

Introduction

The Leveraged Freedom Chair (LFC) has been in development since 2008. Since then it has been tested in Kenya, Tanzania, Uganda, Guatemala, India and Haiti. Through these field trials and our close collaboration with wheelchair riders and the organizations that support them, the LFC has evolved from a prototype into a product. We have repeatedly seen the impact that the LFC has on people's lives and we are confident that it is ready for wide-scale distribution. A summary of our recent field trials in India and Haiti is below.

Field trials in India

Trial 1: 2011

In 2011 we conducted a field trial with 24 patients across India. The patients who participated in the trial included a mix of wheelchair and tricycle users from both rural and urban areas. The LFC is primarily intended for people who need the seating and postural support of a wheelchair and who live in rural areas, but we chose to test the LFC with a diversity of subjects to explore its viability in different demographics.

Of the 11 wheelchair users included in the trial (10 rural, 1 urban), 10 adopted the LFC as their primary mobility aid. The one user who rejected the chair reported that the seat width was too narrow for him to sit comfortably; this issue has been resolved by producing multiple sizes of the LFC. With their conventional wheelchair, most of these subjects were not able to leave the house without the assistance of a family member; with the LFC, they are now independently traveling an average of 2.7 km/day. Four subjects gained employment as a direct result of having the mobility to travel to their job. Our biomechanical testing showed that the LFC is 74% faster and 28% more efficient than a conventional wheelchair when traveling on an average daily commute and can produce 53% higher peak propulsion force (n = 7).

Although the LFC is not targeted at people with disabilities who would otherwise use a tricycle, three out of five rural tricycle users in the trial adopted the LFC. They cited less fatigue, better maneuverability, indoor usability, and comfort as advantages the LFC provides over a tricycle in rural settings. In urban areas, only two out of eight tricycle users adopted the LFC. This was primarily due to the LFC's slower speed on flat pavement compared to a tricycle.

Five women were included in the trial, three of whom adopted the LFC as their primary mobility aid. One lives in an urban area and previously used a tricycle; she found the LFC much less tiring to propel and small enough to use within the home. The second used a conventional wheelchair but needed assistance to leave the house; now she travels on her own 1.5 km/day to her job. The third is a teenager with cerebral palsy who was unable to propel herself in a conventional wheelchair; now she travels within her community without assistance. The two women who did not adopt the LFC were tricycle users who live in urban areas.

We used the feedback from this trial to refine the design and began working with Pinnacle Industries to develop the manufacturing tooling required for large-scale production.

Trial 2: July 2012 - January 2013

We conducted an extended pilot in India. Approximately 100 patients who would otherwise use a conventional wheelchair have received an LFC chair from the Jaipur and Indore BMVSS locations. A local person was contracted to manage this distribution and continue follow-up with the patients. The GRIT team followed up with five patients in person to gather their feedback. Each patient they visited was using the chair actively and cited an increase in mobility as a result of the LFC of using the LFC. An additional 10 patients have been contacted for feedback by phone and they have also cited the benefits that the LFC has provided and their ability to travel longer distances more comfortably.

Field trial in Haiti

As a result of the 2010 earthquake, Haiti has been facing an increased demand for assistive devices such as wheelchairs, particularly those wheelchairs that are designed for rough terrain. With funding from the Inter-American Development Bank we were able to deliver, adapt and test 17 LFCs in Haiti while training local stakeholders on assembly and repair.

We worked with 6 different local NGOs who identified patients that could test the LFC and provide feedback. The patients who participated in the trial included 10 men and 7 women. All of them were previously using wheelchairs with a mix of hospital-style 4-wheelers and other more appropriate chairs. Based on the results of this field trial, we believe the LFC is well suited for patients living in rural parts of Haiti.