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Epidemiological Study of Landmine/ERW Victims in Kachin, Kayah and Shan States, Myanmar

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July 2017

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Epidemiological Study of Landmines/ERW Accidents and Victims in Kachin, Kayah and Shan States, Myanmar

by Julien Zwang, Ph.D., and Pascal Simon [Danish Refugee Council / Danish Demining Group]

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Executive Summary

In Burma (the Republic of the Union of Myanmar), there is no systematic and organized victim information system (VIS) of landmine and explosive remnants of war (ERW) victims, and few studies have been conducted on the topic, in particular in Kayah, Kachin, and Northern Shan States (NSS), where most of the accidents have recently occurred. Between 2015 and 2016, casualty reports compiled by the Mine Risk Working Group (MRWG) chaired by the Department of Social Welfare (DSW) showed that the number of mine/ERW victims increased by 58% in the country, particularly in Shan and Kachin States, while the number of victims decreased in Kayah State. Documenting victims' profiles and risk behaviors are needed to help design victim assistance and mine risk education (MRE) programs. To collect this information, Danish Refugee Council/Danish Demining Group (DRC/DDG) conducted an epidemiological study in Kachin, Kayah, and Shan States to analyze data collected about landmines victims and accidents.¹

Method

The study combined a qualitative analysis using an anthropological approach and a quantitative analysis of mine/ERW victims recorded by DRC/DDG using the Information Management System for Mine Action (IMSMA) standards. The qualitative part of the study was conducted with guidelines in Kachin and Northern Shan States from April to May 2017 and used the Washington Group² Short Set of Questions on Disability to assess the type and the severity of the functional impairments of the victims. Risk ratio (RR) and adjusted odds ratios (AOR) using multivariate analysis were measured. Confidence intervals (CI) were calculated at 95% (95% CI) and comparisons considered statistically significant when the p value was below 0.05 ($p < 0.05$). Data were analyzed using SPSS.³

¹ The study was funded by the United States Department of State (USDOS).

² Washington Group on Disability Statistics; www.washingtongroup-disability.com

³ Statistical Package for the Social Sciences

Ethics

Informed oral consent was obtained from all study participants after explaining the interview content, and discussions only started after the respondent agreed. For people under 16 years old, consent was sought from a family member, who was present during all interviews. All interviews were anonymous, and the names were not recorded for confidentiality.

Results

Overall, 290 mine/ERW victims were included in the study in 211 separate accidents occurring in rural areas up to May 2017. In-depth interviews were conducted with 35 victims, and 255 victims data were analyzed from a mine/ERW victim register. As a total, over three quarters (79%) of the accidents happened in Kachin State, 16% in Kayah, 5% in Northern Shan States, and 2% in other regions. A higher number of accidents were reported since 2014 in Kachin State, in particular in Bhamo district (Mansi and Momauk townships) and Mhonyin district (Mogaung and Mhonyin townships).

Profile of the Victims

Adults accounted for 83% of the victims, adolescents 13%, and younger children 4%. Most of the victims were farmers (40%), laborers (11%), or students (11%), while army soldiers represented 8% of the victims.

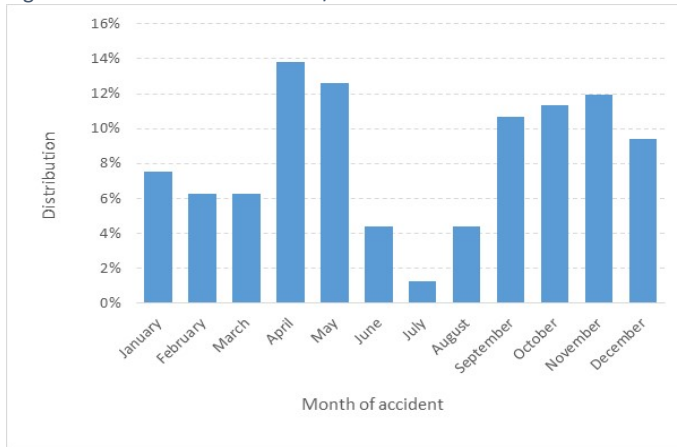
Males were over five times more at risk for mine/ERW accidents than females (84%, 16%, respectively, RR 5.83, $p = 0.001$).

The fatality rate among mine/ERW victims was 24%. Nearly two-thirds of survivors (60%) had to drop out of their activity because of the severity of the disability caused by the accident (59% of the farmers, 61% of the casual workers, and 68% of the soldiers). The fatality rate in students was higher (38%) than in other population groups, and 54% of the student survivors had to drop out of school. Unemployment was multiplied by fourfold and 67% of the survivors were unemployed following their accident.

Landmine accidents caused extreme livelihood hardship for the extended family, particularly in cases of severe injuries or death of the victim, since 80% of the adult victims had children. Of the victims, 62% were settled and 33% were internally displaced persons (IDP). In Kachin State, IDPs (who represent a smaller population compared to settled villagers) are over nine times more at risks for an accident (RR 9.49, $p = 0.001$) than settled villagers, while in Northern Shan State only settled villagers had a landmine accident (as recorded in the DRC/DDG database).

Seasonal trend. Over the years, rural populations were significantly more at risk to mine/ERW accidents in April and May (RR 1.72, $p = 0.001$) compared to other months, while the number of accidents significantly decreased (RR 0.41, $p = 0.001$) during the first part of the rainy season (from June to August).

Figure 1: Month of the landmine/ERW accidents



Place of accident. All accidents took place in rural areas, mostly in the forest (31%), on a foot path (17%), or on the side of a path (13%). Other accident locations (< 6%) were in villages, along a riverbank, or on grazing land, fields, farming land, residential or military areas.

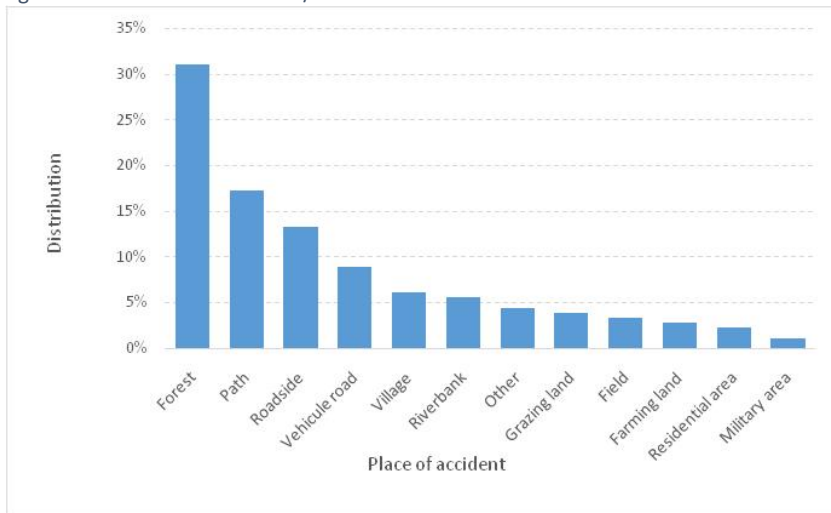


Tea leaf garden



Hills in Kachin State

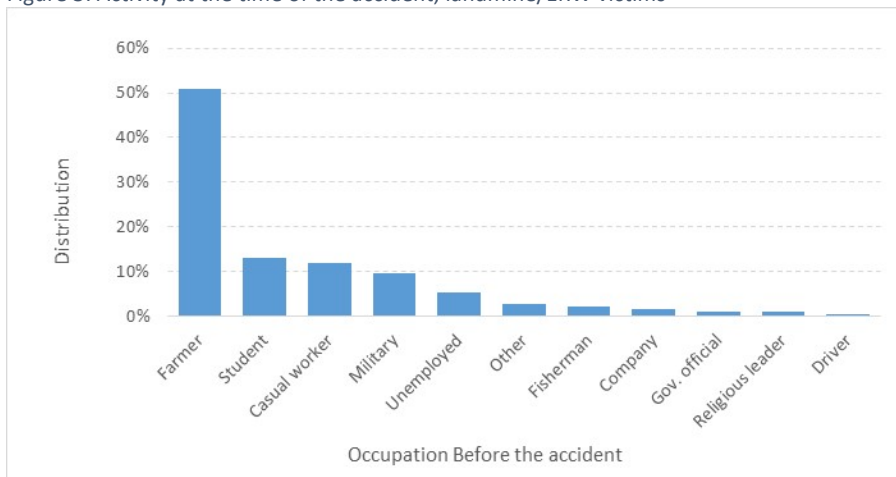
Figure 2: Place of the landmine/ERW accident



Activities at the time of accident. At the time of accident, the most frequent activities were travelling on foot (28%), collecting firewood (13%), tending animals (12%), travelling by vehicle such as bullock cart, motorcycle, bicycle (8%), military duty (7%), or hunting or fishing (7%).

IDPs were slightly more at risk of having an accident while travelling on foot compared to settled victims (RR 1.32, 33%, 25%, respectively, $p = 0.141$) as well as hunting/fishing (11%, 5%, respectively, $p = 0.042$). On the other hand, settled victims were at significantly higher risks for accidents while tending animals (5%, 16%, respectively, $p = 0.008$) and tampering with landmines and ERW (0%, 4%, respectively, $p = 0.063$) compared to IDPs.

Figure 3: Activity at the time of the accident, landmine/ERW victims



Perception of danger. According to respondents, “in conflict zones, there is no mine sign indicating dangerous areas,” and the vast majority of the victims did not think that the place of the accident was hazardous (79%). Compared to adult victims, younger victims were at higher risks (AOR 3.53, 95% CI 3.20–3.88, $p = 0.051$) of believing that the location of their accident was not a hazardous area (91%, 76%, respectively). Among victims who were conscious of the danger, the most frequent activities during the accident were military duty (30%) and travelling on foot (29%), while for those not conscious of the danger, the activities were travelling on foot (29%) and collecting firewood (15%).

Reasons for entering hazardous areas. For most of the respondents, the perception of danger was distorted by their extreme poverty and livelihood, which led to unsafe behaviors. Most of the respondents had an accident in hazardous areas because of economic necessity (51%), because of no other access (8%), or by peer pressure (8%). Despite knowing they were travelling across hazardous areas, farmers still need to make a living and cannot abandon their livelihood activities (farming, fishing, or collecting leaves in the forest). Despite understanding that the area was potentially dangerous, some people thought that going to the same area or using routine strategies by walking on the same path would reduce the risk of having an accident. The perception of danger was also related to the knowledge of the number of accidents occurring in the area. Other reasons for entering hazardous areas (33%) were when victims had to flee their village because of hostilities or were engaged in forced labor or military duties.

Medical Assistance

The fatality rate among mine/ERW victims was 24% with no difference between genders. Half of the deceased were killed in situ, while the other half died during medical evacuation or at the medical facility.

Among mine/ERW survivors, 40% had multiple injuries. A large majority of the survivors (62%) had an injury below the knee and 21% above the knee. Other injuries involved the arm (19%), finger (14%) and abdomen (12%). The prevalence of each other injury—eyesight, back, head/neck, chest, pelvis, and hearing—was below 10%. In many cases, the landmine metallic fragments were not all removed by the medical services, in particular in Kachin State. Remaining fragments in the body is a risk factor for severe pain which prevents victims from working.

Comparing the prevalence of injuries between survivors and deceased victims (not in situ, i.e., during evacuation or at the health facility), we observed that multiple injuries was a risk factor for fatality (AOR 4.36, 95% CI 1.11–17.06, $p = 0.023$). Other risk factors for fatality were an injury above the knee (AOR 5.12, 95% CI 1.46–17.90, $p = 0.005$) or at the abdomen (AOR 4.74, 95% CI 1.26–17.88, $p = 0.013$). Most of the victims (52%) could reach the first hospital in over four hours, from two to four hours (28%) and less than two hours (20%). Difference in distance or time to reach the health facility was not a risk factor for fatality. Overall, victims of an accident in Kachin State were at higher risks for fatality (AOR 2.79, 95% CI 1.18–6.61, $p = 0.020$)

than in other states as well as for teenagers (AOR 2.84, 95% CI 1.29–6.27, $p = 0.010$) compared to other age groups.

Alternative Livelihood

While generating an income, home-based livelihood activities seemed to be a good alternative to prevent the victims from travelling to hazardous areas, particularly for the person with a severe disability or for the family of the deceased victim. To promote home-based livelihood activities, DRC/DDG support is provided by donating two piglets or a cash grant to open a small shop in front of the house. For the respondents, these home-based solutions are good livelihood alternatives as it is safer than travelling to hazardous areas or, for IDPs, than returning to their village of origin that could be contaminated by landmines and where the conflict can resume.



Legend: Piglets donated by DRC/DDG to landmine victims as an alternative source of income

MRE and Perception of Populations Most at risk

For respondents, while landmines are theoretically supposed to target military personnel, the groups most at risk of accidents in Kachin and Northern Shan States are rural, low-income people of all ages. Respondents indicated that, even if they are aware that the area might be dangerous, they still have to take a chance for their daily livelihood and the survival of their family.

For mine/ERW victims or their families, receiving MRE training increases awareness about the dangers of landmines and can reduce casualties via training session, or short play for Shan people. Respondents also indicated that adults who receive MRE training can also teach their children safe behaviors in hazardous areas.

Conclusion

The mine/ERW study conducted in Kachin, Kayah, and Northern Shan States identified a total of 290 mine/ERW victims combining both quantitative and qualitative techniques. All landmine accidents happened in rural areas and involved IDPs as well as settled villagers.

Recent casualty reports showed that the number of mine/ERW victims increased in Burma, mainly because of a surge of accidents recorded in Kachin and Northern Shan States. Moreover, in Kachin State, IDPs are nine times more at risk of mine/ERW accidents than settled villagers while in Northern Shan, the victims were settled villagers.

During ongoing armed conflicts and without mine/ERW clearance activities, vulnerable people from rural areas are forced to travel to hazardous areas for their livelihood needs, indicating that they are prone to extreme poverty and that their perception of danger is distorted because of financial necessity.

Overall, people from rural areas have frequent accidents because they are more exposed to landmines and ERW while walking on a footpath or driving a vehicle in hazardous conflict areas or next to armed group's camps on their way to livelihood activities (collecting leaves or firewood, farming, fishing, or tending to livestock). Tampering with or using artisanal explosives are also unsafe behaviors that were reported.

IDPs traveling on foot to their villages of origin (to check their homes or their livestock) face increased risks of mine/ERW accidents. In addition, IDPs are at a higher risk of mine/ERW accidents when they are fleeing the conflicts while their home village is besieged by armed groups and must escape to the forest, or while they are walking outside an IDP camp to collect food in the nearby forest.

Remaining mine/ERW metallic fragments that are not removed from the victims' bodies indicate a need for better health care services and infrastructure. Poor responses from medical services after an accident might lead to irreversible and severe pain as well as physical impairments. Unemployment could be the consequence of these disabilities, resulting in economic hardship for the family as 60% of the survivors had to abandon their professional activity after the accident and 80% of the adult victims, including deceased victims, had children at the time of accident.

Combatants, who were supposed to be the primary targets for landmines, often receive better medical assistance in military medical facilities than other population groups. High fatality rates in mine/ERW accidents, particularly in Kachin State, are probably due to the remoteness of the accident locations and poor transportation infrastructures, which increase the time of evacuation.

Recommendations

Mine risk education. Because of an increase in military activities at the end of 2016 and the beginning of 2017, some areas still subject to armed conflicts lack MRE training and demining activities, and the number of accidents has recently increased in Kachin and Northern Shan States. MRE training sessions in IDP camps and villages should therefore be continued and strengthened. MRE should also be included in school curriculums to increase awareness about the danger of landmines and ERW and reduce unsafe behaviors among children and youth. While taking into account seasonal variations (increased risk of accidents between April to May), MRE programs should primarily focus on IPDs who are at higher risks of accidents while traveling on foot to their village of origin.

Advocacy. Overall, we recommend raising awareness of the study results and subsequent training on disability inclusive development (marginalized and excluded groups are stakeholders in development processes) to State level authorities (district, township and village). By creating more awareness of mine/ERW victims with disabilities, especially relating to livelihoods, and the access and inclusion of persons with disabilities in educational and health programs, the situation in Burma will improve.

Victim assistance and rehabilitation. The remoteness of accident locations and the poor transportation infrastructures in Kachin and Northern Shan States increases evacuation times and highlights the difficulties victims have in accessing medical services. Mapping available services and delivering training on referral pathways (efficient lines of communication between health services) is recommended, in particular for medical emergency and physical rehabilitation services. Information campaigns on access to services would be an asset for landmine victims with severe disabilities to promote access to health and medical rehabilitation as well as economic and education services.

In a context of extreme poverty faced by mine/ERW victims and their families in Burma, forthcoming interventions should focus on inclusive vocational training programs and livelihood opportunities. Mine/ERW victims' reintegration assistance should preferably be community-based, conflict sensitive, and delivered through local organization networks providing vocational training, small business grants, and livelihood support. Grants for surgical support could be provided to survivors with metallic fragments remaining in their body because of severe, pain-limiting job opportunities.

Psychosocial support should be delivered through community-based organizations, and the creation and strengthening of self-help or peer support groups should be applied to increase social cohesion, dissemination of information, and awareness-raising on the rights of persons with disabilities. Persons with disabilities must be included in the provision of assistance services, especially services essential to basic needs (primary healthcare, food distribution, water access, sanitation, and hygiene). This includes the consideration of mine/ERW victims with disabilities in a humanitarian crisis. Physical and communication accessibility must also be

considered. Regarding food aid for mine/ERW victims with severe food shortages, interventions should focus on children and persons with severe disabilities.

Victim information system. Without a national mine/ERW accident notification system, the methodology used to record the accidents by mine action organizations is likely to underestimate the number of victims from the villages. While these organizations have developed a simple system to collect information on the victims through their own networks to guide their strategic interventions, it is recommended to set up a national, organized, and systematic victim information system complying with international standards.

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Report contents

Introduction.....	14
Objectives	14
Context	14
States characteristics	14
Conflict.....	15
Methods	15
Anthropological approach	15
Quantitative analysis	16
Ethics	16
Results	17
Accident location	17
Seasonal trends	19
Profile of the landmine/ERW victims.....	20
Age and sex.....	20
Ethnicity	21
Home status.....	21
Occupation at the time the accident	22
Place of accident.....	23
Activity during the accident.....	24
Perceptions and attitudes towards danger	27
Knowledge about hazardous area	27
Reasons for going to hazardous areas and marked area.....	27
Livelihood	29
Change in occupation after the accident.....	29
Alternative livelihood	31
Medical assistance, access and quality of the service	33
Injuries in survivors.....	35
Injuries and risk factors for fatality.....	35
Fatality rates and risks	36

Multivariate analysis for fatality	37
Recommendation	37
Perception of danger and MRE training	38
MRE training	38
Perception of the most at risk population	38
Safe behavior	39
MRE support information and target population	39
Difficulties of MRE training coverage	39
Conclusions and recommendation	40
Reference	43

Introduction

By 2017, no national notification system of landmine/explosive remnants of war (ERW) victims is in place in the Republic of the Union of Myanmar. Data collection was not comprehensive and very few studies on landmine/ERW victims have been conducted, in particular in Kachin, Northern Shan State and Kayah States where armed conflicts have contaminated whole regions with landmines and other dangerous ERW.

According to 2015 and 2016 UNICEF reports, the number of reported casualties has increased by +58% (from 102 to 161 casualties, respectively) in particular in Shan (from 28 to 81) and Kachin (from 41 to 55 victims) States while the number of victims decreased in Kayah State (from 22 to 14). Additionally, in 2016, ICRC reported that around 40% (301/764) of the total number of prostheses produced in the orthopedic workshops supported by the organization were delivered to landmine/ERW survivors and 132 landmine/ERW victims received physiotherapy. While these reports might only reflect a part of the total number of casualties and not include all accidents in the country, this suggests the high incidence and the possible increase of landmine/ERW victims in the country.

Objectives

The objective of the study is to describe the profile of the landmines/ERW victims' population in Kachin, Northern Shan and Kayah States, Republic of the Union of Myanmar and identify risk factors for accidents, casualties and fatality. Documenting victims' profile, their knowledge about landmine/ERW and their potential risk behaviors are needed to help designing victim assistance (alternative livelihood, inclusive vocational training programs) and mine risk education (MRE) programs.

Context

States characteristics

According to the Myanmar census 2014, the population size of the Kachin State was 1,640,000 persons with a low population density (18 persons per km²). 64% were living in rural area (n=1,050,000) with a higher sex ratio in rural (1.13) than in urban areas (1.00).

Kayah is the smallest State of the Union with a population size of 286,000 people, 75% living in rural area and a low population density (24 persons per km²).

The population of the Shan State was around 5,800,000 persons in 2014 with 76% living in rural areas and a population density of 37 persons per km². The northern Shan State is composed of 5 districts (Lashio, Kyaukme, Muse, Laokine and Kunlon) for a total of around 2,050,000 persons (35% of the State).

Conflict

While a ceasefire was signed in 2012 between armed groups in Kachin State, the 17 year cease-fire between the Myanmar Government Army and the Kachin Independence Army (KIA) broke out in June 2011 in Kachin and Northern Shan States. This conflict displaced hundreds of thousand people in the last decades and recently, over 77,000 persons in Kachin State and 6,000 in Northern Shan State were registered as IDPs (UNHCR 2016). Some were displaced due to immediate security threats and/or destruction of houses. Others have moved following the loss of livelihood opportunities since occupational activities became dangerous due to proximity of fighting and/or landmines and ERW.

Methods

The landmine/ERW victims study was evidence based and achieved by conducting a qualitative population based study in Kachin and Northern Shan States and the analysis of landmine/ERW register including also victims from Kayah.

Anthropological approach

Given the large size of the States, the travel limitations and the difficulties to find landmine/ERW victims who are usually from remote rural areas, snowball sampling, an anthropological and technically non-probabilistic approach, was used for participant identification (Zwang and Garenne, 2008). This technique enabled to explore a network of relationships from one local community contact.

As in the Myanmar Census 2014 (Department of Population Ministry of Immigration and Population, May 2015), the Washington Group (WG) short set of questions was used to identify and to assess the type and severity of the functional limitations of the respondent (CDC, 2010).

In order to conduct in-depth interviews on a representative sample of the local landmine/ERW population, an age and gender balanced sample of landmine/ERW victims was drawn from the DRC/DDG network that supports victim assistance for landmine/ERW survivors in the region.

A validated guideline which was appropriately pilot tested was used. The principal investigator trained the translators for qualitative interviews techniques. After obtaining verbal consent, the translators were interviewing the respondents in various local languages and while he was translating in English, the principal investigator was taking verbatim notes.

Quantitative analysis

The landmine accidents information were collected by DRC/DDG (Danish Refugee Council / Danish Demining Group) in Kachin, Northern Shan and Kayah States. The IMSMA (Information Management System for Mine Action) standards were used to collect and record information on landmine/ERW victims and accidents since 2013. DRC/DDG has been providing victim assistance in the region since 2013 (Kachin since 2014, Northern Shan since 2016 and Kayah since 2013) but notification reports were not exhaustive. Therefore, the present report does not intend to measure and provide casualty rates but rather describe the victims profile and the risk factors for accidents and fatality related to demographical, occupational information and hazardous behaviors.

The Myanmar 2014 census (Department of Population Ministry of Immigration and Population, May 2015) and the Camp Profile Analysis (UNHCR 2016) results were used to compare the general population to the IDP population size to measure the overall risk factors of the landmine victims by age, sex and State.

Continuous data were reported as mean (standard deviation) or median with range (minimum, maximum) for non-normally distributed data and compared with a Student or a Mann-Whitney test as appropriate. Categorical data were compared using the chi-square or the Fisher exact test as appropriate. The fatality risk factors of the deceased landmine victims were analyzed using multivariate logistic regression presented as adjusted risks (AOR) using age (categorical, in years), sex (binary), district (categorical), types of injuries (categorical) and any other relevant characteristics according to the different aspects of the analysis to be conducted.

Confidence intervals (CI) were calculated at 95% (95%CI) and comparisons considered significant when $p < 0.05$. Data were analyzed using SPSS v22 (IBM).

Ethics

Ethical approval for the study was sought and obtained from DRC/DDG. Informed oral consent was obtained from all study participants. Informed oral consent was obtained after explanation of the interview content and only starter and the respondent's agreement. For people under 16 years old, consent was sought from a family member, who was present during all interviews. Respondents were interviewed in a safe place. All interviews were anonymous and the names not recorded for confidentiality.

Results

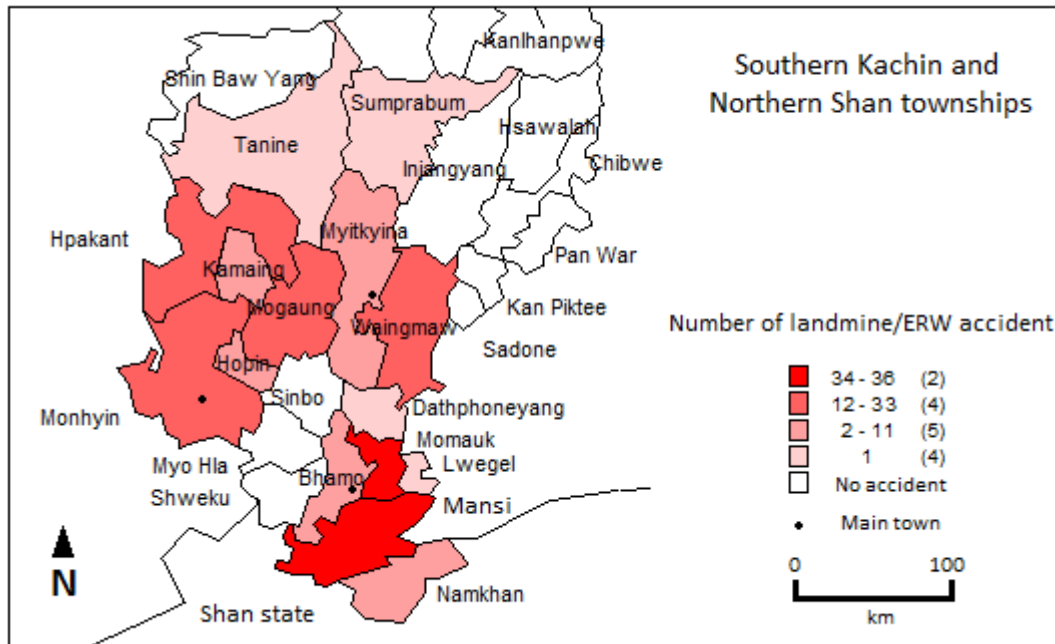
Accident location

The overall number of landmines/ERW accident was 211 up to May 2017. Over three quarters (77%) of the accidents occurred in Kachin State, 18% in Kayah, 2% in Shan and 3% in other region (Kayin State, Bago States and Thaninthary division). The origin and characteristics of half of the explosive devices were unknown for half of the accidents, 46% were anti-personal mines (APM), 2% anti-vehicle mines (AVM) and 2% ERW. Most of the accidents occurred in the morning (47%), at night (37%) or in the afternoon (16%).

Over the period, accidents included in the study happened in all the four districts (12 townships) of the Kachin State. 53% of the accidents occurred in Bhamo districts (Bhamo, Mansi, Momauk, Lwegel townships), 32% in Monhyin district (Monhyin, Dathponeyang, Hopin, Tanine, Kamaing, Hpakant townships townships), 14% in Myitkyina district (Myitkyina, Waingmaw, Mogaung Townships) and 1% in Putao district (Sumprabum Township).

In Northern Shan State, 64% of the accidents included in our study occurred in 3 districts and 6 townships. Two third of the accidents happened in Kyaukme District (Kyaukme, Namhsan, Namtu, Hsipaw Townships), 27% in Muse (Namkhan township) and 9% in Loilen districts.

Figure 1: Map of the number of landmine/ERW accident in Southern Kachin and Northern Shan townships



The median year of these accidents was 2014 with differences between States: 92% of the accidents happening in Kachin State between 2011 and 2017 while 90% of the accident occurred before 2008 in Kayah State.

A higher number of accidents were reported since 2014. Since then, the highest incidence of accidents per district has switched from Bhamo (69%) in particular in Mansi and Momauk townships to Mhonyin district in 2015 (61%) and 2016 (52%) in particular in Mhonyin and Mogaung townships.

Over the period in Kayah State, 90% of the accidents occurred before 2008, 69% of the accidents occurred in Loikaw, 19% in Hpasawng, 9% in Bawlakhe and 3% in Demoso.

Figure 2: Map of the number of landmine/ERW accident in Kayah townships

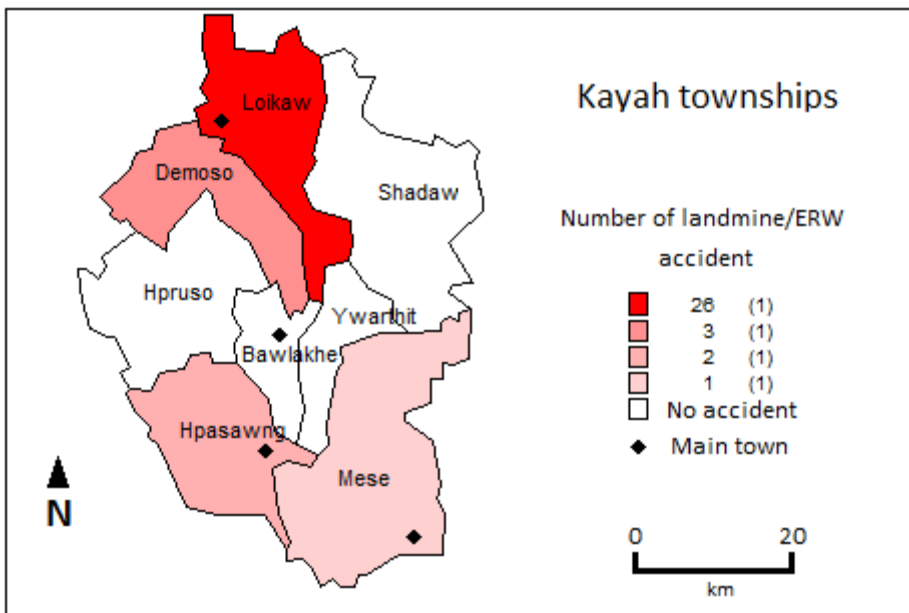
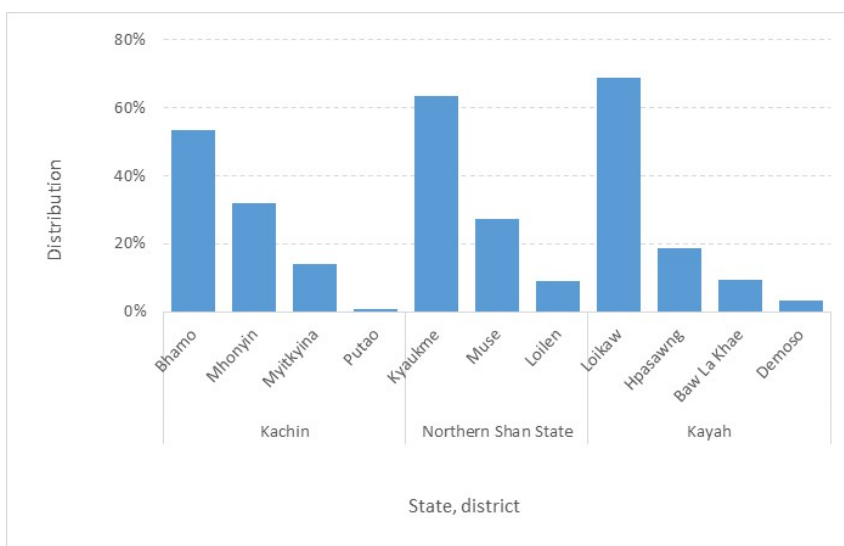


Figure 3: Place of the landmine/ERW accident by State and district

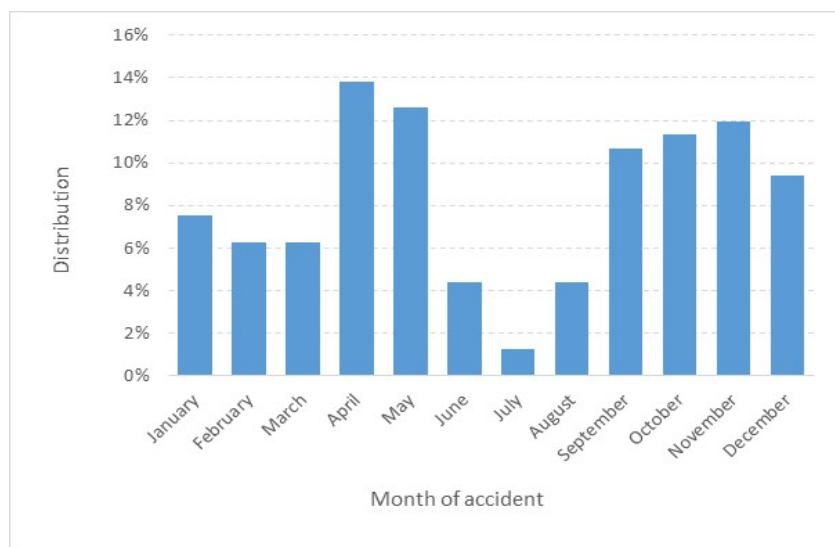


Seasonal trends

Over the years, the population has been significantly more exposed to landmine/ERW accidents in April and May while the number of accidents significantly decreased subsequently during the beginning of the rainy season (from June to August).

Using person-day analysis, the risks of accidents in April and May were almost twice higher (RR 1.72, $p=0.001$) compared to the rest of the year and multiplied by over three-fold (RR 3.41, $p=0.001$) compared to the beginning of the rainy season period (June to August).

Figure 4: Month of the landmine/ERW accidents



According to in-depth interviews, the increased landmine/ERW accident rate occurring in April, May, could be related to the accidents happening to younger victims when they were on holidays to help their parents at the farm. This period is also the beginning of the rainy season and farmers start going back to work on their fields. These months are also a better period for fishing when it starts raining and before there is no access to these areas because the heavy rains and the floods. On the other hand, during rainy season compared to other periods, farmer do not need to go much in the field and their activity mostly consist in taking care of the crops by spraying pesticides or fertilizers.

April and May accidents

- “My son’s accident happened in the beginning of April. We can only find fish at this period because the place is flooding during rainy season.” (male, deceased, age at accident 16, Mogaung Township, Kachin State).

- “My accident happened in May after the water festival. I was on holiday, helping my parents at the farm, driving a bull cart on a vehicle path. The explosion happened on the wheel of my cart” (male, severe hearing impairment, age at accident 12, Mogaung Township, Kachin State)
- While my daughters were on holidays (May), they were helping me in the field where I was working, it was very hot so I told them to work in the shade when the explosion happened near a tree (two daughters severely injured (17,22) and one daughter deceased (9), Mansi Township, Kachin State).
- “Since I lost my son (24), I have many debts because at the beginning of the rainy season (May) we were starting to work on paddy fields but we could not finish the job” (male, deceased, age at accident 27, Mogaung Township, Kachin State)
- “My landmine accident happened in May [...] the beginning of the rainy season is the best time to get a lot of fish” (male, moderate injuries, age at accident 26, Mogaung Township, Kachin State).

Rainy season accidents

- “My husband’s accident happened at 4 PM when they were on their way to collect bamboo shoots during the rainy season in July” (male, deceased, age at accident 16, Mogaung Township, Kachin State).
- “My accident happened when four of us were walking on a foot path in the morning (8 AM) on our way to work in a paddy field. It was in August we are spraying pesticides” (male, moderate functional impairment, age at accident 41, Namtu Township, Northern Shan State).

After rainy season accidents

- “My accident happened in November, after the rainy season when I went to check the trees that I had planted” (male, severe walking functional impairment, age at accident 27, Myitkyina, Kachin State)
- “My accident happened in January, I was putting some ground on the tea tree and when I came back to my motorcycle around 1 PM for my lunch break I triggered a landmine” (male, severe walking functional impairment, age at accident 43, Namhsam Township, Northern Shan State).

Profile of the landmine/ERW victims

Age and sex

The overall mean age of the victims at the time of the accident was around 35 years old with males being significantly older (38 years old) than females (33 years old). The proportion of male victims was 84%. Using the Myanmar Census 2014 results from rural areas in the region (Department of Population, Ministry of Immigration and Population, May 2015), males were over 5 times at higher risks to have a landmine/ERW compared to females (RR 5.83, 95%CI 3.92-7.04, p=0.001).

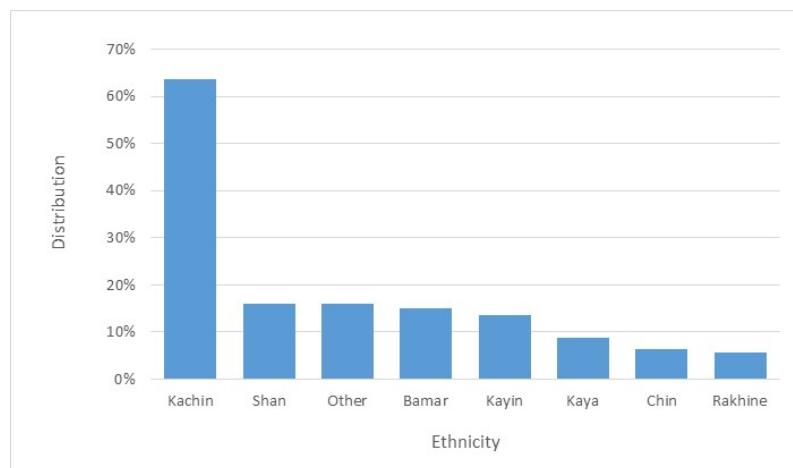
The proportion of adults (18 years or more) was 83%. In adult victims, 75% were married, 6% were widow/widower and 2% were separated suggesting that around 80% of the adult victims had children. Adolescents (aged between 13 and 17 years old) accounted for 13% and younger children for 4%, no sex difference was detected between age groups.

Using Myanmar census 2014, the total adult rural population was accounting for 63% and were at higher risks for a landmine/ERW accident (RR 1.32) as well as adolescents (10%, RR 1.26) while younger children (27%) were at lower risks (RR 0.15).

Ethnicity

In our sample, the majority of the landmine/ERW victims were Kachin (55%), Shan (14%), other groups (10%), Bamar (9%), Kayin (7%), Kayah (3%), Chin (1%) and Rakhine (<1%).

Figure 5: Ethnic group distribution, landmine/ERW victims



Home status

The proportion of IDPs landmine victims in Kachin State (42%) was higher than in Kayah (16%) and none in Northern Shan State. Overall, 92% of the IDP landmine victims were from Kachin State.

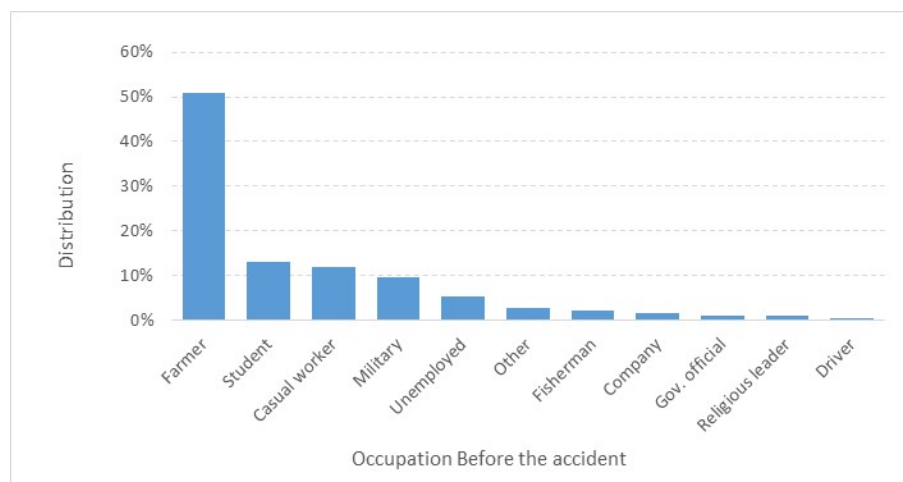
In 2016, out of 83,000 IDPs registered by the UNHCR, 93% were in Kachin State and 7% in Northern Shan State. In our sample, 62% of the victims were settled and 33% were IDPs.

In Kachin State, despite a lower number of accidents and lower population size of IDPs compared to settled rural population (around one IDP for 12 settled persons), the high incidence rate of landmine/ERW accidents showed that IDPs were over 9 times at higher risks for landmine/ERW accidents (RR 9.49, $p=0.001$) compared to settled persons while no accident happened in IDPs from Northern Shan State.

Occupation at the time the accident

Two third (63%) of the landmine/ERW victims had an occupation related to farming activities whether on their own land or as a casual worker (51% and 12%, respectively), others were on military duties or forced labor (10%) while younger victims were students (13%).

Figure 6: Activity at the time of the accident, landmine/ERW victims



IDPs are at risks for landmine/ERW accidents while collecting tree leaves out of the camp in order to improve their routine meal as well as settled villagers.

- “The accident happened when I was walking from the IDP camp to the forest on a foot path while we were collecting tree leaves for our curry. I always went there just to look for some food. In my IDP camp I eat beans with oil and salt. It is ok but I have been eating the same food for four years and I got tired of always eating the same thing every day. We need changes. We need various kinds of food meat, salad or soup with vegetables, in particular for the children” (male, IDP, severe walking impairment, age at accident 37, Mansi Township, Kachin State).

Settled persons and IDPs were also at risks for landmine/ERW accidents any time of the year on the way to the field as a farmer, while approaching a tree by the side of the road or walking in the forest to collect leaves, or collecting bamboo or bamboo shot.

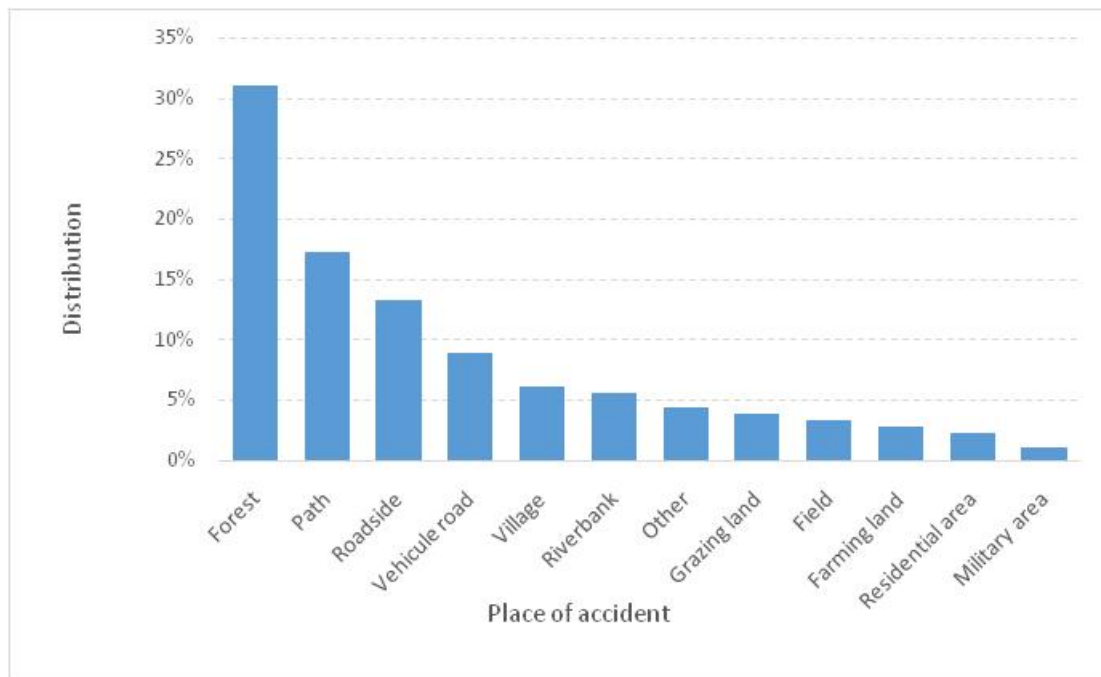
- “It was early morning, I was walking on a footpath. I was going to work at the tea garden. The explosion occurred on the side of the path, another adolescent girl was injured and one adult died” (female, moderate accident, age at accident 13, Hsipaw Township, Northern Shan State).

- “My son (16) died when on the side of a path while he was collecting leaves from a small 6 feet tree to sell at the market. He went for net fishing in the morning and while he was waiting he went to collect tree leaves” (male, deceased, age at accident 16, Mogaung Township, Kachin State).
- “My husband accident happened at 4 PM when they were on their way to collect bamboo shot” (male, deceased, age at accident 42, Mogaung Township, Kachin State).
- “Five of us were walking on a foot path two miles away from our camp to collect some bamboo in the forest to make a stage and decorations for a religious event when my friend triggered a landmine” (male, IDP, multiple severe functional impairment, age at accident 43, Loeje Township, Kachin State).

Place of accident

Most of the accidents took place in the forest (31%), path (17%), roadside (13%) and road for vehicle (9%). Other places (<6%) were in the village, on the riverbank, grazing land, field, farming land, residential or military areas.

Figure 7: Place of the landmine/ERW accident



The most hazardous place for landmine/ERW victims was in the forest, on a foot path or on the side of the path as the victims collect tree leaves to improve the daily meal or increase their income.

- “The accident happened when I was walking from the IDP camp to the forest on a foot path while I were collecting tree leaves for our curry. I always been there just to look for some food” (male, IDP, multiple severe functional impairments, age at accident 37, Mansi Township, Kachin State)
- “My accident happened in the forest while I was collecting leaves that I can sell to some shops for packaging so that I can pay for the education of my daughter in high school” (female, severe walking impairment, age at accident 50, Mogaung Township, Kachin State).

- “My son was with other friends, some were in front and others were behind. Only my son got killed by a landmine because he was walking on the side of the path to collect tree leaves” (mother reporting, male, deceased, age at accident 16, Mogaung Township, Kachin State).

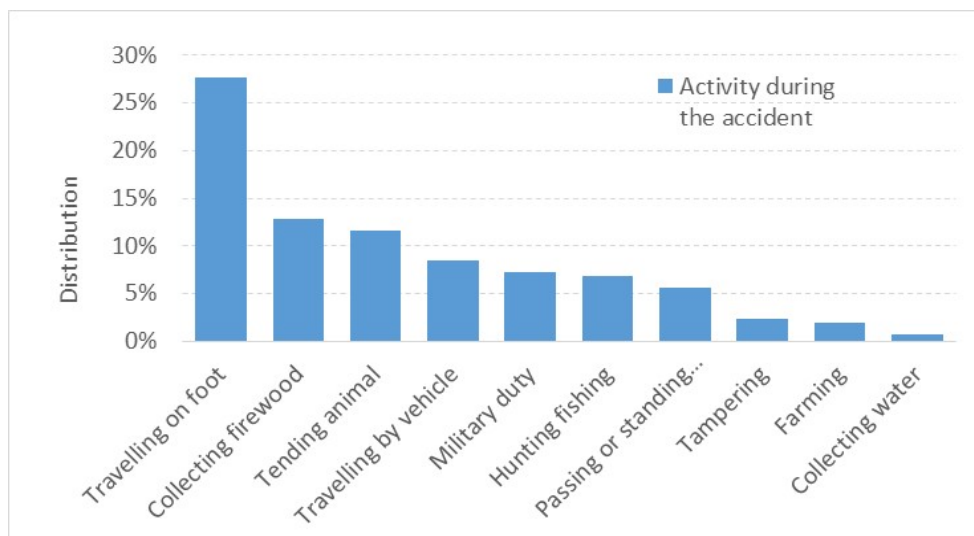
Depending on the season, landmine accidents could occur while the victims had to go further in the forest to collect leaves for their animals in the farm.

- “In December, it is more difficult to find leaves to feed my pigs so we need to go further in the forest. I was driving my 4-wheel drive vehicle in the forest to find some vegetables for my pigs when the explosion came from the side” (male, villager, no severe injuries, age at accident 22, Momauk Township, Kachin State)

Activity during the accident

During the accident, the most frequent activities were travelling on foot (28%), collecting firewood (13%), tending animal (12%), travelling by vehicle (8%), military duty (7%) and hunting or fishing (7%).

Figure 8: Activity during the accident, landmine/ERW victims



IDP were slightly more at risk for an accident while travelling on foot (33%) compared to settled victims (25%, $p=0.088$) as well as hunting/fishing (10%, 5%, respectively, $p=0.063$).

It is very likely that the most incident cause of accident for IDPs was while they were travelling on foot in very hazardous areas for fleeing the conflict or travelling back to their home village to see their house or their garden .

Coming back to home village

- “After armed conflicts in my village, I had to move to an IDP camp with my family but after four months we never received any support for food. So I had to go out of the camp for collecting tree leaves. After collecting leaves next to my original village, we went to have a look at our house. While we were walking in the house compound, the foot path was booby-trapped. One of us triggered the landmine injuring three and killed one of us” (male, severe injuries, age at accident 33, 6 children, Loeje Township, Kachin State)
- “When the conflict started in our village in 2012, we had to escape at 1 PM, it was raining and we could only take a few clothes, not even our bed mat. So we decided with my husband and my son to visit our house and also collect some fruit from our garden so that we can sell them later. We were walking into the compound house, my husband was behind us when the landmine exploded and killed him” (male, deceased, age at accident 48, 4 children, Lisu IDP camp, Loeje Township, Kachin State)
- We were walking from our IDP camp heading to our village of origin to find our buffalos [when one of us triggered the landmine](female, severe walking impairment, age at accident 41, 7 children, IDP, Loeje Township, Kachin State)

IDPs were also at high risks for accident while they were travelling in particular while they were fleeing their home village during the conflict or while their home village was besieged by armed groups without any food left and they have to escape in the forest.

Fleeing the conflict

- “There were conflicts between armed groups in my village. At first women and children had to escape while men were staying in the village to secure their farm and cattle. The village was besieged and they were shooting mortars at us. After one month we did not have food anymore so we had to leave the village. The roads were controlled by armed groups so we had to find some shortcut through the forest to join our family and that’s where I triggered the landmine” (male, IDP, severe functional impairment, age at accident 35, Mansi Township, Kachin State).
- “We had to leave our house at night under the rain because our village was under attack. We could not take anything with us. 3 months later, my husband and three other people were walking from the IDP camp to our village of origin to see our house. The accident happened on a vehicle road” (male, deceased, age at accident 39, 4 children, IDP, Loeje Township, Kachin State)

On the other hand, settled victims were significantly at higher risks while tending animals (5%, 16%, respectively, $p=0.011$) or tampering or fishing with artisanal explosive (0%, 4%, respectively, $p=0.069$) or travelling by vehicle compared to IDPs.

- My son was walking back home in the evening after tending cows” (male, deceased, age at accident 24, Mogaung Township, Kachin State).
- My accident happened when I was fishing on a boat with a home-made explosive device. It was already dark and we did not have fish yet. We usually use black powder bought from the Chinese shop but we did not have a proper fuse and we decided to make one using paper. When I burned the fuse, the explosion took away my two arms and my right eye (male, very severe multiple functional impairment, age at accident 47, Myitkyina Township, Kachin State).

- “I was [...] driving a bull cart on a vehicle path. The explosion happened on the wheel of my cart, a friend was following also driving a bull cart and three bulls were killed” (male, settled, transient severe hearing impairment, age at accident 12, Mogaung Township, Kachin State).

Table 1: Activities at the time of the accident in IDP and settled landmine/ERW victims

Activity at the time of the accident	IDP	Settled	Total	P*
Travelling on foot	33%	25%	28%	0.088
Collecting firewood	14%	12%	13%	0.631
Other	11%	12%	12%	0.921
Hunting/fishing	10%	5%	7%	0.063
Military duty	6%	6%	6%	0.897
Unknown	6%	1%	2%	0.012**
Tending animal	5%	16%	12%	0.011**
Travelling by vehicle	5%	10%	8%	0.145
Farming	3%	1%	2%	0.233
Passing or standing nearby	2%	8%	6%	0.096
Collecting water	1%	1%	1%	0.652
Demining	1%	0%	0%	0.171
Tampering	0%	4%	2%	0.069

*Statistical comparison between survivors and deceased victims **significant difference (p<0.05)

According to our in-depth interviews, settled villagers seemed at high risks for accidents while they were engaged in forced labor. When people are forced to work for local armed groups carrying heavy bags from a place to another, they are exposed to attacks and booby-traps from other armed groups.

Military duty and forced labor

- “I was walking on a foot path near an abandoned railway train. I was a porter carrying bag pack for the armed group. It was forced labor. I did not see anything as I was carrying a heavy bag. The explosion killed one person on the spot, and eight of us had darkened faces and bleeding the whole body” (male, villager, severe functional impairment, age at accident 52, 3 children, Namtu Township, Northern Shan State).
- “That day, I was ordered from my house by the local armed group to some forced labor for them. We do not get paid for these duties but I am afraid of them and I have to obey because they have guns. So I had to do some cleaning around their post when I stepped on a landmine right inside the trench just next to the post” (male, villager, very severe functional impairment, age at accident 24, 2 children, Namtu Township, Northern Shan State).

Conclusion

Settled villagers are at risks for landmine/ERW accidents because their village is often located in hazardous conflicts areas or next to armed group’s camps. They are therefore exposed to landmines while they are walking on a path on their way to their farm or when they go fishing, tending livestock

and collecting firewood or leaves in the forest to find their preferred food. On the other hand, IDPs are at higher risks while coming back to their home village, fleeing conflicts, and also while they are walking outside the camp to collect some food in the nearby forest.

Recommendation

MRE strategies should focus on IDPs who are travelling by foot in much higher hazardous areas compared to settled villagers. Since IDPs had to flee their village because of conflicts it is likely that their houses are booby-trapped as well as the roads or paths that lead from the camp to their home village.

Perceptions and attitudes towards danger

According to respondents, “in conflict zones, there is no mine sign indicating dangerous areas” and the vast majority of the victims did not think that the place of the accident was hazardous (79%). Younger victims were at higher risks (OR 3.53, 95%CI 3.20-3.88, $p=0.051$) to believe that the place of their accident was not a hazardous area compared to adult victims (91%, 76%, respectively). The proportion of victims visiting the accident site more than once a day was 27%, once a day was 12%, several times a week was 34% and never before was 27%. No difference was detected according to age groups or the fatality of the accident.

Knowledge about hazardous area

In victims who did not know that the area was contaminated, the most frequent activity when the accident happened was travelling on foot (29%), collecting firewood (15%) and tending animals (13%). In victims who were aware of the danger the most frequent activities were military duty (30%), travelling on foot (29%) and tending animals (8%).

Reasons for going to hazardous areas and marked area

The accident occurred to 3% of the victims despite the fact that the area was marked as dangerous.

- In conflict areas, there are no signs indicating dangerous areas. In my case, I would feel very scared if I see signs because, as a porter for the army, I am forced to keep going anyway (male, villager, no severe impairment, age at accident 27, Mogaung Township, Kachin State).

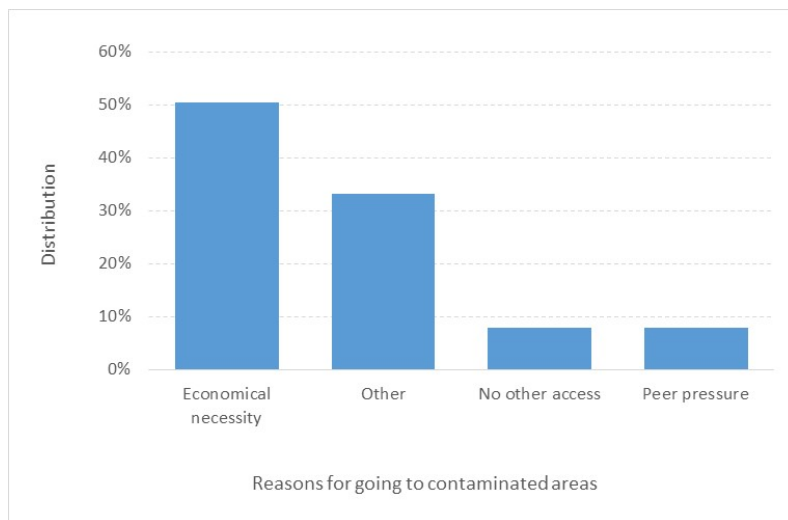
After an accident, it is recommended that the victims report the place where it happened to the local authorities or local community leader but it does not seem to be a frequent practice.

- I don't know if the place is now marked because I never came back again. Since my accident, people know that this place is dangerous but another accident happened not long after very close from there.

The majority of the respondents had an accident in hazardous areas because of economic necessity (51%), because of no other access (8%) or by peer pressure (8%).

Other reasons for going to hazardous areas (33%) were when they had to flee their village because of hostilities, or were engaged in forced labor or military duties. After the accident, some landmine/ERW victims still have to conduct the same socio-economic activities in the same area, exposing themselves again to the risk of a new accident.

Figure 9: Reasons for going to hazardous area, landmine/ERW victims



For most of the respondents, the perception of the risks of accidents was reduced by the needs in livelihood and extreme poverty leading to unsafe behaviors. Despite farmers knew they were travelling across hazardous areas, they still need to make a living and they cannot abandon their activity (farming, fishing or collecting leaves in the forest).

- Some of my neighbors [of our home village] started going there again and told us that they had seen our buffalos. As we are poor, even if the area is still dangerous, we wanted to find and sell them to get some money (female, IDP, severe pain due to remaining fragments, age at accident 41, 7 children, Mogaung Township, Kachin State).
- Even if we are told it is dangerous, we still need to go fishing and farming and some people would always take a chance for livelihood purpose (male, villager, no severe impairment, age at accident 27, Mogaung Township, Kachin State).

Even knowing that the area was dangerous, some people thought that going to the same area and using strategies like using the same path would prevent from the risk of accident.

- I knew the area was dangerous but I thought I was safe because I always use the same path twice a week (female, urban, severe functional impairment, age at accident 50, Myitkyina Township, Kachin State)

The perception of danger was mostly related to the knowledge of the number of accidents occurring in the area.

- It was the first time for me to go there. It was someone else's farm, not close to my village. I did not know it was dangerous, I never heard about any accident before (female, villager, very severe functional impairment, age at accident 13, Hsiphaw Township, Northern Shan State)
- "At that time, we did not think it is that dangerous since no accident had happened yet" (male, IDP, moderate functional impairment, age at accident 33, 6 children, Loeje Township, Kachin State)

Most of the people did not feel in danger until the accident had happened.

- There is no close conflict in our area and no accident happened recently in that forest (male, IDP, severe walking impairment, age at accident 43, 3 children, Loeje Township, Kachin State).
- Since no accident happened, I did not think it was dangerous. After the explosion, armed groups came to check if there were other landmines and I still use this path because it's the only way to go to my cornfield plantation and to other villages (male, villager, severe hearing impairment, age at accident 52, 3 children, Namtu Township, Northern Shan State).

After the accident, some landmine/ERW victims still want to continue the same activity despite they are aware that the area is dangerous and their activity exposes them to risk of accidents.

- I prefer to help my father in transport business even if the area is dangerous. Although my parents wanted me to continue going to school, I am satisfied with my level of education (grade 8). I could be interested to be a mechanic but I prefer helping my father as a spare man, I have no time for now (male, villager, no severe impairment, age at accident 16, Namtu Township, Northern Shan State).
- I have been working since I am 12 years old because we do not have enough food at home. I started working again two months after the accident. Now I am still going to work at the same tea garden but I am very scared (female, villager, age at accident 13, Hsiphaw Township, Northern Shan State).
- Landmine/ERW victims are scared to go to the place of their accident because they are traumatized. Now I don't go to the place of my accident because I am scared and I cannot walk anymore (female, urban, severe walking impairment, age at accident 50, Mogaung Township, Northern Shan State).

Livelihood

Change in occupation after the accident

Almost two-third of the survivors (60%) had to drop out their activity and did not work or study anymore. Two third of farmers (59%) and laborers (61%) could not work anymore and two third of the

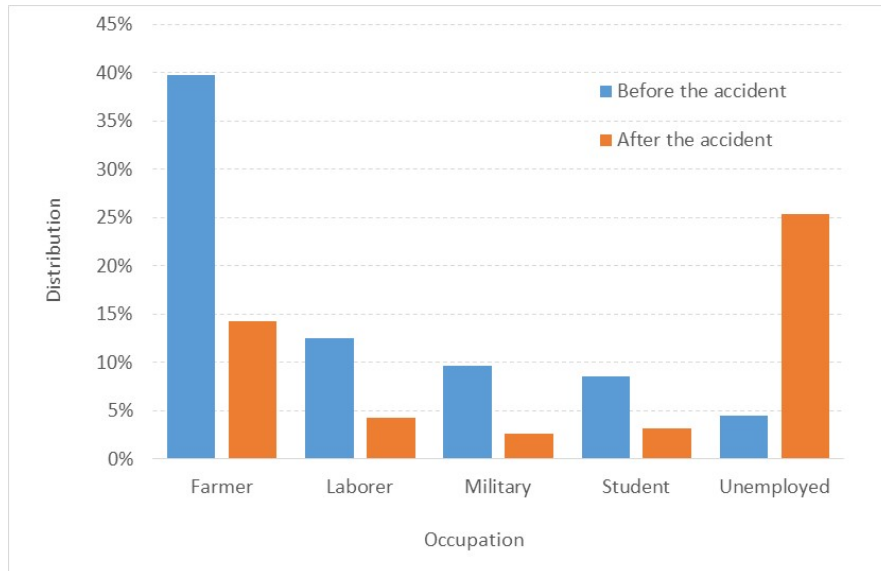
soldiers left their activity (68%). Unemployment was multiplied by four-fold to reach 67% of the survivors.

- Since the accident, I don't go to work anymore because of my suffering leg. Most of the time I stay at home and cook. I don't like cooking because I have to collect the firewood and my leg is very painful (female, villager, severe walking functional impairment, age at accident 13, Hsiphaw Township, Northern Shan State).
- Now that I have lost my arms and one eye in the accident, I cannot do anything anymore and now I have to rely on my family for food (male, villager, very severe multiple functional impairment, age at accident 47, Myitkyina Township, Kachin State).
- Before the accident, I was a farmer working on my own land planting cornfield. After the accident, I could not work for 6 months but with the rainy season I feel pain and I cannot do hard work anymore (male, villager, severe walking functional impairment, age at accident 43, 3 children, Namtu Township, Northern Shan State).
- Before the accident, I was working in a cornfield plantation and still now as I was not severely injured (male, severe walking functional impairment, age at accident 15, Namtu Township, Northern Shan State).
- Before I came in the IDP camp, I used to work as a farmer every day but now I can't do anything (female, IDP, severe pain due to fragments in the body, age at accident 36, Mansi Township, Kachin State).
- Before the accident, I used to go far away for farming, 3 hours walk from my village of origin but now I cannot work anymore and it is also not allowed to go there anymore (male, IDP, severe walking functional impairment, age at accident 43, Loeje Township, Kachin State).
- Before I was a farmer in cornfield and paddy field. Now I am still working but I feel severe pain when the rain is coming and I feel tired very quickly (male, seeing functional impairment, severe pain due to remaining fragments, age at accident 38, Namtu Township, Northern Shan State).

Over a half (57%) of the survivors students had to drop out of school.

- "I dropped out of school after the accident because of the detonation I could not hear very well anymore and I could not concentrate during the lessons at school. Now I am not interested in schooling anymore" (male, villager, transient severe hearing impairment, age at accident 12, Mogaung Township, Kachin State).

Figure 10: Occupation before and after the accident, landmine/ERW victims



Alternative livelihood

DRC/DDG has been supporting landmine victims in terms of livelihood in Myanmar starting from 2013. Alternative livelihood is provided to landmine/ERW victims (or to the family in case of death) to decrease the risks of accidents by preventing people from travelling across dangerous areas, for instance by supporting home based activities. According to respondents if demining is not possible in hazardous areas, alternative job opportunities have to be created.

- If we cannot do demining in hazardous areas, we have to create job opportunities in other places (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State).

Home based livelihood

To achieve the objective of creating home based livelihood, supports are given to landmine victims by donating 2 piglets or some cash grant to open a small shop in front of the house. Home based livelihood seems to be good alternative to farming and it is adapted when the injuries and the functional impairments caused by the accident are severe or caused death leaving a family without income.

- Now that I have changed my activity [not going in the forest to collect leaves] I feel safe (male, no severe injuries, age at accident 22, Momauk Township, Northern Shan State).
- Since my husband died and my children are very young, I cannot leave home. I can only do casual work sometimes (wife reporting, male husband, deceased, 6 children, age at accident 42, Mogaung Township, Kachin State).

- My daughter now works as a home maid and my husband is a casual worker in a banana garden. I wish I could set up a small grocery shop in front of my house (female, urban, severe walking impairment, age at accident 50, Mogaung Township, Kachin State).

For respondents, raising pigs at home or having a small shop in front of the house seemed to be a good alternative for their livelihood and it is safer than travelling in hazardous areas or going back to their home village where conflict can happen again.

- Now I raise pigs at home and my wife opened a small shop in front of the house supported by DRC (male, severe functional impairment, 4 children, age at accident 35, Mansi Township, Kachin State).
- I wish I could do many things but it is impossible now. I think the best job for me would be to raise cattle at home (male, very severe walking impairment, 2 children, age at accident 24, Namtu Township, Northern Shan State).
- Before my husband died in the landmine accident, we used to plant potatoes. But now that I stay in the IDP camp with my children, I don't work anymore. I have to rely on NGO support: rice, bean, oil, salt, medicine or clothes. I also received two piglets two years ago from DRC. Compared to potato farming raising pigs at home is less dangerous because I don't need to go far in dangerous areas and I can stay at home to take care of my children. 8 months later, I could sell the pigs for my children's education and extra food to cook curry (wife reporting, IDP, husband deceased, 4 children, age at accident 39, Loeje Township, Kachin State).
- I would like to raise pigs in my own village but now I cannot go back. It is very dangerous there, even if there is no armed group. If there are conflicts going on, we might have to come back again to the IDP camp anyway so it is safer to stay in the IDP camp (male, IDP, severe multiple functional impairments, 4 children, age at accident 37, Mansi Township, Kachin State).
- Before the accident, I used to go far away, 3 hours walk from my village of origin for farming but now I cannot work anymore and it is also not allowed to go there anymore. Now I stay at home taking care of my children and two pigs. I use waste food given by some people because I cannot walk far and carry anything to feed the pigs (male, IDP, 3 children, age at accident 43, Loeje Township, Kachin State).

Pig raising

When people are raising pigs at home, they have to walk in the forest around the IDP camp to search tree leaves and banana trunk. Finding food for pigs could be more difficult in dry compared to the rainy season and when the pigs get bigger. Although the behavior consisting in walking in the forest collecting tree leaves was a risk factor for accidents, it did not seem that these persons perceived this activity as dangerous since many people were going out of the camp for the same reason and no accident happened yet. However, the difficulties faced with pig raising is the cost of vaccines and medicines.

- I give tree leaves and banana trees for food for my pigs but it is more difficult to find food for them in particular when they grow up, as they have to eat more. I have to go outside in the forest around the camp to collect leaves but I am not afraid because we all go to the same place and there has been no accident there. I received the piglets in January or February, and two or three months later during the rainy season, it is easier to find leaves when they grow up. The price of the white pig depends on its weight but I received over 100,000 MMK while I bought it around 40,000 MMK depending on the species. I am happy with this business that I would like to carry on with more pigs. I think I could make space for 4 of them. Depending on the size of the pig I have to go and collect leaves almost every day but the

difficulties that I face are that pigs can be sick and I need money to buy medicines (wife reporting, IDP, husband deceased, 4 children, age at accident 39, Loeje Township, Kachin State).

Conclusion

Home based livelihood activities seem to be a good alternative to prevent from the landmine victims and potential new victims to go to hazardous areas, in particular if the landmine/ERW victim had severe functional impairment due to the accident.

Recommendation

It is recommended to give and start raising piglets in January during dry season while the pigs are still small so that it is easier to find tree leaves and banana trunk during the rainy season when the pigs get bigger to prevent from the risk of going in hazardous areas.

Medical assistance, access and quality of the service

Access to medical service, first aid

Among landmine/ERW survivors, most of the victims went to hospital (53%), clinic (24%) or other facilities (23%). The time to the first health facility was over two hours (57%), one to two hours (23%) and less than one hour (23%).

Landmine victims seem to have better access to medical care when their accident happened while they were on military duty compared to villagers or IDPs.

Kachin State

- “The accident happened while I was in the army. It took only 15 minutes to receive the first aid. I went to Mingaladon hospital three weeks later and stayed there for 5 months” (male, very severe walking impairment, age at accident 33, Myitkyina Township, Kachin State).
- “His friends heard the explosion and run to rescue him but it took three hours to take him to the hospital and he died during the evacuation (mother reporting, male, deceased, age at accident 16, Mogaung Township, Kachin State).

Northern Shan State

- “After the accident, nobody was around, although I had a leg injury we had to walk from the field to the closet town for about three hours arriving at 1:30 PM where we received first aid at the Mansam clinic (10 miles away). We got injections there and some landmine fragments removed. We stayed there for two hours and we went to Lashio, arriving at the hospital at 8:30 PM by ambulance” (male, transient severe walking impairment, age at accident 41, Namtu Township, Northern Shan State)

- The accident happened at 8 AM, we were sent to the Mansam village clinic by pick-up truck and arrived around 10 AM there. They removed the fragments and gave me some bandages. I slept at the clinic the first night and went back there every three days (male, severe hearing impairment, age at accident 41, Namtu Township, Northern Shan State)

Most of the victims could only reach the first hospital after four hours (52%), from two to four hours (28%) and less than two hours (20%). No distance or time difference was detected between survivors and deceased during the transport or at the health facility.

- The accident happened at 6 PM but we only arrived in the closet village in the morning where we received local medicine treatment in the evening. In total, it took us three days to reach Bhamo Hospital (female, walking impairment due to remaining metallic fragments, age at accident 41, Mansi Township, Kachin State).
- The accident happened at 11 AM, I was bleeding a lot but I arrived at the hospital only at 11 PM where they did a blood transfusion and they amputated my leg above the knee (male, very severe walking impairment, age at accident 7, Loeje Township, Kachin State).
- The accident occurred at 3 PM. First, they used a motorcycle and we arrived at the next village at 5 PM. From there then they went to Kyaukme by pick-up truck and they arrived at the hospital at 12 PM (male, moderate impairment, age at accident 5, Kyaukme Township, Kachin State).

Quality of the service

Kachin State

- I cannot work hard anymore otherwise the remaining fragments inside my body hurt me (male, severe walking impairment due to me remaining metallic fragments, age at accident 22, Momauk Township, Kachin State)
- “I did not get any operation, I can feel there is still something in my leg. I feel pain when I walk or when I touch it. For me as an IDP, the doctors [from Bhamo Hospital] did not remove the explosive fragments from my body because they know that I do not have enough money to pay them” (female, deceased, age at accident 41, Mansi Township, Kachin State)
- “The wheel of the car was destroyed so I called someone for rescue and it took us around 3-4 hours to reach the hospital. At the hospital, they did not remove anything but the one in my face just went out by itself. I wish the doctors had removed the iron from my body but they did nothing, one cannot trust them” (male, moderate injuries, age at accident 22, Momauk Township, Kachin State)

Landmine victims from Kachin prefer going to Chinese hospitals.

- “The accident happened around 8 AM, I was unconscious, I fainted many times. I don’t remember who gave me the first aid, I just woke up once the blood was dry on the face in the morning and I woke the day after in the morning at the Jankran Chinese hospital”

Northern Shan State

- “The accident happened at 10:30 AM. As first aid, the soldiers from the outpost gave me bandages to stop the hemorrhage. The ambulance arrived at 12:30 and I arrived in Lashio hospital at 5 PM (25 miles away). I think the medical service was good, they removed all the fragments” (male, severe walking impairment, age at accident 24, Namtu Township, Northern Shan State)
- “I had to go back to the hospital twice. They operated the wound and removed 6 landmine fragments from my body. I also was treated by the nurses from the mobile team” (male, transient severe walking impairment, age at accident 41, Namtu Township, Northern Shan State)
- “They removed a lot of landmine fragments from my body but there is still a big one in my back. I saw it when I came back from hospital so I went there back again but it is difficult to remove, they suggested me to come back. (male, transient severe walking impairment, age at accident 38, Namtu Township, Northern Shan State)
- “I went to Lashio hospital where they removed some landmine fragments but I still feel pain, there is still some metallic fragment in my ankle, so I cannot walk far or work in the field anymore” (female, severe walking impairment, age at accident 13, Hsipaw Township, Northern Shan State).

Psycho-social trauma

- When I lost my two legs, I lost my ability to walk and my rights, people don't respect me anymore (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State).
- Now that I am almost blind because of the landmine accident, I am scared to walk around although I have to go and work in my cornfield and paddy field while my children are at school and my wife is gardening at home for our meals (male, severe visual impairment, age at accident 38, Namtu Township, Northern Shan State).

Injuries in survivors

Among landmine/ERW survivors, 40% had multiple injuries. A large majority of the survivors (62%) had an injury below the knee. Other injuries were above the knee (21%), arm (19%), finger (14%) and abdomen (12%). The prevalence of other injuries (eyesight, back, head/neck, chest, pelvis, and hearing) were below 10%.

Injuries and risk factors for fatality

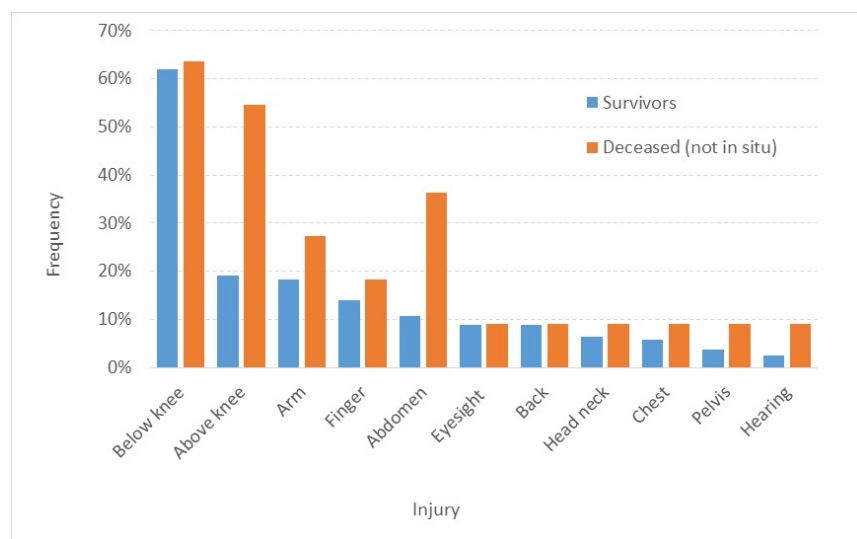
Comparing the prevalence of injuries between survivors and deceased victims (not in situ, i.e. during evacuation or at the health facility), we observed that multiple injuries was a risk factor for fatality (OR 4.36, 95%CI 1.11-17.06, $p=0.023$). Other risk factors for fatality were an injury above the knee (OR 5.12, 95%CI 1.46-17.90, $p=0.005$) or at the abdomen (OR 4.74, 95%CI 1.26-17.88, $p=0.013$).

Table 2: Injuries in survivors and deceased landmine/ERW victims (in situ)

Injury	Survivors	Deceased (not in situ)	Total	P*
	%	%		
Multiple injury	38%	73%	40%	0.023
Below knee	62%	64%	62%	0.915
Above knee	19%	55%	21%	0.005**
Finger	14%	18%	14%	0.696
Arm	18%	27%	19%	0.465
Eyesight	9%	9%	9%	0.979
Hearing	3%	9%	3%	0.214
Head neck	6%	9%	7%	0.720
Back	9%	9%	9%	0.979
Chest	6%	9%	6%	0.645
Abdomen	11%	36%	12%	0.013**
Pelvis	4%	9%	4%	0.394

*Statistical comparison between survivors and deceased victims **significant difference (p<0.05)

Figure 11: Injury in survivors and deceased (in situ) landmine/ERW victims



Fatality rates and risks

The proportion of deceased persons among the landmine/ERW victims was 24% without significant sex difference (26% of male and 15% of female, p=0.157). Around half of these deceased landmine/ERW victims (52%) were killed in situ, other victims died during the medical evacuation or at the medical facility.

No difference in mean age was detected between the deceased victims (32 years old) and the injured victims (34 years old, $p=0.387$). However, teenagers were significantly at higher risks for fatality (AOR 2.91, 95%CI 1.33-6.35, $p=0.007$) compared to other age groups.

While the proportion of deceased persons due to landmine/ERW was 24%, the victim fatality rate was higher in student (38%) than in fisherman (25%), in farmer (25%), in unemployed (20%), in laborer (19%) and in military (6%).

The victim fatality rate was 28.0% among Bamar, 27.5% among Kachin, 25.9% among Shan, 25.9% among other and 22.2% among Kayah ethnic group. Compared to other ethnic groups, the Kayin victims were those with the lowest fatality risk (OR 0.13, 95%CI 0.17-1.01, $p=0.051$).

Multivariate analysis for fatality

Overall, victims of an accident occurring in Kachin were at higher risks for fatality (AOR 2.79, 95%CI 1.18-6.61, $p=0.020$) compared to accidents occurring in other States as well as for teenagers (AOR 2.84, 95%CI 1.29-6.27, $p=0.010$) compared to other age groups.

Recommendation

As used for the Myanmar census 2014 and in our qualitative study, the Washington group short set of questions would be an interesting tool in the landmine/ERW victims register to assess the severity of functional impairment (seeing, hearing, walking, washing, remembering and communicating) of the victims due to the landmine/ERW accident.

Perception of danger and MRE training

MRE training

Despite frequent and documented landmine/ERW accidents in the region under study, the proportion of victims who ever received mine risk education training before the accident was 3.5% (95%CI 1.1%-5.9%). Only adults had received this training. Therefore, the proportion of people with knowledge about the risks of landmine risks seemed very low. Respondents believe that if they had MRE before, their accident probably would not have happened.

- “I never received MRE training and I can see many people fishing with home-made explosive so I did not think it was dangerous for me” (male, multiple severe functional impairment, age at accident 46, Myitkyina Township, Northern Shan State).
- “I don’t think that people know how mine can explode so people get accidents like me” (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State)
- I think MRE can reduce the risks of accidents but because of ongoing conflicts there will be some more accidents (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State)
- Before MRE training session I did not have any knowledge about landmine (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State).

Perception of the most at risk population

For the respondents, while landmines are supposed to target army soldiers, the most at risks for landmine accidents in Kachin and Northern Shan States are poor people of all age groups from the rural areas. Respondents indicated that, even if they were aware that the area is dangerous, they still have to take a chance for their daily livelihood and the survival of their family, for instance while collecting leaves, walking in the forest, on the way to their field, or passing near armed groups positions.

- “I think that poor people from the rural areas are the most at risks because they have to take risks to get their food from the forest on a daily basis” (male, severe walking impairment, age at accident 37, Mogaung Township, Kachin State)
- I think the farmers of all ages are the most at risk (female, no severe impairment, age at accident 13, Namtu Township, Northern Shan State)
- “I think the people from rural areas and the farmers who need to walk or travel often in the forest are the most at risks” (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State).
- “I think the population most at risks are the farmers because they have to pass nearby the armed groups camps” (male, severe walking impairment, age at accident 24, Namtu Township, Northern Shan State).
- “I never heard that soldiers had any landmine accidents, only villagers have accidents although the landmines are supposed to target army soldiers (male, transient hearing impairment, age at accident 12, Mogaung Township, Kachin State)
- Although there is an army camp nearby, we used to often go to the place of the accident so we did not think it was dangerous (Mother reporting, 2 daughters severely injured (17, 22), one died (9), Mansi township).

Safe behavior

Receiving MRE training increased the knowledge about the danger represented by landmines and how to reduce the risk of casualties. Some adults receiving MRE training can also teach their children and younger adults to reduce their hazardous behaviors.

- I was told about landmine danger by the nurses after the accident. I have told my children about the danger of playing around and now they don't go out of the village anymore (male, transient walking impairment, age at accident 41, Namtu Township, Kachin State).
- When they see the accident, they run to the victim to stop the bleeding and carry him/her to the nearest hospital but I think this behavior is dangerous because there might be other mines around (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State)
- When we see a landmine, we should not touch it but ask help from a specialist (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State)

MRE support information and target population

- I think MRE training session would be the best because people are busy and don't have time to watch movies. For leaflet, most people in rural areas don't know how to read (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State)
- I think it would be useful for the next children generations to receive MRE to prevent accidents. I suggest children from 11 years old (grade 4-5) up to 14 years old should receive MRE. At the age of 14 years old, children have to move to the secondary school so they start to drop out of school but there is not enough food to feed the family and they have to help the parents to the farm (female, severe multiple impairment, age at accident 61, Mogaung Township, Kachin State).
- I received MRE training at my church after the accident. In my opinion training session is the best (male, very severe walking impairment, age at accident 40, Myitkyina Township, Kachin State).
- I prefer playlets, we do not have electricity at home or in the village anyway (female, severe walking impairment, age at accident 13, Namtu Township, Northern Shan State).

Difficulties of MRE training coverage

- "I never received MRE training. There has never been any MRE staff coming to my village because of the political situation and with the presence of armed groups, the access is difficult" (male, severe walking impairment, age at accident 24, Namtu Township, Northern Shan State).
- For us, as Shan people, we like drama activities with actors on stage. Although we have no stage in the village, I prefer the playlet to TV (male, no severe injuries, age at accident 16, Namtu Township, Northern Shan State).

- I think we need MRE training at school starting very young age. Although I don't go to school anymore, I think receiving MRE at school is the best. I wish we had playlets during school class (female, no severe impairment, age at accident 13, Namtu Township, Northern Shan State)

Conclusions

The landmine/ERW study conducted in Kachin, Kayah and Northern Shan States identified a total of 290 landmine/ERW victims combining both quantitative and qualitative techniques. All landmine accidents happened in rural areas and involved internally displaced persons (IDPs) as well as settled villagers. Recent casualty reports showed that the number of landmine/ERW victims increased in the Union of the Republic of Myanmar, mainly because of a surge of accidents recorded in Kachin and Northern Shan States. Moreover, in Kachin State, IDPs are 9 times more at risks compared to settled villagers while in Northern Shan, the victims were settled villagers.

During ongoing armed conflicts and without landmine/ERW clearance activities, vulnerable people from rural areas are still forced to travel to hazardous areas for their livelihood needs, indicating that they are prone to extreme poverty and that their perception of danger is distorted because of financial necessity.

Overall, people from rural areas have frequent accidents because they are more exposed to landmines/ERW while walking on a footpath or driving a vehicle (bull cart, bicycle or motorcycle) in hazardous conflict areas or next to armed group's camps on their way to their activities (farming, fishing, tending livestock, collecting firewood or leaves in the forest or fishing). Tampering or using artisanal explosive are also unsafe behaviors that were reported.

IDPs are at high risks of a landmine/ERW accident while travelling on foot from the IDP camp to their village of origin to check their house and tend their crops, when they have to flee the conflicts while their home village is besieged by armed groups and must escape to the forest, or while they are walking outside the camp to collect food in the nearby forest.

Remaining landmine/ERW metallic fragments that are not removed from the victims' bodies indicate a need for better health care services and infrastructure. Poor medical service response after the accident might lead to irreversible severe pain and physical functional impairments. Unemployment could be the consequence of those disabilities, resulting in economic hardship for the family as 60% of the survivors had to abandon their professional activity after the accident and 80% of the adult victims - including deceased victims - had children at the time of accident.

Combatants, who were supposed to be the first target of the landmines, often receive better medical assistance in military medical facilities than other population groups. High fatality rates in landmine/ERW accidents, in particular in Kachin State, are probably due to the remoteness of the accident locations and poor transportation infrastructures resulting in an increased duration of evacuation.

Recommendations

Mine Risk Education

Because of an increase in military activities at the end of 2016 and the beginning of 2017, a lack of MRE training in some areas still subject to armed conflicts and in the absence of demining activities, the number of accidents has recently increased in Kachin and Northern Shan States. MRE training sessions in IDP camps and villages should therefore be continued and strengthened. MRE should be included as well in school curriculums to increase the awareness about the danger of landmines/ERW and reduce unsafe behaviors among children and youth. MRE programs should primarily focus on IPDs who are at higher risks of accidents while they travel by foot to their village of origin as well as take into account the seasonal component (increased risks of accidents in April-May).

Advocacy

Overall, awareness raising on the study results and subsequent training on disability inclusive development to State level authorities (district, township and village) is recommended. Creating more awareness of the situation of landmine/ERW victims with disabilities, especially as it relates to livelihoods and the access and inclusion of persons with disabilities in educational and health programs is needed.

Victim assistance and rehabilitation

Usual remoteness of accident locations and poor transportation infrastructures in Kachin and Northern Shan States result in an increased duration of evacuation and highlight the difficulties to access adequate medical services response. Mapping available services and delivering training on referral pathways is recommended, in particular for medical emergency and physical rehabilitation services. Information campaigns on access to services would be an asset for landmine victims with severe disabilities to promote access to health, medical rehabilitation but also economic and education services.

In a context of extreme poverty faced by landmine/ERW victims and their families, forthcoming interventions should focus on inclusive vocational training programs and livelihood opportunities. Landmine/ERW victims' reintegration assistance should preferably be community based, conflict sensitive and delivered through local organizations networks providing vocational training, small business grants, and livelihood support. Grants for surgical support could be provided to survivors with metallic fragments remaining in their body because of severe pain limiting job opportunities.

Psycho-social support should be delivered through community based organizations and the creation and strengthening of self-help groups (SHG) should be applied to increase social cohesion, dissemination of information and awareness-raising on the rights of persons with disabilities. Persons with disabilities must be included in the provision of assistance services, especially services essential to basic needs (primary healthcare, food distribution, water access, sanitation and hygiene). This includes the consideration of landmine/ERW victims with disabilities in a humanitarian crisis. Physical and communication accessibility must also be considered. Regarding food aid for landmine/ERW victims with severe food shortage, interventions should focus on children and persons with a severe disability.

Victim Information System

Without a national landmine/ERW accident notification system, the methodology used to record the accidents by mine action organizations is likely to underestimate the number of victims from the villages. While these organizations have developed a simple system to collect information on the victims

through their own networks to guide their strategic interventions, it is recommended to set up a national, organized and systematic victim information system complying with international standards.

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