)	54 (19.5)	28 (10.1)	14(5.1)
9	Eating and drinking	256 (92.4)	13 (4.7)	7 (2.5)	1(0.4)
10	Shopping	213 (76.9)	40 (14.4)	16 (5.8)	8 (2.9)
11	Cooking	179 (64.6)	64 (23.1)	18 (6.5)	16 (5.8)
12	Taking care of themselves and taking medications	197 (17.1)	53 (19.1)	15 (5.4)	12 (4.3)
13	Telephone	246 (88.8)	18 (6.5)	8 (2.9)	5 (1.8)
14	Doing housework	153 (55.2)	80 (28.9)	30 (10.8)	14 (5.1)
15	Washing clothes or using washing machine	164 (59.2)	61 (22)	32 (11.6)	20 (7.2)
16	Driving (motorcycling)	135 (48.7)	49 (17.7)	26 (9.4)	67 (24.2)
17	Managing affairs of life	214 (77.3)	37 (13.3)	15 (5.4)	11 (4)

The table above showed that many daily activities have been impaired for people with permanent injuries and various disabilities caused by the landmine explosion. On average, approximately 85% of the injured are able to continue to be responsible for their personal care, and independently eat, drink, bathe, dress, etc. However, the remaining 15% are unable to take care of themselves and are dependent on personal care assistants.

The most daily activities that people need so much for doing them include washing clothes, doing housework, and climbing stairs. Driving and motorcycling are the activities that 24% of the injured cannot do alone after the incident.

occupation showed a significant correlation in the adjusted regression model (P-value <0.05). In this study, there was no significant relationship between the severity of injury and season of incident.

Severity of an individual's dependence on others for daily activities was one of the factors measured in this study to examine the extent of injuries and disabilities caused by the explosion of ammunition and landmines. To this end, 17 activities were measured in the questionnaire. The score for degree of dependence, for all 17 activities, could range from 0 to 100 points; the higher the score, the greater the victim's dependency on others for doing daily activities. The mean score of the total individual dependence on others for daily activities was 16.90 ± 18.31 of 100.

According to Table 5, in this study, there was no statistically significant relationship between age and place of residence of victims (city and village) and the severity of dependence on others for doing daily activities. The findings also showed that, in the adjusted regression model, the level of dependence of individuals on others in performing daily activities in men was significantly lower than women (P-value <0.05). In people with amputations caused by landmine explosions, the level of dependence on others in implementing daily life activities was higher than that of injured individuals without amputations, and this difference was statistically significant in both the raw and adjusted regression models (P-value <0.05). Also, in the adjusted regression model, the degree of dependence on others in performing daily living activities in people who were affected by injury to more than 1 body area (trunk and limb, head, neck and limbs, neck, trunk, and limbs) was greater than in those whose injuries were limited to 1 body area, such as head, neck, trunk, or limbs (P-value < 0.05).

DISCUSSION

This study was carried out in 2015-2016 to investigate the health-related consequences of landmine blasts during a 37-year period in Kurdistan Province. A total of 410 victims of landmine explosions, including dead and injured persons, were identified through official statistics in the health system as well as visits to health centers and health houses. Victims were interviewed, and questionnaires were completed. Health-related outcomes and daily activity constraints of the victims of the landmine blast events are reported.

Results show that 88.5% of landmine-related incidents occurred in rural areas, and urban areas only accounted for 11.5% of incidents. A study in Cambodia also showed that, due to lower social vulnerability indicators in rural areas, the mortality rate from landmine explosions was higher than urban areas.[19] The findings of this study were not directly related to the analysis of vulnerability indicators, but factors such as remoteness of landmine infested villages in relation

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TABLE 4

Relationship Between Severity of Injury and Risk Factors at Time of Incident (n = 277)

Variable	Number	Percentage (%)	Average Score of Injury (Calculated from 100)	Crude Difference	*P*-Value	Adjusted Difference	*P*-Value
Survivors population	277	100	30.62	-	-	-	-
Age (Year)							
<18	11	4	23	-	-	-	-
18-28	29	10.5	27.93	4.93	0.516	2.67	0.73
28-38	74	26.7	31.14	8.14	0.24	6.36	0.38
38-48	72	26	28.76	5.76	0.406	4.95	0.499
48-58	44	15.9	29.32	6.33	0.381	4.66	0.557
>58	47	17	37.34	14.34	0.046	12.87	0.111
Sex							
Female	21	7.6	30.71	-	-	-	-
Male	256	92.4	30.62	−0.903	0.985	4.82	0.484
Living Place							
City	30	10.8	25.96	-	-	-	-
Village	247	89.2	36.19	5.22	0.212	5.69	0.043
Education (Pre-incident)							
illiterate	86	31	29.57	-	-	-	-
Primary	152	54.9	31.18	10.09	0.428	5.65	0.036
Elementary	30	10.8	29.86	1.25	0.891	4.9	0.048
High school	6	2.2	30.83	0.29	0.95	4.14	0.648
Diploma	2	1.1	39.66	1.61	0.582	12.43	0.327
University	0	0	0	0	-	-	-
Occupation (Pre-incident)							
Unemployed	2	0.7	12.5	-	-	-	-
Student	80	28.9	38.3	13.9	0.407	8.2	0.6
Housewife	9	3.2	38.8	26.3	0.363	23.6	1.97
Retired	1	0.4	55	42.5	0.104	47.2	3.23
Basiji volunteer	8	2.9	39.2	26.7	0.113	18.6	1.17
Army occupations	7	2.5	44.3	31.7	0.063	8.6	0.024
Carrying Goods	7	2.5	48.6	15.2	0.374	9.4	0.029
Shepherd	57	20.6	45	19.5	0.203	13.7	0.037
Farmer and gardener	69	24.9	30.9	18.3	0.23	10.5	0.454
Practitioner (temporary)	26	9.4	31.3	18.7	0.23	13.2	0.693
Army occupations	3	1.1	36.7	24.1	0.215	18.6	0.896
Basiji volunteer	3	1.1	23.3	10.8	0.587	5.9	0.089
Season of Incident							
Winter	29	10.5	30.3	-	-	-	-
Autumn	58	20.9	32.6	2.2	0.65	−2.2	0.495
Summer	70	25.3	27.95	−2.3	0.62	2.2	0.531
Spring	120	43.3	31.32	0.9	0.824	−1.5	0.747

to the city center, poverty, illiteracy, and distances from urban health centers can be considered as important physical and social vulnerability indicators.[20] In addition, the remoteness of some villages located in mountainous regions and lack of access to medical care result in increased mortality rates by landmines in the rural areas. Moreover, there was a direct correlation between poorer socioeconomic status and higher mortality in a study on landmine injury in Bosnia-Herzegovina.[15]

In our study, approximately 4% of the injured population were under the age of 18 years, and the most affected population were in the age groups of 28-38 and 38-48 years with 26.7% and 26% of total population, respectively. A similar study in Afghanistan showed that 1 of every 2 victims was a person under the age of 18.[21] In another study in Russia, this figure was estimated at 1 per 4 people.[11] However, other studies suggest that unexploded landmines are considered as potential hazards for safety of children and teens under 18 years of age. Therefore, there is an essential need to form a public awareness campaign about mine-risk education programs that must focus on this age group as the more vulnerable target group in the landmine polluted areas.[13,22,23] The adoption of policies to protect children from landmines in some countries, such as Turkey, is on the agenda.[24] By gender, 92.4% of the injured were male. In most studies on landmine-related injuries, the ratio of men was much higher compared with that of women, which is mostly attributed to the nature of the work and activity of men outside the home.[2,5,7]

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TABLE 5

Relationship of Dependency Rate on the Daily Activities in the Injured Population Post-incident According to the Variables Under Study (n = 277)

Variable	Number	Percentage (%)	Average Score of Dependence on the Daily Activities (Calculated From 100)	Crude Difference	*P*-Value	Adjusted Difference	*P*-Value
Survivor population	277	100	16.90	-	-	-	-
Age (Year)							
<18	11	4	22.99	-	-	-	-
18-28	29	10.5	16.01	−6.97	0.277		
28-38	74	26.7	16.52	−6.99	0.230		
38-48	72	26	16.71	−6.20	0.288		
48-58	44	15.9	12.7	10.59	0.081		
>58	47	17	23.2	−1.03	0.865		
Sex							
Female	21	7.6	22.82	-	-	-	-
Male	256	92.4	16.41	−6.41	0.121	−5.85	0.046
Living place							
City	30	10.8	18.71				
Village	247	89.2	16.69	−2.01	0.574	−2.06	0.532
Amputation							
No	105	62.1	10.50	-	-	-	-
Yes	172	37.9	21.48	10.70	0.0001	12.51	0.0001
Organs With Injury or Disability							
Head and neck	53	19.1	12.84	-	-	-	-
Trunk	16	5.8	10.93	−1.90	0.702	−1.65	0.732
Limbs (hands and feet)	157	56.7	16.28	3.43	0.218	−4.12	0.183
Head, neck, and trunk	12	4.3	16.04	3.19	0.582	0.45	0.935
Trunk and limbs	8	2.9	34.03	21.1	0.003	12.55	0.036
Head, neck, and limbs	27	9.7	28.81	15.9	0.0001	8.23	0.029
Head, neck, trunk, and limbs	4	1.4	11.02	−1.81	0.841	1.64	0.051

In the present study, approximately 85.9% of the injured people were illiterate at the time of the incident or had an elementary education, which is a higher percentage than similar studies.[18] Regarding the injured individual's job, shepherds and farmers accounted for 45.5% of the total number of injured people. Students, who lived mostly in the rural areas and often traveled long distance to attend schools, accounted for 28.9% of victims of landmine incidents. Those who smuggle goods for their livelihood in harsh and mountainous border areas have also been exposed to minefields and unexploded ERWs. Some seasonal occupations, such as collecting plants and flowers for oral and medicinal use in the spring, by referring people to the plains, mountain range, etc., increase the incidence of injury caused be landmine blasts. In this study, the most incidents occurred in the spring, due to growing more plants and flower during this season. In addition, most of the areas traveled by locals are polluted with landmines and lack warning signs. Given the heavy rain and snow fall, frost, and generally harsher weather conditions, the number of incidents caused by the mine explosions are significantly reduced in winter.[6] Such a trend has also been shown in a similar study published on landmine victims in Vietnam in 2012.[25]

Studies reporting type and severity of landmine injuries support that injuries in most victims result in upper or lower limb amputation, causing substantial physical, mental, social, and economic disability.[6,26] Moreover, the study by Ilam (2008), assessing health-related quality of life, showed that patients with landmine injuries experienced a lower quality of life compared with the general population.[12] Similarly, our study demonstrated that the health-related impacts of landmine explosions are very widespread. Sometimes, the injuries are very severe. In these cases, the affected patients are completely dependent on others for performing their basic daily functions, such as going to the toilet, eating, drinking, dressing, and brushing their hair. Some landmine victims can dress themselves but need some help for doing other daily activities, such as washing clothes, cooking, doing housework, or driving a car or motorcycle and shopping outside the home. These conditions influence the quality of life in landmine victims. A significant point in this study is the 26% increase in the unemployment rate in the landmine affected population compared with the pre-incident time in Kurdistan Province, which directly related to the degree of injuries and disabilities in affected people, and also, indirectly exhibits the effects of these

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incidents on the socioeconomic situation of landmine contaminated regions.[1]

CONCLUSIONS

The troubling findings revealed that, despite conducting demining activities in previous years, contamination at the borders and rural areas in Kurdistan Province still exists and there is an urgent need to clean up the affected areas as soon as possible. Also, a more favorable option is complete clearance of mined areas, and landmine warning signs should be installed in contaminated areas.

In this regard, mine awareness programs should be conducted on a targeted group, including children and students in residential areas. In rural areas, it is also necessary to increase the capacity of primary and pre-hospital assistance to reduce incidence of death and severity of injuries in the event of an explosion. Another good measure for mitigation of death and injuries by landmines is providing maps of the mine infested areas and distributing them widely among inhabitants of at-risk regions. Meanwhile, it is recommended to develop and implement physical rehabilitation programs and psychological interventions and reduce physical and social vulnerabilities for landmine injury victims in the province.

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Supplementary material

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