

## Research Article

### Prevalence of Autism Spectrum Disorders in Asian Countries

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#### ABSTRACT:

**Introduction:** A series of complicated neurodevelopmental diseases known as autism spectrum disorder (ASD) are defined by symptoms that appear in the very early stages of life. The precise frequency of ASD in numerous Asian nations is unknown, despite its acknowledgement.

**Objective:** This review aims to examine all ASD prevalence studies that have been conducted in this area in order to fill in any information gaps and to spot any weaknesses.

**Methodology:** Online databases like PubMed and Google Scholar were used to extract the English-language papers published between 2012 and 2022. The search was conducted in accordance with PRISMA standards. Nine studies in all that satisfied the established inclusion criteria were included in our study.

**Results:** In these investigations, the reported prevalence of autism ranged from 0.062% in Iran to 3.22% in Japan. In Saudi Arabia, the study's sample size was 1023, while in Iran, it was 1.32 million. Age ranged from one to thirty. The evaluation identifies variations in screening methods and diagnostic standards between the studies, making comparisons difficult.

**Conclusions:** In developing Asian countries, accurate and reliable diagnoses of autism spectrum disorder (ASD) are essential for future policymaking. Further study is required to collect data for improved management, early intervention, and resource allocation in these regions due to the paucity of knowledge on the prevalence of ASD in various Asian nations.

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**Key Words:** Autism Spectrum Disorders, ASD, Prevalence, Asia.

## INTRODUCTION:

The term "autism spectrum disorders" (ASD) refers to a group of ailments marked by varied degrees of poor social behavior, communication, and language abilities, as well as a constrained set of personal interests and repetitive behaviors.<sup>1</sup> There are many factors that contribute to the development of autism spectrum disorders (ASD), which have been the subject of numerous research investigations. These variables include neuroanatomical variations, immunological variables, biochemical variables, environmental exposures, perinatal variables and genetic variables<sup>2</sup>. The difficulties brought on by ASD persist throughout a person's life and are acknowledged to have a considerable negative impact on their social relationships, financial security, and functional capacities. As a result of these repercussions, not only the ASD sufferers but also their families and society at large are affected. There is a theory that early screening for autism results in early intervention and better outcomes. By skilled specialists, autism spectrum disorder (ASD) can be identified as early as 18 months to 2 years of age. Children are frequently not diagnosed until they are older, though<sup>3</sup>.

Globally,<sup>4</sup> autism spectrum disorder (ASD) is estimated to affect 1 in 100 children. The estimates of the prevalence of ASD have risen over time and might fluctuate greatly amongst various socio-demographic categories<sup>5</sup>. One in 59 eight-year-old children in the USA has an ASD diagnosis<sup>6</sup>. 3.9% of people in Asia are said to have autism spectrum disorder (ASD)<sup>7</sup>. ASD is becoming more common in South Asia, with prevalence rates ranging from 0.09% in India to 1.07%

in Sri Lanka<sup>8</sup>, according to a recent comprehensive study. Similarly, prevalence in Arab nations bordering the Persian Gulf ranges from 0.14 to 2.9%<sup>9</sup>.

The ambiguity surrounding the overall prevalence<sup>10</sup> of autism spectrum disorder (ASD) in Asia has been exacerbated by the absence of a standardized ASD-monitoring network. Determining the prevalence of autism accurately is essential to assessing the financial burden brought on by the illness and making educated judgments about the distribution of funds and services to the family. It also enables us to pinpoint regional and environmental risk factors linked to the ailment<sup>11</sup>. Although there have been numerous studies on the prevalence of autism in different Asian nations, the breadth and depth of research may differ by country. While other nations might have less published studies accessible, certain nations have made significant attempts to study the prevalence of autism.

With the help of this study, we aim to systematically review the prevalence of autism in Asian countries and identify the gaps in our current knowledge. This research offers details on the epidemiology<sup>12</sup> of autism, which will enable us to personalize treatments for the condition to fill resource gaps, encourage early detection, and shape local public health policy.

## MATERIALS AND METHODS:

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) standards were followed in this study<sup>13</sup>. Online databases like PubMed and Google Scholar were used to extract the English-language papers published between 2012 and 2022.

We searched the databases using the following keywords 'autism' or 'autistic disorder' or 'autism spectr-

um disorders' or 'pervasive developmental disorders or 'Asperger syndrome', AND 'epidemiology' or 'prevalence', AND 'Asia' or 'Afghanistan' or 'Pakistan' or 'Bangladesh' or 'Bhutan' or 'India' or 'Nepal' or 'China' or 'Hong Kong' or 'Mongolia' or 'Japan' or 'Korea' or 'Taiwan' or 'Thailand' or 'Malaysia' or 'Indonesia' or 'Philippines' or 'Singapore' or 'Myanmar' or 'Vietnam' or 'Iran' or 'Iraq' or 'Saudi Arabia' or 'Israel' or 'Lebanon' or 'Kuwait' or 'Qatar' or 'Jordan' or 'UAE' or 'Yemen' or 'Syria'. To find other relevant papers, reference lists of the related studies were further looked through.

Based on the following inclusion criteria, studies were chosen. 1) Cohort or cross-sectional study designs published in English between 2010 and 2022. 2) Research studies that made use of reliable autism diagnosis tools 3) Research that gave prevalence information 4) research with human subjects 5) a population with a specific location.

The following were the exclusion requirements: 1) Use of redundant or repetitive data in research. 2) Lack of comprehensive textual material in research. 3) Investigation using secret or obscure detecting techniques. 4) Qualitative research and studies that are written as theses or dissertations.

To assure data integrity, all databases were initially thoroughly searched using specialized search techniques, and duplicate research were eliminated. A list of relevant papers was then created for further evaluation. Following previously set inclusion and exclusion criteria, the remaining papers' titles and abstracts underwent a rigorous assessment in the first phase. In the

second stage, research that were found to be unrelated were eliminated from consideration after the appropriateness of the studies had been determined by examining the full texts of relevant articles.

Following a thorough inspection, we classified the publications and pulled pertinent information from each study. The extracted data was then put into a tabular format for better representation. (i) first author, (ii) year of publication, (iii) country, (iv) setting (community and facility based, rural and urban) (v) screening strategy and diagnostic criteria (vi) age ranges, (vii) sample size, (viii) reported prevalence of ASD. All the research that was not included in the analysis were meticulously noted and documented.

## RESULTS:

17,200 studies in all were found in the initial literature search. 2,200 records were left for additional review after duplicate studies were eliminated and records were excluded for a variety of reasons. After carefully examining the titles and abstracts, 1,800 studies that didn't fit the eligibility requirements were dropped from consideration. The complete text retrieval was conducted on the remaining 400 studies. In the screening phase, 200 reports were evaluated for eligibility; 191 articles were disqualified from consideration after a thorough analysis of their whole texts since they did not match our needed criteria. In the end, nine publications were included in this systematic review. Between 2012 and 2022, studies in many nations, including those in the Asian region, were published. Table 1 displays the major findings and qualities of the included studies. Comparing studies on autism spect-

rum disorder (ASD) is extremely difficult due to the disparities in methodology, screening instruments, and diagnostic standards utilized between nations. The re-

ported prevalence rates may vary significantly as a result of these changes.

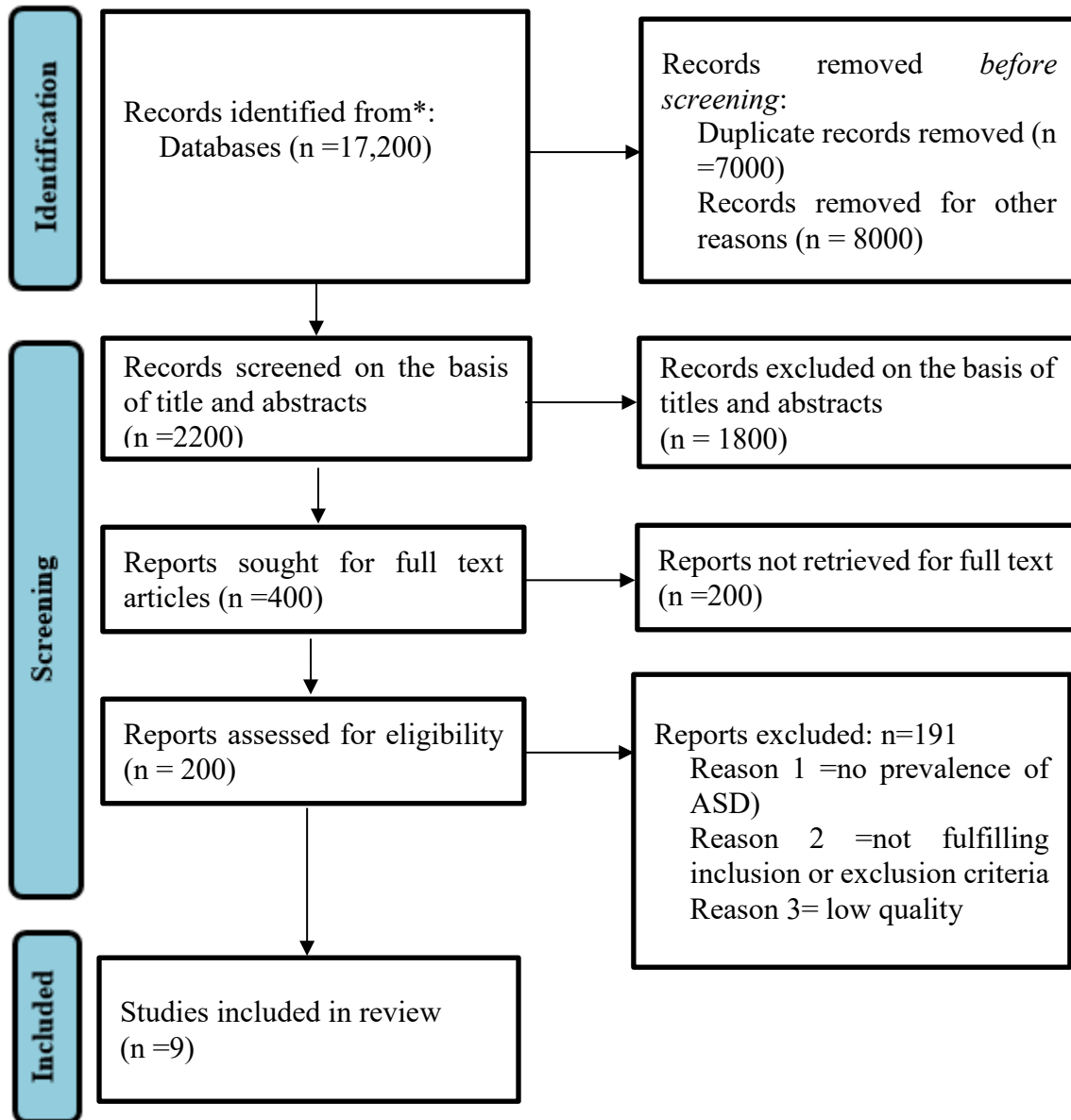


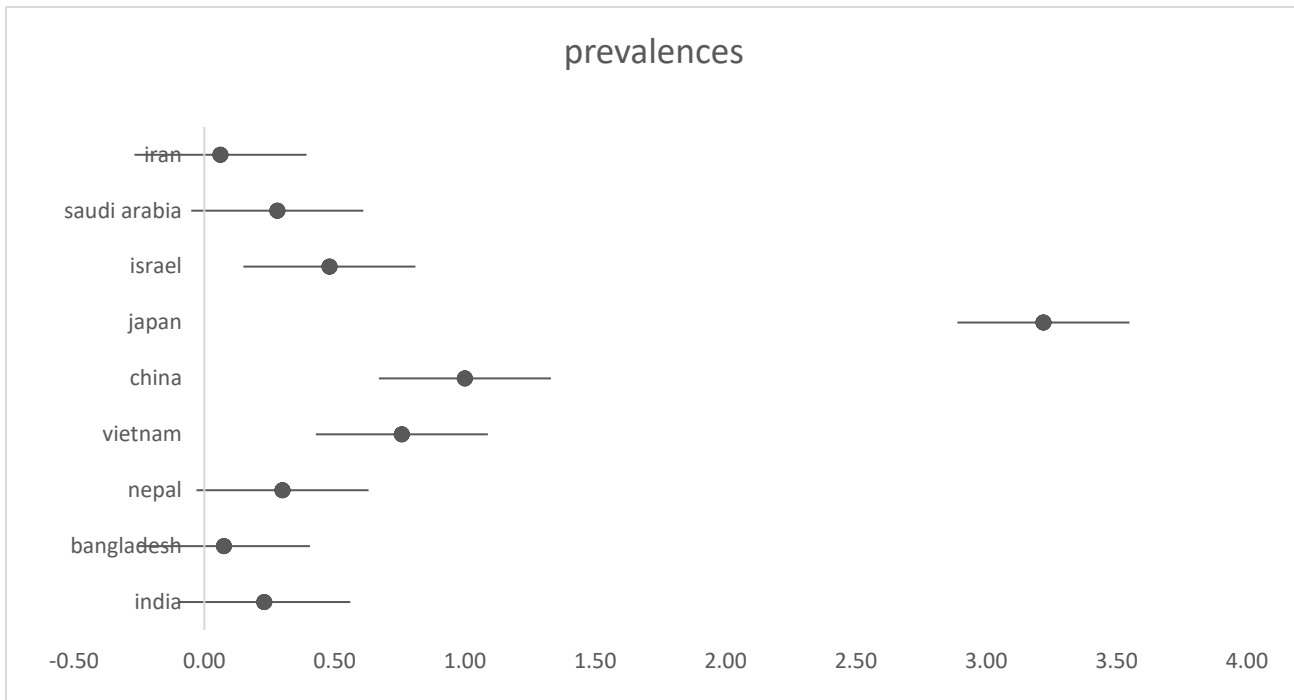
Figure 1: PRISMA flow chart of study selection

**Table 1: Characteristics of Included Studies**

AUTHOR	PUBLICATION YEAR	COUNTRY	SETTING	SAMPLE SIZE	SCREENING STRATEGY	AGE RANGES	PREVALENCE
Poovathinal et al (14)	2016	India	Community based	18,480	DSM-IV TR	1-30 year	0.23%
Akhter et al (15)	2018	Bangladesh	Rural	5286	M-CHAT	18-36 months	0.075%
Heys et al (16)	2018	Nepal	Rural	4098	AQ-10	9-13 year	0.3%
Thi Vui l et al (17)	2022	Vietnam	National population based	40,243	M-CHAT DSM-IV	18-30 months	0.758%
X Sun et al (18)	2019	China	Community based	45,036	CAST DSM-IV -TR DSM -5 ADOS ADI-R	6-10 year	1%
M Saito et al (19)	2020	Japan	total Population sample based	3954	ASSQ, ADHD-RS, DCDQ, SDQ, and PSI	5 years	3.22%
Davidovitch et al (20)	2013	Israel	mixed	42,3524	DSM-IV	1-12 year	0.48%
HJ Sabbagh et al (21)	2021	Saudi Arabia	Community based	1023	DSM -5	6-12 year	0.281%
SA Samadi et al (22)	2012	Iran	Mixed	1.32 million	SCQ ADI-R	5 years	0.062%

Table 1 shows nine studies from different parts of Asia. The screening and diagnostic criteria for autism utilized in these studies showed a large amount of variation. There aren't many studies on the prevalence of autism from South Asia. From 2012 to 2022 we only identified studies reporting the prevalence from India, Nepal and Bangladesh. Among South Asian countries highest prevalence was reported from Nepal in a study conducted by Heys et al <sup>16</sup> who estimated the prevalence at 0.3% with a sample size of 4098 and in a rural setting. Poovathinal et al <sup>14</sup> from India conducted a study with sample size of 18,840 in a semi urban

setting and found the prevalence at 0.23%. while from Bangladesh in a rural based setting with sample size of 5286 the prevalence was reported to be 0.075% <sup>15</sup>. In East Asia Studies from China <sup>18</sup>, Japan <sup>19</sup> revealed the prevalence to be 1% and 3.22%. From west of Asia studies from Israel<sup>20</sup>, Saudi Arabia<sup>21</sup> and Iran<sup>22</sup> estimated the prevalence to be 0.48%, 0.28% and 0.062% respectively. From south east Asia a national population-based study from Vietnam <sup>17</sup> reported the prevalence of autism was 0.758%. In all these studies the sample size ranged from 1023 -1.32 million. The age range varied between 1-30 years.



**Figure 2:** Forest Plot Showing Prevalence of Autism in Different Countries

## DISCUSSION:

In this systematic review we investigated the updated prevalence of nine countries in Asia. (South Asia: India, Nepal, Bangladesh; east Asia: China, Japan; west Asia: Saudi Arabia, Israel, Iran; south east Asia: Vietnam). The prevalence in these countries ranged from 0.062% in Iran to 3.22% in Japan. Japan was determined to have the highest prevalence. The prevalence of autism spectrum disorder (ASD) increased in Japan between 2009 and 2019; this may be the cause. The greater public understanding of the illness may be to blame for this rise across the country. However, disparities in the incidence at the regional level may be influenced by other factors, both those connected to the etiology of ASD and those unrelated, like variations in service accessibility<sup>23</sup>. A systematic review found that there were 26.6 cases of autism per 10,000 people in

Taiwan, Hong Kong, and Mainland China<sup>24</sup>. This number is far lower than those seen in Western nations, suggesting that these areas may be underdiagnosed. This Chinese study that was part of our analysis was carried out in Jilin City, where information from both mainstream and special schools was accessible. The results showed that the prevalence of autism in China is roughly equal to that of Western nations, at 1% (6). Bangladesh, a country in south Asia, showed a relatively low frequency of 0.075%; the study was done there. Preliminary results made up the first set of reported prevalence data from India. These conclusions were drawn from a midterm report that was delivered to the sponsoring organization in charge of the project<sup>25</sup>. According to Poovathinal et al.<sup>14</sup>, the most recent prevalence data from the south Indian state

of Kerala revealed a higher prevalence of autism compared to a prior study<sup>25</sup>. This suggests a considerable rise in the prevalence of autism in India, which is cause for alarm. The study from Nepal stands out among the papers we reviewed since it is one of the very few studies carried out in a rural, low-income context. According to Elsabbagh et al.'s 2012 study<sup>26</sup>, the estimated prevalence of autism in this study was 3 per 1000, which is lower than the reported rates in high-income countries (HICs), where it ranges from 10 to 20 per 1000. As reported by Kakooza-Mwesige et al. in 2014<sup>27</sup>, the prevalence in the Nepalese study was likewise lower than that of the only other low-income country (LIC) study carried out in Uganda, where the estimated rates among 1 to 10-year-olds were determined to be 12 to 13 per 1000. With a prevalence of 0.758%, or 1 in 132 children, autism spectrum disorders (ASDs) were found to be very common among Vietnamese children between the ages of 18 and 30 months. The study found that possessing heritable genetic characteristics, being a boy, and residing in urban regions were all related with an increased risk of ASD<sup>17</sup>. It's important to note that this epidemiological, nationally representative, and population-based study was the first of its sort in Vietnam.

In contrast to rates seen in more developed nations like the United States, where the rate was estimated to be 1.68% (6), ASD prevalence in Vietnam is lower. As one of the few nations that thoroughly screens youngsters for autism spectrum disorder (ASD), Iran stands out. This test is a vital component of a nationwide Iranian screening program that is closely related to enrollment in school. Families are required to take part

in the screening procedure as a result. However, only about 40% of five-year-olds nationwide have received an autism screening up to this age. Nevertheless, a disproportionately higher percentage of kids have been screened in big cities<sup>22</sup>. However, the prevalence rates found for Iran in this study (6.26 per 10,000) are far lower than those found for the USA in 2001<sup>28</sup> by Bertrand et al. According to that research, up to 40 out of every 10,000 children had an autistic disorder diagnosis. A prevalence rate of 0.48% for autism spectrum disorder (ASD) among children aged 1 to 12 years was discovered in our Israeli study for the year 2010<sup>20</sup>. These values are equivalent to the 0.62%<sup>26</sup> global average estimates Elsabbagh et al. reported in 2012. These results imply that Israel's prevalence of ASD is comparable to the average rates shown globally in those relevant studies. In a study we did in Saudi Arabia, we calculated the prevalence of autism spectrum disorder (ASD) to be 2.81 per 1,000 kids ages 6 to 12 who attended ASD-specific schools or rehabilitation centers in Makkah and Jeddah<sup>21</sup>. This incidence is in line with the results of other research conducted in Saudi Arabia and other Arab nations<sup>29</sup>. These results suggest that the frequency of ASD is similar across different Arab nations in the region.

Direct comparisons are difficult since the reported research from Asia that are included of our study display methodological discrepancies. Case definitions, screening tools, diagnostic standards, and age groups evaluated all differ from one another. Misclassification bias could be introduced by the sensitivity, specificity, and diagnostic methods of various tools. Comparisons of prevalence are also impacted by

differences in the desired population size. The findings' low generalizability stems from their focus on a small number of Asian nations. To assess prevalence in a way that is thorough and comparable, a standardized method is required.

## CONCLUSION:

The objective of our study was to thoroughly analyze the Asian prevalence studies of autism spectrum disorder (ASD). The evaluation identifies differences in screening methods and diagnostic standards used by the research, which makes comparisons difficult. In developing Asian countries, accurate and reliable diagnoses of autism spectrum disorder (ASD) are essential for future policymaking. Further study is required to collect data for improved management, early intervention, and resource allocation in these regions<sup>30</sup> due to the paucity of knowledge on the prevalence of ASD in various Asian nations.

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