Socioeconomic Disparity in the Prevalence of Autism Spectrum Disorder in Wisconsin

Matthew J. Maenner, BS; Carrie L. Arneson, MS; Maureen S. Durkin, PhD, DrPH

ABSTRACT

Background: The number of children receiving services for autism spectrum disorders in Wisconsin and nationally has steadily increased in recent years. The Wisconsin Surveillance of Autism and Other Developmental Disabilities System was developed to study the prevalence of and risk factors for autism spectrum disorders. This analysis of Wisconsin surveillance data examined whether autism prevalence is positively associated with socioeconomic status.

Methods: Surveillance methods developed by the Centers for Disease Control and Prevention were used to determine the number of 8-year-old children with an autism spectrum disorder in a 10-county area of southeastern Wisconsin in 2002. Socioeconomic status quintiles were created based on census block group indicators. Autism prevalence was computed for each socioeconomic status quintile of the population.

Results: Using educational attainment as an indicator of socioeconomic status, autism spectrum disorder prevalence increased from 2.6 per 1000 in the lowest to 6.8 per 1000 in the highest education quintile. The prevalence ratio for the highest to lowest education quintile was 2.6:1 (95% confidence interval: 1.6, 4.5). Using median household income as an indicator of socioeconomic status produced similar results.

Conclusion: Autism spectrum disorder prevalence is positively associated with socioeconomic status based on population-based surveillance in Wisconsin.

INTRODUCTION

The number of children receiving services for autism spectrum disorder (ASD) in Wisconsin and nationally has increased steadily since 1992, when autism was first introduced as a category under which children can receive special education services. This trend has created concern among the public, increased demands on school systems and health care professionals, and a pressing need for improved epidemiologic information. In 2003, the Wisconsin Surveillance of Autism and Other Developmental Disabilities System (WISADDS) joined the Centers for Disease Control and Prevention’s (CDC) Autism and Developmental Disabilities Monitoring (ADDM) Network. The ADDM Network is a program that funds states through cooperative agreements to develop surveillance systems to provide population-based, epidemiologic information on developmental disabilities, including ASD. These systems provide a basis for estimating prevalence, monitoring trends, and planning and evaluating services and policies. For 2002, the estimated prevalence of ASD across the ADDM Network among 8-year old children was 6.6 per 1000, with the prevalence in Wisconsin estimated at 5.2 per 1000.1

Other than gender, few risk factors for autism are known. The relationship between socioeconomic status (SES) and autism has been examined in a number of studies, but results have been inconsistent. Kanner’s original description of children with autism noted that many of the parents were highly educated and had prestigious occupations.2 In an epidemiologic study of children with infantile autism in Wisconsin, Treffert also described the parents as highly educated and having high occupational statuses.3 However, results of subsequent
cases were geocoded to their block group of residence and categorized to the corresponding SES quintiles. The prevalence of ASD was calculated within each SES quintile. Prevalence ratios with 95% confidence intervals (CI) were also computed.

**RESULTS**

Using the census indicator for educational attainment to define SES, autism prevalence increased in a dose-response fashion from 2.6 cases per 1000 in the lowest SES quintile to 6.8 cases per 1000 in the highest (Figure 1). Compared to the lowest SES, the prevalence ratios (95% CI) for each quintile, from second lowest to highest, were: 1.7 (CI: 1.0, 3.1), 1.9 (CI: 1.1, 3.2), 2.3 (CI: 1.4, 4.0), and 2.6 (CI: 1.6, 4.5). A similar pattern was observed using income to define SES quintiles, except that prevalence was somewhat higher in the second-to-highest versus the highest SES quintile (Table 2).

**DISCUSSION**

These results show a clear positive association between SES and the prevalence of ASD among 8-year-old children in Wisconsin. This pattern differs from prevalence of intellectual disabilities and developmental disabilities as a whole, which are generally found to be more common among economically disadvantaged children. Although the positive association with SES reported here is consistent with early observations of autism and some previous epidemiologic studies, the reason for this association and the potential role of SES differences in access to health and educational services for ASD cannot be determined from the data available.

An advantage of this study, in addition to its relatively large size and population-based design, is the use of active surveillance to ascertain all children meeting diagnostic criteria for ASD regardless of previous diagnoses or access to services specifically for ASD. A limitation of the data available is that they do not include information from educational records. Most other sites participating in the CDC’s ADDM Network were able to incorporate information from both health and educational records to evaluate diagnostic criteria for ASD. A question for further research is whether the SES gradient observed in the surveillance data from Wisconsin is present in sites that incorporate both health and educational information. Further research is also needed to examine whether the association reported in this paper is a result of differential access to health services, other sources of ascertainment bias, or SES differences in the risk of developing ASD.

**METHODS**

The Wisconsin site for the CDC ADDM Network identified all cases of ASD in a population of 8-year-old residents in 2002 in a 10-county area of southeastern Wisconsin, that contains approximately half of the population in the state. Cases were confirmed using the CDC’s autism surveillance methodology, which ascertains cases independent of clinician diagnoses. Detailed descriptions of this methodology and ASD case definitions have previously been published. The denominator includes 36,989 8-year-olds in the study area from the year 2000 census (Table 1). Educational attainment (% of adults with bachelor degrees) and income (median household income) at the census block group level were included as indicators of SES. Block groups were weighted by the distribution of 8-year-olds and categorized into quintiles. Cases were geocoded to their block group of residence and categorized to the corresponding SES quintiles. The prevalence of ASD was calculated within each SES quintile. Prevalence ratios with 95% confidence intervals (CI) were also computed.
Table 2. Prevalence of Autism Spectrum Disorder by 2 Census-Based Socioeconomic Status Indicators

<table>
<thead>
<tr>
<th>SES Quintile</th>
<th>Educational Attainment</th>
<th>Median Household Income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prevalence (per 1000)</td>
<td>Prevalence Ratio (95% CI)</td>
</tr>
<tr>
<td>Low</td>
<td>2.6</td>
<td>1.0 (reference)</td>
</tr>
<tr>
<td>2</td>
<td>4.5</td>
<td>1.7 (1.0, 3.1)</td>
</tr>
<tr>
<td>3</td>
<td>4.7</td>
<td>1.9 (1.1, 3.2)</td>
</tr>
<tr>
<td>4</td>
<td>6.0</td>
<td>2.3 (1.4, 4.0)</td>
</tr>
<tr>
<td>High</td>
<td>6.8</td>
<td>2.6 (1.6, 4.5)</td>
</tr>
</tbody>
</table>

Abbreviations: SES, socioeconomic status; CI, confidence interval.

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REFERENCES
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