Policy Brief
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Medical Journal of the Islamic Republic of Iran (MJIRI)

Med J Islam Repub Iran. 2026 (13 Jul);40.74. https://doi.org/10.47176/mjiri.40.74

Policy and Systemic Barriers to Accurate Diagnosis of Childhood Apraxia of Speech in Iran: A Policy Brief

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Received: 22 Jan 2026 Revised: 22 May 2026 Accepted: 13 Jun 2026 Published: 13 Jul 2026

Abstract

Accurate diagnosis of Childhood Apraxia of Speech presents a significant clinical challenge in Iran, where the lack of culturally and linguistically appropriate assessment tools frequently leads to misdiagnosis, delayed intervention, and increased healthcare costs. The effective implementation of these tools necessitates sufficient knowledge resources, financial support, and specialized human capital to conduct experimental research and provide equitable, evidence-based clinical services.

Keywords: Childhood Apraxia of Speech, Speech Disorders, Diagnosis, Policy Brief, Evidence-Based Practice, Speech-Language Pathology, Iran

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Cite this article as: Imani-Shakibayi M, Zarifian T. Policy and Systemic Barriers to Accurate Diagnosis of Childhood Apraxia of Speech in Iran: A Policy Brief. *Med J Islam Repub Iran.* 2026 (13 Jul);40:74. https://doi.org/10.47176/mjiri.40.74

Introduction

Developmental speech disorders are prevalent among children, with reported rates in Iranian primary school students ranging from 6.5% to 13.8%. Karbasi et al. (2011) reported a prevalence of 13.8% in Yazd (1), while Yavari et al. (2016) reported a prevalence of 8% in Arak (2). Additionally, a review of the prevalence of speech disorders in Iranian children by Hassanzadeh (2019) estimated the overall prevalence to be approximately 6.5% (3). Childhood Apraxia of Speech (CAS), a subtype of these disorders, is particularly complex and controversial due to its varied symptoms, limited research, and uncertain long-term outcomes (4). CAS is a motor-based impairment affecting the articulatory organs, in which no obvious neuromuscular deficits are observed. Affected individuals may face difficulties in speech production and experience impaired social communication, which may expose them to bullying (5). They are at an increased risk for reading and literacy difficulties, all of which can have lasting adverse effects on their academic and occupational achievement (6). Current evidence suggests that diagnosis should be made by an experienced and competent pediatric Speech-Language Pathologist (SLP), who can provide a comprehensive evaluation tailored to the child's age, disorder severity, and co-occurring conditions (7). Systematic review evidence has also demonstrated that no high-quality studies have yet been conducted on this topic (6).

While the American Speech-Language-Hearing Association (ASHA) has identified three core diagnostic indicators for CAS, several challenges remain in its diagnosis (5). These challenges include a lack of operational definitions and standardized criteria (8). The comorbidity rate of CAS with other conditions—such as hearing impairment and

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Key Messages:

↑What is "already known" in this topic:

Existing research highlights the challenges in diagnosing Childhood Apraxia of Speech (CAS) globally; however, these challenges are amplified in Iran. Limited resources, policy gaps, and reliance on non-standardized assessments contribute to misdiagnosis and delayed intervention. Addressing these systemic barriers is crucial for improving outcomes for children with CAS in Iran.

→What this article adds:

This article offers practical, policy-oriented recommendations to enhance the diagnosis of CAS in Iran. These recommendations include targeted training for speech-language pathologists and researchers, the development of national research capacity, sustainable financial investment, the establishment of a regulatory framework, the creation of culturally adapted assessment tools in major Iranian languages, and the strategic implementation of technology and modern clinical equipment.

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[DOI: 10.47176/mjiri.40.74]

autism spectrum disorder—is notably high (3). In the absence of language-specific research on CAS, SLPs primarily rely on English-based studies for assessment and treatment. Although many features of CAS appear consistent across languages, linguistic differences remain significant (9).

Analysis

This policy brief synthesizes evidence from research examining the experiences of SLPs in evaluating CAS (10, 11) and in designing a test battery for diagnosing CAS in Persian-speaking children. The first assessment package for evaluating CAS was developed with five assessment tasks; however, only two tasks were identified as the most suitable components of the assessment battery. Findings from these studies informed six key policy dimensions that emerged from a systematic analysis of barriers to CAS diagnosis. This structure provides decision-makers with a robust framework for enhancing diagnostic equity and improving service delivery for children affected by CAS.

Challenges and Barriers

To develop standardized assessment methods that align with international research and achieve culturally and linguistically adapted tools, several obstacles and challenges must be addressed:

1. Knowledge Barriers: A systematic review reported profoundly negative effects of economic sanctions on all aspects of Iran's healthcare system (12), including restricted access to major academic databases and advanced research tools (13), as well as hindering the import of advanced research technologies, such as data analysis software and laboratory equipment (12, 14). The lack of up-to-date and specialized assessment tools further restricts the accurate diagnosis of various speech disorders. Existing instruments are predominantly generic, validated on small populations, and lack broad clinical applicability. Additionally, Iran faces a shortage of SLPs with expertise in CAS, limited access to professional training resources, and minimal Persian-language evidence concerning its diagnosis and treatment.

2. Empirical Research Barriers: Research on speech disorders in Iran is predominantly restricted to universities or university-affiliated research centers. The primary constraints of this research include limited time, small sample sizes, and inadequate collaboration between academic institutions and clinical or community settings for participant recruitment.

3. Financial Challenges: A lack of financial support has significantly hindered Iran's international competitiveness and scientific advancement across several key domains (12, 14, 15). Consequently, many research projects are discontinued, and priority is often given to smaller, low-cost studies that yield limited scientific impact. Research on CAS diagnosis has faced challenges due to difficulties in accessing diverse research groups, which requires recruiting participants from multiple specialized research centers and covering their associated travel expenses.

4. Policy Challenges: Effective decision-making in speech-language pathology necessitates coherent, evidence-informed programs and policies grounded in robust and reliable research. However, insufficient research-based guidelines have resulted in persistent inconsistencies in diagnosis and intervention. Furthermore, gaps in formal regulations or structured referral frameworks impede systematic and timely patient referrals from healthcare centers and physicians to speech therapy clinics.

5. Equity Challenges: Persistent gaps remain in service coverage, gender parity, access to healthcare in remote areas, and the provision of services for low-income and vulnerable populations (16). The limited number of available assessment tools for speech disorders in Iran have been developed in Persian; however, they have not been standardized for the broader child population and lack established diagnostic norms, rendering their use largely informal. Given the country's significant linguistic and ethnic diversity—including large Turkish, Kurdish, Laki, and Armenian-speaking communities—Persian-language tools are unsuitable for many children, particularly in non-Persian-speaking provinces.

6. Operational Challenges in Clinical Settings: In clinical environments, the ongoing dependence on manual, paper-and-pencil assessments for CAS highlights broader operational constraints, including limited digital infrastructure and inadequate policy support for technology adoption. These inefficiencies contribute to increased diagnostic variability and errors, underscoring the urgent need for standardized, computer-assisted assessment systems that are integrated into routine clinical workflows.

In summary, the accurate diagnosis of CAS in Iran encounters several interconnected challenges. Limited access to international scientific resources, insufficient training opportunities, and financial constraints hinder the availability of up-to-date assessment tools and large-scale research. Additionally, the absence of standardized diagnostic protocols and clear referral systems has resulted in inconsistencies in clinical practice. Disparities in service access—particularly for children in remote or non-Persian-speaking regions—and the continued reliance on manual assessment methods further complicate accurate diagnosis. Addressing these challenges is crucial for improving diagnostic accuracy and ensuring equitable access to speech-language services. The following section presents key policy recommendations to address these gaps.

Policy Recommendations

In light of the existing barriers and the findings of this study, several policy options are proposed to improve the diagnostic assessment of CAS:

1. Training of SLPs and Researchers: Strengthening the skills of SLPs and researchers necessitates ongoing professional education programs and hands-on workshops conducted by international experts. Access to scientific resources, textbooks, and research tools should be broadened. Additionally, international collaborations and scientific exchange programs can further augment research capacity and clinical expertise.

2. Capacity Building for National Research Projects: National-level standardized assessments necessitate coordinated research projects. These projects should

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[DOI: 10.47176/mjiri.40.74]

concentrate on identifying linguistically relevant speech features and developing validated diagnostic tools. Large and diverse samples from multiple research centers are essential to ensure reliable and generalizable findings.

3. Provision of Financial Resources: Sustained financial investment is essential for the expansion and validation of the current assessment package, utilizing larger and more diverse populations at the provincial level. Adequate funding would facilitate comprehensive analyses and enhance data collection efforts.

4. Development of Regulatory Frameworks: Establishing national clinical guidelines for standardized assessment is essential for consistent diagnosis. A pilot implementation in selected provinces can help identify practical challenges and facilitate cultural or contextual adaptations. Following a successful evaluation, nationwide policy directives can ensure uniform adoption across clinical settings.

5. Development of Assessment Packages in Major Iranian Languages: Equitable diagnosis, in accordance with WHO and UNESCO principles, necessitates the use of culturally and linguistically appropriate tools for bilingual and multilingual children. This process involves collaboration with SLPs and trained interpreters proficient in local languages. It is essential to prioritize the translation, cultural adaptation, and pilot testing of assessment tools in major languages, such as Turkish and Kurdish.

6. Utilization of Technology and Clinical Equipment Enhancement: The introduction of digital assessment systems in speech therapy clinics can enhance diagnostic consistency and efficiency. Technology-assisted assessments facilitate faster data processing and minimize human error. Furthermore, digital tools can improve children's engagement during testing, thereby enhancing the practicality and reliability of evaluations.

Policy actions to improve the diagnosis of CAS in Iran can be implemented across three-time frames. In the short term, priorities include strengthening the training of SLPs and researchers, allocating funding for research projects and technology-assisted tools, and pilot-testing current assessment tools in selected provinces. In the medium term, policymakers should support larger validation studies, expand national research collaborations, and translate and culturally adapt assessment tools for major Iranian languages. In the long term, the focus should shift to the nationwide implementation of standardized diagnostic frameworks, the development of fully validated multilingual assessment tools, and the establishment of a sustainable national infrastructure for referral pathways. The barriers and policy recommendations are provided in Table 1.

Conclusion

The differential diagnosis of childhood speech disorders remains a critical and unresolved challenge in speech-language pathology, both globally and in Iran, necessitating immediate, coordinated policy attention. Current evidence clearly indicates the need for further research involving larger and more diverse populations to establish the practical applicability and psychometric robustness of culturally and linguistically specific diagnostic assessment packages. Health authorities and professional organizations should mandate and support multi-provincial pilot implementations by practicing clinicians to generate robust data on feasibility, usability, and diagnostic accuracy in real-world clinical settings. The development of a comprehensive

Table 1. Challenges of CAS and Policy Recommendations For Policymakers

Challenges and Barriers to CAS diagnosis	Policy Recommendations	Recommendations Time-frame
Knowledge Barriers		
Shortage of SLPs with expertise in CAS.	Provide specialized training for SLPs and researchers.	Short-term
Limited access to academic databases and research resources.	Expand access to scientific resources and foster international collaborations.	Medium-term
Financial Challenges		
Insufficient funding for large-scale research and the development of digital assessment tools.	Allocate funding for research projects.	Short-term
	Support the development of computerized Persian assessment tools.	
Empirical-Research Barriers		
Limited research evidence and a lack of research-based clinical guidelines.	Establish national clinical guidelines.	Medium-term
	Support national-level research initiatives.	Long-term
Policy Challenges		
Regulatory gaps in referral pathways and service delivery.	Establish formal referral frameworks.	Long-term
Lack of evidence-based policies	Adapt diagnostic tools to local cultural and clinical contexts.	Short-term
Equity Challenges		
Limited assessment tools are available in languages other than Persian.	Translate and culturally adapt tools for the major Iranian languages.	Short-term
Operational Challenges in Clinical Settings		
Limited digital and computer-assisted assessment tools.	Develop computerized Persian assessments.	Long-term
	Adapt digital speech analysis systems for Persian.	
	Equip clinics with updated digital technologies.	

Note: CAS= Childhood Apraxia of Speech, SLP= Speech-language pathologist

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[DOI: 10.47176/mjiri.40.74]

diagnostic assessment package must be recognized as a long-term national priority, with dedicated investment in systematic adaptation and standardization across Iran's major local languages to ensure equitable, nationwide access to accurate diagnosis.

Acknowledgment

The authors express their sincere gratitude to the Vice-Chancellor for Research and Technology of the University for their support of this project.

Conflict of Interests

The authors declare that they have no competing interests.

Authors' Contributions

All authors contributed equally to the conception, drafting, and revision of this policy brief and approved the final version for publication.

Ethical Considerations

This study was approved by the Medical Ethics Committee of the University of Social Welfare and Rehabilitation Sciences under the ethics code IR.USWR.REC.1400.094.

Funding Support

This research was supported by the University of Social Welfare and Rehabilitation Sciences.

Data Availability

No new datasets were generated or analyzed in this study.

AI Use Statement

During the preparation of this work, the authors used ChatGPT to improve the readability and language of the manuscript. Following the use of these tools, the authors reviewed and edited the content as necessary and assumed full responsibility for the content of the published article.

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[DOI: 10.47176/mjiri.40.74]