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Access to Assistive Technologies Among Older Adults in Iran: A Secondary Analysis of the 2022 Rapid Assistive Technology Assessment (rATA) Survey

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Abstract

Background: Aging is often accompanied by physical and cognitive decline, increasing the need for assistive technologies (ATs) to support daily living. Despite the clear benefits of ATs, access remains a significant barrier, particularly in low- and middle-income countries. This study explores access to ATs among older adults in Iran, using data from the 2022 Rapid Assistive Technology Assessment (rATA) Survey.

Methods: This secondary analysis was based on cross-sectional data drawn from a subsample of 2888 participants aged 60 years and older, obtained from the 2022 Iran rATA survey. Descriptive and comparative statistics were used to examine self-reported functional difficulties and access to ATs, with group differences tested using chi-square and t tests or nonparametric equivalents as appropriate.

Results: Overall, 1979 participants (68.58%) reported experiencing at least 1 functional difficulty. Among them, 1527 (76.23%) used at least 1 AT. The use of AT varied significantly by location, with urban residents reporting greater access than their rural counterparts. Most ATs were provided by the private sector (965, 65.47%) and primarily funded out-of-pocket (951, 64.52%). Additionally, 1230 users (83.45%) expressed satisfaction with their devices.

Conclusion: The findings underscore the need for targeted policies to strengthen governance and reduce financial and geographic barriers to ATs for older adults. Strengthening public provision, improving affordability, and integrating ATs into health systems are key priorities for equitable aging.

Keywords: Disability, Universal Health Coverage, Health Policy, Utilization, Equity

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Introduction

The global population aged 60 years and older is projected to increase from 1.1 billion in 2023 to 1.4 billion by 2030, with the most rapid growth occurring in developing regions—posing significant public health implications (1). Although aging is a natural process, it is frequently accompanied by declines in physical and cognitive function, which can substantially reduce autonomy and functional capacity. Assistive technologies (ATs)—including devices, equipment, and software designed to enhance functioning, independence, and well-being for individuals with

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↑What is "already known" in this topic:
Iran is undergoing a rapid demographic shift, with its population aging at a rapid rate. Assistive technologies (ATs) play a crucial role in promoting functional independence and enhancing the quality of life for older adults. Although some evidence exists on AT access in the general population, data specifically addressing access among Iranian older adults remain scarce.

→What this article adds:
This study provides evidence on the use of ATs among older adults in Iran. Approximately 69% reported experiencing functional difficulties, and more than three-quarters used at least 1 device. Despite high satisfaction with their devices (83%), access was unequal, with most devices obtained privately and paid for out-of-pocket.

disabilities, older adults, and those with chronic conditions—are crucial for supporting daily living (2). These technologies, ranging from basic mobility aids to advanced digital tools, can improve balance, reduce pain, enhance mobility, lower the risk of falls, aid in managing chronic diseases, and promote independence and quality of life (3-5).

Similarly, Iran is experiencing a rapid demographic transition: the proportion of people aged 60 years and older is expected to rise from just over 10% in 2022 (6) to more than 31% by 2050 (7). This accelerating aging trend presents complex challenges that demand urgent, coordinated health system responses to safeguard the health and well-being of older adults (6). Addressing these needs is vital for 2 reasons. First, it is essential to achieve universal health coverage (UHC), a national and global priority (8). Second, it aligns with Iran's policy emphasis on equity and the protection of vulnerable populations (9). Ensuring the availability and accessibility of ATs is one such intervention, with the potential to enhance quality of life, support self-care, and advance the country's commitments.

Globally, access to ATs is constrained by affordability, low awareness, weak service delivery and repair systems, a limited trained workforce, supply-chain gaps, and uneven policies/financing (2). As a result, while an estimated 2.5 billion people require assistive products, many—particularly in low- and middle-income countries (LMICs)—have limited or no access (2, 10, 11). In Iran, recent studies echo these global barriers, noting the absence of targeted policies or programs to improve access to ATs (12). Users and their families frequently report financial constraints and limited knowledge about ATs. At the same time, local assessments highlight gaps in maintenance and repair services, as well as uneven insurance coverage—factors that hinder sustained access, particularly for lower-income households and children with disabilities (13, 14).

In Iran, the most reliable data on access to ATs comes from the national Rapid Assessment of Assistive Technology (rATA) survey, a nationwide study conducted in 2022 to assess both the need for and access to ATs. Findings from this Survey indicate that 28% of individuals who require ATs lack access (2024). Robust evidence is essential to clarify the scope and scale of unmet needs for ATs and to guide effective policy and programmatic responses (15). However, comprehensive data on older adults' access to ATs remain scarce in many LMICs, limiting the ability to assess the problem's magnitude fully. This study addresses this gap by analyzing the 2022 rATA survey data to provide an overview of older adults' access to ATs in Iran. Specifically, it examines the prevalence of functional difficulties, the proportion of affected individuals with access to ATs, the sources and financing of these technologies, and user satisfaction. The findings aim to quantify unmet needs, inform advocacy, and support evidence-based policymaking to improve AT access for older adults in Iran.

Methods

Study Design and Source

This study is a secondary analysis of data collected from the 2022 Iran rATA survey (16).

Study Source

The Iran rATA was carried out in 4 phases using a multi-stage random cluster sampling method, with households as the primary sampling units. A total of 18,070 households from all provinces were included in the study. To account for socioeconomic disparities, 2 counties were selected from each province—1 with higher deprivation and 1 with lower deprivation—based on the National Deprivation Atlas. Within each selected county, 11 clusters were sampled (7 urban and 4 rural). Data were collected over 5 months, from February to June 2022, using the Persian version of the rATA questionnaire (12), administered by trained interviewers. The instrument comprised 7 sections covering demographics, needs, demand and supply, user satisfaction, and recommendations, with all variables self-reported by participants.

Sample Selection

Of the 18,070 survey respondents, all individuals aged 60 years and older (n = 2888) were included in this secondary analysis.

Study Variables

The study analyzed the following variables:

- Demographics: Place of residence (urban or rural), age, and sex (male or female);
- Functional difficulties: Type of difficulty (mobility, vision, hearing, communication, cognitive, or self-care);
- ATs use: Utilization of ATs, source of ATs acquisition (public sector, nongovernmental organizations (NGOs), private sector, family and friends, self-made, or other), and payer of ATs (government, NGOs, employer/school, insurance, out-of-pocket payment, family and friends, or other);
- Satisfaction: Satisfaction with ATs' use.

Data Analysis

Statistical analyses were conducted using IBM SPSS Version 26. Descriptive statistics were applied to summarize demographic characteristics and the prevalence of disabilities. Exploratory comparative tests examined differences between groups, considering whether the data followed a normal distribution. Parametric or nonparametric tests were selected based on the distribution patterns to compare populations by sex, age groups, and urban versus rural residence. The results were weighted according to the reverse ratio of the number of people in the sample groups based on age, sex, and place of residence (urban and rural), in each province, to the population at the same groups in each province. These sampling weights account for the fact that our sample was not perfectly proportional to the national population distribution by province, age group, sex, and place of residence. Without weighting, estimates could be biased toward strata that were over- or

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underrepresented in the sample. Applying these weights ensures that each participant represents the appropriate number of individuals in the population, so that all estimates (eg, proportions and means) reflect the national population structure rather than the sample composition.

Results

Demographic Characteristics of the Sample

The study included 2888 individuals aged 60 years and older. Among the participants, 48% were female and 52% were male. Most of the sample (65%) resided in urban areas, while 35% were from rural regions. The age distribution was as follows: 56% of participants were aged 60-69 years, 30% were aged 70-79 years, and 14% were aged 80 and older (Table 1).

Prevalence of Functional Difficulties Among Elderly Participants

Of the participants, 68.58% reported experiencing at least 1 type of functional difficulty. The most common impairments were related to mobility (40.21%) and vision (49.86%). Women exhibited a higher prevalence of disabilities compared to men, particularly in mobility (46.52% vs 33.61%) and vision (55.53% vs 43.91%). Rural residents reported higher rates of mobility impairments (48.41%) compared to urban residents (37.61%), while urban residents had a slightly higher prevalence of vision impairments (51.58%). Age was a significant factor, with the prevalence of disabilities increasing sharply with age. Among individuals aged 60-69 years, 64.17% reported at least 1 disability, which rose to 82.36% among those aged 80 years and older. These findings underscore the increasing burden of disabilities, particularly in mobility and vision, as individuals age, highlighting the need for targeted interventions to support aging populations (Table 2).

Use of ATs Among Patients With Functional Difficulties

A total of 76.23% of participants with at least one functional difficulty reported using at least one AT, and there were no statistically significant differences in AT use between males and females for any functional difficulty (Table 3) (all $P>0.05$). Significant differences in AT usage were observed between rural and urban areas for the overall population with functional difficulties ($P<0.0001$). This pattern of significantly higher usage in urban areas was particularly evident in individuals with mobility ($P=0.0018$) and visual ($P<0.0001$) difficulties. Age also played a critical role in ATs' utilization. Individuals aged 80 years and older demonstrated significantly higher ATs usage compared to the 60-69 years age group, particularly for mobility ($P<0.0001$), vision ($P<0.0001$), and cognitive disabilities ($P=0.047$). Additionally, differences in mobility-related assistive devices ($P=0.0018$) and vision-related assistive devices ($P<0.0001$) were noted, depending on the type of ATs.

Sources of ATs Provision, Funding, and User Satisfaction

The majority of ATs were provided by the private sector (65.47%), followed by family and friends (21.51%), the public sector (6.65%), self-made solutions (5.16%), and NGOs (0.41%). Regarding funding sources, out-of-

Table 1. Participant Demographics: Sex and Residence (n = 2,888)

	Total	Sex		Place	
Age group, years		Female	Male	Rural	Urban
60-69	1621(56%)	814(50.2%)	807(49.8%)	544(33.6%)	1077(66.4%)
70-79	859(30%)	422(49.1%)	437(50.92%)	298(34.7%)	561(65.3%)
>=80	408(14%)	146(35.8%)	262(64.2%)	168(41.2%)	240(58.8%)
Total	2888(100%)	1382 (48%)	1506(52%)	1010(35%)	1878(65%)

Table 2. Distribution of Functional Difficulties Among Participants by Sex, Age, and Place of Residence (Weighted Data) [a]

Variable	Total difficulties N = 2004	Mobility N = 1269	Seeing N = 1327	Hearing N = 500	Communication N = 69	Cognitive N = 271	Self-care N =368
Total Participants	68.58 (66.85-70.27)	40.21 (38.42-42.03)	49.86 (48.01-51.70)	15.65 (14.34-17.03)	3.41 (2.78-4.14)	8.03 (7.07-9.09)	10.79 (9.68-11.98)
Gender							
Male	61.09 (58.57-63.56)	33.61 (31.22-36.06)	43.91 (41.39-46.46)	16.58 (14.73-18.55)	3.68 (2.78-4.76)	6.47 (5.28-7.83)	8.85 (7.46-10.40)
Female	75.74 (73.39-77.98)	46.52 (43.87-49.19)	55.53 (52.87-58.18)	14.76 (12.93-16.74)	3.16 (2.30-4.22)	9.53 (8.03-11.20)	12.65 (10.94-14.52)
Urbanity							
Urban	68.64 (66.49-70.74)	37.61 (35.41-39.85)	51.58 (49.29-53.86)	15.28 (13.68-16.99)	3.64 (2.84-4.59)	8.04 (6.85-9.36)	10.33 (8.99-11.80)
Rural	68.40 (65.43-71.26)	48.41 (45.28-51.54)	44.42 (41.33-47.55)	16.82 (14.56-19.27)	2.70 (1.79-3.90)	8.01 (6.41-9.86)	12.25 (10.29-14.44)
Age Group, yrs							
60-69	64.17 (61.78-66.51)	32.49 (30.21-34.83)	48.60 (46.14-51.07)	9.20 (7.84-10.71)	2.74 (2.00-3.36)	5.75 (4.67-7.00)	6.81 (5.63-8.15)
70-79	73.70 (70.62-76.62)	46.99 (43.61-50.40)	51.60 (48.19-54.99)	22.52 (19.77-25.47)	4.23 (2.99-5.81)	10.13 (8.19-12.35)	14.35 (12.06-16.88)
≥ 80	82.36 (78.31-85.94)	69.59 (64.87-74.02)	53.09 (48.12-58.02)	37.29 (32.58-42.18)	5.39 (3.41-8.05)	16.48 (13.01-20.45)	25.88 (21.69-30.42)

[a] Data are presented as percentages (95% CI)

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Table 3. Prevalence of at Least One Assistive Technology Use Among Participants with Functional Difficulties

Variable	Total difficulties N = 2004	Mobility N = 1269	Seeing N = 1327	Hearing N = 500	Communication N = 69	Cognitive N = 271	Self-care N =368
Total Participants with Difficulties	76.23 (74.30-78.08)	74.33 (71.83-76.71)	80.54 (78.31-82.64)	71.96 (67.80-75.86)	77.81 (66.19-86.93)	73.83 (68.17-78.96)	78.95 (74.43-83.01)
Gender							
Male	77.19 (74.42-79.79)	76.73 (73.07-80.12)	81.00 (77.75-83.96)	75.38 (70.04-80.19)	82.78 (66.81-93.16)	77.73 (68.90-85.05)	82.43 (75.74-87.90)
Female	75.49 (72.74-78.09)	72.66 (69.17-75.96)	80.20 (77.01-83.12)	68.30 (61.47-74.59)	72.27 (53.68-86.55)	71.30 (63.60-78.19)	76.63 (70.20-82.27)
P-value H0: diff=0	0.3988	0.1998	0.6498	0.8030	0.7199	0.7986	0.7944
Urbanity							
Urban	80.42 (78.17-82.54)	78.95 (75.90-81.78)	84.75 (82.25-87.03)	74.19 (69.05-78.87)	80.34 (65.60-90.77)	72.96 (65.87-79.28)	81.65 (76.06-86.42)
Rural	62.96 (59.25-66.56)	63.01 (58.60-67.26)	65.15 (60.35-69.72)	65.59 (58.09-72.55)	67.05 (45.55-84.35)	76.59 (66.49-84.87)	71.79 (63.43-79.16)
P-value H0: diff=0	0.0000	0.0018	0.0000	0.4460	0.7850	0.6377	0.5309
Age Group, yrs							
60-69	75.44 (72.69-78.04)	68.26 (64.24-72.09)	80.67 (77.64-83.45)	67.17 (59.75-74.01)	71.60 (50.66-87.38)	70.79 (61.62-78.86)	75.72 (67.35-82.86)
70-79	75.25 (71.71-78.55)	78.20 (74.00-82.02)	79.06 (74.74-82.94)	72.20 (64.94-78.69)	80.60 (60.45-93.34)	73.95 (63.23-82.93)	80.10 (72.49-86.39)
≥80	81.96 (77.41-85.94)	84.78 (79.98-88.81)	83.35 (77.16-88.42)	78.61 (71.09-84.94)	91.25 (67.41-99.37)	79.95 (68.76-88.52)	82.47 (73.63-89.32)
H0: equal	0.0000	0.0000	0.0000	0.980	0.589	0.047	0.101

pocket payments were the most common (64.52%), with additional support coming from family and friends (22.80%), insurance coverage (5.43%), the public sector (3.53%), and NGOs (1.70%).

The findings reveal consistently high satisfaction levels across all aspects of AT usage. For device satisfaction, 83.45% of users reported positive experiences (49.46% "quite satisfied," 33.99% "very satisfied"), with only 7.26% expressing dissatisfaction. Service and maintenance satisfaction showed 68.25% approval (37.04% "quite satisfied" and 31.21% "very satisfied") against 6.04% dissatisfaction. Meanwhile, training programs received a 75.51% satisfaction rating (40.37% "quite satisfied" and 35.14% "very satisfied"), with 4.34% expressing dissatisfaction. Across all categories, neutral responses ("neither satisfied nor dissatisfied") were 9.02% for devices, 10.52% for service, and 9.36% for training. Nonresponse and "not applicable" rates were highest for service and maintenance (15.20%) and training (10.79%).

Discussion

This study examined the use of ATs among older adults in Iran, revealing that 1 in 4 older adults with impairments does not use any assistive products. The use of ATs was notably higher in urban areas compared to rural regions, with most devices being obtained through out-of-pocket expenditures and the private sector. Nevertheless, user satisfaction was relatively high, demonstrating that ATs and their related services are effectively meeting users' needs.

Our findings, functional impairments are prevalent among older adults, align with global evidence that links aging to increased physical and cognitive limitations (17). The natural aging process, combined with chronic conditions such as arthritis, cataracts, and dementia, exacerbates these challenges. Given the rapid growth of the aging population worldwide, addressing functional limitations should be a priority for health and social policies (18). Effective policymaking should focus on enabling older adults to maintain their independence and engage in active social participation despite these challenges. Integrating ATs into health and social care frameworks (19-21) can serve as an effective strategy to enhance the quality of life, reduce caregiver burden, and alleviate pressure on the healthcare system.

A critical finding of this study was that 24% of older adults with functional disabilities did not use ATs, which reflects a gap in service coverage and presents a barrier to achieving UHC. Limited access to ATs is a well-documented issue, particularly in LMICs. Several systemic obstacles contribute to the underutilization of ATs. Health system inefficiencies, particularly in the procurement and distribution of these technologies, remain a significant challenge in resource-limited settings (2, 11, 22). At the same time, geopolitical factors such as economic sanctions may further restrict access (23, 24). The quality and appropriateness of ATs are also critical, as poorly designed or low-quality devices often fail to meet individual needs, leading to dissatisfaction and lower adoption rates (11, 25); weak regulatory oversight and market inefficiencies further exacerbate the availability of substandard products (2, 26). Financial barriers also play a significant role, with high costs and insufficient insurance coverage placing a heavy burden on older adults (25, 27). Meanwhile, limited public funding compels reliance on out-of-pocket payments, highlighting gaps in health financing systems. Finally, a lack of awareness about available ATs, coupled with stigma or negative perceptions associated with their use, may discourage older adults from seeking or utilizing them (11, 25).

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To address these challenges, future research should focus on identifying the root causes of accessibility issues in AT (28). Targeted interventions should aim to strengthen health system governance, improve service delivery, and expand financial coverage for ATs (29). Awareness campaigns and community-based interventions are also essential for normalizing the use of ATs and improving public understanding of their benefits (21, 30).

Our study found that urban residents were more likely to use ATs than their rural counterparts, a finding consistent with those from Nepal, India, and Bangladesh (30). This disparity may be attributed to differences in healthcare infrastructure, availability of trained personnel, and socioeconomic factors. Rural residents also face transportation barriers, limited awareness, and reduced access to the market for assistive products (31-33). Addressing these geographic disparities requires targeted policy interventions, such as mobile AT services, community-based outreach programs, and financial subsidies for rural populations. Closing these gaps is crucial to achieving equitable access to health services and ensuring that no one is left behind in the pursuit of health equity.

This study raises a key concern about reliance on direct out-of-pocket payments and private procurement to acquire ATs. The limited public financial support for ATs represents a significant gap in social protection (34), undermining the principles of UHC. In Iran, rehabilitation services have minimal insurance coverage, and many ATs are not included in public health benefit packages. This financial burden places vulnerable older adults at risk of unmet needs (35). Similar challenges have been observed in other resource-constrained settings (11, 27). To improve affordability and accessibility, policymakers should prioritize the inclusion of ATs in national health insurance schemes. Cost-effectiveness analyses can help determine which ATs should be covered under public financing programs. Expanding insurance coverage and subsidy programs would alleviate financial hardship and ensure equitable access to essential assistive products.

Our study found that overall satisfaction with ATs was relatively high, indicating that ATs generally meet user needs when available. However, a deeper understanding of user experiences is necessary to assess service responsiveness. Qualitative studies that explore user perspectives can provide valuable insights into device usability, appropriateness, and unmet needs. Additionally, some older adults may lack awareness of quality standards for assistive devices, leading to the acceptance of suboptimal ATs (11, 34). Enhancing consumer education and implementing stricter regulatory measures to improve product quality and customization are crucial steps toward optimizing AT provision.

Conclusion

This study highlights the urgent need for policy interventions to improve access to ATs among older adults in Iran. Addressing financial barriers, strengthening health system governance, and reducing urban-rural disparities are critical steps toward ensuring equitable and sustainable ATs provision. Future research should identify effective strategies to enhance service delivery, improve product quality, and integrate ATs into broader health and social protection frameworks. By prioritizing ATs' accessibility, policymakers can support older adults in maintaining their independence, improving their quality of life, and alleviating the burden on caregivers and healthcare systems.

Authors' Contributions

S.S., F.S.S., M.S., and H.S.S. contributed to the conception and design of the study. S.S. and F.S.S. conducted data cleaning and analysis. S.S. and H.S.S. drew the chart. F.S.S., H.G., and M.S. completed and revised the manuscript. All authors have read and approved the final version of the manuscript.

Ethical Considerations

The approval for this study was granted by the Research Ethics Committees of the National Institute for Health Research, Tehran University of Medical Sciences (IR.TUMS.NIHR.REC.1403.018).

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Conflict of Interests

The authors declare that they have no competing interests.

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