The Health Effects of Landslides

Introduction

Landslides are slope movements of rock, earth, mud, or debris that can deliver an array of devastating economic, social, and health impacts.[1] Landslides often accompany other disaster events, such as volcanic activity, flooding, earthquakes, tsunamis, or human activity such as construction, mining, or deforestation.[2] Such events can cause one singular landslide or trigger several landslides. Landslides may result in detrimental impacts to community health and well-being. Specifically, highly fluidized, rapid landslides with velocities greater than 5 m/s are typically the only kind of landslide to result in detrimental human health impacts.[3] Residents may be displaced from their homes and communities, need to seek emergency healthcare, and experience mental health conditions for months or years after the event. Additionally, landslides can cause unstable ground and create treacherous or impossible travel conditions, complicating evacuation and emergency response.[4, 5]

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Health Impacts

Acute and long-term landslide health impacts may have regional variation, depending on local culture, economics, and preparedness to disasters. Acute health impacts and mortality can occur during and immediately after landslides, both for at-risk and healthy individuals. Many affected by landslides experience a range of mental health impacts, which may not present for months following the event.[6] While there has been limited research on health risks faced by recovery workers after a landslide event specifically, information on the physical and mental health risks experienced by disaster recovery workers more generally may inform precautions to protect their health and safety in this context.[7–9]

Acute Impacts

Flowing debris and mud can cause injuries during landslide events. Medical professionals characterize these injuries as "debris flow syndrome."[10] Other acute impacts may arise from displacement or harsher living conditions post-disaster, lack of clean water and sanitation, and airborne particulate matter in the lungs. Acute landslide impacts include:

- Soft tissue abrasions and lacerations, including to the eyes[10]
- Orthopedic injuries[10]
- Hypothermia[10]
- Craniofacial trauma[10]
- Mud impaction[10]
- Skin diseases[11]
- Heat stroke[11]
- Diarrhea[11]
- Respiratory issues[11]

Mental Health

Landslide survivors can experience mental health impacts for months to years after the event. In addition to physical injuries, many impacted individuals lose property, income, loved ones, or sense of place, and may experience economic challenges following the event.[3] Individuals of all ages, including disaster response and recovery workers,[12] may be harmed psychologically by the event itself, even without other injury or loss.[13] Some of the most common mental health impacts caused by landslides are:

- Post-traumatic stress disorder, or PTSD[13]
- Anxiety[14]
- Sleep disruption[14]
- Suicidal thoughts[6]

Mortality

Landslides and accompanying events have killed thousands of people globally.[15] People who are driving, riding in trains, walking or otherwise outside, and in buildings that collapse are most likely to be fatally injured.[16] Injuries that cause death include:

- Severe traumatic injuries[17]
- Suffocation[18]
- Complications from acute injuries[18]

Impacts to Healthcare

Because landslides can have a variety of impacts on different people, healthcare workers must be prepared to respond quickly and flexibly. Here are some lessons learned on the impacts on healthcare workers and healthcare infrastructure from past landslide events:

Impacts on Healthcare Workers

- Communications infrastructure can be damaged during landslide events and cause delays in receiving outside aid.[19]
- Healthcare workers may experience loss or injury during a landslide event, affecting their ability to support others.[19]
- Patients may continue to seek medical care for disaster-related injuries days and weeks after the event.[20]

Impacts on Healthcare Infrastructure

- Some landslides have caused a surge in demand for medical assistance, in-patient care, emergency housing, and medical equipment, particularly in developing countries. Many healthcare facilities cannot handle such a surge due to lack of trained personnel, hospital bed capacity, storage to dispense controlled substances, and equipment such as CT scanners and ultrasounds.[21]
- Landslides can impact roads and transportation systems, making it difficult to transport patients to healthcare facilities.[22]

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