



Earthquake of 12th January, 2010 - Haiti

Preliminary findings about persons with injuries

Greater Port au Prince Area

15-26 January, 2010



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January 29, 2010

Key points:

- To date, HI has assessed / supported more than 600 persons with injuries at hospital and community level in Port-au-Prince and surrounding areas, at risk of developing secondary disabilities
- Earthquake-related injuries appear to affect all ages and appear to be equally distributed between males and females
- Approximately 80% of persons presenting to hospital have orthopaedic injuries, with lower extremity fractures predominating
- There appears to be a high prevalence of amputations, both as primary and now secondary interventions
- Complete or partial damage to almost all existing health facilities has significantly impacted on the availability of emergency surgical and medical care
- Quick and unclear discharge & referral procedures of persons with injuries in addition with poor follow-up at community level raises major concerns about the immediate future of these injured persons, many whom are now homeless and have lost family members
- Immediate intervention is required at community level for a proper injury surveillance mechanism and coordinated care and support for persons with injuries and disabilities
- Persons with specific conditions such as spinal cord injuries, amputations, and burns will require long-term support to prevent premature death and promote a good quality of life

I. Context & background

Tuesday, January 12th at 4:45 pm local time, a massive earthquake measuring 7.3 on the Richter scale hit Haiti, causing widespread destruction, loss of life and injuries. The capital - Port-au-Prince – and surrounding areas with more than two millions inhabitants have been significantly impacted. As of January 27th, the government reports 112,392 deaths and 196,501 people injured¹. However, the latest estimations suggest 170,000 deaths and over 200,000 persons with injuries in need of follow-up².

Initial conditions of health response were reminiscent of those found in war zones. In the first days following the earthquake, many of the hospitals were overwhelmed with patients, with minimal human resources, operative capacity, and medical supplies. Indeed, many of the facilities suffered structural damage as well, further compromising the delivery of urgent surgical and medical care. Consequently, few hospitals had the capacity to obtain detailed statistics on the numbers and types of injuries seen, the numbers of surgeries, and admission/discharge information, particularly during the first week following the EQ. Furthermore, patients who have received care or have been operated on leave the hospitals with no treatment advice, limited post-operative follow up and no rehabilitation. For some, they do not have anywhere to go, and thus remain in the hospitals, reducing the number of beds available for incoming emergencies. For those that manage to leave the hospitals, they have no choice but to return to the streets or the makeshift camps which have sprung up everywhere and where hygiene conditions are catastrophic, encouraging the development of infections and gangrene.

Handicap International (HI) immediately began responding to the earthquake both with an assessment of the situation and providing immediate relief in hospitals and in the community. Since January 15th, HI has been providing urgent post-operative services at more than 14 hospitals in the Port au Prince area and Petit Goave: supporting medical teams with essential physical rehabilitation care, and provision of technical aids and mobility devices. In the community, we have been providing psychosocial support, wound care, rehabilitation and distribution of mobility aids.

This report presents initial findings from Handicap International's hospital and community actions for persons with injuries. It does not aim to present a comprehensive account and analysis of conditions following the earthquake in Haiti. It aims to provide an overview of the patterns of injuries and the available management, to aid in planning the needed physical rehabilitation and related services, and to guide the development of an appropriate strategy of short and long term follow-up.

II. Objectives and methodology of the assessment

- ✓ To evaluate the current situation of the victims of the EQ, with a specific focus on incidence and management of conditions potentially leading to secondary disabilities such as
 - Single, multiple or complex fractures
 - Polytrauma
 - Vertebral fractures
 - Spinal Cord Injuries
 - Amputations
 - Traumatic Brain Injuries
 - Burns

¹ OCHA situation Report #14, 27th of January, 2010

² The Washington Post, "A glance at Haiti developments 17 days after quake" – Friday, January 29, 2010

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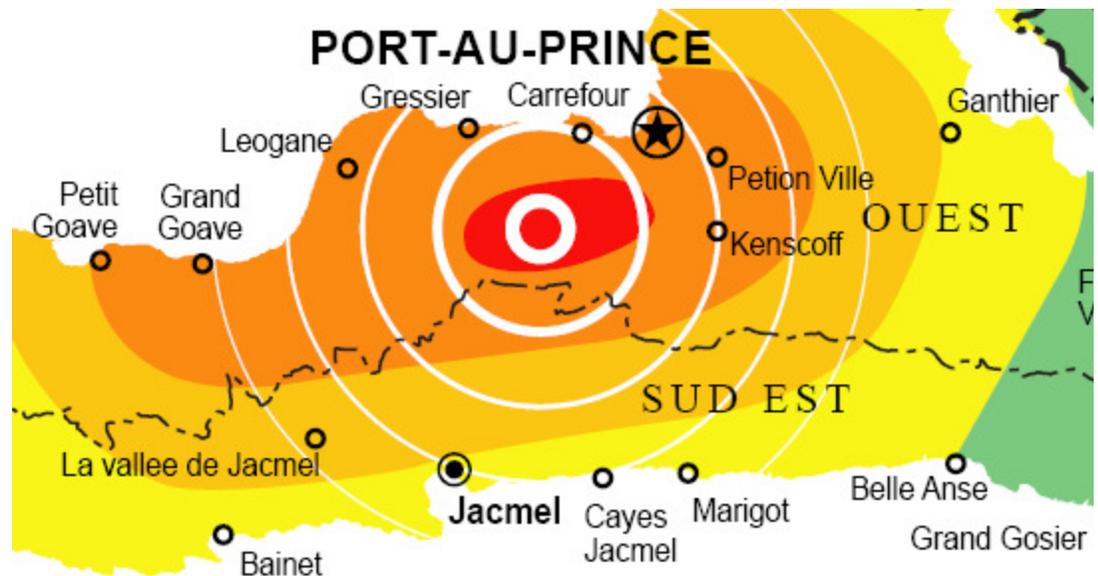
- ✓ To identify the postoperative care and acute rehabilitation interventions, the discharge and referral procedures, and in coordination with the hospital's professionals, to forecast the possible evolution of required rehabilitative care and management for the injured (further complications, challenges faced)
- ✓ To evaluate the rationale and strategy of early rehabilitative intervention at hospital and community levels, with a focus on timely, accessible, and appropriate interventions to minimize disability and maximize participation
- ✓ To collect baseline information to support mid- and long-term strategy and planning for the health and disability sector

Methodology:

- Visits to and data collection from 17 hospitals from 15-29th of January 2010
- Collection of available data from the Governmental representatives, International NGOs, national NGOs and Emergency coordination units (Clusters, etc.)
- Direct assessment of approximately 600 persons with injuries, in the different categories of targeted pathologies at both hospital and community level
- Interviews with doctors, administration staff, paramedical teams, physical rehabilitation teams
- Cross-reference for comparison with previous disasters

III. Targeted structures

HI rehabilitation professionals visited 17 hospitals in the Port au Prince area, including Carrefour area (epicentre), Canape Vert, Tabarre, Petionville, Kenscoff and Petit Goave. These assessments took place between January 15-29, with many sites visited on multiple occasions. Hospitals included public, field, and private hospitals, all now open to public and most operating with Haitian personnel supported by expatriate assistance. In addition, HI rehabilitation teams have been able to visit and assess 600 patients following the earthquake, in both hospitals and community settings. In most hospitals, patients were outdoors in tents or other basic shelters. This was due to many factors, including structural damage to the health facility, the volume of patients, the fears of patients to be indoors, or the nature of the field hospital itself. The following data presented was obtained from 282 direct patient assessments in hospital settings.



IV. Output

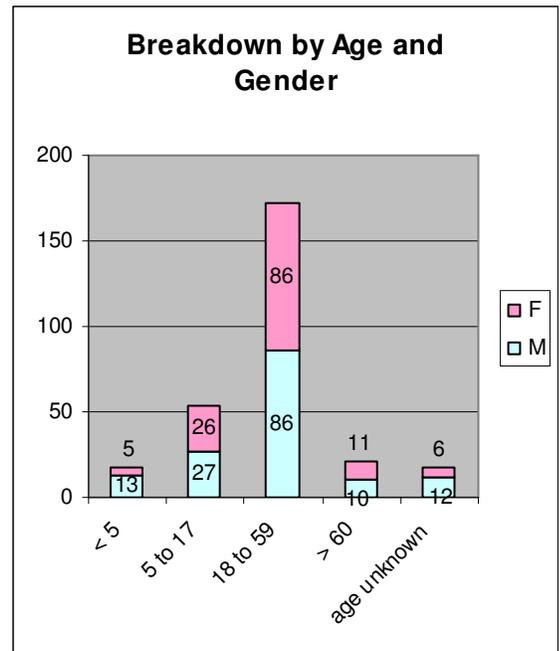
Geographical origin of the assessed patients

It has not been possible to assess this aspect properly. Many patients living in Port au Prince at the time of the earthquake, may report their home origin as elsewhere, as they have migrated to the city for employment. Generally patients were first seen in hospital closest to their home location, or where they were at the time of injury. After the first 3-7 days, patients were travelling to hospitals more distant to their home area, due to availability of resources. However, fuel shortage and impassable roads impacted the ability for patients to transport themselves.

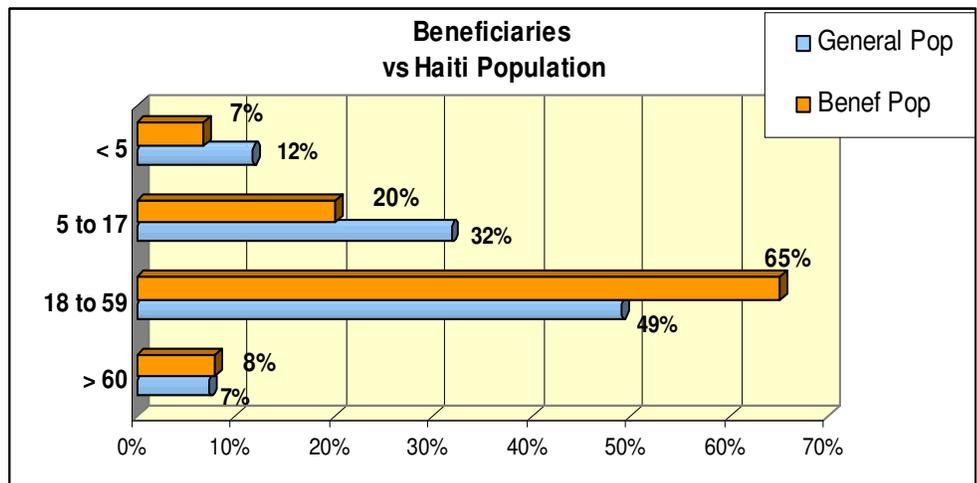
Gender and age repartition of the assessed patients:

The data presented below is based on those persons with injuries visited by HI teams at hospital level only. The HI team focused on persons with injuries requiring urgent post-injury or post-operative rehabilitation care to prevent secondary complications and maximize functional recovery. Thus, the data cannot be interpreted as representing all injuries sustained in the earthquake (i.e. minor wounds, small injuries).

Age	Total	M	F	Patient repartition	Haiti population
< 5	18	13	5	7%	12%
5 to 17	53	27	26	20%	32%
18 to 59	172	86	86	65%	49%
> 60	21	10	11	8%	7%
Total Known age	264	136	128	100%	100%
age unknown	18	12	6	7%	
		52%	48%		
Haiti Pop		48%	52%		



Severe injuries affected the working age-group – those between 18 and 59 – are disproportionately high. This category accounts for 49% of the population in Haiti while HI recorded 65% severely injured from this age bracket. Conversely, the proportion of children with severe injuries under the age of 18 is noticeably less than in the total population.



Past surveys and studies show that during earthquakes, children and older persons are usually more prone to severe injuries, particularly due to the fact that they are less able to escape collapsing buildings³. HI has not been able to collect any data available regarding the aftermath of this earthquake in term of casualties. It is then impossible to provide explanation regarding this surprising repartition in Haiti.

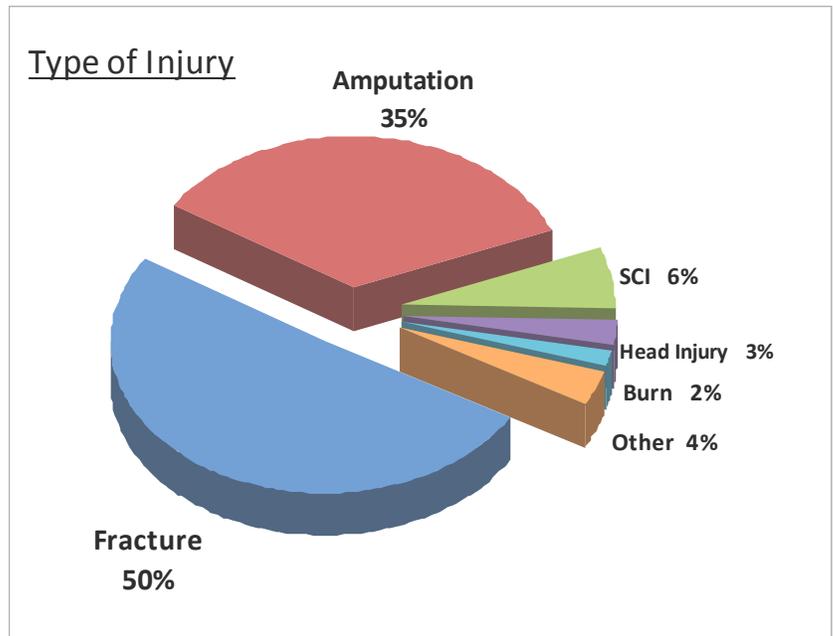
Types and patterns of injuries

In all hospitals visited, physicians and administrators reported that approximately 80-90% of their admissions in the first week following the earthquake were orthopaedic traumas; the majority affecting the lower extremities including the pelvis. The tables below present the proportion of presenting injuries and most frequent body localisation among the 282 persons being assessed for immediate physical rehabilitation support. Assessed conditions included:

- Fractures , complex fractures or polytrauma (comminuted fractures, multiple fractures, compound fractures, and fracture associated with another type of body trauma)
- Amputations
- Spinal Cord Injuries
- Traumatic Brain Injuries
- Burns

Other most common presentations in the week following the EQ included fasciotomies, compartment syndromes, wound infections and secondary amputations.

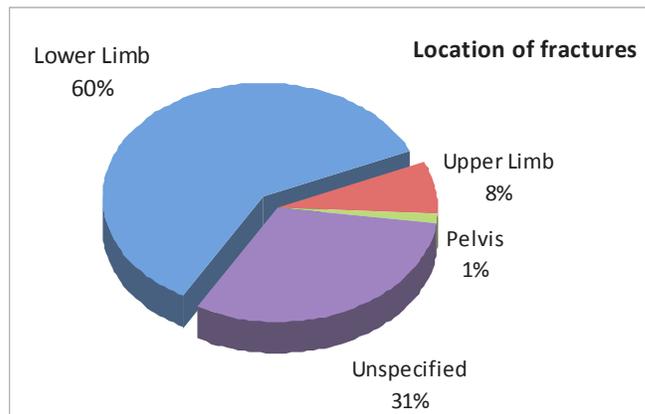
Condition	Nb	%
Fractures	156	51%
Amputations	107	35%
Spinal Cord Injuries	19	6%
Traumatic Brain Injuries	9	3%
Burns	5	2%
Other	11	4%
Total	307	100%



³ Previous research has shown that factors such as age and gender, building characteristics, and shaking intensity are related to the likelihood of being killed in an earthquake. See for example "Seismic, structural and individual factors associated with earthquake related injuries" - <http://cmbi.bjmu.edu.cn/news/report/2008/eq/145.pdf>, or "Risk factors for death and injuries in earthquake, cross sectional study from Afyon, Turkey" - www.cmj.hr/2005/46/4/16100765.pdf

Fracture Breakdown		
Lower Limb	94	60%
Upper Limb	12	8%
Pelvis	2	1%
Unspecified	49	31%
Total	157	100%

We can see that more than half of the **fractures** requiring rehabilitation occurred in lower limb (60%), followed by upper limbs (8%). This repartition is very consistent with previously observed earthquake events (see ref 3).



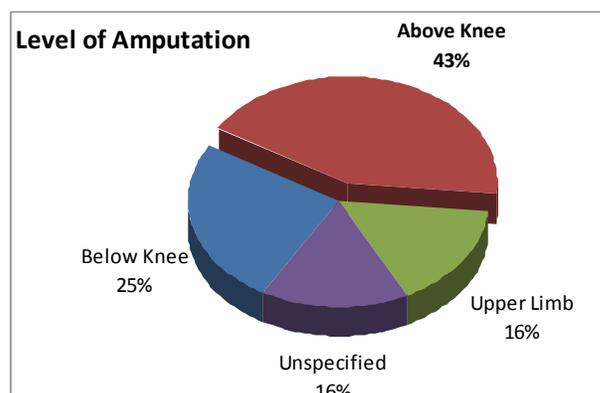
More generally speaking, **lower body trauma** is more prevalent than upper body

Explanations for this repartition include:

- The fact that in a collapsing building, people instinctively tend to protect their face and upper trunk with their arms, thus leaving their legs more exposed
- The fact that severe upper limb trauma could potentially have had higher mortality as associated with injury to chest and head.

Level of Amputation		
Below Knee	27	25%
Above Knee	46	43%
Upper Limb	17	16%
Unspecified	17	16%
Total	107	100%

Amputation ranks at the 2nd place among the presentations requiring rehabilitation seen by the team. It is extremely unusual and does not corroborate with findings from previous earthquakes. Amputations usually represent from 2.5 to 5% of the overall consequence of an earthquake in terms of orthopaedic injuries⁴.



The majority of persons with amputations visited by the team presented with lower limb amputation (68%). Among them, persons with above knee amputations are the majority and account for not less than 43% of all of the amputations.

Specific conditions of concern

The 3 specific conditions presented here are highlighted due to the impact on long term rehabilitation needs, and the impact on the individual in terms of community participation and inclusion.

These injuries generally cause permanent impairment (the exception being incomplete spinal cord injuries and appropriately managed fractures) that potentially lead to permanent disability, particularly in the absence of a coordinated, timely, and accessible rehabilitation strategy.

Fractures:

As would be expected, fractures were one of the most common injuries that presented to hospitals following the earthquake. Many patients were initially treated with available supplies, in hospitals without light or electricity. Physicians and hospital staff had noted that external fixation availability generally resulted in fewer subsequent amputations in the days that followed acute fracture management. Patients have presented to hospitals as long

⁴ For example Bam EQ in Iran (2004), Kashmir EQ in Pakistan (2005)

Handicap International Report - Preliminary findings about persons with injuries – Haïti Earthquake 12 January 2010 as 2 weeks following the earthquake, with untreated fractures. Complications of compartment syndrome requiring fasciotomy and infected wounds are common hospital admissions in the days and weeks following the earthquake. All modes of fracture management have been reported including traction, closed reduction, ORIF, external fixator, slab cast and splint, and complete circumferential casting. Lack of imaging capacity in many facilities limited diagnostic abilities, and doctors noted that some fractures had to be diagnosed by palpation only. Other centres ran out of film and processing agents, resulting in similar limitations. Limited access to mobility aids has hindered discharge from hospital for patients unable to weight bear to mobilize.

↳ **Amputations**

In all hospitals, high numbers of persons requiring amputation surgery were reported. Many patients had amputation as primary intervention for complex severe wounds and fractures. Amputation by guillotine procedure was a life-saving intervention in some centres and in the field when access to more sophisticated care was not available. Amputations as secondary treatment for infected wounds, compartment syndromes, and poorly treated fractures have been reported in high numbers. Amputation revisions are commonly occurring at many hospitals in order to close open wounds, manage infections, or modify terminal limb to optimize prosthetic rehabilitation. There have also been many patients with finger, partial hand, toes, and partial foot amputations, as well as individuals with multiple limb amputations. It is estimated based on the numbers of patients physically counted on the grounds of hospitals, the numbers reported by physicians and staff in the hospitals visited, and reports from other hospitals and centres outside of Port au Prince area, that the numbers of persons with amputations may approach 1500-2000. These numbers may fluctuate greatly, as no detailed statistics were taken in the first few days of the earthquake, when many amputations were reported to have been performed. In addition, there is now a “second wave” of amputations as terminal limbs are revised, and persons with secondary complications of infection, open wounds, complex untreated fractures are presenting to hospitals. Extrapolating from this assessment, between 2000-4000 amputations can be estimated as resulting from the earthquake.

↳ **Spinal cord injuries (SCI)**

Spinal cord injuries have been identified in most of the hospitals visited. Few patients had appropriate imaging, and most were diagnosed by examination only. At least 2 patients with high tetraplegia and nonventilator dependent were found to have survived at least 10 days, and were transferred to facilities outside the country for definitive surgical intervention and early rehabilitation. Discussion among spinal cord experts ascertained that Haiti does not have the capacity to currently provide appropriate imaging and surgical intervention for patients with spinal cord injury, and recommendations to facilitate transfer to appropriate centres out of the country have been made. At least 13 patients are known to have been transferred out of the country. The HI evaluators have learned of at least 50 persons reported to have presented to hospitals with spinal cord injury, with 2 known survivors with high tetraplegia, and the remaining with thoracic and lumbar injuries. Essentially all of the patients examined by the HI rehabilitation team had indwelling catheters placed. A number of patients were noted to be laying on hard surfaces, such as plywood. Many patients reported that following their extrication from the rubble, they had been carried by others to hospitals, without spinal precautions. Comprehensive rehabilitation strategies including training of local health workers in spinal cord injury, and establishing a specialized centre for SCI rehabilitation will need to be part of the country’s overall rehabilitation strategy, with efforts focusing on repatriating individuals to Haiti in order to participate in rehabilitation with their family and community.

Rehabilitation Services

Prior to the earthquake, very few hospitals provided rehabilitation services. There are no accredited training programs in Haiti for rehabilitation professionals. The few centers that were providing rehabilitative care suffered severe structural damage in the earthquake and are not operational or have had to move to temporary locations. Before the earthquake, there was only one full-time functional prosthetic and orthotic workshop operational in the country (Healing Hands for Haiti). Unfortunately, the center has sustained a high level of damage and is not operational today.

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During our assessment, besides the hospitals supported by HI rehabilitation professionals, we noted only 5 other hospitals with appropriate rehabilitation staff, mostly expatriates that have arrived after the earthquake.

Discharge and referral procedure

In some hospitals, patients were discharged very quickly in order to free up beds for incoming severe injuries; particularly those patients with what were considered to be minor injuries. However, in many cases, despite the need to free up beds, patients were not willing to leave hospitals as they had nowhere to go.

A number of post-operative hospitals have been and continue to be set up in order to reduce the load on the acute care facilities, while still providing an appropriate environment for the recovery of persons with injuries. Referral procedures between acute care and post-operative facilities are still being set up.

Due to the high caseload and the emergency situation, most hospitals have not been able to collect complete patient information before discharge. In addition, referrals to other facilities which may have had more resources were hindered by lack of communication (poor phone and internet connections).

In some of the hospitals HI covered in the assessment, HI has been collecting information on discharged patients in order to ensure community-level follow-up. Similarly, after the first week following the earthquake, most hospitals visited have begun to collect more complete patient registration and discharge data as well as booking return appointments for wound care and fracture management. According to hospital staff, it would appear that the majority of patients are coming back for follow-up when provided with a return appointment. In addition, many hospitals have implemented an outpatient clinic to facilitate wound care and fracture management. However, our community teams have reported that many people are afraid to go to hospital as they fear they will leave with an amputation.

V. Extrapolation

It is always difficult to extrapolate with certainty on impact and needs at this early stage of the response, and more time and assessment will be necessary to obtain consolidated information about the full extent of the consequences of the Haiti earthquake in terms of injury and disability.

However, relying on HI's prior experiences in similar earthquake contexts and our initial action here, a rough estimation can be already done to establish priorities in the health response toward persons with injuries. The estimated ratio of 200,000 injured vs. 197,000 casualties appears low when compared to other similar powerful earthquakes (Bam, Kashmir, Sichuan), but the ratio injuries/deaths is highly dependent on the timeliness and efficiency of the initial response and the severity of injuries considered in the count. We will stick to this figure for the following discussion:

Follow-up of persons with severe injuries at risk of developing disabilities

If we base our estimation at 200,000 persons with injuries, about 25% (50,000) of them will have fractures and other orthopaedic trauma. We could estimate that at least 15% of them (conservatively 7,500 persons) will develop complications and permanent disabilities if not provided with immediate medical follow-up and rehabilitation attention, including continuous care at community level.

Persons with spinal cord injuries

They usually account for about 1% of the persons having traumatic injuries. This would represent about 750 persons with spinal cord injuries. However, this is highly dependent on the capacities of the rescue teams to evacuate quickly the persons to *equipped* hospital facilities. Considering the context in Haiti, it is probably wiser to give an estimation of 100 persons that have survived and will live with a spinal cord injury.

Persons with amputation

Based on HI's assessment, we can estimate that there have been approximately 2000-4000 amputations. Again, this is a very rough estimation as described above.

Should we remain conservative and analyse a figure of 1,500 persons, we can roughly estimate based on our initial findings at hospital and community level than:

- At least 2/3 of them, therefore 1,000 persons had lower limb amputation and will be in need of a lower limb prosthesis
- Among them, approximately 650 persons will need an above kneed prosthesis and 350 will need a below knee prosthesis

It is also to be noted that these immediately acquired and secondary disabilities will probably more impact the adult working population (18-59 years old), therefore further challenging the ability for the household to have regular income and impairing its ability to cope with the situation.

Immediate recommendations

Based on HI's assessment and past experience, most of the people presenting with serious injuries (fractures, amputations, spinal cord injuries) will require particular attention in order to mitigate at maximum the impact of the earthquake. We can expect that a number of these injured people will develop further complications, such as infected wounds or secondary amputations. In addition, a number of persons with amputations will require a second surgery to revise their stump to prepare for prosthetic fitting.

In order to maximise the impact of the national and international support, the following immediate actions should be considered:

- ⇒ Improve coordination mechanisms among relief stakeholders with regards to treatment and follow-up of persons with injuries (the Health Cluster has set up a Working Group on Injury Rehabilitation and Disability under the co-leadership of CBM and HI)
- ⇒ Enhance data collection and referral mechanisms from hospital to community level
- ⇒ Use appropriate technologies and materials for all prosthetic and orthotic devices and other technical aids: provide solutions appropriate to local context, use a coordinated approach and ensure capacity-building of local Haitian staff for an efficient, sustainable and homogeneous response
- ⇒ Develop specific psychosocial initiatives for persons with new disabilities resulting from their injuries
- ⇒ Establish a multi-player system at community level to ensure appropriate follow-up, referral and services for persons with injuries
- ⇒ Consider and plan immediately for the long-term needs of persons who have sustained amputations, spinal cord injuries and other disabling conditions. Consider also the long-term needs of these persons in the reconstruction process by reconstructing accessible infrastructure
- ⇒ Provide the most vulnerable injured persons with essential items such as nutritious food, accessible temporary shelter, blankets, mattresses, hygiene and other non-food items in order to promote the healing process
- ⇒ Ensure that all humanitarian assistance programs take into account these persons, and consider their specific and basic needs. Some of these persons will face enormous challenges to access mainstream humanitarian assistance and special efforts must be made to include them