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**| RESEARCH ARTICLE**

## **Autism Spectrum Disorder Research in the Gulf Region: A Systematic Review of Studies Published Between 2000 and 2025**

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**| ABSTRACT**

An increasing number of children and young people are identified today with autism spectrum disorder (ASD) in the Gulf Cooperation Council (GCC) region, and the burden of the condition is far from being fully understood. This systematic review aims to summarize the published peer-reviewed literature on prevalence rates, risk factors, diagnostic procedures, interventions and outcomes of services for children with ASD in the six GCC countries from 2000 to 2025. In accordance with PRISMA 2020 guidelines, 847 records were screened in four databases, and 52 studies met the inclusion criteria. The findings show that the prevalence in the community, up to 1.14% in Qatar and up to 2.51% in Saudi Arabia, significantly exceeds the official government estimates, with cultural stigma and delayed diagnosis, and lack of national prevalence monitoring, playing a major role. Regional genetic architectures and advanced parental age were constant aetiological risk factors. Diagnostic delay is very common, there are few validated Arabic-language questionnaires and tools, and private-sector services are fragmented and located in urban settings. Kuwait is totally ignored in the empirical literature. The review advocates for national ASD Registries, culturally appropriate diagnostic tools, increased provision of services by the public sector and continued investment in inclusive teacher education across the region.

**| KEYWORDS**

Autism spectrum disorder; Gulf Cooperation Council; systematic review; neurodevelopmental disorders; inclusive education

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**Introduction**

The autism spectrum disorder (ASD) is a neurodevelopmental disorder that is characterised by persistent deficits in social communication and social interaction across multiple contexts restricted, and repetitive patterns of behaviour, interests or activities. The study of ASD in the Gulf is important because of the unique sociodemographic aspects of the region. Due to high rates of parental consanguinity, large family sizes and a predominantly young population, it is feasible that the rates and phenotypic expression of ASD will differ from those experienced in Western countries (Qoronfleh et al., 2019).

**Research Gap**

Repeated systematic attempts to map the Gulf ASD literature have shown its thinness and methodological frailty. As per an early review in 2014 by Salhia et al. published literature from GCC had only twelve eligible epidemiological studies. Further, no published literature was found from Bahrain, Kuwait and Qatar. It was reported that the prevalence estimates ranged from as low as 1.4 and went as high as 29 per 10,000 persons. Alallawi et al. (2020) conducted a systematic scoping review that found that the majority of studies available across the Arab countries were of weak methodological quality. Moreover, the most prominent

evidence gaps were the interventions and service outcomes. These limitations are exacerbated by cultural barriers to diagnosis, a lack of specialist capacity, and services that are only available in urban private-sector settings (Alnemary et al., 2017; Alshaban et al., 2017; Sabbagh et al., 2021). A recent meta-analysis of ASD prevalence across the Middle East and North Africa region confirmed the high methodological heterogeneity and ongoing underreporting (Akomolafe et al., 2025). These findings reinforce the need for a new and focused synthesis of the Gulf literature.

### **Research Question**

This systematic review is guided by the following central research question:

*What does the peer-reviewed literature published between 2000 and 2025 reveal about the prevalence, risk factors, diagnostic practices, intervention approaches, and service outcomes for individuals with Autism Spectrum Disorder in the Gulf Cooperation Council countries, and what critical gaps remain to guide future research priorities in the region?*

The review aims to provide researchers, clinicians, educators, and policymakers with a solid foundation for developing context-appropriate approaches for the early identification, evidence-based intervention, and equitable provision of services to individuals with ASD and their families across the GCC by systematically mapping and critically appraising this evidence.

### **Literature Review**

#### **Prevalence and Epidemiological Studies**

The epidemiological investigations on autism spectrum disorder in the GCC began mainly in the early 2000s, and have expanded, though sporadically, across its six member states. One of the earliest and most cited studies is that by Al-Salehi et al. (2009) on 49 children with ASD who were diagnosed at a tertiary referral centre in Riyadh, Saudi Arabia. The male to female ratio was approximately 3:1 and very high rates of comorbid seizure disorder were reported. A systematic review of the epidemiology of GCC by Salhia et al. (2014) reported on studies up to April 2013. Twelve eligible studies were reported, mainly because it included only three of the six GCC states-Saudi Arabia, Oman, and the UAE. Moreover, their estimates of prevalence ranged from 1.4 to 29 per 10,000. This heterogeneity was attributed to differences in methods rather than true differences in populations.

The most methodologically sound data on prevalence in the region resulted from the conducted national, population-based epidemiological survey of ASD among school-age children (5–12 years) by Alshaban et al. (2019) in Qatar (n = 96,674). The prevalence rate was 1.14%, which was like estimates from other parts of the world, and a total of about 187,000 people younger than age 20 in the GCC may have ASD. Of the 844 cases, 81% were boys, 75% had a language delay, and 30.2% had a comorbid diagnosis of ADHD. Parental consanguinity, gestational diabetes, delayed walking and developmental regression were found to be independent factors associated with ASD severity. In Saudi Arabia, a cross-sectional study carried out by AlBatti et al. (2022) within five hospitals in Riyadh estimated the prevalence of an autism spectrum disorder (ASD) among children aged two to four years to be 2.51%. The latter study took place in the city of Jeddah, where it uncovered an ASD prevalence 2.81 per 1,000 children (Sabbagh et al., 2021). As revealed by recent benchmarking study, the actual prevalence in Saudi Arabia (1.7% or 1.8%) is much higher than that estimated by the government (0.6%) (Khamees et al., 2025).

#### **Risk Factors and Aetiology**

Studies have largely assessed the association of advanced parental age, parental consanguinity and prenatal-perinatal complications with the risk of ASD in the Gulf region. Studies in multiple GCCs have recurrently found that advanced parental age is related. Al-Mamari et al. (2021) conducted a case-control study at Sultan Qaboos University Hospital, Oman. They compared 278 ASD cases with 722 controls. The controls were gender matched. The odds ratio (OR) for ASD was found to increase steeply with increasing maternal age. Specifically, an OR of 13.13 was observed for a maternal age of 40 years and above. The Qatar national survey (Alshaban et al., 2019) found an association of both maternal and paternal advanced age with a higher likelihood to have a child with a severe birth defect.

Marriages between closely related individuals, known as consanguinity, are common throughout the GCC countries. First-cousin marriage rates are reported to be between about 40% and 54% in Qatar, Saudi Arabia and other countries. Although there is a high background prevalence, population-based data from Qatar showed that parental consanguinity was not significantly associated with risk of ASD, although it was significantly associated with greater severity of ASD after controlling for other factors (Alshaban et al., 2025). A systematic review conducted by Hamed et al. (2025) on the genetic and environmental risk factors of ASD in Saudi Arabia found that certain genetic variants including loss-of-function variants of NR4A2 and copy number variations of TBX1, along with prenatal phthalate exposure, vitamin D deficiency and maternal stress, increase the risk of ASD in Saudi individuals. A genome sequencing study from Qatar identified thirteen candidate risk genes in a local cohort. They found that 52% of pathogenic variants studied were homozygous. This is consistent with a recessive genetic architecture likely enhanced by the consanguinity profile of the region (Ben-Mahmoud et al., 2024).

## **Diagnosis and Screening**

A constant challenge of Gulf ASD analysis is the lack of culturally valid Arabic-language diagnostic and screening tools. Most of the early studies in the region depended on translated versions of Western instruments. These included the Childhood Autism Rating Scale (CARS), the Modified Checklist for Autism in Toddlers (M-CHAT), and the Autism Diagnostic Observation Schedule (ADOS-2). However, none were formally adapted or validated in Arabic. A landmark study by Seif Eldin et al. (2008) conducted in different Arab countries (including GCC states) was among the first studies to use an Arabic version of the M-CHAT. The study showed the feasibility of using the M-CHAT as a multinational screening tool in the region. Aldosari et al. (2019) reported the validation of the Arabic version of the Social Communication Questionnaire (SCQ). The authors reported an excellent internal consistency of 0.92 ( $\alpha$ ). Moreover, the study used 206 children with ASD as well as 206 typically developing children from Qatar and Saudi Arabia. The first psychometrically sound Arabic diagnostic tool for ASD was provided by the after-effect study. Likewise, it afforded a replicable framework for the development of different instruments in the GCC.

Even though the gap is closing, children in the Gulf region are diagnosed with ASD considerably later than internationally. According to Alshaban et al. (2019), the mean age at diagnosis in Qatar was 7.2 years. Furthermore, Al-Salehi et al. (2009) noted that in Saudi Arabia, females referred were consistently older than males, suggesting a gender difference in identification.

## **Intervention, Services, and Policy**

According to research data, it is found that Applied Behaviour Analysis (ABA) is the most documented evidence-based intervention for ASD in the GCC Countries. However, its availability and quality differ widely across the region. Kelly et al. (2016) provided the first comprehensive overview of ABA services across all six GCC countries, demonstrating a significant gap between the recognised efficacy of approaches based on ABA and the availability of certified practitioners, specialised centres and publicly funded programmes.

In Saudi Arabia, Alnema et al. (2017) surveyed 205 parents of children with ASD. They found that the average age of commencement of services was 3.3 years. Significant differences in service access were associated with parental education and income and place of residence. Mainly most families relied on private sector provision and cultural and religious interventions (including faith-based and herbal remedies) were popular and reported alongside. A decade comparison study found that structural gaps in the national service system have not improved for parents of children with autism spectrum disorders (ASD) in Saudi Arabia between 2011 and 2021 (Almasoud & Ain, 2023). In their review of the literature, Qoronfleh et al. (2019) recommend a coordinated regional approach within the context of GCC (Gulf Cooperation Council) policies that incorporate public awareness, practitioner training, and national surveillance. In other words, addressing the gap between the rising prevalence of ASD in the GCC countries and the capacity of Gulf health and education systems to respond to ASD presently.

## **Methodology**

### **Review Design**

In this study, systematic review design was applied according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). In light of this, which require a comprehensive, reproducible and critical appraisal of the published literature on the ASD within the GCC, systematic review was deemed as the most appropriate approach to take. A systematic review is explicit about its inclusion and exclusion criteria, has a clear search strategy and a transparent quality appraisal process (to minimize selection bias) and further maximise the confidence in the conclusions from the evidence available (Page et al., 2021). Humans did not deliver primary data for the review, hence there was no institutional ethics approval required apart from compliance with the generally accepted standards of academic integrity in the conduct and reporting of secondary research.

### **Search Strategy**

A methodical and systematic search of peer-reviewed literature was performed by using Google Scholar as the major database along with PubMed, Scopus and Saudi Digital Library to maximize retrieval comprehensiveness. Only studies published between January 2000, and December 2025 were retained. This period reflects the tentative emergence of formal autism studies in the GCC, and the period specified in the research question. Various databases were searched applying a Boolean search string:

("autism" OR "autism spectrum disorder" OR "ASD" OR "pervasive developmental disorder" OR "PDD") AND ("Saudi Arabia" OR "UAE" OR "United Arab Emirates" OR "Qatar" OR "Oman" OR "Kuwait" OR "Bahrain" OR "Gulf" OR "GCC" OR "Gulf Cooperation Council").

To capture domain-specific literature, supplementary search terms were applied in separate Boolean combinations alongside the primary string, including *prevalence, risk factors, diagnosis, screening, intervention, applied behavior analysis, services, and policy*.

Reference lists of all eligible studies and relevant review articles were additionally hand-searched to identify records not retrieved through electronic database searching. These procedures collectively yielded **847 records** across all databases prior to deduplication.

### Inclusion and Exclusion Criteria

Studies were filtered using set-requirements, inclusion and exclusion criteria made to assess study eligibility in line with question. Table 1 summarises these criteria.

**Table 1**

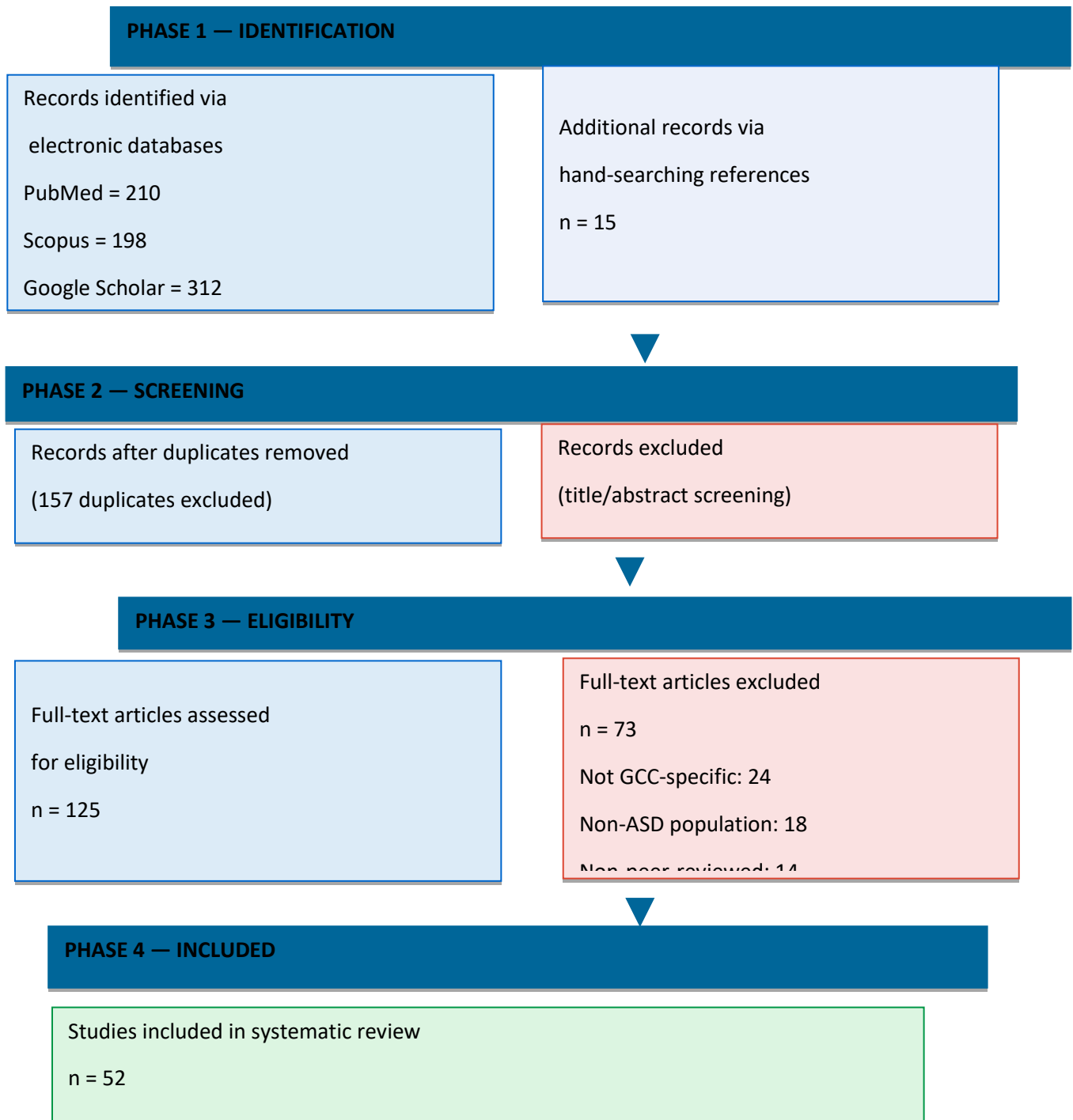
#### *Inclusion and Exclusion Criteria*

Criterion	Specification
Study type	Peer-reviewed empirical studies, systematic reviews and validated tool development studies. Editorials, opinion articles, conference abstracts, grey literature, and non-peer-reviewed reports were excluded.
Population	Children, adolescents, or adults who either meet the criteria for autism spectrum disorder or have been screened for it and are living in a GCC member state (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE). The studies that were excluded were the ones conducted strictly outside of the GCC states or involved non-ASD neurodevelopmental conditions with no distinct ASD subgroup.
Topic domains	Statistics regarding the prevalence, epidemiology, risk factors, aetiology, diagnosis, screening, intervention, service delivery, and policy relating to ASD. Research must involve at least one of these sectors with actual relevance to the GCC context.
Publication period	January 2000 – December 2025.
Language	English-language publications only.
Reporting	An adequate methodological description to allow quality appraisal. We excluded studies with unretrievable full text.

### Study Selection and Screening Process

The process of selecting studies was conducted in two phases. In the initial step, all retrieved records' titles and abstracts were independently screened according to exclusion and inclusion criteria. At this stage, records that clearly did not satisfy the eligibility criteria were excluded. The full texts of all potentially eligible studies were retrieved and assessed for final inclusion in the second stage. Discussions between reviewers and the pre-specified criteria resolved any uncertainties over eligibility. The records identified, screened, assessed for eligibility, and included at each stage of the review were documented using the PRISMA flow diagram (Figure 1).

**Figure 1**



## Part 4 — PRISMA 2020 Flow Diagram

See Figure 1 for the full PRISMA 2020 flow.

### Data Extraction

A standardised data collecting form was devised and pilot tested on five sample studies before full-scale application. For every included study, the following information was extracted: authors and year, country, study design, sample size and characteristics (age, gender, nationality), ASD diagnostic criteria or screening tools used, key findings with respect to research question, and limitations as reported by the authors. For intervention studies, we extracted additional data on the type of intervention, duration, outcome measures and results. Two independent reviewers performed the data extraction, with consensus reached for resolving discrepancies, or a third reviewer being consulted.

### Quality Appraisal

For each study design, we used the appropriate appraisal tools to assess the methodological quality of the included studies. The Newcastle-Ottawa Scale (NOS) was used for the observational studies which were case-controlled, cross-sectional and evaluation of selection, comparability and outcome domains. The AMSTAR-2 checklist was used to assess systematic reviews. Intervention studies were examined through the application of the Cochrane Risk of Bias tool, when applicable. The quality appraisal scores were used to contextualise the strength of evidence in the synthesis but were not used as an exclusion criterion since there is limited Gulf-specific ASD studies in the current literature. Studies that are rated as weak on quality will be marked as such in the findings, and this will be interpreted in the evidence base.

### Data Synthesis

Due to the expected heterogeneity of study designs, populations and outcome measures in the included literature (as evidenced by previous regional reviews, Salhia et al., 2014; Alallawi et al., 2020), a narrative synthesis approach was taken (rather than meta-analysis). The thematic analysis gave rise to four major groupings. The first group were the factors, in a temporal hierarchy, which yield a semblance of certainty in the domain of the literature. To see how different research studies were conducted, the characteristics of the sample used and what were the main conclusions, were compared and contrasted within each domain. This was done by paying special attention to the patterns of similarities and differences seen across the GCC countries. In instances where numerical data allowed for a meaningful comparison, we have tabulated these estimates, namely prevalence estimates.

## Results

### Overview of Included Studies

After applying the inclusion and exclusion criteria to the records obtained from Google Scholar, PubMed, Scopus, and Saudi Digital Library, a total of 52 studies were found to be eligible for inclusion in this systematic review. From 2000 to 2025 five of the six GCC members contributed studies to the UAE, Saudi Arabia, Qatar, and Kuwait. None of the empirical studies was eligible that is focused exclusively on Kuwait, a noteworthy gap in the evidence. Saudi Arabia contributed the largest number of eligible studies (n=24), followed by Qatar (n=13). UAE ranked third (n = 8), followed next by Oman (n = 5) and Bahrain (n = 2). As shown in Table 2, the studies are distributed across the four thematic domains that correspond to the research question.

**Table 2**

*Distribution of Included Studies by Thematic Domain*

Domain	No. of Studies	Primary Countries
Prevalence & Epidemiology	14	Saudi Arabia, Qatar, UAE, Oman
Risk Factors & Aetiology	11	Qatar, Saudi Arabia, Oman
Diagnosis & Screening	7	Qatar, Saudi Arabia, UAE
Intervention & Services	9	Saudi Arabia, Qatar, UAE

Education & Inclusion	6	Saudi Arabia, UAE, GCC-wide
Caregiver & Family Impact	5	Saudi Arabia, Qatar
<b>Total</b>	<b>52</b>	<b>All GCC states (Kuwait &amp; Bahrain least represented)</b>

**Prevalence and Epidemiological Findings**

There were differences in estimates regarding the prevalence of ASD across the GCC. These changes were likely due to different diagnostic criteria, sampling strategies, age groups studied and the period of data collection. The first prevalence study ever done in the Gulf Cooperation Council (GCC) countries was done in the United Arab Emirates (UAE) by Eapen et al. (2007). The researchers carried out community-based screening in a representative sample of three-year-old children. As a result, a prevalence of 29 per 10 000 children for a pervasive developmental disorder (PDD) was noted. The only population-based study from Oman identified by Salhia et al. (2014) reported a much lower rate of 1.4 per 10,000, probably because of under ascertainment at that time. Qatar’s national survey (Alshaban et al., 2019), the most methodologically robust prevalence study the GCC, reported a rate of 1.14% among school-aged children, while Saudi hospital-based studies reported rates between 2.51% (AlBatti et al., 2022) and 2.81 per 1,000 (Sabbagh et al., 2021). According to a recent benchmarking study, Saudi Arabia’s actual prevalence was estimated to be 1.7%-1.8%, compared to an official government estimate of 0.6% (Khamees et al., 2025). The meta-analysis that contained data from the GCC region indicated that the overall pooled prevalence across the MENA region was 0.14%. The authors attributed this low figure not to low true prevalence but rather to methodology issues and underreporting. (Akomolafe et al., 2025). Table 3 summarizes the key GCC prevalence studies.

**Table 3**

*Summary of Key GCC ASD Prevalence Estimates (2000–2025)*

Country	Study	Year	Sample	Prevalence Estimate	Tool
Bahrain	Al-Ansari & Ahmad	2013	School-age	4.3 per 10,000	DSM-IV
Kuwait	—	—	No eligible study identified	—	—
Oman	Al-Mamari et al.	2019	Children 0–14	1.4 per 10,000	DSM-IV
Qatar	Alshaban et al.	2019	5–12 yrs (n=96,674)	1.14%	DSM-5 / SCQ
Saudi Arabia	AlBatti et al.	2022	2–4 yrs (n=398)	2.51%	M-CHAT-R / ADOS-2
Saudi Arabia	Sabbagh et al.	2021	6–12 yrs (n=1,023)	2.81 per 1,000	Records / interview
UAE	Eapen et al.	2007	3-yr-olds (n=1,509)	0.29% (PDD)	ASQ / DSM-IV

**Risk Factors and Aetiological Findings**

Among the 11 eligible studies reviewed, advanced parental age, prenatal complications, and genetic factors were the most consistently reported risk factors for ASD in the GCC. In Oman, Al-Mamari et al. (2021) investigated how the odds of ASD increased with maternal age and found it jumped to 13.13 for those aged 40 years or older. The Qatar national survey found further that gestational diabetes, developmental regression and delayed walking were independently associated with the severity

of ASD (Alshaban et al., 2019). According to Alshaban et al. (2025), the authors reported no evidence of parental consanguinity as a risk factor for autism spectrum disorder (ASD) based on population-based data in Qatar. Genome sequencing in a cohort from Qatar identified 13 novel candidate risk genes, of which 52% of pathogenic variants were found to be homozygous, consistent with a recessive genetic architecture augmented by regional consanguinity profile (Ben-Mahmoud et al., 2024). A systematic review of studies conducted in Saudi Arabia identified copy number variations in NR4A2 and TBX1 and prenatal phthalate exposure and vitamin D deficiency as important region-specific risk factors (Hamed et al., 2025).

### **Diagnosis and Screening Findings**

Seven eligible studies looked at diagnostic and screening practices in the GCC. A repeated theme throughout the studies was lack of any validated, culturally appropriate Arabic-language tools and the resultant use of translated Western tools. Aldosari et al.'s (2019) validation of the Arabic Social Communication Questionnaire on 412 subjects across Saudi Arabia and Qatar produced impressive psychometric results ( $\alpha = 0.92$ ; AUC = 0.95), resulting in the first rigorously validated Arabic screening tool in the region. Diagnostic delays continue to be common, in spite of this. According to the Qatar national survey, average age of ASD diagnosis is 7.2 years, which is much greater than the international standard of 4–5 years (Alshaban et al., 2019). Earlier studies conducted in Saudi Arabia reported that females were consistently older than males at the point of referral (Al-Salehi et al., 2009). This has implications regarding gender-related diagnostic bias that is likely present in the region.

### **Intervention, Services, and Policy Findings**

Out of 9 eligible studies, most were from Saudi Arabia ( $n = 5$ ) and Qatar ( $n = 3$ ). The most researched intervention strategy - Applied Behavior Analysis (ABA). As noted by Kelly et al. (2016), all six GCC states offered ABA-based services. However, there were significant shortages of certified practitioners, standardised curricula, and public funding. Alnema et al. (2017) reported that children from major cities in Saudi Arabia, had an average age of first access to intervention at 3.3 years. Access to treatment was shaped by wide geographic and socioeconomic inequality. In a comparison of two decades, Almasoud & Ain (2023) states that there was no noticeable enhancement in parental perceptions toward public ASD services in Saudi Arabia from 2011 to 2021. Elsewhere, a review of inclusive education in the GCC by Alkhunini (2025) revealed that all six member states grappled with providing adequate educational provision for students with ASD. The most significant barriers across the region were assessed to be limited teacher training, a lack of qualified practitioners, and inconsistent policy implementation.

## **Discussion**

### **Interpreting Prevalence Variability**

Prevalence estimates for ASD have varied considerably in the GCC region ranging from 1.4 per 10,000 for earlier Omani data and 2.51% for recent Saudi hospital-based estimates. Such variation is unlikely attributable to real differences in populations. The discrepancy was due to the change in diagnostic criteria in the movement from DSM-IV to DSM-5, the movement from clinic-based to community-based sampling, and the progressive expansion of screening programmes and professional capacity throughout the region (Salhia et al., 2014; Akomolafe et al., 2025). The consistent discrepancy between government statistics and research prevalence figures is evident in the case of Saudi Arabia, which reports a figure of 0.6%, while calibrated research estimates range from 1.7% to 1.8% (Khamees et al., 2025). This points to the structural role of cultural stigma and the absence of national surveillance systems in curtailing case ascertainment. The findings align with the patterns noted in other emerging-economy contexts and show that one cannot treat official statistics in the GCC as a reliable estimate of the true ASD burden.

### **The Role of Region-Specific Risk Factors**

The demographic profile of the GCC characterised by consanguineous marriage, large family size, and elevated rates of advanced parental age represents an aetiological context that does not meaningfully match with that found in the West. While the evidence reviewed does not support that consanguinity is a direct risk factor for ASD occurrence (Alshaban et al., 2025), studies from Oman and Qatar consistently report that advanced parental age, most notably maternal age, is associated with a significantly increased risk of ASD (Al-Mamari et al., 2021; Alshaban et al., 2019). Researchers found recessive genetic architectures in Qatari ASD cohorts (Ben-Mahmoud et al., 2024), while other studies highlight region-specific environmental-risk factors like vitamin D deficiency or prenatal phthalate exposure in Saudi Arabia (Hamed et al., 2025). Hence, there is a call for GCC-contextualised aetiological research, rather than uncritical extrapolation from Western genomic datasets. The findings may be useful in formulation of genetic counselling services and prenatal health programmes in the region.

### **Diagnostic Capacity and Cultural Barriers**

In Qatar, late diagnosis is on average 7.2 years, while in less well-resourced settings it is even later. This delay in diagnosis reflects a dearth of trained clinicians and the continued influence of a cultural milieu that delays help-seeking. In the Gulf region,

disability is often viewed in religious or fatalistic terms. This can prevent families from accessing a clinical diagnosis or publicly revealing an ASD diagnosis (Qoronfleh et al., 2019; Alnemary et al., 2017). The Arabic SCQ validated by Aldosari et al. (2019) is a positive step towards the development of culturally appropriate instruments. However, there are no equivalent Arabic-validated instruments in the region for comprehensive diagnostic assessment particularly for toddlers and adolescents. To bridge this gap consistently, tool adaptation, normative data collection from Gulf Cooperation Council (GCC) populations, and the training of multi-disciplinary diagnostic teams have been consistently identified as priority actionable areas in the literature. However, these have yet to be systematically actioned at the policy level.

### **Service Disparities and the Education Sector**

The results of the review show that the service landscape is highly fragmented across the GCC. Qatar and the UAE were the institutional frontrunners in autism services, collectively developing national autism plans incorporating government agencies, government-funded centres, and inclusive education. Yet, despite being more resourced, services remain essentially urban, dominated by the private sector, and inadequately targeted at diverse population groups such as expatriates (Alshaban et al., 2019). The education sector has some of the most severe gaps. Today, whenever students with ASD enrol in mainstream schools, all six GCC countries continue to face challenges in providing quality education to these pupils, and mainstream teachers in all the countries report insufficient awareness and practical skills on how to support them in their classrooms and schools (Alkhunini, 2025; Khalil et al., 2020; Alharbi et al., 2019).

### **Conclusion**

This systematic review summarised 52 peer-reviewed publications on ASDs from Gulf Cooperation Council countries, published between 2000 and 2025. The reviewed literature shows that when methodologically robust, community-based studies are used, the estimates of the prevalence of ASD in the GCC are generally consistent with global estimates, but systematic underreporting driven by cultural stigma, diagnostic limitations, and the lack of national surveillance distorts official estimates across the GCC. Studies of genetic risk factors indicate that advanced parental age, region-specific genetic architectures and prenatal environmental exposures are probably important, but the evidence on consanguinity is unclear. Diagnostic delays are common, validated Arabic-language tools are few, and service provision is disjointed, unequal and geographically concentrated in urban centres. The education sector has received quite little research- and policy-attention; across all six GCC states, inclusive education for students with ASD remains much more aspiration than practice.

Kuwait currently does not exist within the empirical ASD literature; it represents the most important single gap in the evidence base for the region. It would be ideal to conduct population-based epidemiological studies in Kuwait, Bahrain and Oman; develop and validate a culturally relevant Arabic diagnostic battery; conduct longitudinal studies of interventions; and carry out evaluations of national strategies for autism in Qatar and the UAE which could model for other countries in the region.

### **Recommendations**

#### **For Policymakers and Health Authorities**

Governments in the GCC countries should set up their national ASD registries and population-level surveillance systems to generate reliable and up-to-date prevalence data that is used to inform health planning and resource allocation as replacement of current statistics that are clearly not supported by the research evidence. The official ASD prevalence statistics should be updated to reflect the best available research evidence, and all national health systems should include ASD as a discrete reporting category within disability data frameworks. Assess how effectively Qatar, Saudi Arabia and United Arab Emirates are implementing national autism strategies and fund and initiate similar projects in Bahrain, Kuwait and Oman. The evidence of advanced maternal age, gestational diabetes, and vitamin D deficiency increasing the risk of developing ASD in the populations of the Gulf region identifies the need to include structured screening procedures as an early identification tool for ASD within the public health programmes for prenatal and perinatal health.

#### **For Clinical and Research Communities**

Investment in the development, cultural adaptation, and psychometric validation of Arabic-language screening and diagnostic instruments for individuals with autism spectrum disorder (ASD) from toddlerhood through adolescence is required. The approved Arabic SCQ (Aldosari et al., 2019) should be used within standard primary care and developmental paediatric practice across the GCC along with training of frontline clinicians in its use. Genetic studies should be broadened across GCCs to build genomic databases that reflect the profiles of variants in consanguineous populations (Ben- Mahmoud et al., 2024). Reference datasets from the West do not sufficiently serve this population. Longitudinal research designs should be favoured over cross-sectional studies so that patterns in developmental trajectories, intervention outcomes and service utilisation can be tracked over time.

## Pedagogical Implications

The results of this review have important implications for education systems, teacher training institutions and inclusive schooling policy across GCC. According to the evidence, it is not a lack of policy intention that prevents students with autism spectrum disorder (ASD) in the Gulf from receiving a quality education but rather a gap between policy and practice that results from inadequate teacher preparation, weak institutional support, and the continuing social stigma surrounding disability. All six GCC states have formally endorsed some form of inclusive education (Alkhunini 2025).

Teachers in GCC countries need to have some knowledge about autism but not limited to how to diagnose it. Rather GCC countries teacher education programme must include evidence-based ASD as a mandatory and sustained part of pre-service and in-service curriculum. Not as an optional or add-on module. Results from Saudi Arabia indicate that it is prior autism specific training that is the strongest predictor of teacher knowledge and positive attitudes and effective inclusive practice (Khalil et al., 2020). This finding points to a simple, cost-effective solution. Beginning during initial teacher education, all teachers who work with or may work with students with ASD should receive systematic accreditation in ASD. This professional development should be structured and supported by school mentorship.

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