Annex 1:
China Assistive Product Supplier Landscape

CLINTON HEALTH ACCESS INITIATIVE

ATscale
GLOBAL PARTNERSHIP FOR ASSISTIVE TECHNOLOGY
Hosted by UNOPS

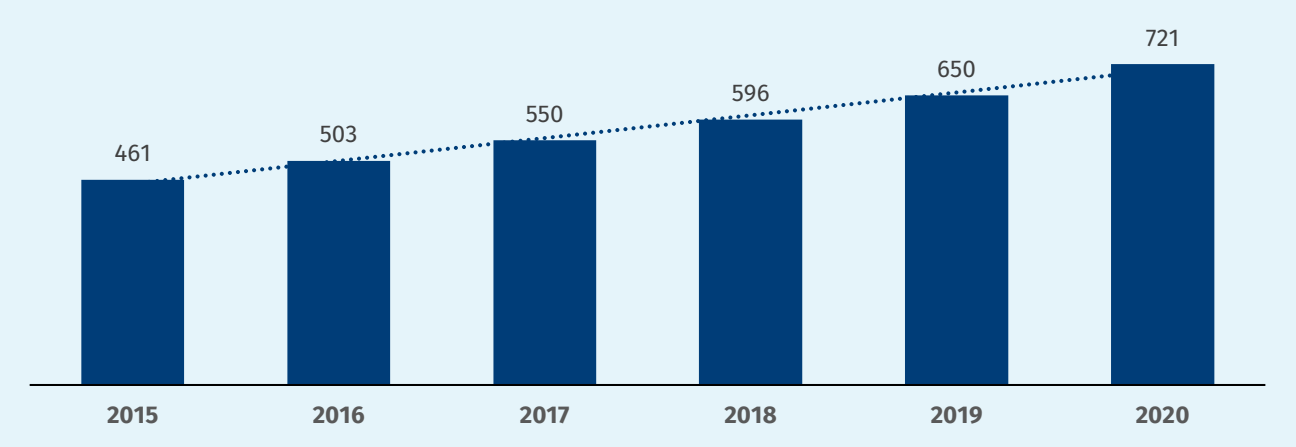
Table of Contents

Introduction

China is the world's largest domestic market and a key global manufacturing hub for assistive products. According to recent estimates, a significant proportion of assistive products available globally are manufactured in China. For instance, over 50 per cent of global spectacles exports and over 60 per cent of global hearing aids are made in China [1][2]. Furthermore, China's overall rehabilitation assistive products market has been growing 9.4 per cent year-on-year since 2015, which is estimated to be higher than global average [3]. The AT market growth in China is driven by two critical factors:

1. Large and growing domestic demand: As of 2023, China has 86 million persons with disabilities and 297 million people over 60 years old [4][5]. The population over 60 years old has grown to 21.1 per cent of the total population in 2023 and is projected to exceed 33.3 per cent by 2050 [6]. As one of the key AT used among elderly population, research shows that from 2016 to 2022, the market size of manual wheelchairs in China grew from US$590 million to US$1 billion [7].
2. Strong policy support: In 2016, the State Council launched the first national guideline "Several Opinions of the State Council on Accelerating the Development of the Rehabilitation Assistive Devices Industry, State Issue [2016] No. 60" to accelerate the growth of the assistive technology industry, aiming for a market size of RMB700 billion (~US$97 billion) by 2020 [8]. This guideline positioned the AT industry as a national priority and has led to the development of many relevant policies and regulatory changes on both the demand and supply sides for persons with disabilities in China. With this support, the industry has shown robust expansion over the past decade.

Figure 1: Market size of China's rehabilitation assistive product[1] industry from 2015 to 2020 (Unit: 1 bn RMB, equivalent to US$140 mn) [3][9]



China is home to thousands of manufacturers producing across 10,000 different types of assistive products [9]. According to the China Association of Assistive Products, from 2016 to 2020, the number of Chinese wheelchair companies grew by 51.3 per cent, those producing or selling hearing aids by 142.5 per cent and those producing or selling prostheses by 85.8 per cent [10]. By 2020 the total number of companies in these three segments exceeded 25,000 — a fivefold increase from 2010. Several global leading companies have manufacturing plants in China such as EssilorLuxottica (spectacles), Ottobock (prostheses) and GN (hearing aids).

China's assistive products supply is characterized by competitive pricing and diverse product range. Key drivers are strong manufacturing capability, supply chain advantage, and policy support. However, China's manufacturing capability still focuses more on low to mid-end products compared to countries with longer manufacturing experience, such as Europe, the US and Japan. The overall supplier landscape is fragmented, consisting of small- to medium-sized suppliers (< 100 staff) with limited publicly available information on their product quality and pricing. This makes it challenging for global buyers to find suitable suppliers offering affordable, high-quality products.

This report provides an overview of China's supplier landscape for five assistive products (Digital AT, spectacles, hearing aids, prostheses and wheelchairs). It examines the manufacturing landscape for these products in China, identifies suppliers capable of and interested in supporting low- and middle-income countries (LMICs) assistive product sales. The report also explores growth trends, challenges and opportunities for China's

[1] Definition of "Rehabilitation assistive product" in China can be found at "China Catalogue of Rehabilitation Assistive Products (2023 Edition)". It includes both rehabilitation devices and assistive products.

exports to LMICs and provides recommendations for global stakeholders to better leverage China's AT manufacturing capability to benefit persons with disabilities worldwide.

Research methodology

The report is informed by primary and secondary research. It includes a literature review of China's supplier landscape, focusing on suppliers with export experiences to LMICs. A survey was also conducted through the China Assistive Devices and Technology Center for Persons with Disabilities (CADTC) to gather information on suppliers interested in expanding into LMIC markets. Additionally, over 20 suppliers were interviewed and 10 site visits were conducted. Suppliers selected for interviews and site visits were chosen based on their manufacturing capabilities, previous experience in LMICs and interest in expanding into these markets.

In total, 90 suppliers responded to the survey, 66 of whom supply the five priority assistive products (9 supply digital AT, 12 for vision aids (including spectacles), 16 for hearing aids, 20 for prostheses, 31 for wheelchairs and the rest mainly for walking aids and sickbeds).[2]

Please note that only a small set of spectacles, such as low-vision products, are classified as assistive products in China; spectacles for myopia and presbyopia do not fall into the AT category. Therefore the survey is not designed to target spectacles suppliers, the data for the spectacles section are mainly derived from desktop research and expert interviews.

[2] Note: some manufacturers supply more than one priority assistive product.

Scope and limitations

This report focuses on five priority assistive products. Moreover, the report focuses on assistive products that meet WHO assistive product specifications [11]. This excludes low-quality products, which are prevalent in LMICs.

The suppliers in this report are mainly those currently exporting to or interested in LMIC markets. Suppliers primarily focus on domestic or high-income markets are not captured as they do not prioritize products tailored to LMIC needs.

Most data are based on self-reports from suppliers who participated in the survey and interviews. These data have not been independently verified, so readers are advised to carefully interpret the information.

Given that spectacles are not classified as assistive products in China, the spectacles suppliers participating in the survey are limited compared to the large supplier base in the country. The team has tried to identify those interested in and capable of LMIC sales through desktop research and interviews, but readers are advised to interpret the findings with this context in mind.

Overview of Chinese assistive products export to LMICs

Company size and sales pattern

Most Chinese suppliers are small to mid-sized enterprises (< 100 staff). Around 80 per cent of the respondents reported annual revenue under US$5 mn. Correspondingly, most respondents' export revenue to LMICs is below US$2 mn per year.

Chinese suppliers export to LMICs through three main channels: 1. as Original Equipment Manufacturer (OEM)/Original Design Manufacturer (ODM) for global brands or NGOs; 2. via exporters and distributors (mainly connected via participating in-person EXPOs); and 3. through direct sales, either by responding to tenders or via e-commerce. Branded sales remain limited, with only 9 respondents (17 per cent) registering their own products in LMICs, primarily in Asia. Some larger suppliers have dedicated sales representatives for LMICs, but very few have local offices. Given this, Chinese manufacturers mainly deliver after-sales services either via local LMIC partners or remotely.

Overseas manufacturing in LMICs is also very limited. Out of all manufacturers who participated in the survey or interviews across 5 product categories, only two spectacles manufacturers have set up manufacturing plants in LMICs.

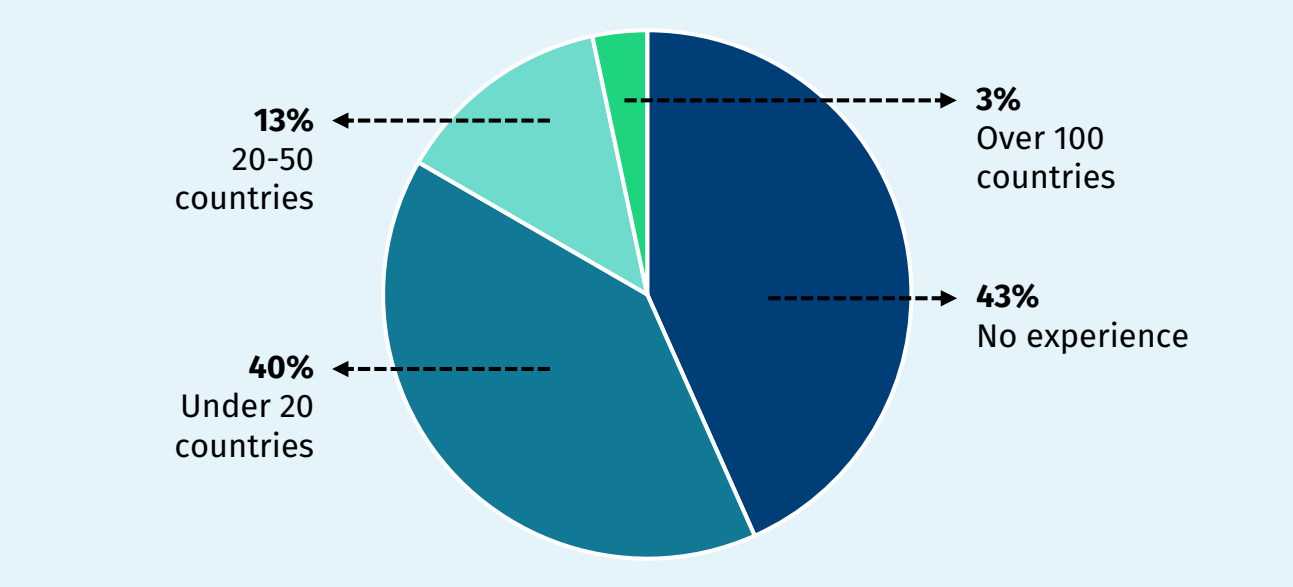
Survey respondents expressed strong interest in increasing their engagement in global public sector sales, and many have attempted to do so. For government tenders, most respondents indicated that they participate through local distributors or partners due to the need for local registration and government relationships. Regarding NGO procurements, suppliers tend to reactively wait for opportunities rather than proactively seek them out, given the fragmented and limited volume of NGO procurement.

For tenders like those from UNICEF Supply Division, while most suppliers are interested in responding, they face several challenges: 1. lack of awareness of such tenders; 2. limited understanding of the global market, leading to uncompetitive pricing; 3. lack of international standards required by UNICEF, such as ISO 7176 wheelchair standards or medical equipment certificates for hearing aids; and 4. inexperience in responding to public tenders directly, including unfamiliarity with the procedure, the level of detail required, the timeline, and the communication methods.

Companies exporting to LMICs

Among the 90 survey respondents, 51 (or 56 per cent) have already sold to LMICs (see Figure 2). Nearly all companies confirmed their interest in future sales to LMICs and 7 in 10 have shown interest in joining international initiatives, including product donations.

Figure 2: Number of LMICs exported to by survey respondents



Asia is the top export destination for Chinese suppliers. The table below shows the top 10 LMIC sales destinations. LMICs geographically close to China, such as the Philippines, Viet Nam and India, are the most common sales destinations. However, more distant countries like Bolivia, Egypt and Kenya also show significant interest in Chinese products.

Table 1: Top 10 LMIC sales destinations for the survey respondents

#	Country	# of suppliers	Region
1	The Philippines	31	Asia
	Viet Nam	31	Asia
3	India	29	Asia
4	Cambodia	20	Asia
	Ukraine	20	Europe
6	Pakistan	17	Asia
	Myanmar	17	Asia
8	Bangladesh	14	Asia
9	Uzbekistan	13	Asia
10	Mongolia	12	Asia
	Laos	12	Asia
	Bolivia	12	Latin America
	Egypt	12	Africa
	Iran	12	Asia
	Kenya	12	Africa

This growing interest in LMIC markets is driven not only by rising demand but also by intense competition in the domestic market. Several suppliers have highlighted the fierce domestic competition and the associated price wars that erode their margins. According to one of China's largest wheelchair suppliers, they have observed an approximate 40 per cent decrease in their domestic market sales and are therefore actively strengthening their exports.

Quality

Most assistive products are regulated and inspected by the State Administration for Market Regulation (SAMR), the national government agency responsible for overseeing market regulation, product quality and fair competition. Some assistive products, such as manual wheelchairs and hearing aids, are also classified as medical equipment and therefore receive additional regulations and inspections by the National Medical

Products Administration (NMPA), China's regulatory authority responsible for the supervision and administration of drugs, medical devices and cosmetics.

National quality standards have been developed for all key assistive products. Many assistive product standards in China are primarily developed based on ISO standards with equivalent application. Core parameters, such as fatigue testing criteria, generally maintain consistency with ISO standards, incorporating only minor adaptations for Chinese conditions and needs. For example, some products may require slight modifications to account for anthropometric differences between Asian and Western populations or local usage environments.

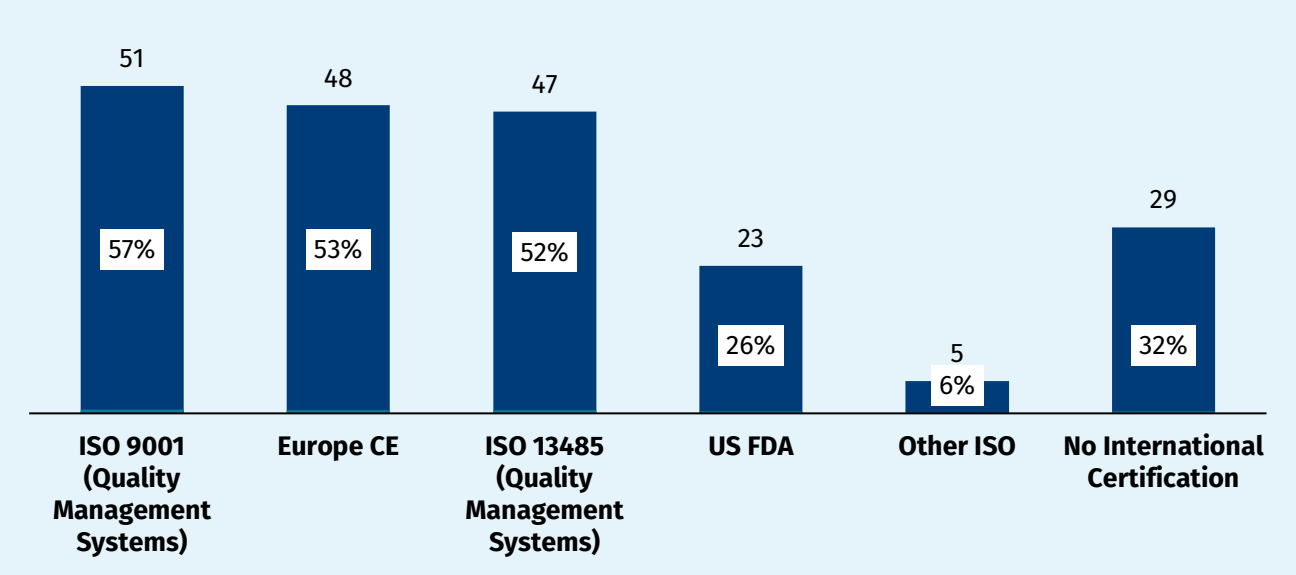
Table 2: Quality management of different assistive products in China[3]

Product category	Classified as assistive product?	Classified as medical equipment?	Illustrative national quality standards
Spectacles	Yes for low vision No for myopia and presbyopia	No for myopia and presbyopia	• Lenses (GB 10810) • Near-vision spectacles (GB 13511) • Frames (GB 14214)
Hearing aids	Yes	Yes, Class II medical device	• BTE hearing aids (GB/T 14199)
Wheelchairs	Yes	Yes, manual wheelchair is Class II medical device	• Manual wheelchairs (GB/T 13800)
Prostheses	Yes	No	• Modular units of the lower limb prosthesis (GB 14723) • Structural testing for lower limb prostheses (GB/T 18375)

[3] Details for each product can be found in the following respective sessions.

Regarding international certifications, approximately 70 per cent of survey respondents report having attained one or more international certifications. The table below summarizes the key certifications obtained. Over half of the respondents have Europe CE, ISO 9001, or ISO 13485 certification, and around one-fourth have obtained US FDA approval.

Table 3: The international certifications held by survey respondents



Competitiveness

China's competitiveness lies in its high production capacity, low prices, extensive product categories and efficient delivery. These advantages stem from several factors. For example, each assistive product has multiple dedicated manufacturing hubs in China, supported by local government initiatives such as subsidies, tax incentives, accelerated product approval and specialized industrial parks that centralize resources for production, warehousing, logistics, quality inspection and R&D. Other factors include productive labour, low-cost logistics, a comprehensive supply chain and rich OEM/ODM experience in AT manufacturing.

In addition, China is strategically upgrading its AT innovation capabilities, transitioning from its historical concentration on low-to-mid product models. A study in 2023 shows that most Chinese AT suppliers used to have few patents, with many copying products they previously manufactured for global brands [12]. This resulted in low product differentiation, intense price competition, and low brand awareness in the global market.

The industry recognizes the need for innovation and industrial upgrading, evidenced by growing AT exhibitions, contests and innovation hubs. Many research institutions and manufacturers are also launching related innovation projects. However, commercializing these products and achieving large scale industrial transformation will require a longer time.

Table 4: Examples of assistive technology innovation events in China

Name	Main organizer	Description
Exchange Event for Promoting Innovative AT for PWDs	China Association of Rehabilitation of Disabled Persons and CADTC	• Hosted annually at the Care & Rehabilitation Expo China since 2023. • In 2023 and 2024, 92 and 74 innovative products were selected respectively. Categories covered hearing aids, wheelchairs, digital devices, prostheses, among others [13] [14].
Shenzhen AT Design Innovation Competition	Shenzhen Municipal Disabled Persons' Federation	• Held annually since 2022, open to nationwide and international participants [15]. • Attracts 400 contestants yearly, with about 40 finalists selected, featuring products like screen readers, smart hearing aid fitting, 3D printing sockets, and rehabilitation robotics [16].
Hubei Province Assistive Device Innovation Design and Entrepreneurship Competition for People with Disabilities [17]	Hu Bei Disabled Persons' Federation	• Hosted annually for 4 years. • In 2023, around 170 contestants participated, and 33 made it into the finals.

Yangtze River Delta Region "Technology for Disability" Assistive Product Innovation Competition [18]	Zhejiang Provincial Disabled Persons' Federation	• Held for the first time in 2024 at Alibaba Group. • Held alongside the China Zhejiang Future Tech Parasports Games, the competition focused on the innovations for sports. A total of 19 products were selected as finalists.
Jiangsu Province "Technology for Disability" Assistive Product Innovation Competition [19]	Jiangsu Disabled Persons' Federation	• Held for the first time in 2024. • The winners can further participate in the Yangtze River Delta Region Competition.

Table 5: Examples of assistive product innovation hubs in China

Name	Description
China Assistive Devices and Technology Center for Persons with Disabilities	• Owns innovation projects related to AT for Persons with disabilities. • Provides financial and technical support to selected AT innovation projects [20].
National Research Centre for Rehabilitation Technical Aids	• Owns or collaborates with academic institutions on rehabilitation assistive products innovation projects.
Greater Bay Area Assistive Device Innovation Centre [21]	• Launched in 2022 in Shenzhen and has already attracted several AT innovators [22]. • Hosts several departments, such as the Industrial Transformation Centre, 3D Printing Innovation Centre, and Industrial Design Innovation Centre [23].

Institute for Accessibility Development, Tsinghua University	• Official partnership signed with China Disabled Persons' Federation (CDFP) in Dec 2024 [24]. • The partnership will focus on innovation relevant to rehabilitation and accessible environments.
Zhejiang University	• Official partnership signed with CDPF in Nov 2024. • The partnership will focus on "Technology for Disability," specifically on using big data, artificial intelligence, and brain-computer interface applications in AT [25].
University of Science and Technology of China	• Official partnership signed with CDPF in Dec 2024. • The partnership will focus on the R&D and commercialization of key innovative AT, specifically in communication, motor function recovery and accessible travel [26].

Challenges in entering LMIC markets

Several challenges also exist for exports to LMICs. For example, Chinese suppliers, in general, still lack information on LMIC demand, needs and opportunities given the language barrier and the lack of available information. Chinese assistive product manufacturers are relatively small, so few have a dedicated sales team specifically targeting the LMIC markets. Also, the suppliers face fierce domestic and international competition with homogeneous products.

The expansion of assistive product exports faces several technical and procedural challenges related to standards, certification, and verification processes. In China, some assistive products are subject to compulsory national standards (GB), while others follow voluntary standards (GB/T), allowing for broader market access but resulting in varying degrees of adherence [27]. Product inspection mechanisms, such as spot checks, are in place but may not always reflect the full scale of production. Internationally, while certifications like CE and ISO are widely used, the credibility of certification bodies can vary, and there may be gaps between certified distributors and their upstream manufacturers. Differences in technical standards, classification systems, and certification expectations between China and other countries—particularly regarding medical device designation—can also create complexities for export, often requiring

suppliers to obtain additional documentation such as ""Certificate of Free Sale [4]" or certification tailored to each market.

Suggestions from buyers and suppliers on how to increase Chinese manufacturers' participation in LMIC markets

Chinese suppliers have suggested the following on how policymakers and industry organizations can better support them expand business to LMIC markets:

- Attendance to international exhibitions: Seven in ten survey respondents expressed a desire to increase their presence at global expos, with half specifically interested in OT World. Given this interest, industry associations could organize manufacturers to attend expos together and visit LMIC markets as a group to expand local partnerships and access opportunities.
- Inclusion in Belt and Road Initiative[5]: Suppliers showed interest in having AT better included within the scope of Belt and Road Initiative, such as building more bilateral agreements with Belt and Road Initiative countries in the field of AT, or including AT provision in existing healthcare or disabilities-relevant Belt and Road Initiative initiatives.
- Capacity-building: Suppliers would appreciate additional support such as enhancing overall brand awareness; sales capacity and R&D of Chinese assistive products; acquiring more global information and opportunities; support for logistics, such as local registration; aligning with international standards; and last-mile delivery.
- Adapting to market standards and expectations: Suppliers have emphasized the need to better align with international market requirements. This can enhance recognition of Chinese assistive products and promote healthier competition that benefits both businesses and end users.

And several LMIC buyers have also suggested what Chinese suppliers can focus on more to better serve LMIC markets.

[4] A Certificate of Free Sale (CFS) is used to certify that the aforementioned products can be freely sold in its country of origin. It applies to customs clearance in the importing country, registration with the competent authorities in the importing country and verifying whether the product has legitimate manufacturing procedures.

[5] China's Belt and Road Initiative (BRI) is a strategy initiated by the People's Republic of China since 2013 that seeks to connect countries globally with the aim of improving regional integration, increasing trade and stimulating economic growth.

- Tailor products to local needs: A market information gap remains between regions like Africa and China. More frequent communication and visits can help suppliers better understand local contexts (including cultural, environmental and infrastructural factors) and provide products that are more suitable for these markets.
- Collaborate with local organizations: Suppliers are encouraged to establish more direct partnerships with local NGOs, government agencies and healthcare providers in LMICs, leveraging the knowledge and service capabilities of these local organizations to better promote and distribute AT within the country.
- Consider knowledge transfer or technical partnerships: Several LMICs are interested in expanding local manufacturing. Organizations or suppliers can leverage China's manufacturing capabilities to enhance their self-sufficiency.
- Consider flexible and easier payment options: Many LMICs, particularly some in Africa, are experiencing a shortage of US dollar currency and are encountering payment difficulties. Suppliers should acknowledge this issue and actively seek solutions to accommodate these challenges.

Overview of China's supplier landscape for assistive products

1. Hearing aids

China's annual export for hearing aids was around 14 million units in 2022, with a total export value of approximately US$350 mn [28]. From 2018 to 2022, the market size increased 7 per cent year-on-year [29]. The top 5 global hearing aid suppliers (Demant A/S, GN Group, Sonova, Starkey and WS Audiology), which totally account for over 90 per cent of the global market share, all have China as one of their key manufacturing hubs.

Supplier landscape

Hearing aids are classified as Class II medical devices in China.[6] To obtain a license, producers must submit their quality inspection reports and other required documents. The manufacturers with medical-certified hearing aids will be listed on the National Medical Products Administration (NMPA) official website. For a range of products, including hearing aids, the clinical trial procedure is waived to accelerate their market availability [30]. According to the China NMPA website in October 2024 a total of 96 Behind-the-ear (BTE) hearing aids[7] are certified as medical devices in China[8], produced by 60 manufacturers [31]. Of these 60 manufacturers, 51 are local Chinese companies that registered 70 BTE products. The remaining manufacturers are local production facilities established by foreign brands.

Manufacturing is concentrated in Guangdong (50 per cent of the suppliers with certified BTE products), Fujian (16 per cent) and Jiangsu (9 per cent). Fujian and Jiangsu are where global hearing aids suppliers initially established their manufacturing bases, stimulating the local hearing aid industry growth. Today these regions host the most experienced hearing aids suppliers in the country. Guangdong, as a major hub for electronic components and precision equipment, has a strong supply chain for hearing aid production. A number of existing assistive listening devices (ALDs) suppliers in the region have recently transitioned into manufacturing medical-grade hearing aids.

---

[6] In China, medical devices are categorized into three classes (I, II, and III) based on their risk level, with Class I representing the lowest risk.

[7] Given that the WHO recommends the behind-the-ear (BTE) hearing aid model for LMICs, this supplier landscape analysis will primarily focus on mapping suppliers that offer BTE products. *Source: Preferred profile for hearing-aid technology suitable for low- and middle-income countries, WHO, [https://www.who.int/publications/i/item/preferred-profile-for-hearing-aid-technology-suitable-for-low--and-middle-income-countries].*

[8] The certificate is valid for 5 years and can be renewed upon expiration of the valid term.

Table 6: Top 5 cities with the highest number of certified medical-grade BTE hearing aid suppliers

City	Province	Percentage
Shenzhen	Guangdong	26%
Xiamen	Fujian	16%
Zhongshan	Guangdong	11%
Suzhou	Jiangsu	7%
Hangzhou	Zhejiang	5%
	Total:	65%

Three hearing aid manufacturers are publicly listed in China: Jinghao, Minami Medical, and Cofoe Medical. Jinghao is the most focused on the hearing aid business, with 93.1 per cent of its sales in 2022 attributed to hearing aids, amounting to RMB 179 mn (approximately US$24.3 mn). No specific sales data are available for Minami and Cofoe's hearing aids, but both companies have broader medical equipment product categories and hearing aids are not their primary products.

Based on interviews, Jinghao is one of the largest exporters to LMICs, but the hearing products it exports are not only medical-grade hearing aids but also assistive listening devices (ALDs). While detailed sales data are not available, Jinghao sells to 90 countries and international revenues amounted to US$22.5 mn in 2022 representing over 90 per cent of its total hearing products revenues.

Other Chinese manufacturers with medically certified BTE products and a reported presence in LMICs include Austar, New Sound and Acosound. Austar and Acosound have stated the interest and priority of LMIC in their strategies and would like to promote their own brands while New Sound prioritizes the US market in their current strategy.

Table 7: Survey respondents with medical-certified BTE products and presence in LMICs

Company	Introduction	LMIC presence	Quality
Acosound *(Hangzhou)*	• Annual revenue: US$10-50 mn • Annual revenue to LMICs: US$0.5-2 mn • Annual capacity (Units): 100,000	• 20-50 countries, including Angola, Bangladesh, Bolivia, Cambodia, Cameroon, Central African Republic, Congo, DRC, Ethiopia, Haiti, Zambia, etc. • No product registrations yet in LMICs	• CE • FDA • ISO 9001 • ISO 13485
Austar *(Xiamen)*	• Annual revenue: US$10-50 mn • Annual revenue to LMICs: US$0.5-2 mn • Annual capacity (Units): 600,000	• <20 countries, including Bolivia, Egypt, India, Iran, Kenya, Mongolia, Myanmar, Nigeria, the Philippines, Sri Lanka, Ukraine, Uzbekistan, Yemen, among others • Product registered in Bolivia, Egypt, Iran, Mongolia, Myanmar and Yemen	• CE • FDA • ISO 9001 • ISO 13485
Newsound *(Xiamen)*	• Annual revenue: US$10-50 mn • Annual revenue to LMICs: < US$0.5 mn • Annual capacity (Units): 500,000	• 20-50 countries, including Bangladesh, Bolivia, Cameroon, Ethiopia, Egypt, India, Iran, Kenya, Jordan, Lebanon, Mongolia, Morocco, Mozambique, Myanmar, Nigeria, Pakistan, the Philippines, Sri Lanka, Sudan, Syria, Tunisia, Uganda, Ukraine, Uzbekistan, Yemen, Zimbabwe. • Product registered in Egypt	• CE • FDA • ISO 13485

Beyond certified medical suppliers, sound amplifier or assistive listening device manufacturers also sell their products as low-end hearing aids both domestically and internationally, generally at lower prices than medical-grade hearing aids. However, these products are classified only as electronic products rather than medical devices, and are therefore unregulated by medical authorities. Medical-certified hearing aids are not allowed to be sold online in many LMICs, therefore most products available for purchase online are ALDs. Buyers should be aware of this distinction and choose products accordingly.

Sales pattern

ODM/OEM production for global brands represents the largest proportion of sales. For example, Jinghao generates around 90 per cent of its sales from ODM/OEM. In recent years, Chinese manufacturers have been gradually working to increase their own branded sales overseas. For instance, Jinghao reduced its ODM share from 97 per cent of sales in 2018 to 88 per cent in 2021. Other suppliers exporting to LMICs are making similar efforts. For example, Acosound reported its potential for selling their own brand and is strategizing to gain more direct sales revenue in LMICs.

Overseas manufacturing in LMICs

The hearing aids suppliers who were interviewed generally expressed interest in overseas manufacturing in other regions, such as Asia and Latin America. The key benefits regarding overseas manufacturing in LMICs include better local sales in the region and avoiding trade complications stemming from global dynamics. Cost savings were not cited as a primary reason as all suppliers noted that China's manufacturing capabilities remain more advanced. If manufacturing in LMICs is pursued, suppliers will consider factors such as local policy stability, production efficiency and supply chain robustness, among other factors.

Instead of building a plant from scratch, many hearing aids suppliers prefer to partner with a reliable local partner to co-build local manufacturing capabilities in LMICs. For example, Austar has started a partnership with a supplier in India, focused on know-how transfer and technological collaborations, to build up their local production and R&D capabilities. According to hearing aid suppliers, this approach helps them better penetrate LMIC markets, increase local sales and enhance brand recognition locally.

2. Wheelchairs

China's 2022 export volume of manual wheelchairs reached 9.2 million units, with an export value of approximately US$736 mn [32]. From 2017 to 2022, export volume grew 6 per cent year-on-year, while export value grew at 8 per cent.

Supplier landscape

Known for price competitiveness, China serves as a contract manufacturer for international NGOs and social enterprises such as Motivation, UCP Wheelchairs and LDS Charities. Global brands such as Rehasense and Ottobock have manufacturing plants in China. The average export price for manual wheelchairs (including transport wheelchairs) in 2022 was around US$80 per unit, a figure that has remained steady since 2017 [32].

The Chinese wheelchair industry is fragmented with low market concentration, with the majority being small-scale businesses. According to the survey, a significant number of manufacturers report low sales volumes, with around 80 per cent of suppliers having annual sales of less than US$5 million. This high level of market fragmentation creates pressure on suppliers to remain cost-competitive, which may lead to varied approaches in product design, materials, and production processes as companies seek to differentiate themselves and expand their market share [33].

In China, manual wheelchairs are classified as Class II medical devices. To obtain a license, producers must submit their quality inspection reports and receive approval from NMPA. Clinical trials are not required for manual wheelchairs, as they are exempted along with a list of other medical products, to speed up market availability. According to the China NMPA website in October 2024, 223 certified manual wheelchair products are held by 194 different companies across China.

Wheelchair manufacturing is concentrated in Beijing-Tianjin-Hebei Region, Guangdong, and the Jiangsu province.

- Beijing-Tianjin-Hebei Region holds the largest share, comprising 30 per cent of total certified manufacturers. Within Hebei, Tianjin (24 manufacturers) and Hengshui (15 manufacturers) are the two largest manufacturing clusters.
- Guangdong province closely follows Hebei, accounting for 27 per cent of certified manufacturers. Within Guangdong, Foshan serves as the primary manufacturing hub, with 36 manufacturers – the highest count nationwide. Foshan Dongfang Medical Equipment Manufactory is particularly noteworthy for registering the greatest variety of product types across China.

- Finally, Jiangsu province also maintains a substantial presence in the sector, representing 17 per cent of certified manufacturers.

The Hebei region focuses on low-end products, the Guangdong region on low-to-mid end products (between US$35-US$100), and the Jiangsu region on high-end products (above US$100).

Table 8: Top 5 cities with the highest number of medical-grade manual wheelchair suppliers.

City	Province	Percentage
Foshan	Guangdong	19%
Tianjin	Beijing-Tianjin-Hebei Region	12%
Hengshui	Beijing-Tianjin-Hebei Region	8%
Danyang	Jiangsu	4%
Langfang	Beijing-Tianjin-Hebei Region	4%
	Total:	47%

Seven manufacturers in the survey reported having medically certified manual wheelchairs and presence in LMICs. Among these, both Dongfang and Kaiyang have an annual production capacity of over 600,000 manual wheelchairs and have shown strong interest in expanding into LMICs. However, few suppliers have registered their products in LMICs. Among the 20 respondents that sell to LMICs, only one has products registered in at least one country. They primarily sell through distributors and exporters at ex-factory prices and do not handle in-country product registration.

Table 9: Survey respondents with medical-certified manual wheelchairs and footprints in LMICs

Company	Introduction	LMIC footprint	Quality
Dongfang *(Foshan)*	• Annual revenue: > US$50 mn • Annual revenue to LMICs: US$2 mn - US$5 mn	• 20-50 countries, including Algeria, Bangladesh, Bolivia, Cameroon, Chad, Eswatini, Gambia, Guinea-Bissau, India,	• CE • FDA • ISO 9001 • ISO 13485

	• Annual capacity (Units): 600,000	Iran, Kenya, Kyrgyzstan, Lesotho, Mongolia, Morocco, Mozambique, Myanmar, Niger, Nigeria, Pakistan, Papua New Guinea, Swaziland, Tajikistan, Tanzania, Ukraine, Uzbekistan, and Zambia • Products not registered in LMICs yet	
Hongguan *(Hengshui)*	• Annual revenue: US$1-5 mn • Annual revenue to LMICs: US$0.5-US$2 mn • Annual capacity (Units): 150,000	• <20 countries including Angola, India, Myanmar, the Philippines, among others • Products not registered in LMICs yet	• ISO 13485
Kaiyang *(Foshan)*	• Annual revenue: > US$50 mn • Annual revenue to LMICs: Information is not available. But 20% of the total sales goes to US and Europe market and 80% to rest of the world. • Annual capacity (Units): 800,000	• 50-100 countries • Focus on the Southeast Asia region, with both Viet Nam and Thailand having individual orders valued at US$7 mn. • Product registration in LMICs information is not available	• CE • FDA • ISO 9001 • ISO 13485

Kangyijian *(Hengshui)*	• Annual revenue: US$1-US$5 mn • Annual revenue to LMICs: US$<0.5 million • Annual capacity (Units): 30,000	• <20 countries • Focus on the Southeast Asia region, such as Cambodia, Laos, Myanmar, Viet Nam, among others. • Products not registered in LMICs yet	• None
New Century *(Hengshui)*	• Annual revenue: US$1- US$5 mn • Annual revenue to LMICs: US$0.5-US$2 mn • Annual capacity (Units): 10,000	• <20 countries, including Algeria, the Philippines, Viet Nam, etc. • Products not registered in LMICs yet	• CE • ISO 9001 • ISO 13485
Xiangrun *(Hengshui)*	• Annual revenue: US$1-US$5 million • Annual revenue to LMICs: US$<0.5 million • Annual capacity (Units): 100,000	• <20 countries including Cambodia, India, Myanmar, the Philippines, Pakistan, Viet Nam • Product registered in India, the Philippines and Viet Nam	• CE
Zhongjin *(Changzhou)*	• Annual revenue: Not available • Annual revenue to LMICs: Not available • Annual capacity (Units): Not available	• Multiple LMICs	• CE • FDA • ISO 9001 • ISO 13485

Four publicly listed medical equipment companies also have medical-certified manual wheelchairs.

Table 10: Public listed companies with medical-certified manual wheelchair business segments

Company	Annual revenue and exports percentage	Wheelchair segment introduction	Flagship products outside wheelchairs	Global presence
Cofoe (Hunan, Changsha) [34]	• RMB2.7 billion (~US$380 mn) • Export per centage data are not available	• The annual revenue of rehabilitation products (including manual wheelchairs) in 2023 is RMB 773 million (~US$109 mn), representing 27% of the total and a 30% increase from 2022.	• Other flagship products include hearing aids, in vitro diagnostic products and diagnostic and respiratory products such as blood pressure monitors.	• Multiple LMICs
HL Corp *(Shenzhen, Guangdong)* [33]	• RMB900 million (US$126 mn) • 59 per cent are exports	• All sell through OEM model to leading global wheelchair brands such as Sunrise and Invacare. • The annual revenue of rehabilitation	• Components for bicycles: some of its products have highest market share worldwide.	• Primarily Europe, the US and Asia, with other regions such as Africa.

		products (including manual wheelchairs) in 2023 is RMB200 mn (~US$28 mn), 22 per cent of total. • The annual capacity for wheelchairs (incl. both powered and manual) is 150,000 units in 2022.		
Intco *(Zhenjiang, Jiangsu)* [35]	• RMB6.9 bn (~US$970 mn) • 87 per cent are exports	• The annual capacity for wheelchairs (incl. both powered and manual) is 620,000 units in 2023. • The sales revenue of rehabilitation products in 2023 is RMB395 mn (~US$56 mn), 5.7% of total.	• Medical consumables such as disposable gloves, masks, face shields, apparel, and cold and hot patches.	• 120 countries across Europe, America, Asia, Africa and Oceania. • LMIC footprint includes Bolivia, Egypt, India, Indonesia, Kenya, Libya, Mauritius, Morocco, Mozambique, Nigeria, and Venezuela, among others

Yuwell *(Danyang, Jiangsu)* [36]	• RMB8 bn (~US$1.1 bn) • 9% are exports	• The sales revenue for rehabilitation and mobility products in 2023 is around US$170 mn, 15% of the total.	• 42% of the company sales come from respiratory products and 21% from medical diagnostic products.	• 131 countries worldwide

A few other manufacturers also have all commonly used international certifications (all CE, FDA, and ISO), domestically certified licenses for manual wheelchairs and international sales experience. However, since they did not participate in the survey, detailed information on their capacity and sales is not available. For reference, the company list is provided here for readers wishing for more information and to make contact.

Table 11: Other wheelchair manufacturers identified with all three CE, FDA and ISO certifications

Company	Global footprint	Official website
Caremax (Foshan, Guangdong)	Over 50 countries	https://www.caremax-med.com/
Dayang (Foshan, Guangdong)	Across Asia, Europe, North America, South America and Oceania.	https://www.dayangyiliao.com/
Feiyang (Foshan, Guangdong)	Around 15% of the sales goes to South America and 15% in Southeast Asia	https://feiyangmed.en.alibaba.com/
First Medical (Zhongshan, Guangdong)	Information not available	http://en.fstmed.com/
JBH (Nanjing, Jiangsu)	Countries include US, Canada, Germany, Spain	https://www.jbhwheelchair.com/

Overseas manufacturing in LMICs

According to supplier interviews, local manufacturing or assembly is widely recognized as a growing trend in LMICs, and many companies have conducted in-house research on the topic. However, none have found it cost-effective to expand currently.

For example, one of the leading wheelchair manufacturers shared that they have received interest in overseas manufacturing from Ecuador, Venezuela, India, Viet Nam, and various African nations. Suppliers generally lack confidence in manufacturing in LMICs, citing insufficient infrastructure, financial support and policy backing from local governments. Additionally, the company noted that while overseas factories once included land ownership options, this is no longer available in many countries, further reducing financial incentives.

However, many have shown interest in technical transfer partnerships with local entities to set up assembly plants. While such case studies are currently limited among Chinese suppliers, the topic is worth further investigating for feasibility.

3. Prostheses

According to the most recent estimates, there are currently over 600 various types of prostheses and orthoses manufacturing, assembly and fitting institutions in China [37]. In 2023, China's prostheses sales market size in China is RMB787 million (~US$110 mn), with an annual production volume of approximately 130,000 units and around 70 per cent are lower limb products [38].

China's prostheses are known for their price competitiveness and responsiveness. For example, according to a supplier, the price of their comparable hydraulic knee joints can be 20 to 60 per cent of those from global brands. This is primarily due to China's advanced supply chain and high production efficiency. Required materials can be sourced locally at low cost, resulting in shorter lead times for global procurement.

In China prostheses used to be classified as medical devices. However, certain below-knee (BK) prostheses were removed from the national medical device list in 2015, and certain above-knee (AK) prostheses were removed in 2020 [39][40]. As a result, relevant products are no longer regulated or monitored by NMPA. Quality control for prostheses is now regulated only by the SAMR.

The National Rehabilitation Technical Aids Quality Supervision and Test Centre, under the Ministry of Civil Affairs, is assigned by SAMR to issue quality certifications and to conduct mandatory spot inspections [41]. For lower limb prostheses, the centre has established the national standard GB/T 18375, which leverages global prostheses standards, such as ISO 10328, and is used as the gold standard certification in domestic sales.

Supplier landscape

Prostheses manufacturers are smaller compared to other categories of assistive products. 67 per cent of respondents have an annual sales value of less than US$1 mn. Altogether, 25 per cent reported sales between US$1 mn and US$5 mn.

Around 67 per cent of the respondents have previously sold to LMICs, but none of them have registered their prostheses products in those markets. One of the manufacturers shared that prostheses could be sold in many LMICs without local registration. However, without local registration, they cannot participate in local government tenders, impacting their long-term brand establishment in that market.

China's lower limb prostheses manufacturers are more fragmented, but are primarily located in Beijing and Shijiazhuang, both of which have implemented policies to support

prostheses manufacturing. For example, Beijing offers tax benefits for R&D expenses, accelerated depreciation and corporate income tax reductions. Shijiazhuang has similar government support policies, including a priority product approval process, financial subsidies and investment in industrial parks. In the Jiangsu and Shanghai region, few manufacturers focus exclusively on upper limb prostheses, such as Danyang Prosthetic Factory and Shanghai Kesheng. Below is a list of prostheses suppliers that participated in the survey.

Table 12: Survey respondents for prostheses

Company	Introduction	LMIC footprint	Type	Quality
Chonglang *(Beijing)*	• Annual revenue: US$1-US$5 mn • Annual revenue to LMICs: US$0.5 - US$2 mn • Annual capacity (Units): 50,000	• 20-50 countries, including Bangladesh, Cambodia, Egypt, Ethiopia, Honduras, India, Iran, Kenya, Kyrgyzstan, Laos, Mongolia, Myanmar, Nepal, Niger, Nigeria, Pakistan, the Philippines, Syria, Tajikistan, Ukraine, Viet Nam, and Yemen, among others	• Upper limb • Lower limb • Raw materials • Machinery and equipment	• CE • ISO 9001 • ISO 13485
Fuyutiancheng *(Beijing)*	• Annual revenue: < US$1 mn • Annual revenue to LMICs: < US$0.5 mn • Annual revenue (Units): 5,000	• <20 countries including Cambodia, Egypt, India, Pakistan, the Philippines, Ukraine, and Viet Nam	• Lower limb	• CE • ISO 9001

Fengxing *(Beijing)*	• Annual revenue: < US$1 mn • Annual revenue to LMICs: None • Annual capacity (Units): 20,000	• None	• Lower limb • Raw materials • Machinery and equipment	• CE • ISO 9001 • ISO 13485
Beijing rehabilitation hospital *(Beijing)*	• Annual revenue: < US$1 mn • Annual revenue to LMICs: None • Annual capacity (Units): 50,000	• None	• Upper limb • Lower limb	• None
Linkang *(Bazhou, Hebei)*	• Annual revenue: < US$1 mn • Annual revenue to LMICs: < US$0.5 mn • Annual capacity (Units): 100,000	• 20-50 countries • Afghanistan, Algeria, Bangladesh, Bolivia, Burkina Faso, Cambodia, Ukraine, Viet Nam, Zambia and Zimbabwe, among others	• Lower limb	• CE • ISO 9001
Grootre *(Jinan, Shandong)*	• Annual revenue: < US$1 mn • Annual revenue to LMICs: < US$0.5 mn • Annual capacity (Units): 2,000	• 5 countries • Afghanistan, India, Jordan, Syria, and Ukraine.	• Upper limb • Lower limb • Raw materials	• None
JBK *(Beijing)*	• Annual revenue: < US$1 mn	• None	• Lower limb	• CE

	• Annual revenue to LMICs: None • Annual capacity (Units): 60,000 – 80,000		• Raw materials	• ISO 9001 • ISO 13485
Dongfang Resun *(Beijing)*	• Annual revenue: US$1-5 mn • Annual revenue to LMICs: < US$0.5 mn • Annual capacity (Units): 10,000	• <20 countries • India, Viet Nam	• Lower limb • Machinery and equipment	• CE • ISO 13485
Reborn *(Danyang, Jiangsu)*	• Annual revenue: < US$1 mn • Annual revenue to LMICs: < US$0.5 mn • Annual capacity (Units): 10,000	• <20 countries • India, Sri Lanka	• Upper limb	• CE • ISO 9001 • ISO 13485
Jingbo *(Beijing)*	• Annual revenue: Not available • Annual revenue to LMICs: Not available • Annual capacity (Units): Not available	• Multiple LMICs	• Upper limb • Lower limb • Raw materials • Machinery and equipment	• CE • ISO 9001 • ISO 13485
Ruipu *(Hebei)*	• Annual revenue: US$1-5 mn	• <20 countries • Afghanistan, Cambodia, Kyrgyzstan, Laos,	• Lower limb	• ISO 9001

	• Annual revenue to LMICs: < US$0.5 mn • Annual capacity (Units): 50,000	Myanmar, Tajikistan, and Viet Nam		
Shenghe *(Changsha, Hunan)*	• Annual revenue: < US$1 mn • Annual revenue to LMICs: None • Annual capacity (Units): 100,000	• None	• Upper limb • Lower limb • Raw materials • Machinery and equipment	• None

Sales pattern

The suppliers mainly sell to distributors and exporters, and facilities that directly serve end customers, such as local P&O centres and clinics. Distributors and exporters are primarily reached through EXPOs or e-commerce. According to expert interviews, selling prostheses via e-commerce is challenging due to a lack of quality control, with buyers often prioritising the lowest price. This puts suppliers who invest in higher quality control and inspections at a disadvantage. Additionally, the costs associated with e-commerce have risen and can sometimes exceed the expenses of attending expos abroad.

Overseas manufacturing in LMICs

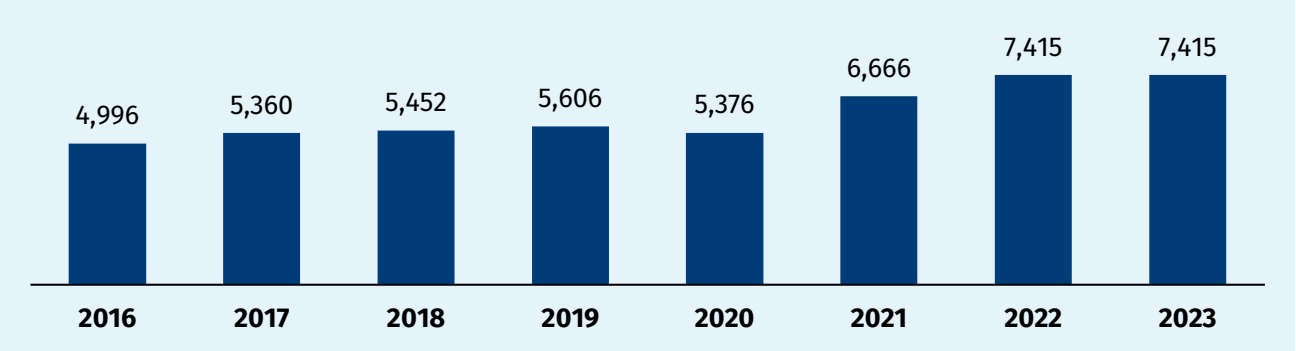
None of the manufacturers has started producing in LMICs. According to one of the leading prostheses suppliers in China, who spent two months in Africa assessing manufacturing opportunities, the supply chain and infrastructure do not meet expectations. For instance, raw materials are not locally available, requiring import from China. Additionally, there are shortages in electricity and power supply, with some factories needing to build their own power plants to operate. Labour efficiency also falls short of expectations, and social instability and unrest add further concerns.

4. Spectacles

China has over 3,000 manufacturers of spectacles and associated products. Of these, 400 have annual sales exceeding RMB20 million (approximately US$2.8 mn), and at least 600 manufacturers export their products. China is the largest exporter of eyewear to LMICs; for instance, 78 per cent of India's eyewear imports come from China. Nigeria also relies significantly on imports, with over 90 per cent sourced from China [1]. Chinese manufacturers also produce products for several global brands such as EssilorLuxottica and Safilo and social enterprises such as Vision Spring.

The China Optometric and Optical Association publishes China's export volume and value every year [42]. The data show a general growing trend of spectacles and its accessories from 2016 to 2023, reaching over US$7.4 bn in 2023 [43]. The export value to "BRI"[9] countries is US$2.7 bn in 2022 (37 per cent of the total), a 20 per cent increase from 2021. And the export value to ASEAN countries is US$639 mn in 2022 (9 per cent of the total), a 52 per cent increase from 2021 [44][45].

Figure 3: China spectacles export value (Unit: US$100,000)



Spectacles are not classified as medical devices in China [46]. Therefore, no compulsory clinical trials are required. In addition, spectacles for myopia and presbyopia are also not classified as assistive products in China and not included in the national rehabilitation and assistive products list.

Spectacles are only classified as an industrial product in China. The quality control is regulated by SAMR. There is a National Inspection and Testing Centre for Ophthalmic Optics Products located in Danyang, established in 2006 as the leading quality inspection centres in China. China has published a series of national compulsory quality standards for spectacles products, which are widely used in the Chinese domestic market,

[9] China's Belt and Road Initiative (BRI) is a strategy initiated by the People's Republic of China since 2013 that seeks to connect countries globally with the aim of improving regional integration, increasing trade and stimulating economic growth.

specifically GB10,810 for lenses, GB13,511 for near-vision spectacles, and GB14,214 for frames [47].

Supplier landscape

The four key spectacles manufacturing hubs are Wenzhou and Danyang (known for producing low- to mid-range products), Xiamen (prominent for sunglasses), and Shenzhen (recognized for high-end brands). Combined, Wenzhou and Danyang host over 1,000 manufacturers. Wenzhou mainly produces frames and near-vision spectacles, whereas Danyang is known for lenses and near-vision spectacles.

Danyang is recognized as the world's largest spectacles production base, which has 600 manufacturers producing over 400 million spectacles in 2022, representing about 45 per cent of global production. Both cities benefit from supportive government policies that foster industry growth and boost export sales.

- In 2017, Wenzhou developed the first Spectacles Industrial Park in Ouhai District, which now hosts 300 manufacturers. The park also offers essential centralized services such as customs clearance, logistics, tax refund applications, and supply chain management. Additionally, the government is developing another industrial park, known as "China Eyeglass Valley," which already hosts 189 manufacturers in 2023 [48].
- In 2021, Over RMB 8.5 billion (~US$1.19 billion) is invested in Danyang to develop the Danyang Eyewear Industrial Town [49]. The government support policies primarily focus on tax incentives, including up to 100 per cent deductions on R&D expenses, corporate income tax discounts, and export tax refunds. At the provincial level, Jiangsu Province has committed to expediting the export tax refund process, reducing the average processing time to under six working days in 2022.

For lenses, there is a lack of publicly available data on the exact number of manufacturers in China; however, it is predicted to be at least hundreds. Among these, Conant and Wanxin stand out due to their production volume, with Conant particularly focused on international sales. According to Conant's 2023 annual report, its resin lens sales exceeded 150 million units, and Wanxin's sales were around 100 million units, ranking them second and third in the world, just behind EssilorLuxottica with over 300 million units. EssilorLuxottica has also established a series of joint ventures in China for lens manufacturing, such as SeeSee Optical and Yoli Optical, where they serve as OEMs for EssilorLuxottica but also manufacture for other brands.

For frames, there is also a lack of publicly available data on the exact number of manufacturers in China, although experts note there are at least hundreds of them. As the production technology required is less complex, the market is more fragmented than for lenses. Among the suppliers, Ouhai Glasses, Pilot Optical and Matt (Weilan) Optical stand out for their production volume. The frame manufacturers also normally produce near-vision spectacles and sell these as ready-made products to LMICs.

Table 13: Survey or interview respondents for spectacles

Company	Introduction	LMIC footprint	Type	Quality
Conant *(Shanghai)*	• Annual revenue: > US$50 mn • Annual revenue to LMICs: US$5 mn – US$20 mn • Annual capacity (Units): 200 million (lenses)	• 20-50 countries including Afghanistan, Côte d'Ivoire, Egypt, Honduras, India, Lebanon, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Ukraine, Viet Nam, etc.	• Lenses • Near-vision spectacles	• CE • FDA • ISO 9001 • ISO 13485
Pilot *(Wenzhou)*	• Annual revenue: US$10-US$50 million • Annual revenue to LMICs: US$2-US$5 million • Annual capacity (Units): 36 million (readers)	• <20 countries including Cambodia, India, Kenya, etc. • Manufacturer of Essilor 2.5 NVG, Costco, ALDI, Watsons, among others	• Frames • Near-vision spectacles	• CE • FDA • ISO 9001 • ISO 13485
Weilan (Matt optical) *(Wenzhou)*	• Annual capacity (units): Over 170 million (all types of spectacles)	• Manufacturer of FGX, Walmart, Costco, BOOTs, Disney, M&S, among others	• Frames • Near-vision spectacles	• CE

Ouhai Glasses *(Wenzhou)*	• Annual capacity (units): 24.7 million	• Mainly export, 95% sales go to Europe and US	• Frames • Near-vision spectacles	• CE • FDA • ISO 9001
Readsun *(Wenzhou)*	• Annual capacity (Units): 1 million	• Manufacturer of Hello Kitty, Sisley, Disney and Yamaha, etc.	• Frames • Near-vision spectacles	• CE • FDA
Select Optical *(Jiangsu)*	• Annual capacity (Units): approximately 8 million [50]	• Multiple LMICs	• Lenses	• CE
Zhantai *(Wenzhou)*	• Annual capacity (Units): Flexible capacity [51]	• Extensive sales experience in Europe, America and Southeast Asia • Manufacturer of Safilo, MUJI, Walmart	• Frames • Near-vision spectacles	• CE • FDA • ISO 9001
Mike Optical	• Annual capacity (Units): 1.8 million	• Rich experience in LMIC sales including Cameroon, Mexico and Zimbabwe, among others	• Frames • Near-vision spectacles	• CE • FDA • ISO

Sales pattern

The manufacturers primarily sell their products directly to spectacles distributors or retailers, as well as through e-commerce. They sometimes access LMIC government tenders through distributors but do not engage directly with the government. According to an interview with Conant, there is a growing demand in LMICs, especially in Asia. However, the willingness to pay is generally low. For example, in Africa, most of the products requested are the lowest standard lenses, with the preferred price point commonly seen at around US$0.7.

Overseas manufacturing in LMICs

No suppliers have established manufacturing plants in LMICs for lenses. Only recently two leading frame and near-vision spectacles manufacturers, Ouhai and Matt (Weilan), opened their first factories in Viet Nam. These factories were established primarily to move part of the production outside mainland China to mitigate the risk of losing global buyers amid increasing international uncertainties. Another goal is to better serve nearby LMIC clients. However, in terms of production capability and efficiency, the suppliers mentioned that China still leads globally, and the Viet Nam plant cannot yet match China's output level.

5. Digital assistive products (screen readers, smartphones, and AACs)

Supplier landscape

Compared to the other four assistive products (spectacles, hearing aids, prostheses and wheelchairs), the publicly available research on the Chinese digital assistive product market is limited. Overall, 9 digital assistive product suppliers responded to the survey. Among them, 6 offer screen readers, 5 provide AACs, 2 produce phones and 4 supply alternate input devices as well as navigation and wayfinding tools. The data indicate that most manufacturers operate on a smaller scale with fewer than 50 staff and have limited exposure to LMICs. These manufacturers do not focus on producing a single type of digital AT but typically offer a diverse range of products.

There are no significant geographical clusters or regional initiatives for digital assistive product production. Limited available data indicate that these products are mainly manufactured in tier-1 cities such as Beijing, Shenzhen and Hangzhou.

Digital assistive products manufacturers that participated in the survey are listed below:

Table 14: Survey respondents for digital AT

Company	Introduction	LMIC footprint	Type	Quality
Huibang *(Shenzhen)*	• Annual revenue: Not available • Annual revenue to LMICs: Not available • Staff number: Not available	• Planning to expand	• AACs • Screen readers • Smart phones • Navigation tools	• ISO 9001
LL Vision (Beijing)	• Annual revenue: < US$1 mn • Annual revenue to LMICs: Not available • Staff number: 51-200	• <20 countries • Afghanistan, Algeria, Bangladesh, Bolivia, Cambodia, India, Iran, Jordan,	• AI subtitle spectacles for persons with hearing impairment	• ISO 9001

		Kyrgyzstan, Syria, Ukraine, Uzbekistan, Viet Nam, among others		
KeAn *(Guangzhou)*	• Annual revenue: US$1-US$5 mn • Annual revenue to LMICs: < US$0.5 mn • Staff number: 1-50	• <20 countries • Mongolia etc.	• AACs • Screen readers • Alternate input devices	• ISO 9001
Qiming *(Shenzhen)*	• Annual revenue: < US$1 mn • Annual revenue to LMICs: 0 • Staff number: 1-50	• None	• Screen readers	• None
Yuanfangboai *(Beijing)*	• Annual revenue: < US$1 mn • Annual revenue: to LMICs: 0 • Staff number: 1-50	• None	• Screen readers • Smart phones	• ISO 9001

Another 7 digital AT suppliers participated in the 2023 China International Care and Rehabilitation EXPO, where interested buyers could explore their product offerings.

Table 15: Additional digital AT suppliers that participated 2024 China International Care and Rehabilitation EXPO

Company	Digital products	Website
Huawei *(Shenzhen)*	Phones	https://consumer.huawei.com/en/sustainability/information-accessibility/
iflytek *(Anhui)*	Speech-text and text-speech	https://www.iflytek.com/en/about-us/csr.html
Jumaoyuan *(Beijing)*	Screen readers	http://jumaoyuanbj.com/col.jsp?id=111
Nanhe Technology *(Shenzhen)*	Phones	http://www.nanhotech.com/
Rejoin Technology *(Hangzhou)*	Screen readers	https://www.rejointech.com.cn/
Shunde F.L.K *(Foshan)*	Screen readers Phones	https://www.cnflk.com/?lang=en
Sightcare *(Hangzhou)*	Screen readers	https://www.crexpo.cn/exhibition/483?cboofs_je=96

According to the WHO, digital assistive technology refers to devices or software that provide practical solutions to individuals with disabilities, enabling improved communication, time management and monitoring [52]. In alignment with this broader definition, smartphones have gained prominence due to their portability, multifunctionality, and integration of advanced accessibility features [53]. In recent years, many leading Chinese smartphone suppliers have already been making efforts to develop smartphones tailored for assistive purposes. Given the significant market penetration of made-in-China smartphones in LMICs, it would be beneficial if more persons with disabilities in these countries could access the products.

Among the Chinese smartphone suppliers available in LMICs, Huawei and Honor are leading the way in accessibility feature development. Since 2017, Huawei has introduced features such as screen readers, voice-to-text capabilities, and AI-powered tools [54]. The company announced in 2024 that its accessibility features have reached almost 8

million users globally [55]. Honor developed several features such as “screen reading”, “AI subtitle” and “Hearing aids as earphones” and announced in their ESG report that monthly almost 1 million users access these functions. Other suppliers, such as Xiaomi, Oppo, Vivo and Transsion, are launching models or systems with accessibility features but detailed user numbers are not publicly available.

All the features work specifically with each phone's proprietary operating system, and any phone model equipped with the system can access them. For example, across different suppliers, phone models ranging from US$80- US$130 could already have these features.

Table 16: Accessibility features introduced by Chinese smartphone suppliers

Supplier	Year	Key accessibility features
Honor [56] [57]	2022	• Screen reading • Audio reading, allowing users to select the content, reading length and speed
	2023	• AI subtitle • Hearing aids as earphones, enabling users to connect their hearing aids to the phone
Huawei [58]	2017	• Screen reading • Enable Google screen reader “Talk Back” installation
	2019	• Visual assistant app, enabling offline text magnification, recognition, and text-to-speech. Featured 6 reading modes, allowing users to choose based on their visual impairment level
	2020 [59]	• AI subtitle • Face-to-face transcription, converting live conversations to text • Smart vision and voice Assistant, enabling objects identification and translation by talking to the phone
	2022 [60]	• AI voice repair feature

		• Obstacle recognition function, providing voice feedback and vibration alerts about the obstacle distance and type • Personalized hearing assessments by Huawei TWS earbuds, targeting elderly or moderately hearing-impaired individuals, analysing hearing abilities across different frequencies and enhancing voices accordingly
	2023 [61]	• Enhanced text-to-speech functionality, allowing users to create custom and highly human-like voices
	2024	• Image and environment description features, leveraging AI to identify and describe surroundings. • Smart Q&A, allowing users to ask questions while taking photos to determine if the desired object is within the frame or to learn about their immediate environment.
OPPO	2017 [62]	• Personalized Colour vision adjustment • Speech-to-text feature
	2021	• ColorOS system, integrating 22 accessibility features for visual-impaired people such as “Talk Back” screen reader and color enhancement
	2024[63]	• Voice-to-text feature
Transsion [64]	2023	• Text-to-voice feature, leveraging NLP[10] solution
	Planning	• AI voice technology platform capable of supporting multiple local African languages
Vivo	2019 [65]	• Voice assistant, enhancing speech recognition accuracy and response speed • Colour correction • AI subtitle
	2021	• Voice-to-text feature

[10] Note: Natural language processing.

	2023 [66]	• "Vivo Sight" AI visual aid - conduct environmental description, photography assistance and object search for visual-impaired people • Enable Google screen reader "Talk Back" installation • upgraded its sound recognition and interpreter systems
	2024	• Upgraded Sign Language Translator feature, enabling better sign language learning and interpretation • Recognition and speech synthesis of multiple languages and regional dialects [67]
Xiaomi	2018	• Accessibility App Zone, allowing users to easily find and access relevant apps [68] • Face recognition with voice prompt
	2020 [69]	• AI subtitle (Xiaomi Wensheng App) and AI calling • Voice command phone, enabling over 20 common gestures like swipe up, long press and click to be controlled by voice. Digital tags can also be put on phone by voice.
	2021	• Sound recognition feature, enabling environment sounds such as alarm, doorbells, notification be converted text. The feature is further incorporated in Xiaomi IoT services such as surveillance camera and sound speaker
	2022 [70]	• Further developed AI-empowered inclusion system and improved the sound, image and speech recognition, phone assistant and voice control.

Competitive advantage for LMIC exports

Chinese suppliers are recognized for their competitive pricing, high production capacity, diverse product range and short lead times. While some other countries have recently expanded manufacturing of low-cost assistive products like spectacles, China's extensive production experience allows it to maintain richer, more affordable product variety with greater functional diversity, solidifying its position as the key global manufacturing hub for assistive products.

Several key factors driving these competitive advantages are listed below:

- China's overall experience in manufacturing: For example, China's expertise in precision instruments provides a strong talent pool and advanced manufacturing capabilities for hearing aids. Also, China's long manufacturing history in industries like bicycles and automotive vehicles provides wheelchair manufacturers with a wide range of upstream suppliers for components such as wheels and steel tubing, thereby supporting their price competitiveness in the global market.
- A comprehensive supply chain that provides easy access to upstream materials and downstream distribution and sales, along with low-cost, productive and skilled labour. For example, according to one leading wheelchair manufacturer in China, a standard manual wheelchair consists of over 200 individual components. Thus the comprehensive supply chain is crucial for cost reduction and shortening the lead time.
- Policy support: In alignment with national assistive technology policies, multiple regional initiatives have been established to support AT manufacturing in China. For instance, the three largest wheelchair-producing provinces offer tax refunds, subsidies, cash awards and industrial park investments, along with infrastructure upgrades including logistics, warehousing, e-commerce platforms and R&D/quality inspection facilities. These measures collectively enhance production efficiency and price competitiveness.
- Increasing adherence to quality: With years of experience in OEM, many manufacturers uphold high quality standards, achieving global certifications like CE, FDA and ISO, and adhering to stringent manufacturing practices.

Challenges for LMIC exports

Most respondents expressed interest in strengthening sales in LMICs. However, based on the interviews, they face several common challenges:

- Operational Trade-offs in Price-Sensitive Segments: In the lower-end segment of the market, many products still show limited differentiation. This contributes to price-driven competition, especially in export-oriented sales. Under continued margin pressure, there have been instances where cost-control measures have affected material selection or certain production procedures, raising concerns around product consistency and long-term performance.
- Logistical challenges for export: According to expert interviews, recent global conflicts have led to delays in Red Sea shipping, with shipping costs increasing up to fivefold. This specifically affects bulk products like wheelchairs. In addition, African markets have limited access to US dollars, making cross-border payments difficult.
- Need to improve access to local information and resources for responding to LMIC government tenders: Many interviewed suppliers currently rely on distributors or exporters when responding to government tenders in LMICs. This is often due to limited access to local market information, challenges with product registration, and a lack of direct engagement channels with government stakeholders. The involvement of multiple intermediaries has, in some cases, led to significant price mark-ups—end-user prices can exceed three times the original ex-works pricing from Chinese manufacturers.
- Differences between Chinese and local standards: In some LMICs, the standards and certification requirements used in procurement differ from those in China. For example, while some hearing aids are certified as medical grade in China, they may not align with medical-grade classifications used in other markets. Similarly, for prostheses, certain LMIC buyers require third-party certification reports or a Certificate of Free Sale issued by the China Council for the Promotion of International Trade. Applying for these additional documents can lead to delays and increased costs, which may result in missed business opportunities for suppliers.
- Product registration cost and time: Many suppliers interviewed highlighted that product registration in LMICs is expensive, a lengthy process and sometimes requires additional expenses for quality certifications. According to a hearing aids

supplier, the minimum product registration period across LMICs is around six months, while it can take up to two years in some Latin American countries. And several wheelchair suppliers reflected that many African countries lack in-country quality inspection capabilities, commonly requiring third-party certifications, such as those from SGS, which further increase manufacturers' costs. The certification and testing can cost around US$13,000 to US$15,000 per product, with an additional US$20,000 for each product's local registration, and often taking 3 to 12 months to complete.

- Lack of access and understanding of global knowledge and standards: For example, WHO launched the Assistive Products Specifications and Preferred Product Profile to guide hearing aid procurement in LMICs, which could be helpful reference documents for suppliers to understand the market and strategize accordingly. However, very few suppliers have indicated that they are aware of these documents. Interviewed prostheses suppliers also reflected that they are fragmented and operate on a small scale, thus lacking the resources and dedicated sales personnel needed for global market research and business development.
- Low brand awareness: For example, in hearing aids, the global market is dominated by the top five international companies, and awareness of Chinese brands among distributors and exporters remains low. And for spectacles, although China exports a large volume, most companies remain weak in brand marketing and only sell as OEM/ODMs. According to supplier interviews, it is common to see spectacles priced between US$3-US$5 ex-works reach prices over tenfold once they are rebranded with a global label.
- Perceptions shaped by differing product standards: In some assistive products, especially those with higher technical complexity, product standards are applied in varying ways. For example, China's national standards for prostheses are generally well-developed for domestic use, but they may not always align with the requirements or expectations in other countries. These differences can contribute to variations in product performance and influence how such products are perceived in international markets.

Several challenges are identified for specific product category, for example in the following fields:

Digital assistive technology:

- Low consumer awareness of the product benefits: According to one of the largest Chinese digital assistive product manufacturers, the sales of digital AT require significant user awareness education, thus sales mainly occur through the public sector, i.e. government procurement and donations, rather than the B2C model. In many LMICs, such products lack policy advocacy and are not yet included in public procurement, making client acquisition more difficult.
- Language: Digital assistive products are primarily used for communication but most Chinese manufacturers design these products with Chinese interfaces. To sell abroad, the language must be modified, and the products need to be redesigned to suit local communication habits, which requires additional effort and investment. AI translation could potentially be leveraged to overcome the language barrier for promoting digital AT.

Spectacles:

- High tariffs: China spectacles manufacturers face significant tariffs when selling to African countries. Generally, China and African countries do not have many free trade agreements, and spectacles are sometimes classified as luxury products, thus not eligible for reduced or exempt taxes. This high tariff challenge is less pronounced in Asia given a few Asia-Pacific trade agreements.
- Additional medical device certification required: Unlike in China, where spectacles are not defined as medical devices, in Europe, the United States and many LMICs spectacles are classified as Class I medical devices. Therefore, manufacturers need to apply for additional certificates to meet local standards.

Recommendations

Chinese suppliers recommend the following to the relevant Chinese industry association and parties to better support them to serve LMIC markets.

- Support better alignment with international market requirements: Helping manufacturers navigate different technical and certification standards across countries can strengthen the competitiveness of export products.
    - For example, in the case of hearing aids, relevant stakeholders could assist in clarifying the distinction between certified hearing aids and assistive listening devices (ALDs). This would support buyers in identifying products that meet their specific needs and help suppliers communicate the intended use and classification of their products more clearly across different markets.
    - For wheelchairs and prostheses, supporting enterprises in understanding the technical expectations of target markets can enhance product consistency and relevance. Tailored guidance or reference materials for key LMIC export destinations may further assist manufacturers in adapting to diverse requirements.
- Promote knowledge sharing of global markets: More industry events or workshops could be hosted to strengthen suppliers' understanding of global market trends and needs. The policymakers can facilitate collaboration between Chinese manufacturers and international organizations to provide better guidance for companies navigating local needs, regulations and standards.
- Invest in global brand building for Chinese suppliers: Organize and offer subsidies for Chinese suppliers to participate in global expos such as the European Union of Hearing Acousticians, OT World, Reha Care, among others.
- Enhance local assembly partnerships: Foster better collaboration between LMIC distributors and manufacturers to establish local assembly. Distributors can manage registration and logistical challenges, while Chinese suppliers provide technical transfer.
- Reduce price-only competition: The policymakers could implement regulations to curb excessive price competition that undermines product quality. For example, it could incentivise manufacturers to prioritize innovation and feature improvements (e.g. enhanced durability) and increase product differentiation. This could shift competitive dynamics from price wars to value-driven differentiation.

- Administrative support for manufacturers: The policymakers could expedite the process for obtaining the Certificate of Free Sale and other required import quality certifications for LMICs, including certification translations, to reduce time and costs for suppliers.
- Promote bilateral trade agreements and partnerships: Policymakers could promote negotiations for free trade agreements with African countries and other LMICs. It could also build bilateral relationships to promote reduced or exempt tariffs on certain assistive products.
- Support leading suppliers to build local presence in LMICs: Encourage more leading manufacturers to join global markets with their own-brands and enhance their visibility in the international arena.

References

[1] ATscale and Clinton Health Access Initiative (2024). Assistive Products Market Report 2024. ATscale and Clinton Health Access Initiative. https://atscalepartnership.org/assistive-products-market-report

[2] Liang, Y. (2024). 2023 China Hearing Aids Market Analysis. Intelligence Research Group. https://www.chyxx.com/industry/1170324.html

[3] Insight and Info (2021). 2021 China Rehabilitation Aids Industry Analysis Report. Insight and Info. https://www.chinabaogao.com/baogao/yiliaoqixie/549167549167.html

[4] China Disabled Persons' Federation (2023). 2023 China Statistical Yearbook on the Work for Persons with Disabilities. China Disabled Persons' Federation. https://www.cdpf.org.cn/sjzx/

[5] Ministry of Civil Affairs of the People's Republic of China (2024). 2023 Annual Report on the Development of China's Ageing Relevant Industry. https://www.mca.gov.cn/n156/n2679/c1662004999980001751/content.html

[6] World Health Organization (WHO). Caring for an ageing population. WHO. https://www.who.int/china/en/activities/caring-for-an-ageing-population

[7] Insight and Info (2024). Research on the Development of the Wheelchair Industry in China and Investment Prospect Forecast Report (2024-2031). Insight and Info. https://www.chinabaogao.com/baogao/202401/690773.html

[8] State Council (2016). Several Opinions of the State Council on Accelerating the Development of the Rehabilitation Assistive Devices Industry, State Issue [2016] No. 60. State Council. https://www.gov.cn/zhengce/content/2016-10/27/content_5125001.htm

[9] Ministry of Civil Affairs of the People's Republic of China (2023). China Catalogue of Rehabilitation Assistive Products (2023 Edition). Ministry of Civil Affairs of the People's Republic of China. https://view.officeapps.live.com/op/view.aspx?src=https%3A%2F%2Fwww.quannan.gov.cn%2Fqnxxxgk%2Fqn8515%2F202312%2Ff793fb50128b491d84772a58cf09b1d6%2Ffiles%2F35763148012f4a1ca60069d11342aa2f.doc&wdOrigin=BROWSELINK

[10] China Association of Assistive Products (2021). Blue Book on the Development of China's Rehabilitation and Assistive Device Industry. China Association of Assistive Products.

[11] World Health Organization (2021). Assistive product specifications and how to use them. WHO. https://www.who.int/publications/i/item/9789240020283

[12] Wang, X., Lee, C., Jiang, J., Zhu, X. (2023). Discussion on Sustainable Development Strategy of China's Rehabilitation Assistive Device Industry Based on Diamond Model. Sustainability 2023, 15, 2468, https://doi.org/10.3390/su15032468

[13] China Disabled Persons' Federation (2023). Exchange and Promotion Event for Innovative Assistive Devices for Persons with Disabilities Held in Beijing. 2023 CR EXPO. https://www.cdpf.org.cn//ztzl/zxzt1/2023/2023kfbzh/2023zhdt/467915dd29a3470baf5b5cb472495984.htm

[14] Cheng, S. (2024). 2024 Assistive Technology Innovation Exchange Event Held in Beijing. China Daily. https://cn.chinadaily.com.cn/a/202412/02/WS674d99cea310b59111da6a7e.html

[15] Shenzhen Municipal Disabled Persons' Federation (2022). Assistive Tech Innovation, Shared Future: 2022 Shenzhen Assistive Device Design Awards Announced. Shenzhen Municipal Disabled Persons' Federation. http://www.cjr.org.cn/news/official/content/post_853890.html

[16] Shenzhen Municipal Disabled Persons' Federation (2023). Official Announcement of Final Winners for 2023 Shenzhen Assistive Device Creative Design Competition. Shenzhen Municipal Disabled Persons' Federation. http://www.cjr.org.cn/info/notice/content/post_1114431.html

[17] Hu Bei Disabled Persons' Federation (2024). Official Announcement on the Final Evaluation of the 4th Hubei Provincial Assistive Device Innovation Design and Entrepreneurship Competition for Persons with Disabilities. National Assistive Devices Central China Resource Center. http://www.hbfj.net.cn/view/1315.html

[18] Chen, Y. (2024). 2024 China Zhejiang Future Technology Games for Persons with Disabilities & Yangtze River Delta Technology-Assisted Disability Innovation Competition (Assistive Device Creative Design Contest) Successfully Held. China Daily. https://zj.chinadaily.com.cn/a/202412/02/WS674d273ba310b59111da67d2.html

[19] Jiangsu Disabled Persons' Federation (2024). Jiangsu Province Technology-Assisted Disability Innovation & Assistive Device Creative Design Competition Held in Yangzhong City. Jiangsu Disabled Persons' Federation. https://www.jscl.gov.cn/html/category/NEWS/article/658adafa696a47cf948c36f7e6ac13b6.html

[20] China Disabled Persons' Federation (2021). Announcement of Selected Projects for the 2021 China Disabled Persons' Federation Research Program on Assistive Devices for Persons with Disabilities. China Disabled Persons' Federation. https://www.cdpf.org.cn/zwgk/ggtz1/a6ca6f4b7a30486d939e4958ca86a6c7.htm

[21] Shenzhen Daily (2023). Pingshan, German cooperate in rehabilitation aids. People's Government of Pingshan District. https://www.szpsq.gov.cn/english/News/LocalNews/content/post_10618586.html

[22] Guangdong Disabled Persons' Federation (2022). Greater Bay Area Assistive Technology Innovation Center Launched. Guangdong Disabled Persons' Federation. https://www.gddpf.org.cn/xwzx/gzdt/content/post_975812.html

[23] Shenzhen Municipal Disable Persons' Federation (2024). Our City Successfully Passed the Mid-Term Evaluation for Establishing the Greater Bay Area Assistive Technology Innovation Center. Shenzhen Municipal Disable Persons' Federation. http://www.cjr.org.cn/news/official/content/post_1123998.html

[24] Dong, L. (2024). Tsinghua University and China Disabled Persons' Federation Sign Strategic Cooperation Agreement. Tsinghua University. https://www.tsinghua.edu.cn/info/1182/116233.htm

[25] Zhang, Y., Zhang, R., Zhu, Y. (2024). Zhejiang University and China Disabled Persons' Federation Sign Strategic Cooperation Framework Agreement. Zhejiang University. http://www.news.zju.edu.cn/2024/1127/c755a2996742/page.htm

[26] China Disabled Persons' Federation (2024). University of Science and Technology of China and China Disabled Persons' Federation Sign Strategic Cooperation Agreement. University of Science and Technology of China. https://po.ustc.edu.cn/2024/1209/c19252a664348/pagem.htm

[27] China device GB Standards English PDF List. https://gbstandards.org/index/standards_search.asp?word=device

[28] General Administration of Customs of the People's Republic of China. http://stats.customs.gov.cn/

[29] Yidu Data (2023). Jinghao Company (872925.BJ) Analysis. Yidu Data. https://pdf.dfcfw.com/pdf/H3_AP202306271591738864_1.pdf

[30] National Medical Products Administration (2023). List of Medical Devices Exempt from Clinical Trial (2023 Edition). National Medical Products Administration. https://www.zhuhai-hitech.gov.cn/attachment/0/391/391824/3750221.pdf

[31] Database of National Medical Products Administration. https://www.nmpa.gov.cn/datasearch/home-index.html?3jfdxVGGVXFo=1749199818940#category=ylqx

[32] Zhang, S (2023). 2023 China Wheelchair Market Analysis. Forward the Economist. https://www.qianzhan.com/analyst/detail/220/230802-fd255207.html

[33] HL Corp (Shenzhen) (2024). 2023 Annual Report. HL Corp. https://static.cninfo.com.cn/finalpage/2024-04-24/1219772440.PDF

[34] Cofoe Medical Technology Co., Ltd (2024). 2023 Annual Report. Cofoe Medical. https://www.cofoe.com.cn/uploads/image/20240525/665194cf2d6b3.PDF

[35] INTCO Medical Technology Co., Ltd (2024). 2023 Annual Report. INTCO Medical. https://static.cninfo.com.cn/finalpage/2024-04-24/1219766821.PDF

[36] Jiangsu Yuyue Medical Equipment & Supply Co., Ltd (2024). 2023 Annual Report. Yuyue Medical Equipment & Supply. https://static.cninfo.com.cn/finalpage/2024-04-27/1219871664.PDF

[37] Zheng, Y. (2022). Behind the Beijing Winter Paralympics: The Prosthetics Industry Awaits Its Spotlight. The Beijing News. https://m.bjnews.com.cn/detail/164610174314616.html

[38] Intelligence Research Group (2024). Market Dynamics and Development Strategy Research Report on China's Prosthetics Industry (2025-2031). Intelligence Research Group. https://www.chyxx.com/research/202110/981568.html

[39] Chemical Inspection and Regulation Service (CIRS). List of 28 Products Not Classified as Medical Devices According to CFDA's Latest Definition. CIRS. https://www.cirs-group.com/cn/md/cfdazxjdd28gbzwylqxglgldcpqd

[40] National Institutes for Food and Drug Control. http://app.nifdc.org.cn/biaogzx/dataGk.do?formAction=listFljdResult&index=191

[41] National Research Center for Rehabilitation Technical Aids. https://kffj.mca.gov.cn/n809/n829/index.html

[42] China Optometric and Optical Association (COOA). Brief Introduction to China Optometric and Optical Association. COOA. http://www.chinaoptics.com/aboutUs/en-brief.html

[43] Huajing Industry Research Institute (2024). Statistical Analysis of China's Eyewear and Component Export Value in 2023. Huajing Industry Research Institute. https://www.huaon.com/channel/tradedata/963214.html

[44] Ministry of Foreign Affairs (2024). Introduction of Association of Southeast Asian Nations—ASEAN. Ministry of Foreign Affairs. https://www.mfa.gov.cn/web/wjb_673085/zzjg_673183/yzs_673193/dqzz_673197/dnygjlm_673199/dnygjlm_673201/

[45] China Optometric and Optical Association (COOA) (2023). 2022 China Eyewear Industry Import-Export Briefing Report. COOA. http://www.chinaoptics.com/policy/details215_4577.html

[46] National Medical Products Administration (NMPA). Medical Devices Classification. https://www.nmpa.gov.cn/wwwroot/gyx02302/flml.htm

[47] China Optometric And Optical Association (2022). National Standards. http://www.chinaoptics.com/policy/details214_4025.html

[48] Wenzhou Net (2023). Government Leadership, Dual-Engine Drive, Sustainable Development: Wenzhou Eye Valley Decodes the Health & Aesthetics Economy. Wenzhou Net. https://finance.66wz.com/system/2023/09/11/105599348.shtml

[49] Zhenjiang Municipal Government (2023). Danyang Eyewear Industry Explores New Transformation Models to Build Competitive Advantages. Government of Jiangsu Province. https://www.jiangsu.gov.cn/art/2023/9/7/art_88959_11016715.html

[50] Select Optical. About Us. Select Optical Official Website. https://www.selectopticallens.com/about-us/

[51] Zhantai Glasses. Production. Zhantai Glasses Official Website. https://zhantaiworld.com/competence/production/

[52] World Health Organization and the United Nations Children's Fund (UNICEF) (2022). Global report on assistive technology. WHO and UNICEF. www.unicef.org/reports/global-report-assistive-technology

[53] Senjam, S., Manna, S., and Bascaran, C. (2021). Smartphones-Based Assistive Technology: Accessibility Features and Apps for People with Visual Impairment and its Usage, Challenges and Usability Testing. Clinical Optometry (Auckl). 13:311-322. 10.2147/OPTO.S336361.

[54] ITHome (2023). Huawei's Responsibility as a Tech Leader: Making Innovations Benefit Everyone and Pioneering Sustainable Development. Tencent. https://news.qq.com/rain/a/20231206A062WY00

[55] China News Weekly (2024). Huawei adheres to one fundamental principle in creating a barrier-free digital world. Sohu. https://www.sohu.com/a/788735527_220095

[56] Honor (2024). Environmental, Social and Governance Report (2023 Edition). Honor. https://www.honor.com/cn/honor-esg/esg-report/

[57] Honor (2023). Environmental, Social and Governance Report (2021-2022 Edition). Honor. https://www.honor.com/cn/honor-esg/esg-report/

[58] Huawei (2021). Huawei Consumer Business Sustainability Progress Report (2011-2020). Huawei. http://www-file.huawei.com/-/media/corp2020/pdf/sustainability/huawei-consumer-business-sustainability-progress-report-2011-2020-en.pdf

[59] Accessibility Research Association (2020). Accessibility for All: Huawei Store Experience Day. Accessibility Research Association. https://siaa.org.cn/news_content?id=692

[60] Huawei (2023). Huawei Consumer Business Sustainability Progress Report (2021-2022). Huawei. https://www-file.huawei.com/-/media/corp2020/pdf/sustainability/others/huawei-consumer-business-sustainability-progress-report-2022-cn.pdf

[61] Huawei (2024). Huawei Consumer Business Sustainability Progress Report (2023-2024). Sohu. https://www.sohu.com/a/820421623_468661

[62] OPPO (2023). Sustainability Report 2022. OPPO. https://www.oppo.com/content/dam/oppo/common/mkt/footer/2022-OPPO-Sustainability-Report-EN.pdf

[63] Huanqiu Net (2024). World's First! 7B-Parameter AI Model Deployed on OPPO Smartphones. Huanqiu Net. https://mp.weixin.qq.com/s/muFduS1YPvMTwFNx-KsKxQ

[64] Transsion (2024). 2023 Environmental, Social and Governance Report. Transsion. https://q.stock.sohu.com/newpdf/202457758924.pdf

[65] Chen, J., Yang, J., Zeng, Q and Yu, Y. (2024). Domestic Smartphones Collaborate to Build an Accessible Ecosystem: Delivering 'Tech with Heart' Through Innovation. https://mp.weixin.qq.com/s/oQhXCnDAknzPy3KVoBcs5A

[66] Vivo (2024). Sustainability Report 2023. Vivo. https://asia-exstatic-vivofs.vivo.com/PSee2l50xoirPK7y/activity/1726036437437/zip/img/vivo_Sustainability_Report_2023.pdf

[67] Canzhang Zhiyin (2024). Vivo Unveils New 'BlueHeart AI' Strategy with Special Focus on Visual and Hearing Accessibility. Canzhang Zhiyin. https://mp.weixin.qq.com/s/TNej2zdlvvOdEroppUzjiA

[68] Xiaomi Corporation (2023). Environmental, Social and Governance Report 2022. Xiaomi Corporation. https://xiaomi.gcs-web.com/system/files-encrypted/nasdaq_kms/assets/2023/04/26/10-13-04/2022%20ESG%20Report_ENG.pdf

[69] Xiaomi Corporation (2020). Environmental, Social and Governance Report 2019. Xiaomi Corporation. https://ir.mi.com/static-files/412216ea-c5b5-4f22-ad1a-8e464a7478c6

[70] Xiaomi Corporation (2021). Environmental, Social and Governance Report 2020. Xiaomi Corporation. https://ir.mi.com/static-files/412216ea-c5b5-4f22-ad1a-8e464a7478c6