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Introduction

Assistive Technology comprises the application of assistive products — any external devices, software, equipment, or instruments—to help individuals with disabilities improve their functional capabilities and inclusive social participation [1]. An estimated 2.5 billion people — a quarter of the global population— currently need AT, including older people, children and adults with disabilities, and people with non-communicable diseases (including those with cognitive impairments) [2,3]. The number is projected to reach 3.5 billion by 2050, owing to the growing population and increasing prevalence of lifestyle diseases [4].

AT enables people with functional limitations to perform daily activities and exercise their rights to health, education, work, leisure, social and cultural participation, and freedom of opinion and expression; AT essentially plays the first step in social and cognitive development of children with disabilities—thus contributing to social and economic growth of nations. Ensuring universal access to AT is integral to achieving sustainable development goals [5].

Globally, access to AT ranges from 3% in low-middle-income countries (LMICs) to 90% in high-income countries (HICs), highlighting the need to address this inequitable coverage [4]. Demand-side barriers to accessing AT include lack of awareness, stigma, discrimination, well-trained providers, and affordability; supply-side barriers include non-availability, inappropriate design, and quality— leading to market inefficiencies [6]. This is further compounded by a lack of political commitments, commercial focus, and inadequate resource allocation despite very high return on investment (9:1 for devices such as hearing aids, prosthesis, wheelchairs, eyeglasses) [7]. The major source of funding on AT is out-of-pocket, followed by friends/family, highlighting poor government spending — ranging from 0-10 % across nations [8].

Precise estimates of people requiring AT in India are lacking; however, the National Sample Survey (NSS) 2018 reports 2.2% of the population (approximately 31 million) are disabled — indicating a substantial need for AT in India. While locomotor disabilities carry a higher prevalence amongst elderly aged 60-74 years (50.47%), speech disabilities are more common in children aged 0-14 years (23.06%). Disability is more prevalent among the uneducated, unmarried, marginalized castes (33% higher) and the poorest wealth quintile (55% higher), highlighting systemic inequities [9]. Moreover, PwDs face discrimination in accessing education, healthcare, and employment opportunities and, therefore, are at higher risk of poverty and deepened social exclusion. Financially, they face a significant burden, which is reflected in their low workforce participation (36%; compared to 60% among non-disabled individuals). Furthermore, affected households spend over 20% of their monthly consumption on disability-related healthcare, with more than half (57.1%) experiencing catastrophic health expenditure and nearly one-fifth (19.1%) falling below the poverty line due to treatment costs [10-12].

India has implemented several initiatives to enhance the availability and accessibility of AT. The ADIP (Assistance to Disabled Persons for Purchase/Fitting of Aids and Appliances) Scheme provides free or subsidized assistive devices to economically disadvantaged PwDs, ensuring access to mobility aids, hearing devices, and other essential technologies. The Deendayal Disabled Rehabilitation Scheme (DDRS) supports NGOs in distributing AT and offering related rehabilitation services. Additionally, the National Trust and scholarships like Saksham facilitate access to AT in education and healthcare settings for individuals with intellectual and developmental disabilities. However, national estimates on access and coverage of assistive technology to measure success and challenges of existing programmes and identify future investment needs are limited [13-16].

This review aims to determine the access and coverage of assistive technology and associated facilitators and barriers in India. While existing literature provides valuable insights into the coverage and barriers related to the use of AT in India, an attempt to compile and synthesize evidence at the national level is lacking.

Research question

What is the access and coverage of assistive technology and what are facilitators and barriers to access and coverage in India?

Objectives:

To systematically collate evidence on met and unmet needs and identify facilitators and barriers to access and coverage of assistive technology in India.

Literature Review

1. Prevalence and Demographics of Disability in India

Disability is a multidimensional phenomenon that extends beyond physical impairments to encompass activity limitations and participation restrictions arising from interactions between health conditions and environmental factors [2]. According to the WHO, around 1.3 billion people globally (16% of the population) live with some form of disability, with a striking 80% of these individuals residing in low- and middle-income countries [3].

In India, data on disability has evolved significantly in recent decades, though discrepancies in reporting highlight the complexities of measurement. The 2011 Census of India reported 2.68 crore persons with disabilities (2.21% of the population), but more recent surveys have revealed higher prevalence rates [17]. The National Sample Survey (NSS) 76th Round (2018) estimated disability prevalence at 22 per 1,000 persons, with hearing impairment emerging as the most common form (accounting for 8 per 1,000), followed by visual disabilities (5.1), speech (4.8), and locomotor disabilities (4.3) [9].

The NFHS-5 (2019-21), though primarily focused on health and family welfare, included disability data that suggested 0.93% of individuals and 5.11% of households have at least one person with a disability [11]. The data also highlighted disparities by age group:

- Locomotor disabilities were most common (44.73%), with highest prevalence in individuals aged 60–74 years (50.47%).
- Mental disabilities had a higher burden among adolescents and young adults (15–29 years: 29.98%).
- Speech disabilities were most prevalent in children (0–14 years: 23.06%).

The gender gap was notable, with disability prevalence 58% higher in males than females. Additionally, education and economic status were significant correlates: individuals without formal education were four times more likely to have a disability, while disability prevalence was 55% higher in the poorest wealth quintile compared to the wealthiest. Social group disparities were also evident, with disability burden 33% higher in OBCs compared to Scheduled Tribes, reflecting complex intersections of social and economic exclusion [11].

2. Socioeconomic Impact of Disability

Disability imposes a substantial burden not only on the individuals affected but also on their families and society at large. PwDs in India face challenges that hinder their participation in education, employment, and community life, often leading to social exclusion and deepening poverty cycles. Studies have highlighted that only 36% of PwDs participate in the labor force, significantly lower than the 60% participation rate among non-disabled individuals [18].

Financially, the burden of disability-related care and health expenditures is considerable. Evidence suggests that households with disabled members spend over 20% of their monthly consumption on disability-related healthcare. Moreover, 57.1% of these households experience catastrophic health expenditure, and 19.1% fall below the poverty line due to treatment costs, with an average income shortfall of 11%. This perpetuates economic vulnerability, limiting access to quality health care, nutrition, and education for children in these households [19,20].

3. Legislative and Policy Frameworks

India has progressively strengthened its legal and policy frameworks to uphold the rights and dignity of persons with disabilities:

- The Rights of Persons with Disabilities (RPwD) Act, 2016: A landmark legislation, this Act expanded the definition of disability from 7 to 21 categories, ensuring coverage of a broader range of impairments (including blood disorders, acid attack victims, and autism spectrum disorder). It mandates non-discrimination, reasonable accommodation, and accessibility in education, employment, and public spaces. It also guarantees reservation in higher education (5%) and government employment (4%), with special provisions for women and children with disabilities [13,14].
- National Policy for Persons with Disabilities (2006): This policy emphasizes equal opportunities, protection of rights, and full participation of PwDs in social, economic, and political life. It calls for strengthening community-based rehabilitation and ensuring access to assistive devices [15].
- Accessible India Campaign (Sugamya Bharat Abhiyan, 2015): Launched to make built environments, public transport, and ICT systems accessible, it includes initiatives like retrofitting government buildings and accessible websites [23].
- Deendayal Disabled Rehabilitation Scheme (DDRS): Supports NGOs in delivering services such as education, vocational training, and community-based rehabilitation for PwDs [22].
- Assistance to Disabled Persons for Purchase/Fitting of Aids and Appliances (ADIP) Scheme: Provides financial support for the purchase of assistive devices like wheelchairs, prosthetics, and hearing aids [16].
- Unique Disability ID (UDID) Project: A digital initiative to streamline identification and certification, ensuring that PwDs can easily access benefits and entitlements [21].

- Skill Development and Employment: Programs like the National Action Plan for Skill Development of PwDs (2015) and reservation in government jobs aim to enhance employment opportunities. Inclusive education initiatives, such as IEDSS and Samagra Shiksha Abhiyan, support the integration of children with disabilities in mainstream education [24].

4. Role and Importance of Assistive Technology

AT refers to a wide range of products and devices designed to enhance the functional capabilities of individuals with disabilities, thereby promoting their inclusion and participation in society. AT includes a wide range of physical products—such as wheelchairs, hearing aids, prosthetic limbs, and white canes—as well as digital solutions like screen readers, speech recognition software, and cognitive support applications. It plays a critical role in promoting the independence and social participation of persons with disabilities [1].

Globally, 2.5 billion people currently need one or more assistive products, and this number is projected to rise to 3.5 billion by 2050 due to aging populations and the increasing burden of noncommunicable diseases. In high-income countries, up to 90% of people have access to the assistive products they need, whereas in low-income countries, access can be as low as 3% [4].

In India, schemes like the ADIP Scheme and DDRS have sought to bridge this gap by providing free or subsidized assistive devices. The Assistance to Disabled Persons for Purchase/Fitting of Aids and Appliances (ADIP) Scheme, launched by the Ministry of Social Justice and Empowerment, aims to empower PwDs by providing essential assistive aids and appliances at no cost or at highly subsidized rates. Eligible individuals—those with at least 40% disability and limited monthly income—

can access devices such as wheelchairs, tricycles, hearing aids, prosthetic limbs, and Braille kits. Special provisions include cochlear implants for young children. The scheme is implemented through national institutes, ALIMCO, and NGOs, which conduct distribution camps across the country to ensure accessibility for economically disadvantaged PwDs. Despite its impact in promoting mobility and independence, challenges remain in procurement processes and community awareness [16].

The Deendayal Disabled Rehabilitation Scheme (DDRS) complements ADIP by focusing on the holistic rehabilitation and inclusion of PwDs through financial support to NGOs. It funds a range of projects, including special schools, vocational training centers, community-based rehabilitation programs, therapy centers, and awareness campaigns. DDRS emphasizes reaching marginalized and rural communities, enhancing the availability of assistive services and empowering PwDs to participate fully in society. Regular monitoring ensures accountability, but implementation gaps and limited resources sometimes constrain its effectiveness. Overall, DDRS plays a pivotal role in fostering a supportive ecosystem for PwDs in India [22].

However, challenges remain, particularly in rural areas and among the economically disadvantaged, where access is often limited due to logistical, financial, and infrastructural barriers.

5. Barriers and Facilitators to AT Access

Despite the recognized importance of AT, several barriers hinder its widespread adoption and utilization in India. These barriers include lack of awareness, high costs, limited availability, and social stigma associated with disability and the use of assistive devices. A sub-population-based study conducted in India highlighted that many individuals who could benefit from AT do not have access due to these multifaceted challenges [20].

To improve AT access and utilization, facilitators such as policy support, community-based rehabilitation programs, and awareness campaigns are crucial. Integrating AT into primary healthcare, providing financial subsidies, and promoting inclusive education and employment opportunities can significantly enhance the quality of life for PwDs. Collaborative efforts between government agencies, NGOs, and private sectors are essential to create an enabling environment for the adoption and effective use of assistive technologies [25].

This literature review demonstrates the interconnected nature of disability prevalence, socioeconomic impact, policy initiatives, and the role of assistive technology in India. It highlights that while India has made significant progress through policies and schemes, substantial gaps remain—especially in awareness, affordability, and access to assistive technologies. Bridging these gaps requires a multifaceted approach, including policy implementation, community engagement, and technological innovation, to ensure the dignity, independence, and full participation of persons with disabilities in Indian society.

Methodology

Study design

This study was designed as a scoping review to map the existing literature on barriers and facilitators to access and coverage of AT in India. The review was conducted following the methodological framework proposed by the Joanna Briggs Institute (JBI) and was reported in line with the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) guidelines [26].

Study Selection and Inclusion Criteria

A systematic literature search was carried out using three major academic databases: PubMed, ProQuest, and Web of Science. The key concepts addressed in this review were:

(1) assistive technology;

(2) functional categories of AT, including hearing, vision, mobility, self-care, communication, and cognition;

(3) access and coverage of AT; and

(4) barriers and facilitators to access and coverage.

The eligibility of studies for inclusion in the review was determined using clearly defined inclusion and exclusion criteria, which were developed based on the Population, Concept, and Context (PCC) framework. These criteria, along with the corresponding justifications, have been detailed in a tabular format in (Table 1). The review focused on literature pertaining to people in India who need assistive technology—mainly individuals with disabilities, older adults, and those living with noncommunicable diseases.

Key concepts		Inclusion criteria	Exclusion criteria
Population		People with a need for assistive technology: mostly people with disabilities or noncommunicable diseases and older adults. The search will not be limited to specific subgroups	People with no need for assistive technology
Concept	Assistive technology/ product	Functional categories: mobility vision hearing cognition communication self-care	• Assistive technology belonging to any other group • Any service, treatment or therapy not related to assistive technology • Technology used to diagnose disease, disability or care needs • Assistive technology is owned by and only accessible in a specific setting (e.g. therapy, work or school) as this provides no or only limited

			understanding of effective coverage • Assistive technology which is surgically implanted and remains permanently in the body
Concept	Access and coverage of assistive technology *	Percentage of the population that needs assistive technology and owns/uses assistive products (met needs) Percentage of the population that needs assistive technology but does not own assistive products because of identified barriers (unmet needs	Percentage of the population that theoretically has access to assistive technology from a policy perspective, without an understanding of the effective coverage Focuses exclusively on the development of assistive technology or on people's attitudes towards a specific assistive technology and does not address attitudes towards accessing assistive technology
	Facilitators and barriers to access and coverage	These may fall into these three categories:** • physical accessibility • financial affordability	No facilitators or barriers will be excluded

		• acceptability However, publications that mention other barriers or facilitators are still included	
Context	India	Indian states	Outside India
	Language	English	Publications in a language not spoken by the team and where authors are not available to complete a checklist
	Time range	Any evidence published since 2010	Any evidence published before 2010
	Abstract	Publications with an accessible abstract	Publications without an accessible abstract

Table 1: PCC framework for inclusion and exclusion criteria

An iterative process was used to develop the search strategy, combining keywords such as ("Assistive Technology" OR "AT") AND (Assistive technology functional categories: hearing, vision, mobility, self-care, communication, and cognition) AND (India) AND (Access OR Coverage OR Barriers OR Facilitators) as mentioned in supplementary.

We included studies published since inception and estimated prevalence of AT needs, access and coverage of AT and/or examined barriers and facilitators in Indian population. This review focused on AT used for mobility, vision, hearing, cognition, communication and self-care and studies. We excluded studies on assistive technologies belonging to any other functional domain; studies assessing AT owned by and only accessible in a specific setting (e.g. therapy, work or school), as this provides no or only limited understanding of effective coverage and studies focused on AT which is surgically implanted and remains permanently in the body were

also excluded. We also excluded case-studies, case-series, commendatory, proceedings, editor to letter, editorials, conference presentations, narrative and systematic reviews, studies published in non- English language and for those, full text was not retrievable. We excluded studies estimating the prevalence of current use of AT but were not providing relevant statistics to estimate prevalence of AT needs and met and unmet needs.

In this review, we considered the population in need of assistive technology based on definitions adopted by the included studies. We used access and coverage to indicate met and unmet needs. Met needs are defined as the proportion of population that needs assistive technology and owns/uses assistive products and does not need more AT. Unmet needs are defined as the proportion of population that needs assistive technology bur either does not own AT or own but needs more AT for proper functioning. For instance, individuals with vision impairment whose vision is corrected with their own spectacles would be considered as having met needs. On the other hand, those with vision impairment that remains uncorrected despite using their own spectacles — but improved with further correction —would be considered as having unmet needs. Prevalence of AT needs is defined as total needs (met and unmet needs) divided by total population (sample size assessed for AT needs in the study).

$$Prevalence\ of\ AT\ needs = \frac{(met\ needs) + (unmet\ needs)}{Total\ Population}$$

$$Met\ needs = \frac{(met\ needs)}{(met\ needs) + (unmet\ needs)}$$

$$Unmet\ needs = \frac{(Unmet\ needs)}{(met\ needs) + (unmet\ needs)}$$

Screening, Data Extraction and Synthesis

The **screening process** was carried out in Microsoft Excel. An initial title and abstract screening were conducted independently by two reviewers to filter out studies that were clearly irrelevant. Full-text articles of potentially eligible studies were then retrieved and assessed against the inclusion criteria. Any discrepancies between reviewers were resolved

through discussion or by consulting a third reviewer to ensure consensus and reduce selection bias.

A **standardized data extraction form** was used to collect key information from each included study. This included details such as the author(s), year of publication, location, study design, population characteristics, type of assistive technology covered, as well as identified barriers and facilitators to access and coverage. Measures of AT accessibility and coverage were also recorded wherever available.

The extracted data were synthesized using both qualitative and quantitative approaches. A thematic analysis was undertaken to identify and categorize recurring barriers and facilitators, which were organized into broad themes such as health system factors, financial barriers, societal attitudes, and physical accessibility. Additionally, available quantitative data on assistive technology coverage, including estimates of met and unmet needs, were summarized descriptively to provide an overview of the current landscape in India.

The final results are presented in a narrative format, supported by tables and figures to facilitate clear interpretation. The review aimed to generate a comprehensive understanding of the current state of assistive technology access in India and the factors influencing its equitable distribution.

Results

Summary of publications included in the scoping review

A total of 30 studies were included in this scoping review [27-56]. These studies were identified through a systematic screening process illustrated in the PRISMA diagram [Fig 1]. Initially, 575 records were retrieved from databases including PubMed, PROQUEST, and Web of Science. After removing duplicates (144), 431 records remained for title and abstract screening. Following the screening, 87 full-text articles were sought for retrieval, of which 6 could not be retrieved. After a comprehensive eligibility assessment of 81 reports, 30 studies met the inclusion criteria and were included in the final review.

The included studies were conducted across a range of Indian states and districts, reflecting the diversity of India's population and healthcare infrastructure. Urban centers such as Mumbai, Pune, Delhi NCR, Chennai, Bangalore, Kolkata, Lucknow, and Bhopal featured prominently, as did states like Kerala, Odisha, Rajasthan, Assam, Gujarat, and Himachal Pradesh. Some studies focused on specific districts and rural areas, including tribal populations, highlighting the disparities in access to AT in these settings.

The sample sizes of the studies varied considerably, demonstrating the breadth of research conducted in this area. Smaller studies, often qualitative in nature, involved fewer than 100 participants and focused on capturing nuanced, lived experiences of people with disabilities in local contexts. Moderate-scale studies with samples ranging from 100 to 500 participants typically assessed barriers to AT access and usage in urban and rural communities. A smaller number of large-scale studies, including those with samples exceeding 1000, provided broader insights into the state-wide or district-wide coverage of assistive technology services.

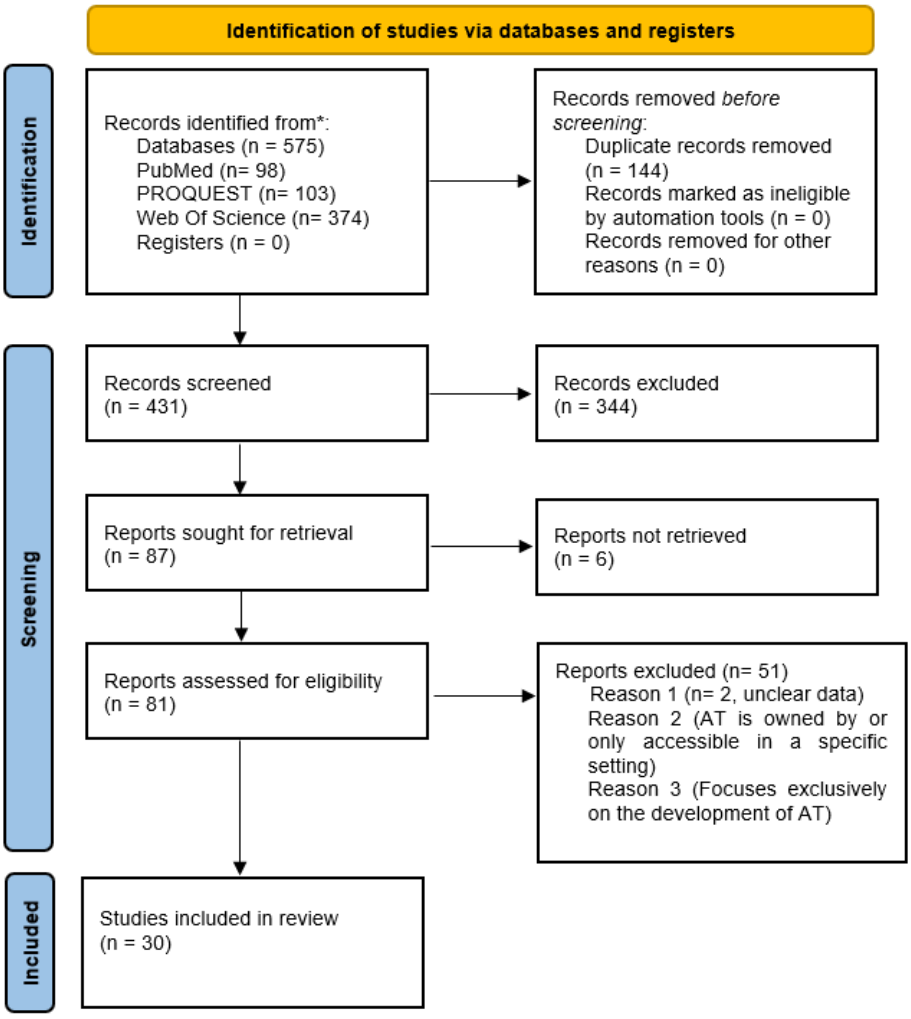

Figure 1: PRISMA Flow Diagram of the Study Selection Process

The studies encompassed various designs, including cross-sectional surveys, prospective studies and mixed-methods research. Most of the cross-sectional studies used structured surveys to assess access, coverage, and barriers to assistive technology. Qualitative studies utilized interviews and focus group discussions to explore the socio-cultural and financial challenges in accessing AT, while mixed-methods studies combined quantitative and qualitative data to present a holistic picture. Together, these publications provided a robust foundation for understanding the met and unmet needs of persons with disabilities and older adults, as well as the facilitators and barriers they face in accessing assistive technology in different regions of India.

Coverage of AT in India

In this scoping review, 13 of the included studies provided data on the coverage of AT, focusing on both met and unmet needs. While all 13 studies reported on met needs—indicating the proportion of people who own or use AT—12 of these studies also discussed unmet needs, highlighting gaps in access and the challenges faced by people with disabilities and older adults in India.

Included studies focused on six functional categories of assistive technology: mobility, vision, hearing, communication, cognition, and self-care. By covering these categories, the studies offered a comprehensive picture of the state of assistive technology access and coverage in India. Several studies focused on more than one functional domain, while others explored multiple assistive products for the same functional domain or across multiple disabilities. This variability in the scope and focus of studies provides a nuanced understanding of AT coverage in India. A summary table of the coverage findings is presented in the table 2 to provide a clear and concise overview of met and unmet needs across the six functional domains.

Study	Study setting	Sample size	Age group	Functional domain	Condition	Assistive Technology used	Prevalence of need	% Met Need
Vignesh,2021,Delhi	Community, Urban	555	60 yr and above	Vision	Refractive errors	Spectacles	84%	59%
Dorothy,2021,Telangana	Community, Rural	3574	All Age groups	Vision	Vision Impairment	Distance glasses	Mild (7.2%), Moderate (3.7%)	Mild VI (44%), Modera e VI (87%)
Srinivas,2017, Telangana.	Community, Rural	5881	40 years and above	Vision	Near Vision Impairment	Spectacles	63.70%	26.40%
Srinivas,2021,Telangana	Community, Rural	5357	40 years and above	Vision	Near Vision Impairement	Spectacles	34.72%	31.80%
Srinivas,2021,Andhra Pradesh	Community, Rural	2587	41 years and above	Vision	Distance Vision Impairement	Spectacles	13.45%	37.40%
Sumit,2022, Haryana	Community, Rural	3246	35 years and above	Vision	Presbyopia	Spectacles	42.90%	25.80%
Srinivas,2013,Andhra Pradesh	Community, Rural and Urban	7378	40 years and above	Vision	Refractive errors	Spectacles	12.90%	38.00%
Srinivas,2013,Andhra Pradesh	Community, Rural and Urban	7378	40 years and above	Vision	Presbyopia	Spectacles	47.20%	27.00%
Srinivas,2012,Andhra Pradesh	Community, Rural	1560	40 years and above	Vision	Refractive errors	Spectacles	16%	28.40%
Srinivas,2012,Andhra Pradesh	Community, Rural	1560	40 years and above	Vision	Presbyopia	Spectacles	45.20%	11.13%
AmitBhardwaj,2023,Odisha	Community, Rural, Urban	3745	40 years and above	Vision	Refractive errors	Spectacles	13.30%	68.90%

Srinivas,2013,Andhra Pradesh	Community, Rural, Urban	494	50 years and above	Vision	Refractive errors	Spectacles	23.10%	35%
Srinivas,2013,Andhra Pradesh	Community, Rural, Urban	494	50 years and above	Vision	Presbyopia	Spectacles	54.90%	28.86%
Srinivas,2017,Telangana	Community, Rural	5881	40 years and above	Vision	Refractive errors	Spectacles	8.60%	53.60%
Sumit,2019, Haryana	Community, Rural	6910	15 years and above	Vision	Refractive errors	Distance Vision Spectacles	16.23%	33.33%
Utkarsha,2016,New Delhi	Hospital, Urban	100	15-60 years	Mobility	Various	walking sticks, wheelchairs, shoe modifications	NA	52%
Dorothy,2021,Telangana	Community, Rural	3574	All Age groups	Mobility	Musculoskeletal Impairment	Wheelchairs	0.10%	33.30%
Dorothy,2021,Telangana	Community, Rural	3574	All Age groups	Hearing	Hearing Impairment	Hearing Aids	3.10%	4.50%

Table 2: Summary table of the coverage findings met and unmet needs across the six functional domain.

Vision

12 publications spanning multiple states and districts of India, including Andhra Pradesh, Telangana, Delhi, Haryana, Odisha, and others discussed about the coverage of vision related AT in India. These studies utilized cross-sectional designs, and their sample sizes varied widely—from as few as 524 participants to as many as 8964. Participants' ages ranged from 15 years to above 60 years, providing a comprehensive look at different population segments. The majority of studies were community-based and covered both rural and urban settings, reflecting the diversity of contexts in India.

Across these studies, the coverage of vision-related AT—primarily spectacles—varied substantially. For instance, in Andhra Pradesh, coverage among individuals with refractive errors ranged from as low as 4.9% to 28.4%, while unmet needs for spectacles in these groups reached up to 88.86%. In Telangana, studies among rural populations reported met needs for spectacles for presbyopia as low as 19.2%, with unmet needs up to 66.8%. In Haryana, the situation was similarly concerning, with only 25.8% coverage for presbyopia in one study and 74.22% reporting unmet needs.

Overall, this wide variation in coverage rates underscores the persistent gaps in vision-related AT access in India, especially among older adults and rural populations.

Hearing

Only one publication provided data on the coverage of assistive technology for hearing in India. The study was done in Telangana, and included rural communities with sample size of 3574 participants.

This large population-based survey found that 4.5% of individuals with hearing impairments were using hearing aids, while 96.5% had unmet needs for hearing aids.

Mobility

Two publications provided data on assistive technology coverage for mobility. The coverage rates varied by age group, geographic region, and study setting. Two studies focused on age between 15-60 years and on all age groups. For instance, one urban hospital-based study in New Delhi involving adults aged 15–60 years reported a coverage of 52% for mobility-related AT such as walking sticks, wheelchairs and shoe modifications. Another study from Telangana, based in a rural community and covering all age groups, found that 33.3% of participants with musculoskeletal impairment used wheelchairs, with 66.66% reporting unmet needs.

Barriers and Facilitators

A total of 24 publications discussed barriers and facilitators to the use and coverage of assistive technology. Of these, 24 publications specifically reported barriers, while 15 highlighted facilitators. These findings were pooled and analyzed due to significant overlap in themes, resulting in a consolidated presentation in Table 2 and 3, which organizes them by relevant categories. The analysis highlights the complex interplay of factors that either hinder or enable access, availability, and effective utilization of assistive technology across diverse settings and populations.

Facilitators of Assistive Technology Coverage and Access

The analysis of included studies identified multiple facilitators that contributed to the successful coverage, access, and sustained use of AT. These facilitators were classified into nine thematic

categories based on the mode of support, actors involved, and contextual mechanisms influencing AT access.

Facilitator Category	Description of Facilitators
1. Community-Based Support	- Hearing aids provision by trained community workers - Identification and referrals by VRWs, ASHA, Anganwadi workers - Local philanthropist camps and donation programs
2. Social and Family Support	- Encouragement and help from family and friends - Parental support and optimism - Social support from neighbors/friends - Willingness to advocate and explain condition
3. Educational and Institutional	- Supportive schools and teachers enabling AT use in education (e.g., braille, large print) - Higher education level
4. Peer and Civil Society Networks	- Access and training via DPOs (Disabled People Organizations), NGOs, peer networks - Device bundling and services through peer networks - NGO/CSR funding for support
5. Healthcare and Eye Care Services	- Primary eye care centers (e.g., LV Prasad network) - Private eye clinics, optical shops, LVP Vision centers - Local ophthalmologists and makeshift eye camps
6. Motivation and Personal Experience	- Feeling of normalcy and need fulfillment - Improved activity performance - Comfort with device (especially for prosthetics) - Self-perceived improvement (e.g., spectacles)
7. Technology-Based Support	- Use of Android phones with JAWS or accessible apps - Internet and mobile apps enabling independence
8. Government and Rehab Institutions	- DDRCs: Assessment, device delivery, and training - NGOs (e.g., Sense International) offering AT training, communication support
9. Local Innovations and Sustainability	- Use of local materials (e.g., wheelchairs with bicycle tyres) - Training local artisans for device repair and sustainability

Table 2: Summary table of the facilitators of AT access six functional domains.

1. Community-Based Support

Community-based delivery mechanisms emerged as significant facilitators for increasing AT access in both urban and rural contexts. The involvement of trained community health workers—

such as Village Rehabilitation Workers (VRWs), Accredited Social Health Activists (ASHAs), and Anganwadi workers—was critical in early identification, user referral, and community-level dissemination of assistive products. Several studies highlighted the role of local donation programs, eye camps, and philanthropic initiatives, which offered free hearing aids and vision devices through temporary setups within the community. These efforts reduced logistical barriers and expanded outreach, especially in underserved areas.

2. Social and Family Support

Support from family, friends, and immediate social circles played a vital role in enabling acceptance and continued use of assistive devices. Encouragement from caregivers and peers helped users build confidence, facilitated daily mobility, and contributed to positive device-related experiences. Parental optimism and proactive involvement were especially relevant in pediatric populations. In some instances, users who were able to advocate for their needs and explain their conditions to others received enhanced support from their communities, resulting in better device integration and reduced stigma.

3. Educational and Institutional Facilitators

Educational institutions functioned as important facilitators, particularly when teachers and school staff were supportive of inclusive learning strategies. The provision of learning tools such as large print books, braille, and scanning devices enabled children with visual and print disabilities to participate in formal education. A higher level of educational attainment among users or their caregivers was also associated with improved awareness, better navigation of AT services, and higher likelihood of sustained device usage.

4. Peer and Civil Society Networks

Peer networks and civil society organizations, including Disabled People's Organizations (DPOs) and NGOs, were instrumental in promoting AT access. These networks offered device bundling, peer-led training, and social modeling, which collectively supported user uptake and acceptability. In multiple studies, NGOs also played a central role in mobilizing resources, raising awareness, and advocating for user rights. CSR (corporate social responsibility) initiatives supplemented government programs by funding AT procurement and community distribution efforts.

5. Healthcare and Eye Care Services

Healthcare infrastructure, especially in the vision domain, facilitated wide-scale access to AT. Primary and secondary eye care centers, such as those within the LV Prasad Eye Institute network, provided comprehensive services, including screening, prescription, and device delivery. Local ophthalmologists, private eye clinics, and optical shops served as key access points for spectacles. Makeshift eye camps organized by public agencies or local philanthropists further expanded service coverage. These initiatives were especially impactful in regions with limited formal healthcare access.

6. Motivation and Personal Experience

Individual motivation, comfort, and satisfaction with devices emerged as strong facilitators for sustained usage. Users reported improved performance in daily activities, feelings of restored normalcy, and psychological fulfillment upon adopting assistive products. These subjective experiences reinforced device retention and long-term compliance. Comfort was particularly critical in the adoption of prosthetic devices, where physical fit and usability often dictated continued use. In the case of spectacles, perceived visual improvement directly influenced user satisfaction.

7. Technology-Based Support

Technological advancements and digital accessibility tools played an increasing role in enhancing independence and self-reliance. The use of smartphones, particularly Android devices equipped with screen readers like JAWS and accessible applications, allowed visually impaired users to communicate, navigate, and access services independently. Internet access and mobile platforms served not only as assistive tools but also as information sources, facilitating awareness of AT products and related services.

8. Government and Rehabilitation Institutions

Formal institutions such as District Disability Rehabilitation Centres (DDRCs) were identified as important facilitators in the structured provision of AT. These centers offered services such as assessment, device provision, and user training, often under government schemes. NGOs such as Sense International contributed to this ecosystem by offering specialized communication support, AT training, and psychosocial services. The integration of these services into government-supported systems ensured consistency and scalability in AT delivery.

9. Local Innovations and Sustainability

The use of locally sourced materials for AT production enhanced device affordability, accessibility, and sustainability. For instance, wheelchairs constructed using bicycle tyres and locally available parts were not only cheaper but also easier to repair within rural settings. Training of local artisans in device repair and maintenance helped establish community-based support systems, reducing dependence on centralized facilities. These innovations contributed to long-term usability and strengthened local ownership of assistive solutions.

Barriers to Assistive Technology Coverage and Access

A synthesis of the studies reveals that access to and sustained use of assistive technology is hindered by a complex interplay of personal, systemic, cultural, and environmental barriers. These barriers span across eight broad categories: awareness and perception, financial constraints, accessibility and availability, device-related issues, health system limitations, psychosocial and cultural factors, environmental and situational challenges, and discontinuation-related concerns.

Barrier Category	Description of Barriers
1. Awareness and Perception	• Lack of awareness about AT • Lack of felt need • Misconceptions (e.g., "others will help me", "I'm too old") • Belief that AT won't help • Social stigma • Shame or embarrassment in using AT • Fear of appearing weak or dependent • Lack of motivation or forgetfulness
2. Financial	• High cost of devices • Unable to afford maintenance or spare parts • No insurance or government support • High out-of-pocket expenses • Devices not replaced if lost/damaged
3. Accessibility and Availability	• Devices unavailable in rural or remote areas • Long waiting times or complex processes • Poor transportation to access services • Few or no local repair services • Urban-centric service distribution
4. Device-Related	• Poor-quality or fragile devices • Uncomfortable or poorly designed • Lack of suitability for daily tasks • Lack of training for usage • Short battery life or frequent breakdowns
5. Health System and Provider	• Inadequate guidance by health workers • Untrained or insensitive staff • Bureaucratic hurdles in access • Corruption or delays • Complex documentation requirements • No follow-up services
6. Psychosocial and Cultural	• Stigma or discrimination • Family/community discouragement • Negative views of disability

	• Perceived unattractiveness of devices • Association with helplessness
7. Situational and Environmental	• Inaccessible physical spaces • Lack of infrastructure in schools/workplaces • Need to travel long distances • Cultural mismatch with devices • Unsafe service environments
8. Discontinuation and Sustained Use	• Devices lost, stolen, or damaged and not replaced • Stopped using due to discomfort or no improvement • Temporary use only • No support for sustained use • Lack of follow-up or motivation

Table 3: Summary table of the facilitators of AT access six functional domains.

1. Awareness and Perception Barriers

A prominent barrier to AT uptake is the **lack of awareness** among potential users and caregivers regarding the existence, benefits, and relevance of assistive products. Many individuals do not recognize their needs or believe that AT could significantly improve their quality of life. This **lack of felt need** is often compounded by personal misconceptions such as “others will help me” or the belief that they are “too old to benefit.” Psychological factors such as **stigma, shame, and embarrassment** related to device usage persist, especially in low-resource or traditional settings. Social perceptions associating AT with weakness, dependency, or aging further discourage use. In some cases, users forget to wear their devices or lack intrinsic motivation, leading to underutilization even when devices are available.

2. Financial Barriers

Cost-related barriers remain among the most frequently cited and significant challenges. The high upfront cost of AT devices, combined with the **lack of financial support**, often renders them inaccessible to low-income populations. Maintenance costs, inability to afford spare parts, and **absence of insurance coverage** or targeted government subsidies exacerbate the financial burden.

Where public schemes do exist, they may not cover replacement in case of device loss or damage, making **sustained access** and long-term use economically unviable for many users.

3. Accessibility and Availability Barriers

Geographical and infrastructural inequities severely restrict AT availability, especially in **rural and remote regions**. Services are often concentrated in urban areas, resulting in **disproportionate service distribution**. Potential users in remote settings face long wait times, travel hardships, and **complex procedural requirements**. Limited local repair and maintenance services also discourage usage. These logistical challenges significantly impact both initial access and long-term retention of assistive devices.

4. Device-Related Barriers

The **quality, comfort, and design** of assistive products strongly influence user uptake. Several studies highlight that users received **poorly designed or fragile devices** that were uncomfortable or difficult to use in daily life. Devices that are not tailored to specific user needs or tasks were frequently abandoned. Inadequate training for first-time users also contributed to underutilization. Furthermore, technical limitations such as **short battery life or frequent malfunctions** reduce reliability and lead to user frustration, discouraging sustained engagement.

5. Health System and Provider Barriers

Barriers within the health system also inhibit effective AT delivery. Health workers often lack training or motivation to provide **adequate guidance or follow-up support**. Reports of **insensitivity, limited counseling, and unawareness of AT options** were common among frontline providers. Complex documentation processes, bureaucratic inefficiencies, and **corruption or procedural delays** in public distribution channels further restrict access. Even

when devices are distributed, **lack of follow-up and absence of service continuity** often result in user dissatisfaction or discontinuation.

6. Psychosocial and Cultural Barriers

Cultural attitudes and stigma surrounding disability and assistive device use constitute deep-rooted barriers. Negative perceptions—such as equating AT with helplessness or unattractiveness—are perpetuated by communities and sometimes even families. In certain cultural contexts, disability is viewed as a source of shame, and **families may actively discourage device use** to avoid social judgment. These social pressures limit not only device acceptance but also reduce willingness to seek out or advocate for AT support.

7. Situational and Environmental Barriers

Environmental and contextual challenges often inhibit the functionality and usability of AT in daily life. These include **inaccessible public spaces**, lack of ramps, unmodified school or workplace environments, and the **need to travel long distances** for services. Additionally, some assistive devices may not align with local cultural practices or physical settings, reducing their practical applicability. **Unsafe or unhygienic service delivery environments** also deter individuals from seeking help, particularly women, elderly users, or those with mobility constraints.

8. Discontinuation and Sustained Use Barriers

Even after initial adoption, many users **discontinue device use** due to a range of factors. These include **device damage, loss, or theft**, with no support mechanisms in place for replacement. Discomfort, **lack of perceived benefit**, or absence of regular reinforcement through follow-up services contribute to abandonment. Some users only use devices temporarily—for example, during formal assessments or public appearances—and discontinue once the immediate need

passes. Without supportive systems to encourage continued usage, many AT interventions fail to translate into long-term benefit.

Discussion

This scoping review systematically mapped the current landscape of access, coverage, barriers, and facilitators related to assistive technology AT use in India. The review included 30 studies spanning diverse states and districts across India, reflecting the country's complex social, economic, and geographical realities. The findings underscore a wide variability in AT coverage across functional domains and regions, highlight significant gaps in access and sustained use, and identify persistent challenges that must be addressed to ensure equitable and meaningful access to AT for all.

Coverage of Assistive Technology

The review revealed notable disparities in AT coverage across functional domains. Vision-related AT—primarily spectacles—was the most reported category, with met needs ranging widely, from 11.13% to 87%, and unmet needs as high as 88.86% in some rural areas. This striking variability suggests substantial gaps in service delivery and uptake, particularly among older adults and rural communities. While some urban and peri-urban centers reported higher coverage, unmet needs remain significant.

In contrast, coverage of AT for hearing and mobility. Hearing aids, for example, were used by only 4.5% of those in need in rural Telangana. For mobility, coverage ranged upto 52%, reflecting both the diversity of AT options (wheelchairs, walking aids, prosthetics) and the challenges in scaling these services in varied contexts. Communication, cognition, and self-care AT coverage was not even documented in a single study. However, these three functional domains need to be researched and studies on the types of devices used and also, there is a need for deeper exploration in these domains.

Overall, the findings demonstrate that **vision and mobility** remain the most documented AT domains, while **cognition, communication, and self-care** are not researched. This imbalance not only limits our understanding of needs and access for these domains but also perpetuates their marginalization in policy and programming.

Barriers to Access and Use

The review identified **eight broad categories of barriers** that inhibit equitable AT access and sustained use:

1. **Awareness and Perception**:
   A significant proportion of individuals and caregivers remain unaware of available AT options or perceive them as unnecessary, especially among the elderly and those with multiple disabilities. Cultural attitudes equating AT use with dependency or weakness further discourage uptake.

2. **Financial Constraints**:
   High upfront costs of devices, coupled with the absence of insurance coverage or consistent government subsidies, make AT unaffordable for many. Out-of-pocket expenditure on disability-related healthcare is particularly burdensome for rural and low-income households, often pushing them into catastrophic health spending and deepening poverty cycles.

3. **Accessibility and Availability**:
   Urban-centric distribution models and fragmented service delivery create major disparities in AT access. Rural and remote communities face challenges like long waiting times, poor

transport infrastructure, and a lack of nearby repair services. The reliance on centralized urban centers for device provision limits equitable outreach.

4. **Device-Related Issues**: Poor-quality or fragile devices, lack of customization, and discomfort in daily use were recurrent themes, often leading to discontinuation. Inadequate training for users—especially older adults and first-time users—also contributed to low adoption rates.

5. **Health System and Provider Challenges**: The review highlighted gaps in provider awareness, motivation, and training. Bureaucratic hurdles, corruption, and complex documentation requirements further hindered effective access. Even when devices were distributed, a lack of follow-up support reduced sustained use and user satisfaction.

6. **Psychosocial and Cultural Barriers**: Social stigma and negative perceptions of disability—particularly within families and communities—discouraged AT use. This was especially pronounced for women, children, and marginalized social groups, compounding their social and economic exclusion.

7. **Situational and Environmental Barriers**: Inaccessible built environments (schools, workplaces, public spaces) and cultural mismatches with device use limited the functional relevance and practicality of AT. Poor physical infrastructure and unsafe service environments also deterred individuals from seeking support.

8. **Discontinuation and Sustained Use**: Discontinuation of AT use was common, driven by device loss or damage, discomfort, or

a perceived lack of benefit. The absence of supportive systems—like follow-up services and community-level reinforcements—exacerbated these trends.

These barriers interact in complex ways, with social and cultural barriers often amplifying economic and infrastructural challenges. This interplay highlights the need for **holistic, multi-level approaches** to improve AT access in India.

Facilitators to Access and Adoption

The review also identified **nine key facilitators** that support successful AT adoption and sustained use:

- **Community-Based Delivery**: Outreach through ASHAs, Anganwadi workers, and local eye camps has expanded AT access in underserved areas.
- **Social and Family Support**: Caregiver encouragement and peer modeling were critical for device acceptance, especially among children and elderly users.
- **Educational and Institutional Enablers**: Inclusive education initiatives, supportive teachers, and accessible learning materials (e.g., braille, large print) facilitated AT uptake in schools.
- **Peer and NGO Networks**: NGOs and DPOs provided crucial training, device bundling, and social modeling, while CSR initiatives funded distribution efforts.
- **Healthcare Services**: Eye care networks like LV Prasad Eye Institute and primary clinics played vital roles in vision-related AT provision.
- **User Motivation**: Improved daily functioning and self-perceived normalcy fostered device retention, especially for vision and mobility aids.

- **Digital Tools**: Smartphones with accessible apps (e.g., JAWS screen readers) and internet-based resources enhanced awareness and independence for visually impaired users.
- **Government and Institutional Programs**: DDRCs and NGO-government collaborations offered structured training and device support, while ADIP and DDRS schemes addressed affordability gaps.
- **Local Innovations**: Use of locally available materials and local artisans for AT repair improved sustainability and cultural alignment.

These facilitators underscore the **potential of leveraging community resources and partnerships** to overcome barriers and promote sustained AT use.

Implications for Policy and Practice

The findings of this scoping review have several **critical implications** for policy and practice in India:

1. **Targeted Outreach and Awareness**: There is a need for culturally sensitive, community-based awareness campaigns to dispel stigma, correct misconceptions, and empower PwDs and caregivers to seek AT support.
2. **Strengthening Government Schemes**: While initiatives like ADIP and DDRS are vital, their impact is limited by fragmented implementation and urban bias. Streamlining procurement, ensuring transparent distribution, and expanding to rural areas will improve equity.

3. **Affordable Access**: Policies must address financial barriers through insurance coverage, subsidies, and sustainable financing models to make AT affordable and reduce catastrophic spending.
4. **User-Centered Design and Training**: AT products should be adapted to user needs and daily contexts, with training integrated into delivery to support effective and comfortable use.
5. **Integration into Primary Health Care and Education**: Embedding AT provision within primary health systems and inclusive education frameworks ensures that AT becomes part of everyday life, not an add-on.
6. **Continuous Support and Monitoring**: Sustained use requires follow-up care, maintenance services, and community reinforcement mechanisms to keep devices functional and relevant.

Research Gaps and Future Directions

This review also highlights **critical gaps in research**:

- No data on AT access for cognitive, communication, and self-care needs.
- Lack of granular data on device types, usage patterns, and long-term outcomes.
- Underrepresentation of marginalized groups (e.g., tribal populations, women with disabilities) in AT coverage data.
- Variation in the definition of "met" and "unmet" needs, indicating a lack of a standardized definition which complicates direct comparisons and comprehensive analysis of AT coverage

Recommendations

The findings of this scoping review, which included studies from across states and districts in India, highlight persistent barriers and facilitators shaping assistive technology AT access and use. Based on the data extracted from these studies, several key recommendations emerge.

First, **community-based delivery models** must be strengthened, as supported by studies from Telangana, Andhra Pradesh, and Haryana that demonstrated the importance of local health workers, eye camps, and mobile outreach in expanding access to vision-related AT. Such models can be leveraged to reach underserved populations across all functional domains, particularly in rural and tribal areas where several studies reported low coverage and high unmet needs.

Second, addressing **financial barriers** is critical. Multiple studies highlighted the high out-of-pocket costs associated with AT—particularly for mobility aids and spectacles—and how this limits sustained use. Policies should build on the ADIP and DDRS schemes by increasing subsidies and extending insurance coverage to cover maintenance and repairs, as identified in studies where device discontinuation was common due to unaffordable repairs or replacements.

Improving the **availability and quality of AT** is another key recommendation. Studies from Andhra Pradesh and Telangana showed that low-quality or fragile devices, along with a lack of local repair services, were major reasons for discontinuation or dissatisfaction with AT. Local manufacturing using indigenous materials and establishing repair hubs at district levels can help address these issues.

The studies also underscore the need for **user-centered design and customization**. Several publications reported that poorly fitting or culturally misaligned devices led to discomfort and low

uptake, especially in older adults. Involving end users—including women, children, and elderly populations—in the design and adaptation of devices can improve their relevance and usability.

Integration into primary health care and inclusive education systems was another gap identified in multiple studies. Few studies reported AT being actively included in PHC settings or school health programs, indicating a missed opportunity for early identification and intervention. Training frontline health workers and educators to recognize AT needs and integrate device usage into daily routines will be key.

The **need for follow-up and maintenance** was repeatedly emphasized in studies from Haryana, Telangana, and Delhi, which showed high device discontinuation due to lack of sustained support. Establishing structured follow-up systems—whether through PHCs, district hospitals, or NGOs—will ensure that devices remain functional and relevant over time.

Awareness and stigma were also significant barriers across the reviewed literature. Many studies reported misconceptions about AT (e.g., seeing them as signs of weakness or dependency), which deterred uptake. Targeted, culturally sensitive **awareness campaigns** involving successful AT users as role models can help normalize device use and reduce social stigma.

Finally, policy and system-level action are crucial. While the ADIP and DDRS schemes were referenced in some studies as positive examples, gaps in implementation and monitoring were also noted. Strengthening the enforcement of the RPwD Act, establishing a centralized AT database, and fostering cross-sectoral collaborations will ensure that these initiatives reach those most in need.

At the research level, this review highlights the lack of data on functional domains like cognition and communication, as well as limited information on how gender, caste, and socioeconomic

factors shape AT usage patterns. Future studies should prioritize these areas and adopt intersectional and longitudinal approaches to fully understand usage trajectories and challenges.

By directly aligning these recommendations with the evidence and gaps identified across the 30 studies included in this review, this analysis provides a clear pathway for improving AT coverage, equity, and sustained use in India.

Conclusion

This scoping review provides a comprehensive overview of the current state of assistive technology access and coverage in India. It highlights the substantial progress made in some functional domains—particularly vision and mobility—while revealing deep gaps in access for hearing, communication, cognition, and self-care devices. These gaps are not uniform and are shaped by a complex interplay of social, cultural, and economic factors, as well as by disparities across age, gender, caste, and economic status.

The review identifies eight major categories of barriers to AT access and sustained use, ranging from affordability challenges and poor infrastructure to social stigma and lack of follow-up support. However, it also points to several promising facilitators—such as community-based delivery models, family and peer support, NGO partnerships, and emerging digital tools—that have shown potential in expanding equitable AT access and usage.

Government schemes like the ADIP and DDRS have played an essential role in improving access to AT, but their reach and impact remain limited by fragmented implementation and a continued urban-rural divide. To realize the transformative potential of AT, India must prioritize a holistic approach that combines policy implementation, community engagement, user-centered design, and financial protection. This approach must also address the specific needs of marginalized groups and recognize that access to assistive technology is not merely a technical issue—it is a matter of dignity, rights, and social justice.

Finally, the review underscores the urgent need for more granular and intersectional data to fully understand usage patterns and long-term outcomes for AT users in India. Despite these challenges, India's robust policy framework, growing networks of community-based organizations, and

innovative local practices offer a solid foundation. By leveraging these strengths and addressing the identified gaps, India can make meaningful strides towards ensuring that every person with a disability has the tools and support they need to live independently and participate fully in society.