

## A REVIEW OF ASSISTIVE TECHNOLOGY AVAILABILITY IN NIGERIA: AN ANALYSIS OF UNMET NEEDS, SYSTEMIC BARRIERS, AND PSYCHOSOCIAL-WELLBEING IMPACTS.

<sup>1</sup>**Jimoh Muideen Adewale**

<sup>2</sup>**Ajibola Abdulrahamon Ishola**

<sup>2</sup>**Ibraheem Abiodun Salako**

<sup>2</sup>**Vangerwua, Barnabas B.**

<sup>1</sup>*Department of Prosthetics and Orthotics,  
Federal University of Health Sciences, Ila-Orangun, Nigeria*

<sup>2</sup>*Department of Audiology,  
Federal University of Health Sciences, Ila-Orangun, Nigeria*

**Corresponding Author:**

*Jimoh Muideen Adewale*

*Email: muideen.jimoh@fuhsci.edu.ng*

### ABSTRACT

**Background:** The provision of prosthetic, orthotic (P&O), and hearing assistive devices in Nigeria represents a critical but severely neglected component of healthcare, rehabilitation, and social inclusion. Despite a high burden of disability, access to these life-changing technologies remains critically low, with profound implications for physical and psychosocial well-being.

**Objective:** This systematic review synthesizes evidence on the availability, systemic barriers, and psychosocial impact of assistive technologies in Nigeria. It aims to quantify access gaps, analyze the interconnected barriers perpetuating "cycles of scarcity," and propose an integrated, multisectoral framework for systemic reform.

**Methods:** A systematic review was conducted following PRISMA guidelines. Databases (PubMed, Scopus, Google Scholar, African Journals Online) and semantic search tools were queried for literature from 1981 to 2025. Sixty-one studies meeting inclusion criteria were analyzed through narrative synthesis across pre-defined domains: quantitative access, device types, barriers, service infrastructure, psychosocial outcomes, and proposed solutions.

**Results:** The synthesis reveals a profound systemic crisis. Only 9-12% of Nigerian amputees access prosthetic devices, with similarly low adoption rates for hearing aids. Access is crippled by a multi-layered barrier system: prohibitive costs, severe geographic maldistribution of services, critical shortages of trained personnel, profound awareness and knowledge gaps, and culturally inappropriate device design. Despite these barriers, robust evidence demonstrates that access to appropriate devices yields significant psychosocial benefits, including higher quality of life scores, reduced odds of depression and anxiety, and enhanced social participation. Indigenous innovations and recent policy developments, such as a N20 billion Foreign Direct Investment for local production, offer pathways for change but are insufficient to meet national need.

**Conclusion:** Transforming Nigeria's assistive technology sector from a story of scarcity to one of inclusion requires urgent, coordinated action. A foundational step is the development of Nigerian-specific anthropometric and audiometric data to inform contextual device design. This must be coupled with parallel reforms in financing, local manufacturing, workforce development, and the integration of community-based, psychosocially-informed service delivery models. Addressing this crisis is a matter of fundamental healthcare equity, social justice, and economic productivity.

**Keywords:** prostheses, orthoses, hearing aids, assistive technology, access barriers, Nigeria, low- and middle-income countries, psychosocial well-being, health systems, community-based rehabilitation

### 1. INTRODUCTION

The global disparity in access to assistive technologies constitutes one of the most pressing yet overlooked challenges in contemporary healthcare equity. The World Health Organization (WHO) estimates that approximately 1.5 billion people worldwide require assistive products, a figure projected to rise to 2.5 billion by 2050 (World Health Organization, 2018). This need is most acute in low- and middle-income countries (LMICs), where only an estimated 5-15% of individuals who

could benefit from such devices can access them (World Health Organization, 2018). Among these technologies, prosthetic, orthotic (P&O), and hearing assistive devices are particularly scarce, despite their transformative potential to restore function, enable social participation, and uphold human dignity. Nigeria, as Africa's most populous nation with approximately 218 million inhabitants, epitomizes this crisis (World Bank, 2023). The country contends with a significant and multifaceted burden of disability. Etiologies include road traffic accidents (a leading cause of traumatic amputation), complications from diabetes and infectious diseases, congenital conditions, age-related hearing loss, and injuries stemming from conflict or traditional practices. Despite this substantial need, Nigeria's fragmented health system and chronically under-resourced rehabilitation infrastructure have resulted in what numerous studies describe as a systemic failure in assistive technology provision (Yinusa & Ugbeye, 2003; Daniel et al., 2024). This failure is not merely a logistical or clinical shortfall; it represents a profound breach of the fundamental rights to health, education, and social inclusion for millions of Nigerians. The consequences of unmet assistive technology needs extend far beyond immediate physical limitations. Disability, particularly when unsupported, has deep and lasting psychosocial repercussions, affecting identity, self-esteem, economic potential, and mental health. Positive psychology frameworks emphasize that successful rehabilitation depends not only on restoring functional capacity but equally on fostering psychological resilience, facilitating social reintegration, and supporting what Tedeschi and Calhoun (2004) term "post-traumatic growth" – the positive psychological change experienced as a result of struggling with highly challenging life circumstances. In this light, appropriate assistive devices serve a dual role: they are functional tools for mobility and communication, and they are psychological catalysts that can restore a sense of self, autonomy, and hope.

Previous analyses of assistive technology in Nigeria and similar LMICs have provided valuable insights but are often limited in scope. Some focus narrowly on specific device types (e.g., lower-limb prostheses or hearing aids alone), particular geographic regions, or isolated barriers such as cost. Few have undertaken a comprehensive, cross-disability synthesis that integrates findings from prosthetics, orthotics, and hearing technologies. Crucially, many reviews underemphasize the psychosocial dimensions of access and use, treating devices as purely technical solutions rather than instruments of personal and social transformation.

This systematic review addresses these gaps by providing an integrated, evidence-based synthesis of the assistive technology landscape in Nigeria. It draws upon and significantly expands a preliminary analysis by synthesizing a broader evidence base, including recent policy developments and deeper psychosocial insights. The review is guided by four specific objectives:

1. To quantify the availability and access gaps for P&O and hearing assistive devices across different Nigerian populations.
2. To identify and analyze the interconnected, systemic barriers that create and perpetuate "cycles of scarcity."
3. To evaluate the impact of device access on functional and, critically, psychosocial well-being, drawing on positive psychology perspectives.
4. To propose a concrete, multisectoral framework for systemic improvement, centered on context-appropriate design, equitable financing, and community-integrated service delivery.

By mapping the current state of evidence, this review seeks to inform national policy, guide international cooperation, stimulate further research, and ultimately contribute to the development of an assistive technology ecosystem in Nigeria that is accessible, appropriate, and empowering for all who need it.

## 2. METHODS

### 2.1. Design

This study was conducted as a systematic review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement. The review protocol was not prospectively registered. The methodology was designed to capture both the breadth of issues (scoping) and the depth of evidence (systematic review) related to assistive technology in Nigeria.

### 2.2. Search Strategy

A comprehensive, dual-phase search strategy was employed to maximize the retrieval of relevant literature from both established academic databases and broader sources, including grey literature and recent policy documents.

Phase 1: Structured Database Search (2018-2025). Systematic searches were conducted in PubMed, Scopus, Google Scholar, and African Journals Online. Searches covered literature published from January 1, 2018, to the present (January 2026), with no initial start-date limit for seminal historical works. Search terms were developed using Boolean operators and included: ("orthoses" OR "prostheses" OR "hearing aids" OR "cochlear implants" OR "assistive technology" OR "assistive device") AND ("Nigeria" OR "low- and middle-income countries" OR "LMICs" OR "sub-Saharan Africa") AND ("access" OR "availability" OR "barriers" OR "utilization" OR "adoption" OR "psychosocial" OR "quality of life" OR "well-being" OR "mental health" OR "community-based rehabilitation").

Phase 2: Expanded and Semantic Search. To capture historical literature, non-indexed African publications, recent policy developments, and emerging research, complementary searches were performed. This included backward citation chasing from key articles, searches of Nigerian government and NGO websites, and the use of the Elicit AI research tool to perform semantic searches across a broad corpus of academic literature. Specific queries included "availability of prosthesis and orthoses in Nigeria," "hearing assistive devices Nigeria," and "community-based rehabilitation Nigeria."

### 2.3. Eligibility Criteria

Inclusion Criteria:

1. Population/Setting: Studies conducted in Nigeria or presenting disaggregated Nigerian data within broader LMIC-focused reviews.
2. Intervention/Exposure: Focus on the provision, use, design, policy, or outcomes related to prosthetic, orthotic, or hearing assistive devices and technologies.
3. Outcomes: Reporting on quantitative access metrics, barriers/facilitators, service delivery models, economic/policy analyses, or psychosocial/quality-of-life outcomes.
4. Study Design: Original quantitative, qualitative, or mixed-methods research; systematic, scoping, or narrative reviews; case series with clear methodological frameworks; policy reports and analyses with empirical data.
5. Language: English or French.

Exclusion Criteria:

1. Studies without extractable, Nigeria-specific data.
2. Articles focusing exclusively on surgical techniques without a rehabilitation or assistive device component.

3. Editorials, commentaries, or letters without original data or analysis.
4. Single case reports without broader system-level insights.
5. Studies concerned solely with the technical/engineering aspects of devices without discussion of service delivery, access, or human outcomes.

## 2.4. Study Selection and Data Extraction

The study selection process followed the PRISMA flow diagram. Two independent reviewers screened titles and abstracts against eligibility criteria, followed by full-text assessment of potentially relevant papers. Discrepancies were resolved through discussion or consultation with a third reviewer.

Data were extracted using a standardized, piloted form. Key domains included:

- Study characteristics: Authors, year, location, design, sample size.
- Device and population: Specific assistive technology type, target user group (age, gender, etiology of disability).
- Access and availability: Quantitative metrics on provision rates, wait times, geographic distribution.
- Barriers and facilitators: Economic, geographic, human resource, knowledge, cultural, and design-related factors.
- Service infrastructure: Models of care (hospital-based, community-based), workforce, coordination.
- Outcomes: Functional, psychosocial, and quality-of-life measures and results.
- Solutions and recommendations: Proposed interventions at policy, system, community, or individual levels.

## 2.5. Quality Assessment

Given the heterogeneity of included study designs (cross-sectional surveys, cohort studies, qualitative inquiries, reviews), a unified critical appraisal tool was deemed inappropriate. Instead, study quality was assessed using design-appropriate tools: the Joanna Briggs Institute (JBI) checklists for analytical cross-sectional and qualitative studies, and the Mixed Methods Appraisal Tool (MMAT) for mixed-methods research. The quality of review articles was assessed using the JBI checklist for systematic reviews. This assessment informed the interpretation of findings and the strength of evidence but was not used as a basis for study exclusion.

## 2.6. Data Synthesis

Due to the significant heterogeneity in populations, interventions, and outcome measures across the included studies, a meta-analysis was not feasible. A narrative synthesis approach was adopted, structured around the pre-defined thematic domains of the data extraction tool. Findings were tabulated and analyzed to identify consistent themes, contradictions, and evidence gaps. The synthesis explicitly explores relationships between different barrier domains and connects findings on access with evidence of psychosocial impact, culminating in the proposed integrative framework for action.

# 3. RESULTS

## 3.1. Study Selection and Characteristics

Our systematic search and synthesis integrated findings from 61 studies published between 1981 and 2025. The initial database search yielded 347 records, with 42 meeting inclusion criteria after screening. A complementary expanded semantic search yielded 65 records, with 19 meeting

inclusion criteria after deduplication. Thus, 61 studies were included in the final synthesis. The included studies encompassed a wide range of methodologies: cross-sectional surveys (n=25), cohort studies (n=10), qualitative studies (n=8), mixed-methods studies (n=4), systematic/scoping/narrative reviews (n=10), and case series/policy analyses (n=4).

**Table 1: Characteristics of Key Included Studies**

Study & Year	Design	Location/Setting	Sample Focus	Size /	Key Assistive Technology Focus	Primary Outcomes Measured
Yinusa & Ugbeye (2003)	Cohort	National Orthopaedic Hospital, Lagos	87 amputation patients		General prostheses	Access rate (16% fitted), barriers to surgery and rehabilitation
Adegoke et al. (2013)	Cross-sectional	Oyo, Lagos, Kwara states	47 lower-limb amputees		Lower-limb prostheses	Quality of life (QoL); significant improvement in users
Olusanya et al. (2004)	Observational	Not specified	Hearing aid users		Hearing aids	Self-reported outcomes via IOI-HA; satisfaction, QoL
Anyaehie et al. (2017)	Case series	Resource-constrained institution	38 patients		Total knee replacements	Feasibility in constrained settings; cost as major barrier
Daniel et al. (2024)	Cross-sectional	SE Nigeria (3 teaching hospitals)	32 mastectomy patients		External breast prostheses	Awareness (50%), usage (28.1%), knowledge of access
Jikukka et al. (2020)	Experimental	Jos metropolis, schools	20 students with HI		Hearing aids	Behavior change via Interpersonal Psychotherapy (IPT)
Zandam et al. (2025)	Cross-sectional (MICS data)	National (Nigeria)	22,443 children with disabilities		Assistive devices (general)	Mental health; lower adjusted odds of depression/anxiety
Okoye (2024)	Survey	Nigeria (national scope)	Not specified		AT for children in education	Inclusion outcomes; AT enables educational participation
Lalu (Peoples Gazette, 2024)	Policy Report	Abuja (National Commission)	Policy focus		Local production of AT	N20bn FDI secured for local manufacturing
Adedeji et al. (2015)	Retrospective	Nigeria	223 children with HL		Hearing aids & cochlear implants	Late diagnosis, limited access and affordability
Chakraborty et al(2017)	Case Study	Benue State (rural)	Community mental health project		CBR as a service model	Transition from inpatient to community-based care

## Quantitative Access: A Landscape of Profound Scarcity

The evidence consistently demonstrates critically low population-level access to assistive technologies in Nigeria. Pooled estimates indicate only 9-12% of Nigerian amputees obtain prosthetic fittings (Edomwonyi & Onuminya, 2014; Yinusa & Ugbeye, 2003). This stark figure is corroborated by hospital-based studies showing only a 16% prosthetic fitting rate (Yinusa & Ugbeye, 2003). Significant disparities exist: while 83% of lower-limb amputees in rehabilitation centers use prostheses, only 28.1% of mastectomy patients use external breast prostheses (Adegoke et al., 2013; Daniel et al., 2024). Access to hearing assistive technologies is similarly constrained by high device costs (\$100-\$150) and a dire shortage of audiologists (Wilkinson et al., 1992; Anyuabaga, 2024). The average wait time for prosthesis provision is 4.7 months, exacerbating functional decline and psychological distress (Edomwonyi & Onuminya, 2014).

### A Multi-Layered Barrier System: The "Cycle of Scarcity"

The literature identifies a complex, interdependent web of barriers creating a "cycle of scarcity." These barriers are consistent across technology domains.

**Table 2: Synthesis of Barrier Domains Across Assistive Technology Types in Nigeria**

Barrier Domain	Manifestations in Prosthetics/Orthotics	Manifestations in Hearing Assistive Tech	Key Supporting Evidence
Economic	Catastrophic out-of-pocket costs; lack of insurance coverage; >50% population below poverty line.	Device cost (\$100-\$150); ongoing maintenance costs; lack of public subsidy.	Ugorji et al. (2024); Anyaehie et al. (2017); Wilkinson et al. (1992)
Geographic/Infrastructure	Services "few and far between," concentrated in urban tertiary hospitals.	ENT/audiology units only in major cities; long, costly travel for services.	Yinusa and Ugbeye (2003); Wilkinson et al. (1992)
Human Resources	Critical shortage of prosthetists/orthotists; unregulated practitioners.	Scarcity of audiologists, ENT specialists, hearing therapists.	Anyaehie et al. (2017); Anyuabaga (2024)
Knowledge & Awareness	Low patient awareness of options; healthcare provider knowledge gaps.	Social stigma; belief that drugs can cure hearing loss.	Daniel et al. (2024); Jikukka et al. (2020)
Design & Cultural	Imported devices ill-suited for climate and terrain; stigma against disability.	Background noise in low-cost devices; aesthetics/stigma.	Adegoke et al. (2021); Onwukamuche et al. (2023)

### Psychosocial Impact of Assistive Device Access and Use

Despite access challenges, robust evidence demonstrates significant psychosocial benefits for device users. Lower-limb prosthesis users report significantly higher quality of life scores in physical health ( $p=0.015$ ), psychological health ( $p=0.008$ ), and environmental domains ( $p=0.011$ ) compared to non-users (Adegoke et al., 2013). Hearing aid users report favorable outcomes, with quality-of-life change scores of  $3.8 \pm 1.0$  (Olusanya et al., 2004). A large national study found assistive device users had lower adjusted odds of both depression (aOR 1.43 vs. 1.66) and anxiety (aOR 1.48 vs. 1.74) compared to non-users (Zandam et al., 2025). The experimental study by Jikukka et al. (2020) demonstrated that Interpersonal Psychotherapy (IPT) could effectively transform negative attitudes toward hearing aid use into positive behaviors.

Indigenous Innovations, Service Models, and Recent Policy Developments Adaptive, context-driven responses have emerged. Indigenous innovations include crafting

waterproof wooden pylons for farmers and cervical collars from PVC buckets (Oshin, 1981). While demonstrating resilience, these highlight the absence of a formal mid-tier manufacturing sector. The dominant service model remains hospital-based, but promising alternatives like the Edawu project illustrate a transition to community-focused care (Chakraborty et al., 2017). A significant recent development is the announcement of a N20 billion Foreign Direct Investment for local production of assistive devices, representing a potential paradigm shift (Lalu, Peoples Gazette, 2024).

## DISCUSSION AND PROPOSED FRAMEWORK

This synthesis reveals a profound systemic crisis in Nigeria's assistive technology sector. The extremely low access rates stand in stark contradiction to the robust evidence of physical and psychosocial benefits for users. This "cycle of scarcity" is sustained by interconnected economic, geographic, human resource, and cultural barriers. A foundational intervention must be the systematic development of Nigerian anthropometric and audiometric databases to enable context-driven, user-centered design, guiding new local manufacturing initiatives. Breaking the cycle requires a coordinated, multisectoral framework.

Table 3: Proposed Integrative Framework for Transforming Assistive Technology Provision in Nigeria

Pillar	Core Objective	Specific Actions
1. Foundational Data & Contextual Design	Create evidence base for appropriate devices.	Conduct national anthropometric & audiometric surveys; establish R&D hubs; integrate data into manufacturing standards.
2. Financing & Policy	Make devices and services affordable and a policy priority.	Legislate AT inclusion in NHIS; create subsidy schemes; implement the National AT Policy.
3. Workforce & Service Delivery	Build a decentralized, skilled service network.	Expand training for prosthetists, orthotists, audiologists; train mid-level technicians & CBR workers.
4. Awareness & Psychosocial Support	Combat stigma and foster inclusive environments.	Launch national awareness campaigns; integrate IPT & peer support into rehab; enforce inclusive laws.
5. Research & Monitoring	Build a learning system for continuous improvement.	Fund implementation science; create a national AT registry to track access & impact.

## Conclusion

This review provides definitive evidence that Nigeria's assistive technology sector is in a state of catastrophic systemic failure. The paradox of proven benefits amidst overwhelming scarcity is sustained by a deeply entrenched "cycle of scarcity." Breaking this cycle is an urgent imperative of public health and social justice. The proposed integrated framework—grounded in local data, financing reform, workforce development, and psychosocial support—offers a pathway for transformation. The recent commitment to local manufacturing is a watershed moment that must be seized to transform Nigeria's narrative from one of lack and limitation to one of innovation, inclusion, and empowerment.

**REFERENCES**

Adedeji, T. O., Sanusi, A. A., & Akinpelu, V. O. (2015). Retrospective study of childhood hearing loss in Nigeria. *International Journal of Pediatric Otorhinolaryngology*, 79(5), 645-648.

Adegoke, B., Kehinde, A., Akosile, C., & Oyeyemi, A. (2013). Quality of life of Nigerians with unilateral lower limb amputation. *Disability, CBR and Inclusive Development*, 24(4), 76-92.

Afolayan, J. A., Abioye, A. I., & Ogunlade, S. O. (2020). The burden of limb loss in Nigeria: A review of the literature. *Nigerian Journal of Orthopaedics and Trauma*, 19(2), 45-52.

Anyaehie, U., Eyichukwu, G., & Nwadinigwe, C. (2017). Total knee replacement in a resource constrained environment: A preliminary report. *Nigerian Journal of Clinical Practice*, 20(7), 800-805.

Anyuabaga, A. D. (2024). Assistive technology adoption rates and barriers among adults with hearing loss. *Lagos Journal of Contemporary Studies in Education*, 8(2), 15-30.

Chakraborty, N., Erinfolami, A., & Lucas, A. (2017). Edawu: a journey from in-patient rehabilitation to community-based treatment and rehabilitation in Nigeria. *BJPsych International*, 14(3), 66-69. <https://doi.org/10.1192/s205647400000194x>

Daniel, J. A., Nkwazema, A. C., Odoh, O. I., Egbujo, S. M., Onyido, D. C., & Okefienam, E. C. (2024). Awareness of external breast prosthesis, its availability and affordability in Eastern Nigeria. *South African Journal of Oncology*, 8(1), a234.

Edomwonyi, E. O., & Onuminya, J. E. (2014). An update on major lower limb amputation in Nigeria. *Nigerian Journal of Orthopaedics and Trauma*, 13(1), 1-5.

Jikukka, L. J. (2020). Effects of interpersonal psychotherapy on behaviour towards hearing aids usage amongst students with hearing impairment in Jos metropolis, Nigeria. *Journal of Special Education and Rehabilitation*, 15(3), 45-58.

Jiménez-Arberas, E., & Díez, E. (2021). Psychosocial Impact of Assistive Devices and Other Technologies on Deaf and Hard of Hearing People. *International journal of environmental research and public health*, 18(14), 7259. <https://doi.org/10.3390/ijerph18147259>

Lalu, S. (2024, January 23). *Federal Government secures N20 billion FDI for local production of assistive devices*. Peoples Gazette.

Okoye, C. C. (2024). Assistive technology and inclusion of children with disabilities in Nigeria. *African Journal of Social Sciences and Humanities Research*, 7(1), 102-118.

Olusanya, B., Ruben, R. J., & Parving, A. (2004). Self-reported outcomes of aural rehabilitation in a developing country. *International Journal of Audiology*, 43(9), 536-541.

Onwukamuche, C. K., Agbasi, P., Ndubuka, G. I., & Ekuma, I. (2023). Level of knowledge and practice of orthotics in the diabetic foot management in Nigeria. *Engineering and Technology Journal*, 41(5), 112-120.

Oshin, T. (1981). Indigenous substitutes for modern prostheses and orthoses. *Prosthetics and Orthotics International*, 5(2), 85-90.

Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, 15(1), 1-18.

Ugorji, T. N., Morenkeji, S. P., Kekere, T. F., Odoh, I. O., Ayinla, S. C., & Bright-Ohaeri, F. C. (2024). Factors influencing the adoption, non-adoption and abandonment of lower limb prostheses among amputees in selected hospitals in Owerri, Imo. *The Nigerian Health Journal*, 24(4), 45-56.



Wilkinson, D., Makan, B., & Dubb, A. (1992). Hearing aid acceptance and refusal in an urban African population. *Tropical Doctor*, 22(2), 76-78.

World Health Organization. (2018). *Global cooperation on assistive technology (GATE)*. World Health Organization.

Yinusa, W., & Ugbeye, M. E. (2003). Problems of amputation surgery in a developing country. *International Orthopaedics*, 27(2), 121-124.

Zandam, H., Sulaiman, S., Mohammad, A. H., & Sabo, A. (2025). Utilization and impact of assistive device use on mental health among children with disabilities in Nigeria: A cross-sectional study. *Disability and Rehabilitation: Assistive Technology*, 20(1), 55-65.