



A Market Landscape
and Strategic Approach
to Increasing Access to
Wheelchairs and Related
Services in Low and Middle
Income Countries

PRODUCT NARRATIVE:

WHEELCHAIRS



ATscale
GLOBAL PARTNERSHIP FOR
ASSISTIVE TECHNOLOGY

atscale2030.org

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ACRONYMS

ACCESS	Accelerating Core Competencies for Effective Wheelchair Service and Support
APDK	Association for the Physically Disabled of Kenya
APS	Assistive Product Specifications
AT	Assistive Technology
CCE	Cold chain equipment
CHAI	Clinton Health Access Initiative, Inc.
CLASP	Consolidating Logistics for Assistive Technology Supply and Provision
CMS	Centers for Medicare and Medicaid Services
CSO	Civil Society Organisation
DPO	Disabled Persons Organisation
FBO	Faith-Based Organisation
FWM	Free Wheelchair Mission
GDI HUB	Global Disability Innovation Hub
HIC	High-Income Countries
ICRC	International Committee of the Red Cross
ISWP	International Society of Wheelchair Professionals
LMIC	Low- and Middle-Income Countries
LRS	Low Resource Setting
NCD	Non-Communicable Disease
NGO	Non-Governmental Organisations
NHS	National Health Service (UK)
PAC	Product Advisory Council
PPP	Preferred Product Profile
TOR	Terms of Reference
TPP	Target Product Profile
UNICEF SD	UNICEF Supply Division
USAID	United States Agency for International Development
VA	Veteran Affairs
WHO	World Health Organization
WSTP	Wheelchair Service Training Package

EXECUTIVE SUMMARY

TO ACCELERATE ACCESS to assistive technology (AT), it is critical to leverage the capabilities and resources of the public, private, and non-profit sectors to harness innovation and break down barriers to affordability and availability. Market shaping interventions can play a role in enhancing market efficiencies, as well as coordinating and incentivising the number of stakeholders involved in demand and supply-side activities. Across health areas, market shaping has demonstrated its potential to enhance national governments' and donors' value-for-money, diversify the supply base, and increase reliability – ultimately increasing product and service delivery access for end users. ATscale, the Global Partnership for AT, aims to apply market shaping approaches to AT, mobilising global stakeholders in line with a unified strategy. To inform this strategy, a comprehensive analysis of the entire value chain, followed by a plan to coordinate interventions on the supply and demand side, is required to address how the market is organised and to overcome barriers to access. The first product undergoing analysis by ATscale is wheelchairs.

Globally more than 75 million people need an appropriate wheelchair, however 85-95% of those in need do not have access. Four in five people who need a wheelchair live in low- and middle-income countries (LMIC) and these countries account for the highest unmet need. While 90% of people with a need in high-income countries (HIC) are estimated to have a wheelchair, this number is likely closer to 5% in LMICs.

Access to an appropriate wheelchair is critical to increasing civic and economic engagement and preventing negative health outcomes. An appropriate wheelchair is defined as one that: meets the user's needs and environmental conditions; provides proper fit and postural support; is safe and durable; is available in the country; and can be obtained and maintained and services sustained in the country at an affordable cost. The use of an appropriate wheelchair enhances users' personal mobility, which is a precondition for active participation in education, employment and civic life.

Appropriate wheelchair service, provided by trained personnel, plays a critical role in matching the user's needs to the appropriate type of wheelchairs needed throughout the user's lifespan. The *WHO Guidelines for the Provision of Manual Wheelchairs in Less Resourced Settings* emphasise eight steps for appropriate wheelchair service to assist stakeholders in developing appropriate wheelchair provision systems in different country contexts. Product standards and specifications for wheelchairs in low resource settings have been developed, or are in development, but uptake to guide purchasing and design has been limited.

The global market for wheelchairs, US\$4.0-4.5 billion in 2018, primarily focuses on high-income markets and is largely fragmented. The United States and Western Europe account for about 40% and 20% of the market, respectively. The five largest manufacturers control less than 50% of the global mobility market.

The primary global manufacturers do not focus on LMICs, as there is limited public funding for procurement and provision of wheelchairs in LMICs; where procurement within the public sector exists, it is often fragmented and/or erratic. NGOs have filled the gap to design, produce and provide wheelchairs that are appropriate for use in low resource settings. Charitable organisations that donate product dominate funded wheelchair demand in LMICs.

Enabled by favourable government policies, incentives to manufacture locally, and the perception that wheelchairs are a low-tech product, several local manufacturers exist in LMICs. Their wheelchairs are designed for the local context, but the manufacturing process is often labour-intensive, expensive to initiate and requires materials or parts from abroad, which limits the ability to scale. While not heavily utilised in LMICs at the moment, localised assembly of component parts could support a cost-effective supply of appropriate wheelchairs. Generic suppliers that serve as contract manufacturers for NGOs and FBOs to produce quality wheelchairs may also be able to supply LMICs cost-effectively, but lack market visibility or scale.

LMIC markets for wheelchairs are nascent, with a need to focus on demand creation. The demand and supply dynamics that have challenged the development of a wheelchair market include: limited awareness of need; limited government involvement; fragmented finance, procurement and provision landscapes across numerous NGOs, FBOs and government; lack of service provision; lack of quality standards and preferred product profiles to support tendering; limited market visibility and incentives for global suppliers to enter LMIC markets; and low use of cost-effective supply mechanisms.

To overcome these market challenges, a multi-pronged approach that is informed by a long-term vision towards a sustainable market for appropriate wheelchairs and their provision in LMICs is required. Four proposed strategic objectives to achieve this include:

- **STRATEGIC OBJECTIVE 1:** Build and stimulate demand through the integration of wheelchair services, including procurement & provision, into healthcare systems
- **STRATEGIC OBJECTIVE 2:** Pool resources to catalyse increases in funded demand and to limit fragmentation in the market
- **STRATEGIC OBJECTIVE 3:** Strengthen procurement via adoption of specifications and standards, improved tendering and increased market information
- **STRATEGIC OBJECTIVE 4:** Identify and support cost-effective supply systems

These strategic objectives are supplemented by initial activities to support access to affordable, quality, and appropriate wheelchairs and related services. ATscale is currently in the process of developing a prioritisation process to inform which of the market shaping activities proposed in this document will be incorporated into the Partnership's initial action and investment plan to guide activities and investment in the short-term. While that is underway, some of these proposed activities will be undertaken in the immediate term by the AT2030 programme, funded by UK aid, in line with its aim to test what works to increase access to affordable AT.

INTRODUCTION

1. Assistive Technology and Market Shaping

Assistive technology (AT) is an umbrella term covering the systems and services related to the delivery of assistive products such as wheelchairs, eyeglasses, hearing aids, prosthetics, and personal communication devices. Assistive products are defined by the WHO as “any external product (including devices, equipment, instruments or software), especially produced or generally available, the primary purpose of which is to maintain or improve an individual’s functioning and independence, and thereby promote their well-being.” Today, over 1 billion people require AT to achieve their full potential, but 90% do not have access to the AT that they need. This unmet need for AT is driven by a lack of awareness of this need, discrimination and stigma, a weak enabling environment, lack of political prioritisation, limited investment and market barriers on the demand and supply side. Narrowing in on the market shortcomings that limit the availability of assistive products, market shaping is proposed to address the root causes that limit availability, affordability and access of appropriate AT with the wider aim of ensuring improved social, health and economic outcomes for people who require AT. To accelerate access to AT, the global community needs to leverage the capabilities and resources of the public, private, and non-profit sectors to harness innovation and break down market barriers.

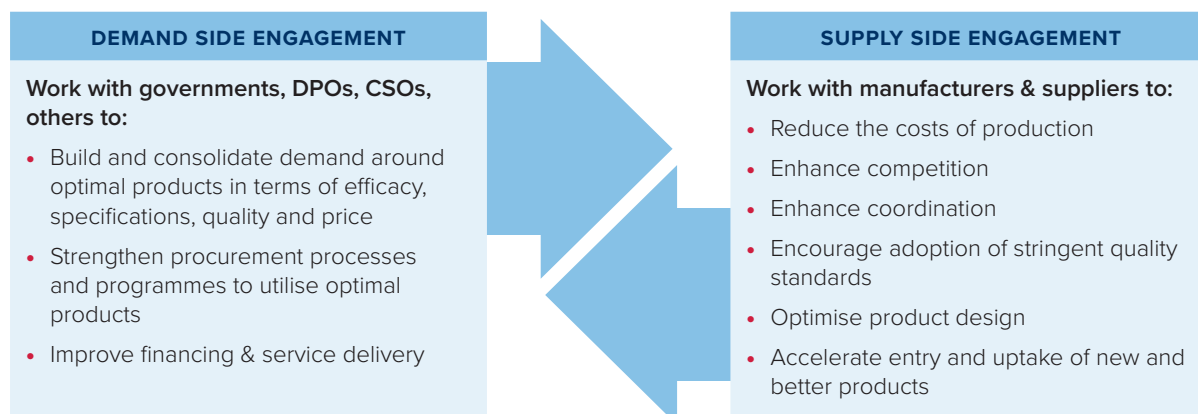
Whether by reducing the cost of antiretroviral drugs for HIV by 99% in 10 years, increasing the number of people receiving malaria treatment from 11 million in 2005 to 331 million in 2011,¹ or doubling the number of women receiving contraceptive implants in 4 years while saving donors and governments \$240 million,² market shaping has addressed market barriers at scale. Market shaping interventions can play a role in enhancing market efficiencies, improving information transparency, and coordinating and incentivising the numerous stakeholders involved in both demand and supply-side activities. Examples of market shaping interventions include: pooled procurement, de-risking demand, bringing lower cost and high-quality manufacturers into global markets, developing demand forecasts and market intelligence reports, standardising specifications across markets, establishing differential pricing agreements, and improving service delivery and supply chains.

Market shaping interventions often require coordinated engagement on the demand and supply side (Figure 1). Successful interventions are tailored to specific markets after robust analysis of barriers and look to coordinate action on both demand- and supply-side. These interventions are catalytic and time-bound, with a focus on sustainability, and are implemented by a coalition of aligned partners providing support where each has comparative advantages.

¹ UNITAID and World Health Organization, ‘UNITAID 2013 Annual Report: Transforming Markets Saving Lives’ (UNITAID, 2013), http://unitaid.org/assets/UNITAID_Annual_Report_2013.pdf.

² Mark Suzman, ‘Using Financial Guarantees to Provide Women Access to the Modern Contraceptive Products They Want to Plan Their Families’ (Bill & Melinda Gates Foundation & World Economic Forum, May 2016), http://www3.weforum.org/docs/GACSD_Knowledge%20Hub_Using_Financial_Guarantees_To_Provide_Women_Access_To_Modern_Contraceptives.pdf.

FIGURE 1: ENGAGING BOTH DEMAND- AND SUPPLY-SIDE FOR MARKET SHAPING



Historically, AT has been an under-resourced and fragmented sector and initial analysis indicated that a new approach was required. ATscale, the Global Partnership for AT, was launched in 2018 with an ambitious goal to catalyse action to ensure that 500 million more people globally are reached with life-changing AT by 2030. To achieve this goal, ATscale aims to mobilise global stakeholders to develop an enabling environment for access to AT and to shape markets to overcome supply- and demand-side barriers, in line with a unified strategy (<https://atscale2030.org/strategy>). While the scope of AT is broad, ATscale has prioritised to identify interventions needed to overcome supply- and demand-side barriers for five priority products.

In support of *Objective 2: Identify interventions required to shape markets and overcome supply and demand-side barriers for priority AT* of ATscale's Strategy Overview, Clinton Health Access Initiative (CHAI) is delivering a detailed analysis of the market for each of the priority products under the AT2030 programme (<https://at2030.org>), funded by UK aid. What follows is a detailed analysis of wheelchairs, the first priority product that is being evaluated.

2. Product Narrative

The product narrative defines the approach, identified by CHAI, to sustainably increase access, availability and affordability to high-quality, low-cost AT in LMICs. The goals of this narrative are to: 1) propose the long-term strategic objectives for a market shaping approach; and 2) identify immediate opportunities for investments to influence accessibility, availability and affordability.

This report has been informed by desk research, market analysis, key informant interviews, and site visits with relevant partners and governments to develop a robust understanding of the market landscape and the viability of the proposed interventions. Appendix A provides a list of all those interviewed. This includes representatives from non-governmental organisations (NGOs), service providers, governments, commercial entities, academic experts, wheelchair users, and partners of the AT2030 programme and ATscale.

This document is divided into two chapters:

- **CHAPTER 1:** Market Landscape, including market context (Section 3), the current product landscape, state of access and provision, supply chain analysis, stakeholders' current engagement (Section 4), as well as key market challenges and barriers to access on both the demand and supply side (Section 5);
- **CHAPTER 2:** Strategic Approach to Market Shaping, including strategic objectives highlighting the long-term outcomes required to shape the market (Section 6) and next steps (Section 7). For any given objective, the interventions are discrete, testable opportunities that support the development of longer-term, scalable interventions and investments.

MARKET LANDSCAPE

3. Market Context

3.1. Globally more than 75 million people need an appropriate wheelchair, however 85-95% of those in need do not have access.

Wheelchairs are one of the most commonly used assistive devices; WHO estimates that 1% of the population, approximately 75 million people globally, require a wheelchair.³ Those needing wheelchairs are those with mobility limitations and may include people born with congenital abnormalities, people with developmental and neurological conditions, such as cerebral palsy or muscular dystrophy, people with a spinal cord injury, people with musculoskeletal conditions such as lower limb amputation, people living with physical impairment which can be a result of polio or non-communicable diseases (NCDs) such as diabetes or stroke, and older people with gradual functional decline.

Four in five people who need a wheelchair live in LMICs,⁴ and these countries account for the highest unmet need. While 90% of people with a need in high-income countries (HIC) are estimated to have a wheelchair,⁵ this number is likely closer to 5% in LMICs. It is estimated that 64 million people need a wheelchair in LMICs (Table 1). This represents a crude estimate of need due to the lack of data available.

TABLE 1: MARKET SIZING FOR WHEELCHAIR NEED

WHO REGION	WHEELCHAIR NEED (IN MILLIONS)	ESTIMATED WHEELCHAIR COVERAGE (IN PERCENTAGE)	UNMET NEED (IN MILLIONS)
Americas (excluding HICs)	~6	5%	~6
Europe (excluding HICs)	~4	5%	~4
Africa	~10	5%	~10
South-East Asia	~26	5%	~25
Western Pacific	~20	5%	~19
HICs	~9	90%	~1
Global	~75		~65

³ World Health Organization, 'Assistive Technology', Fact Sheet, Assistive technology, 18 May 2018, <https://www.who.int/news-room/fact-sheets/detail/assistive-technology>.

⁴ World Health Organization, *Guidelines on the Provision of Manual Wheelchairs in Less-Resourced Settings*, accessed 21 May 2019, <https://www.who.int/disabilities/publications/technology/wheelchairguidelines/en/>.

⁵ Alicia M Koontz et al., 'Wheeled Mobility', *Biomed Res Int.* 2015, no. 138176 (2015), <https://doi.org/10.1155/2015/138176>.

The need for wheelchairs will only continue to grow globally, especially in LMICs. A growing need is driven by:

- **AGING:** world's population over 60 years of age is expected to double to 2 billion between 2015 and 2050;⁶
- **INCREASING RATES OF INJURY:** increasing rates of road traffic injury, occupational injury, violence and humanitarian crisis contribute to the high and growing rate of disability in LMIC; for example, although the rate of disability-adjusted life year (DALY) from road injury is decreasing in high-income countries, the rate has increased in South Asia (6.5%), West sub-Saharan Africa (13.1%) and South sub-Saharan Africa (32.5%) from 1990 - 2013. In the same period, DALYs attributed to interpersonal violence in South sub-Saharan Africa and Oceania have increased 50%.⁷
- **GROWING BURDEN OF NCDs:** stroke prevalence has increased 14% annually⁸ in low-income countries over the past three decades and the number of people with diabetes is expected to rise to 552 million in 2030 from 336 million in 2011 with greatest rate of increase (92%) occurring in low-income countries.⁹

3.2. Access to an appropriate wheelchair is critical to increasing civic and economic engagement and preventing negative health outcomes

An appropriate wheelchair is defined as one that: meets the user's needs and environmental conditions; provides proper fit and postural support; is safe and durable; is available in the country; and can be obtained and maintained and services sustained in the country at an affordable cost.¹⁰ The use of an appropriate wheelchair enhances users' personal mobility, which is a precondition for active participation in education, employment and civic life.

Being properly fitted with an appropriate wheelchair is critical to a user's health and quality of life. Proper fitting helps prevent various secondary health conditions such as: pressure sores and progression of postural deformities or contractures; respiration and digestion complications; and, in cases of people with spinal cord injuries and similar conditions, premature death.¹¹ A study from Sri Lanka showed that 75% of people with spinal cord injuries admitted to hospital died within 18-24 months from secondary complication because of their injuries; however, when healthcare training and appropriate equipment provision improved – including appropriate wheelchairs with cushions – the incidence of pressure sores reduced by 71% and repetitive urinary tract infection decreased by 61% within two years.¹²



CASE STUDY 1: USER'S EXPERIENCE IN TRANSITIONING TO APPROPRIATE WHEELCHAIR

Six months after a car accident, Harrison was sent home from hospital with a wheelchair that was poorly fitted. He was only able to use it for an hour before it became painful, and it was not suitable for the uneven ground in his house or community. After receiving a Motivation Rough Terrain wheelchair that was assessed and fitted to his needs, as well as mobility and health training, life turned around for Harrison. His independence was returned to him: he could move around on his own, use public transport and start to build a new future for him and his young family.¹³

⁶ World Health Organization, 'Facts about Ageing', WHO, accessed 30 May 2019, <http://www.who.int/ageing/about/facts/en/>.

⁷ Haagsma JA, Graetz N, Bolliger I, et al. The global burden of injury: incidence, mortality, disability-adjusted life years and time trends from the Global Burden of Disease study 2013. *Injury Prevention* 2016;22:3-18.

⁸ Martinsixtus C, Ezejimofor et al., 'Stroke Survivors in Low- and Middle-Income Countries: A Meta-Analysis of Prevalence and Secular Trends', *Journal of the Neurological Sciences* 364 (15 May 2016): 68–76, <https://doi.org/10.1016/j.jns.2016.03.016>.

⁹ David R. Whiting et al., 'IDF Diabetes Atlas: Global Estimates of the Prevalence of Diabetes for 2011 and 2030', *Diabetes Research and Clinical Practice* 94, no. 3 (1 December 2011): 311–21, <https://doi.org/10.1016/j.diabres.2011.10.029>.

¹⁰ World Health Organization, *Guidelines on the Provision of Manual Wheelchairs in Less-Resourced Settings*.

¹¹ Maria L. Toro, Chika Eke, and Jonathan Pearlman, 'The Impact of the World Health Organization 8-Steps in Wheelchair Service Provision in Wheelchair Users in a Less-Resourced Setting: A Cohort Study in Indonesia', *BMC Health Services Research* 16 (22 January 2016), <https://doi.org/10.1186/s12913-016-1268-y>.

¹² World Health Organization, *Guidelines on the Provision of Manual Wheelchairs in Less-Resourced Settings*.

¹³ Motivation Charitable Trust, 'Motivation Charitable Trusts | Stories', Motivation, accessed 30 May 2019, <https://www.motivation.org.uk/harrison-kenya>.

3.3. Appropriate wheelchair service, provided by trained personnel, plays a critical role in matching the user’s needs to the appropriate type of wheelchairs needed throughout the user’s lifespan.

WHO categorises wheelchairs as follows:

- **WHEELCHAIRS DESIGNED FOR TEMPORARY USE.**¹⁴ Typically called depot, transport, orthopaedic or “hospital” wheelchairs, this type of wheelchair is designed for temporary use and does not provide the user with additional fitting, postural support or pressure relief. It is frequently pushed by an attendant or carer.
- **WHEELCHAIRS DESIGNED FOR LONG-TERM USE.** Sometimes called **active wheelchairs**, they are designed for long-term use, are adjustable to ensure proper fit, provide pressure relief, and typically provide basic postural support needs (additional postural support devices may be added to fit user needs):
 - Based on the means of propulsion, active wheelchairs can be divided into *manual* and *powered wheelchairs*. Manual wheelchairs are self-propelled or attendant propelled.
 - Based on the environment the wheelchair is primarily used in, active wheelchairs can be divided into:
 - **Indoor/urban/even-surface wheelchairs:** typically lightweight, can have a fixed/rigid or foldable frame, transportable and easy to manoeuvre in small spaces;
 - **Outdoor/rural/rough-terrain wheelchair:** designed to be robust, more stable, and easier to propel over uneven ground. They often have three wheels and a much longer wheelbase;
 - **Dual-use/indoor-outdoor wheelchairs:** have some level of compromise for both environments; for example, a robust wheelchair with large castor wheels, but with a short wheelbase.
- **WHEELCHAIRS WITH POSTURAL SUPPORT.** This type of wheelchair is designed for users requiring a higher degree of postural support such as users with significant muscle weakness or people with cerebral palsy. These wheelchairs are typically highly adjustable, modifiable and come with additional postural support systems such as back support, head support and a positioning cushion. The seating system can be added to a long-term use wheelchair, although more adjustable wheelchair systems are also used.

TABLE 2: EXAMPLES OF WHEELCHAIRS FROM EACH CATEGORY AND INDICATIVE PRICING¹⁵

TEMPORARY USE	INDOOR/URBAN/ EVEN-SURFACE	OUTDOOR/RURAL/ ROUGH-TERRAIN	DUAL USE/ INDOOR- OUTDOOR	POSTURAL SUPPORT
				
LMICs: ~US\$80 HICs: US\$100-800	LMICs: US\$150-300 HICs: US\$2,100-3,500	LMICs: US\$150-300 HIC: rarely found	LMICs: US\$200-300 HIC: rarely found	LMICs: US\$180-350 HIC: US\$2,200-4,000

PHOTOS USED WITH PERMISSION FROM CLASP.ORG

¹⁴ For the subsequent sections of this document, we exclude temporary-use/hospital wheelchairs from the analysis.

¹⁵ CLASP, 'About CLASP', accessed 21 May 2019, <https://www.clasphub.org/about/>; Medicare and Washington Statement Department of Labor & Industries, 'Professional Services Fee Schedule - HCPCS Level II Fees' (Washington Statement Department of Labor & Industries, 1 July 2018); Veteran Affairs, 'DURABLE MEDICAL EQUIPMENT, SUPPLIES, VISION AND HEARING HARDWARE NATIONWIDE- CHARGES BY HCPCS CODE', n.d., [https://www.va.gov/cbo/apps/rates/disclaimer/viewFile.asp?tbl_ID=191&ver_ID=36&mode=1; HCPCS Codes, '2019 DME Fee Schedule - K0005', accessed 30 May 2019, https://hcpcs.codes/fee-schedule/dme/?code=K0005&state=.](https://www.va.gov/cbo/apps/rates/disclaimer/viewFile.asp?tbl_ID=191&ver_ID=36&mode=1; HCPCS Codes, '2019 DME Fee Schedule - K0005', accessed 30 May 2019, https://hcpcs.codes/fee-schedule/dme/?code=K0005&state=)

A wheelchair should be provided based on an assessment of the user’s physical abilities, lifestyle and environment (Figure 2). The wheelchair service then fits a wheelchair to the user, adjusting the features to ensure maximal functions are possible whilst ensuring the safety of the user. The wheelchair user and their caregiver (where applicable) are trained on how to safely and effectively use and maintain the wheelchair. The wheelchair service provides follow-up, maintenance and repair services for the product.

FIGURE 2: FACTORS AFFECTING CHOICE OF WHEELCHAIR (LEFT) AND COMMON ADJUSTMENTS TYPICALLY MADE ON MANUAL ACTIVE OUTDOOR/RURAL/ROUGH-TERRAIN WHEELCHAIRS (RIGHT)

FACTORS AFFECTING WHEELCHAIR SELECTION		EXAMPLES: ACTIVE, MANUAL, ROUGH-TERRAIN WHEELCHAIR
Need of mobility aids	<ul style="list-style-type: none"> • Short duration/intermittent • Long-term/permanent 	<p>Frame</p> <ul style="list-style-type: none"> • Usually fixed frame; 3 or 4-wheel frame format • Long wheelbase (longer than dual terrain wheelchair) • Large overall length and large turning circle • Ergonomically placed push handles for controlled assistance • Integrated stability options for feet • Dirt protection • Low centre of gravity compared to other active wheelchairs <p>Center of Gravity: Frame Adjustments</p> <ul style="list-style-type: none"> • Rear wheel horizontal adjustability/ custom options • Front castor optional horizontal adjustment <p>Frame-Size Range</p> <ul style="list-style-type: none"> • Size width range to be appropriate for the population profile and include paediatric, adult and bariatric sizes as appropriate • Size range in 1-1.5" (25 - 40mm) increments • Range of seat depth options <p>Wheels and Castors</p> <ul style="list-style-type: none"> • Minimum 3 degrees of camber on rear wheels • Larger diameter of push rim ring • Larger rear wheel size; Wider or larger tread tires • Wider (minimum 2"/50mm) and larger diameter (more than 8"/200mm) castor wheels
Ability to propel	<ul style="list-style-type: none"> • Low (requires attendant/powerd) • Medium (e.g., one hand) • High 	
Physical size	<ul style="list-style-type: none"> • Paediatric/Adult • Width, length, and height variations 	
Living & working environment	<ul style="list-style-type: none"> • Outdoor/rough terrain • Indoor/even surface/urban setting • Mixed (indoor and outdoor) 	
Risk of developing pressure sores	<ul style="list-style-type: none"> • Low • Medium • High (e.g., people with spinal cord injury) 	
Postural support needs	<ul style="list-style-type: none"> • Basic • Intermediate • Advanced 	

3.4. Common guidelines exist to ensure the provision of appropriate wheelchairs in less resourced settings

Many wheelchair users in less resourced settings (LRS) receive wheelchairs without the appropriate related service. As a result, users often receive wheelchairs that are inappropriate for their needs, ill-fitting and provided without training on how to safely and effectively use their wheelchair.

In light of contextual realities, a consensus-driven process supported the development of the *WHO Guidelines for the Provision of Manual Wheelchairs in Less Resourced Settings*. The *WHO Guidelines* emphasise eight

steps for appropriate wheelchair service (known as the **WHO 8-Steps** – see Figure 3) to assist stakeholders in developing an appropriate wheelchair provision system in different country contexts.¹⁶ Following the release of the Guidelines in 2008, WHO developed the Wheelchair Service Training Package (WSTP) to support training.

The WSTP consist of:

- **WSTP-BASIC LEVEL AND TRAINING OF TRAINERS:** To develop the minimum skills and knowledge required by personnel involved in wheelchair service delivery.¹⁷
- **WSTP-INTERMEDIATE LEVEL AND TRAINING OF TRAINERS:** To support the training of personnel to provide an appropriate manual wheelchair and cushion for children and adults who need additional postural support and modification.¹⁸
- **WSTP FOR MANAGERS AND STAKEHOLDERS AND TRAINING OF TRAINERS:** To inform managers and stakeholders about the importance and benefit of proper wheelchair service provision which is necessary in order to develop effective and sustainable wheelchair service provision.¹⁹

FIGURE 3: THE WHO 8-STEPS TO WHEELCHAIR PROVISION



The Guidelines have been adopted by various NGOs and large charitable organisations to improve their delivery process and product design to be more in line with best practice. Uptake by country governments has been low due to lack of awareness of the *WHO Guidelines*, a lack of existing service provision systems for wheelchairs or AT, and limited donor support for the dissemination and adoption of the *Guidelines* worldwide.

3.5. USAID has been the primary bilateral funder addressing wheelchair needs in LMICs

To address the unmet need for wheelchairs in LMICs, USAID and other US government agencies have collectively invested more than US\$70 million over the past ten-plus years. USAID’s commitment to wheelchair provision is significant within the sector, but this amount represents a fraction of the spending required globally per year. Other bilateral funders, such as Australia’s Department of Foreign Affairs and Aid, UK’s Department for International Development and the Swiss Agency for International Development, have funded or fund wheelchairs or wheelchair provision, often through one-time grants.

¹⁶ World Health Organization, *Guidelines on the Provision of Manual Wheelchairs in Less-Resourced Settings*.

¹⁷ World Health Organization, 'Wheelchair Service Training Package - Basic Level', Wheelchair Service Training Package - Basic level, accessed 21 May 2019, <http://www.who.int/disabilities/technology/wheelchairpackage/en/>.

¹⁸ World Health Organization, 'Wheelchair Service Training Package – Intermediate Level (WSTP-I)', Wheelchair Service Training Package – Intermediate Level (WSTP-I), accessed 21 May 2019, <https://www.who.int/disabilities/technology/wheelchairpackage/wstpintermediate/en/>.

¹⁹ World Health Organization, Sarah Frost, and Chapal Khasnabis, 'WHO Wheelchair Service Training Package for Managers and Stakeholders', February 2015, <http://www.who.int/disabilities/technology/wheelchairpackage/wstpmanagers/en/>.

In 2007, USAID established the Wheelchair Program to improve access to appropriate wheelchairs and trained service providers in developing countries. The Program has evolved from direct procurement of wheelchairs to supporting investments that would result in systemic and sustainable improvement for the sector. In order to achieve this, USAID has focused their investments in the following key areas: 1) policies to improve access to appropriate wheelchairs and quality services are developed and implemented; 2) access to quality, sustainable services improved; 3) professional standards clearly defined and adopted; and 4) appropriate products are more readily accessible.

Programmatic investments have included both country-based initiatives and global initiatives. A few examples of investments include an Indonesian programme to integrate wheelchair service into the healthcare system, a multicounty programme in partnership with World Vision to support appropriate delivery of wheelchairs in five countries and a Georgian programme to establish wheelchair production and provision. Examples of research funding include assessing influence of peer-group training for active wheelchair users in Romania and studying the impact of service on wheelchair usage in Kenya and the Philippines.

Examples of USAID global investments include:

- **CONSOLIDATING LOGISTICS FOR ASSISTIVE TECHNOLOGY SUPPLY AND PROVISION (CLASP).** CLASP is a centralised distribution hub launched in 2014 as a solution to supply-side challenges faced by wheelchair service providers in LRS including limited product variety, variable quality, extensive lead-time, and logistical burdens.²⁰ [Section 4.12. describes CLASP in more detail]
- **INTERNATIONAL SOCIETY OF WHEELCHAIR PROFESSIONALS (ISWP).** Launched in 2015, ISWP serves as a global resource for wheelchair service standards and provision through advocacy, education, standards, evidence-based practice, innovation, and a platform for information exchange. Some of its outputs include: Basic wheelchair knowledge test; Wheelchair hybrid course, Seating and Mobility Academic Resource Toolkit; a training management platform for the wheelchair sector; and a product catalogue and product standards to promote quality and appropriate wheelchairs.²¹
- **GLOBAL COOPERATION ON ASSISTIVE TECHNOLOGIES (GATE).** Led by the World Health Organization GATE is a global initiative to realise the obligations of the UN Convention on the Rights of Persons with Disabilities (CRPD) towards increasing access to assistive technology. Some of GATE's achievements include the development of the priority Assistive Products List (APL), the adoption of a Resolution on "Improving access to AT" at the 2018 World Health Assembly and the creation of training modules for primary healthcare workers to safely and effectively provide priority AT.

CASE STUDY 2: USAID ACCESS PROGRAM

Led by World Vision, Accelerating Core Competencies for Effective Wheelchair Service and Support (ACCESS) was a US\$9 million USAID-funded project implemented in Kenya, India, Romania, Nicaragua, and El Salvador between 2014 and 2017. The project aimed to strengthen the wheelchair sector through enhanced service capacity, provision of a diverse range of wheelchairs, engagement with national and local governments and increased participation of wheelchair users.

Implementation of the WHO 8-step wheelchair service model resulted in 9 out of every 10 people who were referred and assessed, receiving a wheelchair. In addition, service capacity increased for all service centres and social inclusion of wheelchair users increased over the life of the project, especially for women and children. Follow up was the most challenging step with 30% of clients not having been followed up with after receiving a wheelchair, representing a lost opportunity to address issues of maintenance and repairs.

The project recommended that the networks created during the project between the government departments responsible for disability rights and the Ministry of Health should be continued and strengthened in order for WHO-compliant wheelchair services to be sustainably delivered in country.²²

²⁰CLASP, 'About CLASP', accessed 21 May 2019, <https://www.clasphub.org/about/>.

²¹Mary Goldberg et al., 'The International Society of Wheelchair Professionals (ISWP): A Resource Aiming to Improve Wheelchair Services Worldwide', *British Journal of Occupational Therapy* 81, no. 12 (1 December 2018): 671–72, <https://doi.org/10.1177/0308022618793056>.

²²Enisha Sarin, 'Accelerating Core Competencies for Effective Wheelchair Service and Support (ACCESS) Project - Evaluation of Access Project in Five Countries', August 2017, <https://www.worldvision.org/wp-content/uploads/2017/12/ACCESS-Overall-Evaluation-FINAL-with-annexes.pdf>.

4. Market Assessment

4.1. The global market for wheelchairs largely focuses on high-income markets and is largely fragmented

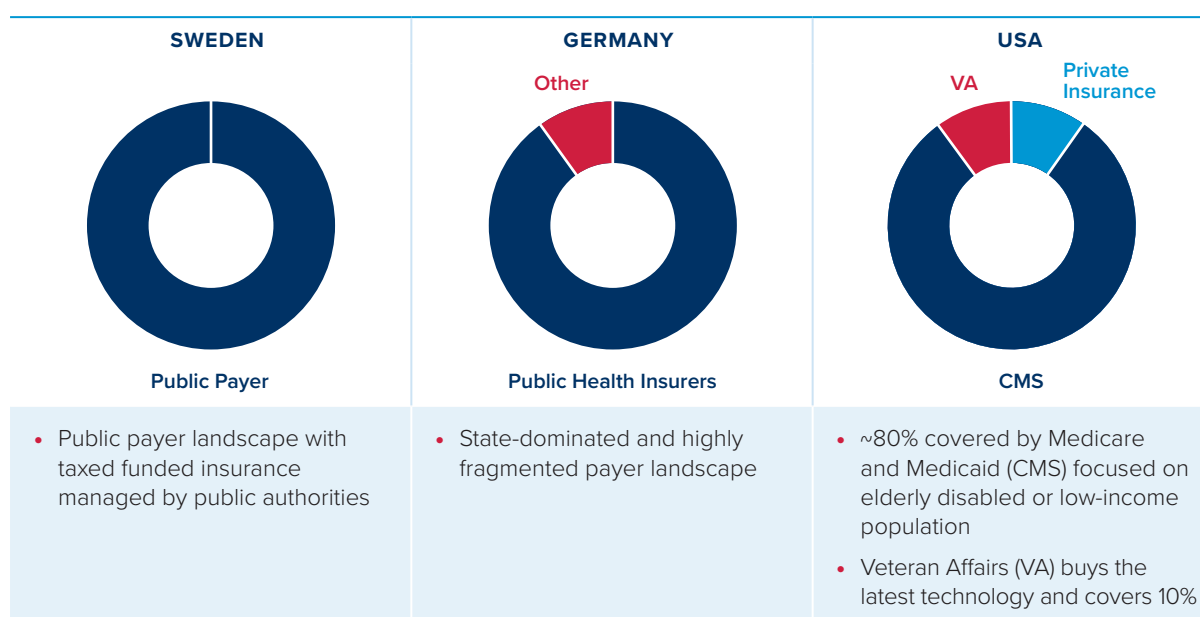
The global market for wheelchairs was estimated between US\$4.0-4.5 billion²³ in 2018 with the United States and Western Europe accounting for about 40% and 20%, respectively. Manual wheelchairs make up about 60% of the sales revenue globally and are projected to grow 6% year-on-year. The powered wheelchairs segment is projected to grow faster at 15-20%.²⁴

The supply landscape is relatively fragmented with the five largest manufacturers controlling less than 50% of the global mobility market. In the United States, 218 different companies, representing over 400 different product lines, have registered wheelchairs with the US Food and Drug Administration (FDA). Leading global players are: Invacare (USA), Sunrise Medical (Germany/USA), Ottobock (Germany), and Permobil (Sweden).

4.2. Reimbursement policies drive product selection, pricing and ultimately profitability for suppliers to HIC markets

The payer landscape in HICs is dominated by public insurance systems that represent 80% or more of the market (Figure 4). Public pressure against the rising costs of health care has prevented a rise in reimbursement rates. Furthermore, a more consolidated payer landscape in HIC markets has spurred competitive tendering. This combination - along with a growing production cost - has eroded profit margins, resulting in market consolidation, increased focus on controlling cost and shifting to more commercially attractive segments.

FIGURE 4: PUBLIC SECTOR COVERAGE FOR WHEELCHAIRS IN HICS²⁵



²³Clinton Health Access Initiative, 'CHAI Analysis', n.d.

²⁴Allied Market Research, 'Manual Wheelchair Market by Category (Adult and Pediatric), Design & Function (Basic Wheelchair, Sports Wheelchair, Bariatric Wheelchair, Standing Wheelchair and Others), and End User (Homecare, Institution, and Others): Global Opportunity Analysis and Industry Forecast, 2018 - 2025', Manual Wheelchair Market Size, February 2019, <https://www.alliedmarketresearch.com/manual-wheelchair-market>.

²⁵John Sintorn, 'Permobil Investor Relations Reports' (Permobil, 28 March 2017), <https://www.investorab.com/media/1634/permobil-final-170328.pdf>.

CASE STUDY 3: CONSOLIDATED PURCHASER IN THE US DRIVES MARKET PRICE

With 40% of global revenues, the US is a key market to many global suppliers. Insurance schemes managed by the Centers for Medicare and Medicaid Services (CMS) cover approximately 80% of the US market. When Medicare started competitive bidding in 2013 on standard, transport wheelchairs,²⁶ it achieved significant price reductions. The strong bargaining power consequently led to lower margins across the value chain and resulted in many distributors exiting the market, which placed further pressure on manufacturers.

Low margins on standard, transport wheelchairs, combined with further price pressure from CMS supporting a rent-to-own reimbursement model for standard wheelchairs, have led manufacturers and distributors to focus on highly-customised, ultra-lightweight active chairs, supportive paediatric chairs, and powered wheelchairs. The ultra-lightweight class of wheelchairs carries a specific reimbursement code (HCPCS K0005) that corresponds to a reimbursement rate of US\$2,128; therefore, the majority of active, lightweight chairs available in the US market will have a list price around this value, which in turn drives a global benchmark price.

4.3. Global manufacturers mostly enter into LMICs through distributors, but this adds costs

The production of active wheelchairs for HICs is highly customised and localised, which limits the product range that could be provided cost-effectively in LMICs. Suppliers, such as Invacare, Sunrise or Permobil, have a limited presence in LMICs and mostly operate via local distributors. Custom ordered products are imported from manufacturing sites that are commonly based in Europe, North America or China. The final price offered to LMIC buyers increases due to high shipping costs, and in some cases, import duties. Small volumes and limited competition among distributors further raises the price. As it can be a lengthy and challenging process to obtain custom wheelchairs, local distributors often limit their wheelchair offering to those that can be easily obtained and warehoused to serve the largest number of people — leading to a higher volume of standard wheelchairs available.

In some countries, wheelchair manufacturers must work with local distributors to supply wheelchairs via the national tender. Distributors' margins increase the cost to the payer by 15% or more, yet they often do not provide additional services that could not be provided by the manufacturer.

4.4. There is limited public funding for procurement and provision of wheelchairs in LMICs; where procurement within the public sector exists, it is often fragmented and/or erratic

Generally, LMIC governments allocate insufficient and/or variable financial resources for the procurement and provision of wheelchairs. In some cases, resources are drawn from specific ministry or department budgets such as social welfare, education and defence, however, the funding is typically insignificant and fragmented. For many countries, whether the funding is coming from the Ministry of Health or another government entity, the amount spent on wheelchair provision is negligible.

A small number of LMIC governments procure wheelchairs directly and provide them through facilities and programmes under health, education, and/or social welfare ministries/departments. In these instances, wheelchairs are typically tendered for at the country or regional level, generally based solely on cost. Procurement and distribution or provision is often fragmented across different ministries, which leads to a variety of challenges, including: no single ministry having complete oversight on procurement and

²⁶Medicare, 'Medicare's DMEPOS Competitive Bidding Program FAQ', n.d., <https://www.cms.gov/outreach-and-education/outreach/partnerships/downloads/dmepospartnerfaqs-revised4813508.pdf>.

provision within government or across partners; different ministries have differing levels of infrastructure or human resources to deliver and maintain wheelchairs; some ministries lack the supply chain or logistics capacity to effectively deliver products appropriately, which leads to a mass distribution model, whereby one wheelchair type is given out with limited service; different ministries have differing mandates on the population served and therefore some populations are left behind.

4.5. As the primary global manufacturers do not focus on LMICs, NGOs have filled the gap to design, produce and provide wheelchairs that are appropriate for use in LRS

As outlined above, the leading global suppliers have limited interest in LMIC markets due to low and erratic funding and demand, a reliance on a distributor network that is often poorly developed in LMICs, and a need to develop products with specific design features for use in LRS. Various NGOs and faith-based organisations (FBOs) fill that gap and deliver low-cost, manual wheelchairs that are specifically designed for LMIC environments.

A variety of NGOs provide quality, context-appropriate wheelchairs. These wheelchairs are often priced between US\$150-350, are designed in line with the *WHO Guidelines* and are tested and certified for quality. The wheelchairs are considered context-appropriate because product design takes into consideration:

- **AFFORDABILITY.** Products are designed and produced to ensure low cost (i.e. material, manufacturing partner/facility, etc.). Large range of adjustability of each products also allows for a reduced total cost to meet diverse needs of users.
- **THE ENVIRONMENTAL FACTORS AND USE CONDITIONS** in LRS to ensure durability and reliability to avoid premature failure. Wheelchairs used in rough terrains are subjected to greater wear and tear than those designed for smooth roads.
- **THE LIMITATIONS OF MAINTENANCE CAPACITY.** Most users in LRS cannot afford the cost of frequent repairs including replacement parts, maintenance and repair services and transportation. These wheelchairs were designed for long useful life and minimal repairs.
- **THE RELATIVELY EASY LOCAL REPAIR BY MAKING USE OF WIDELY-AVAILABLE REPLACEMENT PARTS.** Users could use parts that are available locally in bicycle shops, motorcycle shops, and hardware stores, such as bicycle wheels, tires and tubes and locally-sourced wheel and caster bearings.

NGOs typically have full control over the value chain from product design to service provision. In most cases, the NGOs are structured as social enterprises and will contract third-party manufacturers. Income from wheelchair sales is used to support wheelchair access programmes. Such a model allows the NGO to raise funds for overhead and operational costs while keeping a minimum margin and therefore reducing the price of the final product. In addition to providing wheelchairs and services to users through their local service partners, they also sell their products to donors, other NGOs, and, on occasion, governments.

Volumes from NGO social enterprises for appropriate products are limited and they mainly supply products through donor-funded organisations within the same network. One NGO suggested that higher volumes could enable significant improvements on manufacturing economics. However, low overall demand and fragmented market in LMICs, characterised by fragmented, parallel funding and supply siloes, inhibit the potential for these efficiencies to materialise. In addition to NGOs, the largest FBO donors of wheelchairs for LMICs, LDS Charities and Free Wheelchair Mission (FWM), have designed and produced their own products. These two FBOs are discussed in the next section.

Some social enterprises have attempted to fill market gaps through a cross-subsidisation model. These social enterprises have designed products for users in both HICs and LMICs by considering the profile of users in HIC that are typically brand-conscious and performance-sensitive as well as the environmental condition in LMICs. The product is then offered at differential price points to allow larger margins gained from HICs market to subsidise sales in LIMCs market. Despite this promising model, these enterprises are

still limited by lack of capital, limited brand awareness to buyers in one or both markets, competition with insurance markets and low volume.

Other smaller and relatively new NGOs or social enterprises continue to enter the market, indicating that there is no shortage of innovation in the space, particularly for paediatric wheelchairs; however, market potential for uptake of innovation uptake remains limited.

4.6. Charitable organisations that donate product dominate funded wheelchair demand in LMICs

Most wheelchairs in LMICs are donor-funded with delivery models ranging from organisations distributing refurbished wheelchairs with limited services to mass distribution campaigns to organisations providing quality appropriate wheelchairs with services that meet *WHO Guidelines*. Regardless of the model, almost all chairs are delivered at little or no cost to the user.

FWM and LDS Charities are the largest donors of wheelchairs in LMIC. Large, independent funding sources and higher volumes allow them to have full control over the design, manufacturing, transportation, and inventory management of the primary products that they donate, while also reducing cost per wheelchair provided. To achieve higher volumes and the lowest possible cost, these groups are supplying a limited range of product.

FWM has improved the design and quality of their basic chair in recent years and is looking to better link their distribution campaigns to referral networks for those with more complex seating needs. FWM is interested in increasing their training and service provision; however, investment has been limited due to their commitment to donors to deliver the highest number of wheelchairs within their funding envelope.

LDS Charities often complements their product offering by purchasing other wheelchair types to support local suppliers and fill gaps in need; however, their own branded products designed and produced in partnership with Colors 'N Motion Inc. now consist of standard, urban active, and rough-terrain active wheelchairs.²⁷

4.7. Local manufacturing to meet LMIC demand has been attempted and seen varying levels of success

Enabled by favourable government policies, incentives to manufacture locally, and the perception that wheelchairs are a low-tech product, several local manufacturers exist in LMICs. Their wheelchairs are at times designed for the local context and can be customised to match the user's needs, but the manufacturing process is often labour-intensive, expensive to initiate and requires materials or parts from abroad, which limits the ability to scale.

Local manufacturers come in different forms. Products from artisan local manufacturers, who build wheelchairs manually from a mix of locally sourced (metal tubing) and imported materials (wheels), are often seen as lower quality compared to imports. While these companies typically have a higher cost-structure compared to larger production sites, the proximity to the end-user and lower shipping cost as compared to international freight result in a supply chain that is more responsive to user needs. However, these companies appear to struggle due to low and erratic demand, resulting in low production capacity planning and utilisation and difficulties in sustaining production levels. Furthermore, they are hampered by low investment, training, available equipment, skills and quality assurance mechanisms, which all contribute to the cycle of low quality in production.

²⁷LDS Charities. "LDS Charities test new wheelchair designs." 2019. <https://www.latterdaysaintcharities.org/news/lDS-charities-tests-new-wheelchair-designs>.

Prior to shifting some of its volume to medium and large-scale production through partnerships with contract manufacturers, Whirlwind Wheelchairs International (WWI) spent around 15 years focusing on an artisan model supporting the development of small-scale local wheelchair production in more than 40 countries. Many of the workshops are no longer operating, while some have survived and continue to produce wheelchairs for the community such as Kifas (Turkey) and Fundacion Bertha (Mexico). The main challenge has consistently been generating and maintaining demand to sustain the production levels. High political interest for local manufacturing by government rarely came with the support to procure the final product and to allocate public funding to purchase wheelchairs. Since most wheelchair users have low ability to pay, government financing for wheelchairs and supportive procurement policies (e.g. not solely based on the lowest cost; open to the non-commercial entity) are critical in ensuring demand for local production.

Local manufacturers that serve larger domestic markets, such as CE Mobility in South Africa, show that local manufacturers can be economically viable. Key success factors include: 1) quality and competitive pricing; 2) receiving support from the local government in the form of tender purchases; 3) selling both domestically and through regional exports; and 4) ability to provide a more diverse wheelchair product-offering than traditional imports while maintaining the supply chain responsiveness that is unavailable via the Artisan model.

CASE STUDY 4: TAJIKISTAN'S ECONOMIC ASSESSMENT OF WHEELCHAIR SUPPLY OPTIONS²⁸

Despite having adopted various policies to strengthen AT provision, Tajikistan currently faces significant under-supply of wheelchairs, low quality of imported products and limited wheelchair service provision. To address these challenges, a study was conducted to assess the viability of three wheelchair supply models: 1) import of complete wheelchairs, which is currently the primary practice; 2) import of components for local assembly; and 3) local manufacturing. The study assessed the advantages and disadvantages of each model as well as analysing the cost and benefits from a monetary perspective.

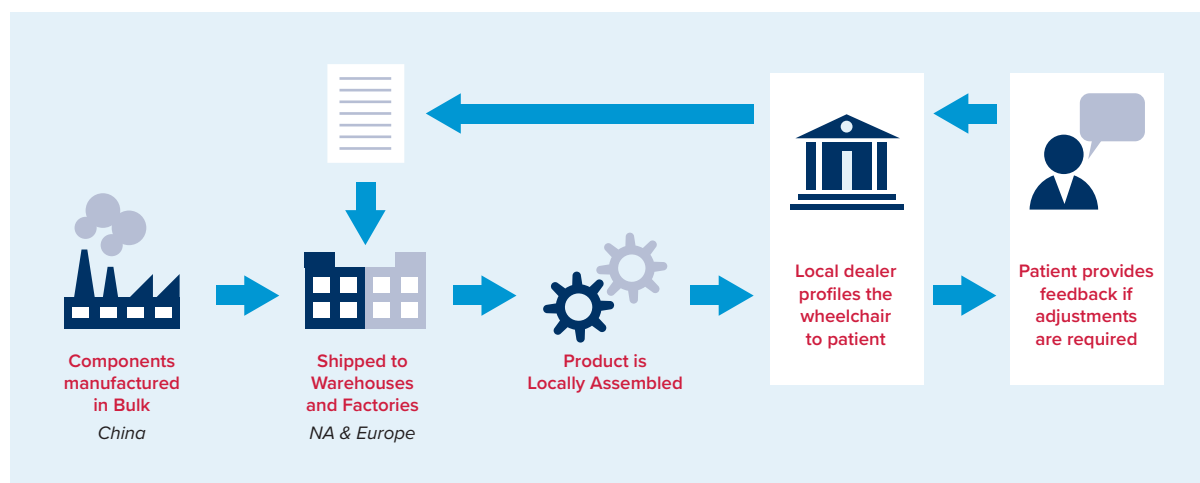
The study concluded that it is unlikely that the challenges can be met over the short-to-medium term through either Models 2 or 3, meaning that Tajikistan may need to continue importing wheelchairs over the short term while improving its procurement practices to ensure quality. However, Model 2 and 3 might work over the medium to long-term (5-10 years) to fulfil the demand for quality wheelchairs sustainably while also providing economic opportunity such as employment and acquisition of manufacturing skills, so long as the following are true: a) there is financial commitment from government to establish a manufacturing facility and to purchase the products; b) technical assistance from international partner; c) a viable business plan; d) quality control; and d) supportive regulatory environment and effective internal management.

4.8. While not heavily utilised in LMICs at the moment, localised assembly of component parts could support a cost-effective supply of appropriate wheelchairs

Bulk manufacturing of parts with regional assembly is the standard manufacturing model employed in HICs. In this model, wheelchair parts are manufactured at a centralised manufacturing site – usually in China – and then shipped to a warehouse or facility that is specialised to do final assembly of certain models (Figure 5). Given the pressure on profit margins, suppliers are optimising warehousing and production costs while maintaining the ability to offer a highly customised final product. One supplier suggested that an assembly approach reduces shipping costs to 25% of the total cost of shipping assembled products. Most assembly of lower-cost wheelchairs happens in China, while more expensive, high-end products are commonly assembled in Europe or North America, closer to the end-user.

²⁸Satish Mishra and Dilorom Sodiqova, 'Provision of Wheelchairs in Tajikistan: Economic Assessment of Alternative Options' (Tajikistan: World Health Organization Regional Office for Europe, n.d.), <https://apps.who.int/iris/bitstream/handle/10665/312049/9789289054041-eng.pdf?sequence=1&isAllowed=y&ua=1>.

FIGURE 5: ILLUSTRATION OF WHEELCHAIR PRODUCTION IN HICS



Numerous NGOs & FBOs have developed an approach that involves ‘localised’ assembly of wheelchairs in LMICs:

- **FWM** is successful in keeping cost of product to a minimum by high volume and shipping bulk parts for local assembly. FWM achieves maximum quantities per container by boxing components separately (i.e. one box does not contain one wheelchair), which represents maximum efficiency in shipping logistics. The downsides of this model are: 1) assembly cost at the factory may or may not be significantly reduced, and 2) mass assembly of many wheelchairs requires immediate distribution of many wheelchairs or significant local warehouse capacity.
- **MOTIVATION** uses a model whereby a compactly boxed wheelchair, also known as a flat-pack, is assembled, inspected and adjusted by moderately trained personnel at the service centre. This is similar to the adult bicycle model in high income markets. In comparison: the bike shop adds cost, but product quality for the user is kept high due to the quality of final adjustment, and because the relationship to manufacturers by their dealer network ensures feedback loop on product quality communications.

Shipping parts for local assembly might be especially suitable for large volume distribution in a locality that has a significant need but is currently not manufacturing other products of similar complexity. Opportunities may exist to learn from the above-mentioned approaches to explore how quality products can be delivered via the volume purchasing power and a value-engineering approach.

4.9. Generic suppliers that serve as contract manufacturers for NGOs and FBOs to produce quality wheelchairs may be able to supply LMICs cost-effectively but lack market visibility or scale

Wheelchair manufacturing has largely shifted to Asian countries, such as China, Vietnam and Taiwan. China’s large bicycle industry together with an extensive and diverse supply chain, indigenous supply of raw materials, high investment in production technology and volume manufacturing infrastructure makes for a very effective production base.

Most NGOs and FBOs use contract manufacturers in China. These companies have the manufacturing capabilities and excess capacity that could be used to serve LMIC markets, but lack understanding on what products are needed in these markets, who the potential buyers are and the size and demand of the potential market.

4.10. Product standards and specifications for wheelchairs in LRS have been developed or are in development, but uptake to guide purchasing and design has been limited

The *WHO Guidelines* also include guidance on minimum product quality standards, based on the user need. Quality standards provide requirements, specifications and guidelines to ensure products are designed and manufactured appropriately. In the *WHO Guidelines*, governments are encouraged to develop and adopt national wheelchair standards based on ISO 7176, the international standards for wheelchairs that evaluate the product's safety, durability, performance and product dimensions.

However, ISO 7176 does not test for factors typical for LRS such as rough terrain and environmental conditions, such as high humidity, exposure to water and sand, and high temperature that differ from HICs. Premature failures of wheelchairs in LRS may be due to shortcomings in product regulations, quality standards and testing. The community recommended that more rigorous standards be developed for wheelchairs in LRS as they are subject to these unique environmental and use conditions.²⁹

To improve reliability and usability of wheelchairs in LRS and guide product design, ISWP developed and published the *Design Considerations for Wheelchairs Used in Adverse Conditions*.³⁰ The document was created to complement the *WHO Guidelines* by providing more detailed information in designing wheelchairs for adverse environment and common pitfalls to avoid. In addition, ISWP developed protocols and equipment to test casters, rolling resistance and corrosion for adverse conditions, labelling it the ISO-Plus, but no specific pass/fail thresholds have been determined as of now.

While documents exist to guide design for LRS products, the acceptance and adoption by the wider community has been limited. Different interpretations of minimum quality standards has led to a spectrum of products that are designed with varying degrees of quality considerations. For example, Motivation has its own Product Assessment Tool that was developed in collaboration with Humanity and Inclusion (HI) and APDK. These differences limit the visibility to suppliers on what is appropriate for LRS. Building consensus among key stakeholders, in particular in the developing world, on minimum accepted quality standards that can be translated into country's national standards, could enhance market participation, while ensuring optimal performance and durability.

At the moment, most LMICs include limited specifications in their tenders, often even restricting the request to a single word, such as "wheelchairs". As a result, these countries may buy products that are not appropriate for their settings or for the users and lack desirable product features, including quality. The WHO, under the GATE Initiative, is developing Assistive Product Specifications (APS) for all assistive products listed in the Priority Assistive Products List,³¹ including wheelchairs. The APS should be adapted to the local context and aims to serve as a set of objective specifications to support procurement and guide suppliers about market needs. The APS for wheelchairs should be available in late 2019.

²⁹Anand Mhatre et al., 'Developing Product Quality Standards for Wheelchairs Used in Less-Resourced Environments', *African Journal of Disability* 6, no. 0 (8 September 2017): 15, <https://doi.org/10.4102/ajod.v6i0.288>.

³⁰International Society for Wheelchair Professionals, 'Design Considerations for Wheelchairs Used in Adverse Conditions', February 2018, https://www.wheelchairnet.org/ISWP/Resources/DesignConsiderations_WheelchairsAC_12142017.pdf.

³¹World Health Organization, 'Priority Assistive Products List (APL)', WHO, n.d., http://www.who.int/phi/implementation/assistive_technology/global_survey-apl/en/.

4.11. A lack of clarity on the ideal products required to serve the highest proportion of the population, as defined by a PPP, contributes to a fragmented market space.

Different NGOs and FBOs have different views on the trade-offs between quality and cost, which in combination with the need for various types and sizes, contributes to a high proliferation of stock keeping units (SKUs; a term that refers to a distinct type of item for sale).

Preferred product profiles (PPP) for different types of wheelchairs that would be appropriate for use in LRS can rationalise demand and increase market transparency. Similar to a target product profile used in drug development, a PPP that contains preferred criteria and specifications for a product that is appropriate for LMIC markets can, when backed by funders, provide strategic guidance to product design wheelchairs. While the WHO Guidelines give providers and programme managers a framework for product selection, there is no mechanism to evaluate products against the criteria in the WHO Guidelines. The APS will help buyers with procurement, but don't include guidance on the desired price points and specific performance standards for LRS conditions.

An opportunity exists to define a PPP for each of five product groups that providers should be able to choose from: 1) standard wheelchair; 2) active urban wheelchair; 3) active dual use/indoor-outdoor wheelchair; 4) active rough-terrain wheelchair; and 5) wheelchair with postural support. All products should be available for both adults and children.

CASE STUDY 5: USE OF A TPP IN COLD CHAIN EQUIPMENT

Cold chain equipment (CCE) is used for storing and transporting vaccines. Safeguarding vaccine quality is critical to extending the reach of immunisation services, especially for children living in remote locations, but many facilities in LMICs lacked functioning CCE.

Gavi, the Vaccine Alliance, supports immunisation programmes in eligible countries and in order to achieve its goals, Gavi created a new mechanism – the CCE Optimization Platform - to strengthen country cold chain systems by offering financial support and incentives for higher performing CCE.

The main objective of the CCE Platform is to get more cold chain equipment that is efficient, sustainable, and better performing deployed to every health facility where it is required at an affordable price. To achieve these objectives, Gavi is putting in place market shaping approaches and tools such as the improvement of product performance through the development of target product profiles (TPPs). Co-investment from Gavi through the Platform is only available for devices meeting future TPPs. By funding only these specific types of devices, Gavi accelerates the speed of development and adoption of specific technical requirements designed to improve equipment reliability.

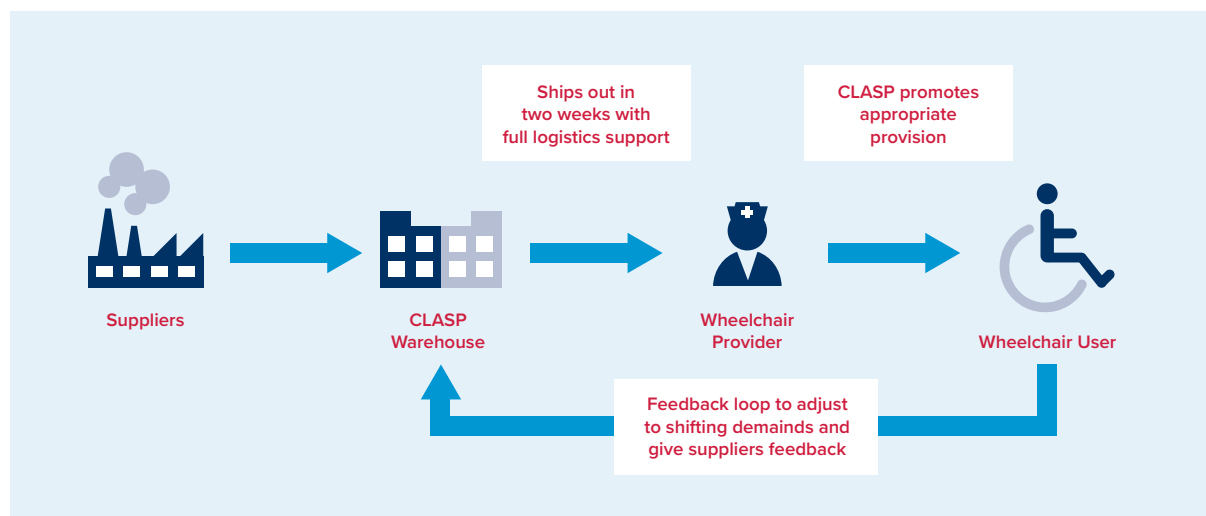
4.12. To address the challenges of a fragmented market landscape, USAID funded the development of a global distribution hub of context appropriate wheelchairs

A distribution hub may help address challenges faced by buyers and service providers in LMICs including product variety and size of order offered by individual suppliers, extensive lead times, and high logistical burden. Distribution hubs may support the increase in market visibility of appropriate, quality products and increase affordability of products by acting as a consolidating agent or pooling mechanism to take advantage of economies of scale through larger volumes for supplier. A distribution hub can benefit suppliers by serving as a global distributor that de-risks market entry for new products and supports marketing, sales and logistics, as well as providing a platform to expand market reach for suppliers.

Consolidating Logistics for Assistive Technology Supply and Provision (CLASP) is a USAID-funded, UCP Wheels for Humanity managed global consolidation or distribution hub launched in 2015. Through a consolidation hub in China, CLASP enables buyers to make large or small orders of mixed products and sizes, delivering mobility devices that best suit users' individual needs. It purchases, warehouses, consolidates and transports assistive products from a number of manufacturers and ships them directly to service providers (Figure 6). This mechanism allows buyers, from NGOs to governments to donors, increase access to preferences as they are able to make large or small orders of a variety of wheelchairs and related products from diverse manufacturers versus buyers purchasing a minimum number of one type from one supplier, while also reducing lead times as products are supplied from the warehoused stock.

CLASP includes an international competitive bidding process for the different products that are included in its portfolio. Through its Product Advisory Council (PAC), which is comprised of users, clinical and technical experts, CLASP evaluates the specifications, quality, price and function of products and makes recommendations for inclusion in the mechanism. The PAC sets a minimum threshold for each criteria for inclusion in the product catalogue. This criteria is shared with product suppliers and designers, which may influence quality improvement and product design in the longer term. The inclusion of the PAC process has helped limit perceived conflicts of interest and standardised the product selection process. Through its Committee of Suppliers, CLASP is able to increase market information for suppliers, including sales and product performance data. This data combined with feedback from the PAC may support suppliers to identify gaps in the market as well as product design and quality deficiencies to improve product quality and increase innovation.

FIGURE 6: HOW CLASP WORKS



While CLASP exemplifies the advantages of a global distribution hub to building and supplying demand for optimal, quality product, it has not been without challenges. CLASP buyers are primarily NGOs and USAID-funded programmes and procurement volumes have been low. Additionally, CLASP has seen limited success in accessing and responding to government tenders due to tender regulations and practices. The low procurement volumes limit availability of working capital to purchase products for warehousing and limits the ability of CLASP to take full advantage of pooled volumes and economies of scale. For example, as CLASP is not the exclusive distributor for suppliers, suppliers have sold directly to buyers below the manufacturer suggested retail price offered by CLASP and therefore, CLASP is perceived as having more expensive products.

5. Market Challenges

LMIC markets for wheelchairs are nascent, with a need to focus on demand creation. In order to make appropriate, affordable, quality AT available to LMICs in a sustainable manner, a number of criteria need to be met and therefore investigated. The demand and supply dynamics that have challenged the development of a wheelchair market are summarised below.

5.1. Demand

AWARENESS

There exists a lack of awareness around the need for and importance of appropriate wheelchairs among end-users, service providers and policymakers.

At the policy level: Policymakers lack awareness and data on the need, importance, and impact of appropriate wheelchairs for users and society. This affects prioritisation in policy, programmatic, personnel's training, and financing decisions. Adoption of the *WHO Guidelines* on wheelchair provision for LRS has been limited at the country level and mostly driven by NGOs.

At the provider level: Wheelchair service provision and training on seating and positioning is often not seen as part of the scope of practice for relevant professionals such as physical therapists, occupational therapists, orthotists and prosthetists. Training packages, such as the WSTP, have not been adopted in training curriculums or by professional associations.

At the user level: Most wheelchair users in LMICs are marginalised members of the community who are not empowered with knowledge on appropriate wheelchairs. When users do not understand the importance of an appropriate wheelchair or do not know that multiple types exist, they will prioritise the lowest cost option or accept an inappropriate wheelchair delivered through mass-distribution.

Among the public: The public can stigmatise a person for using a wheelchair, this can prevent or limit use. Furthermore, the buildings, transport systems and large parts of the built environment remain inaccessible to wheelchair users, meaning they are excluded or take undue risks (e.g. wheeling on busy roads).

POLITICAL WILL

Government involvement is low. Donor funding that fills this gap and supports 'free' product inhibits the development of a public market.

Only recently have many LMICs developed national policies for people with disabilities, so the implementation has not reached optimal levels.

Low prioritisation from governments results in limited to no financing for the purchasing and provision of appropriate wheelchairs. Where funding is available, the amount is low and often divided across different Ministries, with lack of coordination. There is little investment by government to set up the systems and train providers.

Charitable organizations, supported by independent donations, drive the funded demand in LMICs. The donor landscape is concentrated around two FBOs, followed by multiple NGOs providing wheelchairs through a variety of access points in local communities. These organisations emerged to fill gaps not being met by government; however, key informant interviews suggest that delivery by these actors has inhibited government engagement, possibly due to government perception that other organizations are meeting user needs and therefore there is not a role for government to play.

PROVISION**The capacity for service provision in line with the *WHO Guidelines* is limited.**

Due to a lack of awareness, prioritisation and investment in this sector, even donated products are often not provided through a wheelchair service, resulting in a lack of users being appropriately assessed and fitted. Countries lack providers that are trained in line with the WSTP. Misconceptions that providing the product is sufficient and desire to 'do good' leads to mass-distributions of wheelchairs where no user-assessment and fitting by trained personnel are conducted and no follow-up or maintenance is available. Where trained providers exist, they are concentrated in a few urban areas or in specialised or NGO hospitals that are inaccessible or unknown to users.

Countries and providers often lack the willingness to invest in more comprehensive training modules, particularly for fitting more users with more complex seating needs. Experience suggests that once people start participating in training and see the value of appropriate fitting and difference it can make, then they demand more training to meet more users' needs. Getting sufficient training funded at the outset is often very hard for the reasons mentioned above. Currently, funding is overly invested in the purchase of wheelchairs, with limited amounts invested in training for proper provision, even though the per unit training costs are minimal.

FINANCING**There is a lack of financing - both public and private - for the purchase of appropriate wheelchairs.**

Governments lack policies or insurance schemes that allocate funds for wheelchair procurement and provision. When funds are available, they are insufficient and therefore governments look to purchase the cheapest products that they are aware of, which are often of low quality. Frequently, transport-type wheelchairs for temporary users rather than wheelchairs appropriate for long-term users are purchased. Lower quality chairs have a short life span and can increase long-term costs to the public system.

For many people who need a wheelchair, even low-cost wheelchairs are priced above the ability to pay, so out-of-pocket payments are limited or non-existent, especially among the poorest.

Small user contributions have been used by some NGOs to gain user buy-in to the maintenance of the product and to increase user engagement. There is limited evidence if user contributions reduce abandonment or breakdown rates.

PREFERRED PRODUCT PROFILE**Limited consensus on a range of preferred product classes and no commonly accepted objective measure of what is an appropriate wheelchair has contributed to a proliferation of products.**

Different interpretations exist among global stakeholders about the minimum quality standards for wheelchairs in LRS environments that ensure products are robust and durable. Some organisations have developed tools to assess quality, but acceptance and adoption is limited.

In addition to a lack of consensus on quality standards, NGOs and FBOs have designed and manufactured their own range of products, which contributed to fragmentation in financing, procurement and product design. FBOs have significant buying power, but the focus on controlling costs has led to these organisations designing their own product range rather than buying existing products. Many NGOs on the other hand often operate a social enterprise model where revenues from wheelchair sales are an important income stream to sustain other programmes.

5.2. Supply

APPROPRIATE DESIGN

Limited feedback loop from end-users to inform product design and innovation.

The initial focus to design and develop wheelchairs that are lower cost and more robust in LRS has led to products that are typically heavier and less portable compared to HIC markets. Both the portability as well as the style are deemed important by users to reduce stigma, which points to a lack of user-centred design.

Research is ongoing to look at the issue, but this research is often not initiated by or in collaboration with the manufacturers and their research and development teams. One of the best ways to obtain feedback from users is to have a presence in the field, which has supported the dual role of supplier and service provider used by Motivation or UCP Wheels. However, these NGOs have difficulties finding and accessing early-stage investment for product R&D to bring new or improved products to market. Distribution hubs may be able to pool user feedback from disparate environments and buyers for suppliers.

PRODUCTION ECONOMICS

Manufacturing economics for current appropriate products are unfavourable.

Small volumes and wide range of SKUs lead to inefficient manufacturing schedules and increased production costs. Annual volumes from NGOs and FBOs are low, with the exception of FWM and LDS Charities. Low volumes lead to higher raw material costs and a higher number of changeovers on production lines, increasing downtime. Low volumes also limit the investment case for: 1) lines with a higher capacity and lower incremental capital investment per unit produced; and 2) the automation of certain production steps in order to increase throughput.

Demand is commonly driven by donor purchasing, with erratic procurement patterns. Similarly, some governments tend to buy in cycles. Because wheelchairs are costly and relatively bulky products to store, suppliers need a high amount of working capital to hold a good stock level and suppliers will mostly produce to order, which complicates the workforce and production planning.

COMPETITIVE LANDSCAPE

Leading global manufacturers have limited interest in entering LMIC markets.

Leading global manufacturers, such as Invacare or Sunrise, do not invest in products and systems to supply LMIC markets because they don't see the pathway to profitability. As a result, these companies are trying to fit HIC models and approaches into an LMIC context. This includes a bespoke production model and the need to work with distributors that provide customisation support. Such approaches further increase cost in markets where there is limited ability to pay and opportunity for value creation.

Governments have a preference for locally manufactured products.

Governments perceive wheelchairs as relatively simple to manufacture and a good case to create employment opportunities for people with disabilities. However, the market shows that due to limited demand, many local manufacturers struggle to reach scale to produce cost-effectively and competitively. Due to the relatively high capital expenditure required to set up a level of automation and/or working quality control systems, local manufacturers are often smaller, artisan workshops, producing lower quality products than what could be sourced elsewhere.

COST-EFFICIENT SUPPLY CHAINS

Limited use of cost-effective supply mechanisms.

Most wheelchairs are manufactured in China and shipping costs are high. CLASP has been designed to reduce transaction costs while making supply more efficient and appropriate. Uptake has been limited for the variety of reasons outlined above, including that it is often less expensive to procure directly from the manufacturer.

High import taxes increase price to the final payer.

High import taxes for raw materials and parts increases the cost of local manufacturing making local products less competitive than assembled, imported products, which often benefit from tax breaks or exemptions. High import taxes on spare parts also hinders the ability to have spare parts for maintenance available.

5.3. Enablers

QUALITY

Limited quality assurance mechanisms at the demand and supply side.

Demand: Where countries have funding, they select low quality, cheaper products that do not meet the needs of users. Quality standards and product specifications for what constitutes appropriate product and provision are not in place. When government puts out a tender for wheelchairs, often the only information they have is price.

Supply: Due to the lack of regulation around quality assurance in many LMICs the quality assurance approaches from suppliers into LMIC markets is effectively voluntary and often driven by the business philosophy of the supplier. Quality assurance is an added cost, therefore many suppliers will not undertake testing if not paid for or necessitated by regulation. In contrast NGOs' suppliers, will generally necessitate quality testing – due to funder requirements and restrictions, – which adds cost to their product. Therefore NGO wheelchairs are less attractive to LMIC governments than contracting directly with - for example - a standard Chinese supplier whose quality may be substandard.

PROCUREMENT

Fragmented funding drives fragmented procurement and limits reach.

Fragmentation across the NGO and public sector limits the ability to aggregate demand and incentivise volume- and value-based procurement. It contributes to a lack of visibility and data on actual demand. In many cases, the presence of a charity model masks the actual demand for appropriate wheelchairs.

NGO sector: FBOs, NGOs and CSOs, such as Lion's Club or Rotary Club, consolidate monetary and product donations to then be provided to the community that they work in. Products are often distributed at different levels with little to no coordination, which leads to unequal distribution of the limited resources that are available. For example, one community could receive wheelchairs multiple times a year from campaigns, while other localities are never reached.

Public sector: Where a public payer does exist in LMICs, funding is fragmented across ministries or difficult to access. Ministries may not routinely budget for wheelchairs and often submit orders or accept donations in an ad-hoc manner. Limited record keeping and visibility on who has previously received products leads to some end users receiving multiple wheelchairs and others who are never reached.

Procurement is often not linked to service delivery so inappropriate product types are selected. This contributes to an inability to forecast for a mix of appropriate products.

MARKET VISIBILITY

There is limited to no data on unmet need and funded demand for appropriate wheelchairs in LMICs.

Buyers: lack understanding of available and quality suppliers and their product offerings. Purchasers are unable to make informed choices when navigating a highly fragmented, unorganised market of suppliers with a vast product mix. Frequently products can be received but are then not used as they are not fit for purpose leading to further invisibility of the market.

Suppliers: lack of demand information such as visibility to government tenders and capacity to respond to government tenders that do exist limits investment in production capacity and allocation of capacity for appropriate products thus increasing transaction costs.

STRATEGIC APPROACH TO MARKET SHAPING

6. Proposed Strategic Approach to Market Building and Market Shaping for Wheelchairs

To overcome these market challenges and build and shape the market for wheelchairs, a multi-pronged approach that is informed by a long-term vision towards a sustainable market for appropriate wheelchairs and their provision in LMICs is required. This section describes the proposed strategic objectives and long-term target outcomes to achieve this. For each strategic objective, an initial set of activities is proposed that would deliver the outputs required to support the target outcomes. Many of the activities are interconnected.

STRATEGIC OBJECTIVE 1: Build and stimulate demand through the integration of wheelchair services, including procurement & provision, into healthcare systems

BARRIER ADDRESSED	Low and erratic demand in LMICs with limited government engagement and funding.
RATIONALE	<ul style="list-style-type: none"> • There is limited awareness within government on the need for and return on investment for appropriate wheelchairs. • Integrating the provision of wheelchair services into the health sector could drive regular purchases from government, leveraging existing infrastructure and capacity for service provision, product distribution and procurement. • Health systems are well suited to support user identification, service delivery and procurement in particular for remote settings in LMICs. • Buying appropriate wheelchairs and pressure relief cushions can be cost-saving overall to the health system by offsetting negative health outcomes.
PROPOSED ACTIVITIES	<p>Support the integration of wheelchair provision into the health system at country-level:</p> <p>In a sub-set of identified countries [selection process to be developed], increase provision through integration, expanding and further developing proven models for delivery. This includes: 1) mapping the provision landscape and need, where appropriate; 2) developing a roadmap or strategy to integrate wheelchair services into the national health system; 3) developing or expanding personnel and capacity for service provision, including follow-up and maintenance. Document learnings to inform the global toolkit.</p>

	<p>Develop advocacy and implementation toolkit to be used by decision-makers to integrate wheelchair provision into the health system: Develop and disseminate tools to support the implementation and advocacy at government level, including: 1) tools to model the need; 2) investment case for integration of wheelchairs, including financial and societal return on investment (ROI); 3) a road map template including policy, guideline development, procurement guidelines and operational management guidance that can support countries with the integration of services; and 4) a sample budget impact model for scale-up.</p>
TARGET OUTPUTS	<ul style="list-style-type: none"> • Unmet need better understood and quantified • Improved awareness of the need for, and value of, appropriate wheelchairs • Demand generated (sustainably and predictably) in a number of countries • Model for integration tested and evaluated for scaling to meet need that: <ul style="list-style-type: none"> ▪ Improves ownership and coordination ▪ Provides quality-assured product through services
LONG-TERM OUTCOME	<p>Predictable, sustainable and sufficient demand for appropriate, quality wheelchairs which leads to positive outcomes for wheelchair users.</p>

STRATEGIC OBJECTIVE 2: Pool resources to catalyse increases in funded demand and to limit fragmentation in the market

BARRIER ADDRESSED	<p>Fragmented market driven by a lack of coordination among buyers of wheelchairs for LRS and a limited focus on deploying the available resources to effectively support the development of a public sector market.</p>
RATIONALE	<ul style="list-style-type: none"> • Across various LMICs, donors operate parallel delivery systems that often lack coordination with the government. • Successes in other health areas show that viable LMIC markets can be developed through partnering with governments, and with targeted support from donors. • Opportunities exist to expand domestic expenditure and catalyse government participation for both product procurement and service delivery, potentially using innovative financing mechanism (e.g. results-based financing & co-financing). • Pooling the available resources - both donor and government - allows for the channelling of resources to a single payer, thereby strengthening purchasing power, increasing market visibility to suppliers and predictability in funded demand.
PROPOSED ACTIVITIES	<p>Test model(s) to pool resources from key donors: Facilitate and test innovative models with select donor(s) to leverage available resources. This may include, match funding, subsidy, product purchasing support, etc.</p> <p>Leverage donor funds (e.g. from FBOs) to activate government purchasing and unlock additional resources: Work with donors and government to commit resources (in line with innovative funding model, such as match funding) towards wheelchair purchasing or provision, supporting integration into government-owned supply chain.</p>
TARGET OUTPUTS	<ul style="list-style-type: none"> • Government payer activated • Purchaser landscape consolidated and buyer power strengthened • Increased funding predictability • Increased market visibility • Key donors commit to taking proven innovative funding approach to scale
LONG-TERM OUTCOME	<p>Donor funding is effectively deployed to catalyse funded public demand and strengthen systems for the provision for appropriate wheelchairs</p>

STRATEGIC OBJECTIVE 3: Strengthen procurement via adoption of specifications and standards, improved tendering and increased market information

BARRIER ADDRESSED	<ul style="list-style-type: none"> • Proliferation of low-quality products that do not meet end-user needs • Inability to support value-based negotiations • Opaque market environment with limited information available to suppliers and buyers
RATIONALE	<ul style="list-style-type: none"> • Aligning on product specifications and/or a PPP that establishes product quality standards, specifications and target pricing can increase transparency for purchasers, such as government programmes, and suppliers. Thus, making procurement easier for governments, potentially supporting value-based price negotiations, centralised contracting or donor co-financing. • A procurement or distribution hub that rationalises supply and negotiates directly with suppliers may serve as a step toward centralised contracting.
PROPOSED ACTIVITIES	<p>Develop PPP to be adopted into countries' procurement:</p> <ul style="list-style-type: none"> • Establish baseline set of standards and specifications for products in LRS; • Develop key strategic document that communicates PPP requirements for products that fulfil priority needs. The PPP includes desired specifications and requirements, including on environmental conditions, quality and cost; • Develop standards in line with PPP that would be applied to support quality testing and implement testing body with easy to access testing centres. Promote the adoption of new wheelchair standards by ISO; • Advocacy with donors/funders (donors, UNICEF SD, governments, NGOs, FBOs, etc.) should be targeted to emphasise buying only products meeting the minimum requirements and specifications as outlined in the PPP. <p>Increase market visibility:</p> <ul style="list-style-type: none"> • Develop a market intelligence platform that tracks supply and buyer landscape, including data from UNICEF, CLASP, ATscale and AT2030 initiatives, and other field practitioners and NGOs. <p>Strengthen procurement and distribution mechanisms to ensure the ability to meet market needs:</p> <ul style="list-style-type: none"> • Work to increase market information, including upcoming tenders and volumes, available to procurement mechanisms, such as UNICEF SD, CLASP and others; • Include products meeting PPP specifications (and future products meeting PPPs) within global procurement mechanisms, such as UNICEF Supply Division catalogue; increase country knowledge on product availability; • Assess and further develop distribution hub models, such as CLASP, by increasing its independence, diversifying its funding base, reducing product acquisition cost and supporting capacity to increase scale, product range, reach and responsiveness.
TARGET OUTPUTS	<ul style="list-style-type: none"> • Increased visibility of quality suppliers in the market with products that meet PPPs • Demand rationalised as the requirements of buyers are standardised • Buyers have adopted standardised product specifications and standards (in line with PPP) and implemented procurement principles to adopt quality, appropriate product
LONG-TERM OUTCOME	<p>Transparent flow of information on demand and supply enables the market to grow in a cost-effective manner.</p>

STRATEGIC OBJECTIVE 4: Identify and support cost-effective supply systems

BARRIER ADDRESSED	<ul style="list-style-type: none"> • Unfavourable manufacturing economics and high shipping costs significantly increase the cost to LMIC payers. • Governments may prefer 'local products', therefore limiting international supply and uptake of international distribution mechanisms (e.g. CLASP).
RATIONALE	<ul style="list-style-type: none"> • Proven models of affordable, quality, localised supply exist. • Manufacturers of quality, low-cost wheelchairs or wheelchair components exist that could meet LMIC market needs. • Increasing the use of globally recognised minimum quality standards may help filter out lower quality manufacturing in support of new mechanisms for cost-effective supply.
PROPOSED ACTIVITIES	<p>Improve understanding of the economics of local manufacturing versus local assembly: Conduct detailed analysis on the economics of local assembly versus local production in specific countries to support government decision makers and private sector business development units.</p> <p>Test models for localised cost-effective supply systems: Work with (local) suppliers already operating in LMICs and/or with large global suppliers to test approaches for the supply of products that meet quality and price goals. This may include – for example – facilitating a joint venture, supporting licensing agreements between social enterprises and contract manufacturers or supporting the development of a (regional) distribution network.</p>
TARGET OUTPUTS	<ul style="list-style-type: none"> • Governments have the tools and information required to make informed investment and procurement decisions regarding localised production • Proven model for a responsive and cost-effective supply of appropriate wheelchairs in country
LONG-TERM OUTCOME	A healthy supplier base of quality, appropriate products for LMICs that are delivered at optimal prices that can efficiently service market needs.

It is recommended that some of the activities outlined above occur prior to others, while some may stand-alone as discrete pieces of work:

- **On the demand side**, by first testing the integration of provision into the public health system, demand will be generated in a few countries (Strategic Objective 1). This could be supported by parallel engagement with donors to pool available resources (Strategic Objective 2); however, the testing of innovative financing mechanisms could follow-on later, either in the countries targeted by Strategic Objective 1 or in a different set of countries that already have some level of provision in place.
- **On the supply side**, analysing the cost structure of a wheelchair and establishing the economics of local manufacturing versus local assembly will inform decision-makers who see complete local manufacturing of wheelchairs as the most viable option (Strategic Objective 4). Cost information can support the development of the PPPs, which will be a longer consensus process as stakeholders will need to agree on the ideal specifications, supporting standards, and testing process for each wheelchair category (Strategic Objective 3). Other activities on the supply side, such as the development of a market intelligence dashboard, and targeted support to procurement hubs, may occur at any time and are less influenced by the other activities (Strategic Objective 3).

7. Next Steps

This product narrative was developed to support identification of activities that will increase and sustain access to appropriate, affordable wheelchairs. ATscale is currently in the process of developing a prioritisation process to inform which of the market shaping activities proposed above will be incorporated into the Partnership's initial action and investment plan to guide activities and investment in the short-term. While that is underway, some of these proposed activities will be undertaken in the immediate term by the UK aid funded AT2030 programme in line with its aim to test what works to increase access to affordable AT.

As interventions are shown to be effective and learnings and outputs from initial investments emerge, they will support a longer-term sector-wide strategic plan. It is expected that different large-scale investments and financial instruments will be needed to achieve long-term outcomes. For example, system strengthening grants may be needed to support the integration into the health system, while match funding or co-investments may catalyse government procurement and investment. On the supply side, donor investment may be leveraged to de-risk private investment in cost-effective supply mechanism.

ATscale welcomes feedback on the articulated approach and seeks collaboration with partners interested in aligning their activities with the proposed strategic approach to market shaping.

APPENDIX

APPENDIX A: INDIVIDUALS INTERVIEWED OR CONSULTED

ORGANISATION	NAME
ATscale	Alison End Fineberg
Beeline Wheelchairs	Mark James Richard
CE Mobility	Rodney Outram
Dare Consult	Elsje Sophia Scheffler
Diversability Development Organization	Sharmini Constantinescu
El Comité de Rehabilitación - Colombia	Sara Munera
Free Wheelchair Mission	Don Schoendorfer
GDI Hub	Vicki Austin
	Catherine Holloway
	Richard Frost (Consultant)
Independent Consultant	Mark Sullivan
International Disability Alliance	Ana Lucia Arellano
International Society of Prosthetics and Orthotics	Claude Tardif
International Society of Wheelchair Professionals	Jon Pearlman
	Mary Goldberg
LDS Charities	Eric Walter Wunderlich
LeTourneau University	Karen Rispin
Loh Medical	Perry Loh
Massachusetts Institute of Technology	Matt McCambridge
Motivation Charitable Trust and Motivation Direct Ltd	David Constantine
	Amanda Wilkinson
	Tamsin Langford
	Jane Parker
Motivation Romania	Cristian Ipas
Norad	Ivar Evensmo

Office of WHO Ambassador for Global Strategies	Phyllis Heydt
Participant Assistive Products	Keoke King
Pan American Health Organization	Antony Duttine
Permobil	Karin Leire
Philippines Society of Wheelchairs Professional	Cheryl Ann
Rehasense	Roger Dutton
Rough Rider America, LLC	Mark Krizack
Shonaquip	Shona McDonald
Sunrise Medical India (Scoot Wheelchairs)	Vinod Krishnan
UCP Roda Untuk Kemanusiaan Indonesia	Tri Wibawa
UCP Wheels for Humanity	Perth Rosen
	Leesa Hagens
UK DFID	Sara Boiten
	Sophie Bracken
	James Droop
	Anne MacKinnon
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	Dennis Soendergaard
University of Limerick	Rosemary Gowran
Universidad CES - Colombia	María Luisa Toro Hernández
USAID	Michael Allen
	Amy Lin
	Nikki Tyler
Whirlwind Wheelchair International	Bruce Curtis
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	Wei Zhang
WHO Regional Office for Europe	Satish Mishra

The ATscale Forming Committee was consulted throughout the report development process. The ATscale Forming Committee is comprised of China Disabled Persons' Federation, Clinton Health Access Initiative, Global Disability Innovation Hub, Government of Kenya, International Disability Alliance, Norwegian Agency for Development Cooperation, Office of the UN Secretary-General's Special Envoy for Financing the Health Millennium Development Goals and for Malaria, UK Department for International Development, UNICEF, United States Agency for International Development, and the World Health Organization.





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