Devastating injuries from the 12 January 2010 earthquake have permanently disabled untold numbers of Haitians, young and old, as well as worsened already bleak conditions for Haitians who were living with disabilities. The precise scope and implications of new disabilities in the population are as yet unknown but are certainly massive. Equally important, given that some newly disabled Haitians are infants and small children, the earthquake’s legacy will persist for many decades and holds critical consequences for Haiti’s future on multiple levels.

One distant yet potential silver lining is that, if Haiti responds comprehensively to the needs of its newly disabled citizens, these efforts could eventually produce positive transformative changes that would benefit all Haitians at some point in their lives. This comprehensive response will require involvement, commitment, and creative short- and long-term thinking from multiple sectors of Haitian society, including health care, as well as the numerous international agencies poised to help. Here, we briefly review several salient issues primarily pertaining to new physical disabilities caused by massive trauma and its aftermath. We recognize that Haiti’s earthquake also caused or exacerbated mental health, cognitive, and sensory disabilities, which have their own specific needs; in addition, numerous Haitians who already had disabilities lost their “informal” caregivers (family, friends) and found their lives further disrupted. To frame the ensuing discussion about needs, we start by defining disability.

**Disability Definition and Implications**

According to the World Health Organization’s International Classification of Functioning, Disability and Health (ICF), disability is an “umbrella term for impairments, activity limitations or participation restrictions” resulting from “a dynamic interaction between health conditions (diseases, disorders, injuries, traumas, etc.) and contextual factors,” including the social, attitudinal, and physical environments (1). The ICF explicitly recognizes that external factors—physical, social, and attitudinal environments—can exacerbate or mitigate disability. Furthermore, by conceptualizing disability as a continuum, ICF emphasizes the universality of disability and its relevance to “all people . . . at different times in their lives” (2).

The ICF’s framework provides a road map for addressing disability, for both individuals and populations as a whole (3). Responses must include not only treatments of injuries and individuals’ health conditions but also alterations of physical, social, and attitudinal environments to allow persons with disabilities to participate as fully as possible in their homes and communities. Haiti ratified the United Nations Convention on the Rights of Persons with Disabilities on 23 July 2009 (4). Nonetheless, even before the earthquake, Haiti had little to offer persons with disabilities. As elsewhere in the developed and developing world, Haitians with disabilities had fewer employment opportunities, lower educational levels, and worse poverty than nondisabled persons. Steep, mountainous terrain and treacherous, unpaved streets impeded the mobility of persons with impaired walking—even those few who owned wheelchairs. No specialized rehabilitation hospitals existed, and few rehabilitation professionals practiced in Haiti.

**Immediate Needs**

The wounds that disabled countless Haitians were devastating. Data systems do not exist for counting and categorizing injuries, but the Haitian government estimates that 6000 to 8000 persons lost digits or limbs (5). Many had complex compound fractures, spinal cord or brain injuries, extensive burns, or other massive trauma. Clinicians on the USNS COMFORT, anchored off Port-au-Prince, treated critically injured persons of all ages, many of whom had horrendous injuries. Open wounds left bones and soft tissue exposed. Life-threatening sepsis and gangrene were common, and sometimes the physicians recommended amputations to save lives. But some patients refused amputations.
tion, hoping for recovery and explaining that they preferred risking death over the certainty of losing a limb. People who refused treatment sometimes died shortly thereafter. Others left the USNS COMFORT after treatment, returning to unsanitary living conditions and putting surgical wounds at risk.

A United Nations situation report from Haiti (dated 25 February 2010) indicated that 1.2 million people needed shelter (6). The 1 March 2010 report described heavy flooding from recent rains and widespread unsanitary conditions, with only 13% coverage by latrines in targeted areas and 40% of those in need having emergency shelter materials (for example, tarpaulins, tents) (7). Persons with disabilities, especially outside Port-Au-Prince, had not yet been reached by aid agencies and had critical immediate subsistence needs (6). These individuals risked infections and additional wounds that could exacerbate their impairments or even cause death.

In the earthquake’s immediate aftermath, numerous field facilities provided essential care, sometimes of uncertain quality. For the first few weeks, amputations, debridement, and fracture reduction took priority (8). Now, the emphasis turns to wound care and closure. Unless amputation sites heal properly, persons might not obtain maximum benefit from prostheses. Immediate medical stabilization of certain gravely injured patients remains problematic. In particular, finding facilities to care effectively for persons with spinal cord and brain injuries has been difficult. Critical albeit basic assistive technologies are in short supply. Clinicians on board the USNS COMFORT could not find enough wheelchairs for patients they discharged from the ship. On shore, Haitians requiring ambulation aids sometimes could not find even canes or crutches.

**CLINICAL REHABILITATION AND ASSISTIVE TECHNOLOGY NEEDS**

After immediate medical stabilization, rehabilitation must begin with the goal of maximizing patients’ ultimate functional outcomes. For instance, after amputation wounds heal, persons must perform physical therapy to keep the muscles around the amputation site strong and prevent contractures in anticipation of fitting and using prostheses. International medical aid organizations have begun staffing selected Haitian facilities with rehabilitation professionals, but the availability of these essential clinicians remains sporadic. Patients will require interdisciplinary teams, including physiatrists, physical therapists, and occupational therapists, and experts in such assistive technologies as mobility aids, prostheses, and orthotics to address their needs (4). Psychosocial supports are also essential to ensure maximum benefit from these interdisciplinary services.

Persons who underwent emergency amputations in the field immediately after the earthquake may need reoperation by orthopedic surgeons to ensure optimal outcomes. Even under the best circumstances, fitting persons with prostheses and maximizing mobility is challenging, despite substantial progress in prosthetic technologies (9). In recent years, upper- and lower-limb prostheses have improved considerably, with advances in socket fabrication and fitting approaches, components, suspension systems, power sources, and electronic controls. New prostheses and fitting techniques accommodate even high levels of limb amputations, improving patients’ functional abilities. These advances are especially beneficial to individuals with multiple limb amputations, the situation of many Haitian earthquake amputees. Problems with current prosthetic technologies do remain, notably with achieving comfortable socket fits, aligning prosthetic limbs for maximum functioning, and replicating normal gait and other physical maneuvers (10).

However, few Haitians with amputations before the earthquake had the benefits of new—or even older—prostheses. A 2001 investigation found only 3 full-time stores providing prostheses in Haiti, and all offered insufficient services because of lack of supplies and poorly trained personnel (11). Only one quarter of 164 Haitians with amputations interviewed for the study had ever had a prosthetic limb. In geographically isolated regions, prostheses were virtually nonexistent. In postearthquake Haiti, the need for prostheses will skyrocket, but the manufacturing capacity does not yet exist. Furthermore, replicating the prosthetic industry of developed nations might not work optimally in the developing world, where technological sophistication might not be as critical as other factors, such as durability, simplicity, ease of manufacturing, light weight, and cultural acceptability (12). With so many Haitian infants and youth also affected, prostheses must consider the special needs of developing and growing bodies (13). Supplying equipment to children who might rapidly outgrow and no longer use it can raise financial questions in the developing world (12).

Wheelchairs have also been scarce in Haiti, where roadways are frequently unpaved and inaccessible. Many newly disabled Haitians, especially those with spinal cord injuries and multiple amputations, will need wheelchairs. But wheelchair technologies will require extra durability and other features to operate in Haiti’s rugged terrain, upon rocky or debris-strewn roadways, and sandy or muddy surfaces. Complicating matters, persons unable to self-propel manual wheelchairs will need power wheelchairs for maximum independence. Not only do power wheelchairs require electronic circuitry and controls, they also need reliable batteries and steady power supplies for recharging. Importing wheelchairs from abroad is probably the only option to meet the immediate wheelchair needs while Haiti develops its own wheelchair-production capacity.
LONG-TERM NEEDS

Clearly, the needs of Haiti’s newly disabled citizens are enormous. For individuals, minimizing disability and preventing deaths from earthquake injuries may require years of ongoing surgery (8). At the societal level, responses will require concerted efforts from local Haitian authorities as well as international aid agencies, international health care professional organizations, and assistive technology developers and providers. Over the long term, Haiti’s medical educators must begin training cadres of interdisciplinary rehabilitation professionals to staff inpatient and outpatient facilities. Prosthetic, orthotic, wheelchair, and other assistive technology industries must develop culturally acceptable and economically sustainable capacity within Haiti, with distribution links even in remote regions.

As Haiti begins rebuilding its cities and towns, every aspect of that new physical environment—both public and private spaces—must consider and accommodate the needs of persons with disabilities. This process must involve Haiti’s newly disabled citizens in shaping policies and determining rebuilding plans. Experts in accessible design from the United States and other countries should provide essential construction advice. Experience from the developed world indicates that building structures that accommodate the needs of persons with disabilities from the outset is less expensive than renovating later and may add little, if any, additional construction costs (14). Making the structural environment accessible and accommodating needs in other ways will ultimately improve the quality of life for all Haitians with disabilities and allow them to contribute to their own and their country’s future.

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Note: Dr. Ronan worked for 2 weeks as a civilian volunteer with Project Hope on the USNS COMFORT outside Port-au-Prince, Haiti, after the 12 January 2010 earthquake. During this time, he served as part of the Navy’s Rapid Assessment Team.

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