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Prevalence of Children Aged 3–17 Years With Developmental Disabilities, by Urbanicity: United States, 2015–2018

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Abstract

Objective—This report examines the prevalence of developmental disabilities among children in both rural and urban areas as well as service utilization among children with developmental issues in both areas.

Methods—Data from the 2015–2018 National Health Interview Survey (NHIS) were used to examine the prevalence of 10 parent- or guardian-reported developmental disability diagnoses (attention-deficit/hyperactivity disorder [ADHD], autism spectrum disorder, blindness, cerebral palsy, moderate to profound hearing loss, learning disability, intellectual disability, seizures, stuttering or stammering, and other developmental delays) and service utilization for their child. Prevalence estimates are presented by urbanicity of residence (urban or rural). Bivariate logistic regressions were used to test for differences by urbanicity.

Results—Children living in rural areas were more likely to be diagnosed with a developmental disability than children living in urban areas (19.8% compared with 17.4%). Specifically, children living in rural areas were more likely than those in urban areas to be diagnosed with ADHD (11.4% compared with 9.2%) and cerebral palsy (0.5% compared with 0.2%). However, among children with a developmental disability, children living in rural areas were significantly less likely to have seen a mental health professional, therapist, or had a well-child checkup visit in the past year, compared with children living in urban areas. Children with a developmental disability living in rural areas were also significantly less likely to receive Special Educational or Early Intervention Services compared with those living in urban areas.

Conclusion—Findings from this study highlight differences in the prevalence of developmental disabilities and use of services related to developmental disabilities by rural and urban residence.

Keywords: attention-deficit/hyperactivity disorder • autism spectrum disorder • urban • rural • National Health Interview Survey

Introduction

Developmental disabilities are a group of conditions, typically lifelong, resulting from impairments in physical, learning, language, or behavioral areas. In recent years, the number of children with a developmental disability has increased (1). Children with developmental disabilities require more health care and educational services than their typically developing peers (2,3) and use of specialty and mental health services are often needed (4). They also are more likely to have an unmet health need, with less access to a medical home, community services, and adequate health insurance (5). In a similar way, it is known that children living in rural areas have greater unmet medical needs when compared with children living in urban areas (6). For this reason, it is possible that children with developmental disabilities in rural areas may be some of the most vulnerable when it comes to receiving a variety of health care services. The primary objective of this report is to use timely, nationally representative data to describe geographic health disparities for selected developmental disability conditions and use of related services in the United States.



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Methods

Data source

Data from the 2015–2018 National Health Interview Survey (NHIS) were used for this analysis. NHIS is a nationally representative survey of the civilian noninstitutionalized population. Within each household, families are identified, and selected demographic and broad health measures are collected for each family member. In addition, a parent or guardian answers more detailed health questions on a randomly selected child. Sample children aged 3–17 years were included in this analysis ($n = 33,775$). The final response rate for the sample child questionnaire ranged from 59.2%–63.4%, between 2015–2018 (7).

Measures

Developmental disabilities examined in this report were attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorder, blindness, cerebral palsy, moderate to profound hearing loss, learning disability, intellectual disability, seizures in the past 12 months, stuttering or stammering in the past 12 months, or any other developmental delay. Children whose parents answered that their child had one or more of these conditions were classified as having any “developmental disability.”

Urbanicity of residence (available on a restricted NHIS dataset) was categorized as urban or rural—urban was defined as areas consisting of urbanized areas of 50,000 or more people and urban clusters of 2,500–49,999 persons; rural was defined as all other areas (8).

One of the goals of this analysis was to examine health care and educational service use among children with developmental disabilities by urbanicity. Utilization of the following five health and educational services were explored: whether the child saw 1) a mental health professional (psychiatrist, psychologist, psychiatric nurse, or clinical social worker) in the past 12 months, 2) a specialist (medical doctor who specializes in a particular medical disease or problem) in the past 12 months, 3) a therapist (physical therapist, speech therapist, respiratory therapist,

audiologist, or occupational therapist) in the past 12 months, 4) had a well-child checkup in the past 12 months, and 5) currently receives Special Education or Early Intervention Services (EIS). A count of specialty care services was created from whether the child saw a mental health professional, specialist, or therapist in the past 12 months.

Statistical analysis

Weighted percentages of children aged 3–17 years who had each of the selected developmental disabilities and any developmental disability were calculated for the overall time period 2015–2018 and stratified by urbanicity of residence. In addition, weighted percentages of health care and educational service use among children aged 3–17 years with any developmental disability were calculated and stratified by urbanicity of residence. Differences between percentages of developmental disabilities by urbanicity and health care and educational service utilization were tested using bivariate logistic regressions. All analyses incorporated clustering, stratification, and weights to reflect the complex sampling design and allow for the calculation of nationally representative estimates using SUDAAN version 11.0. All estimates reported meet NCHS standards of reliability as

specified in, “National Center for Health Statistics Data Presentation Standards for Proportions” (9).

Results

Prevalence

During 2015–2018, the prevalence of any developmental disability among children aged 3–17 years was 17.8% (95% confidence interval ([CI]): 17.3–18.4). During this time period, children living in rural areas (19.8% [95% CI: 18.5–21.2]) were more likely to be diagnosed with a developmental disability than children living in urban areas (17.4% [95% CI: 16.8–18.0], $p < 0.01$) (Figure 1).

Of the selected developmental disabilities examined, children living in rural areas (compared to urban) were more likely to be diagnosed with ADHD (11.4% [95% CI: 10.4–12.4] compared with 9.2% [95% CI: 8.8–9.7], $p < 0.001$) and cerebral palsy (0.5% [95% CI: 0.3–0.9] compared with 0.2% [95% CI: 0.2–0.3], $p < 0.05$) (Table).

Health care and educational service utilization

Among children aged 3–17 years with developmental disabilities, those living in rural areas were less likely to

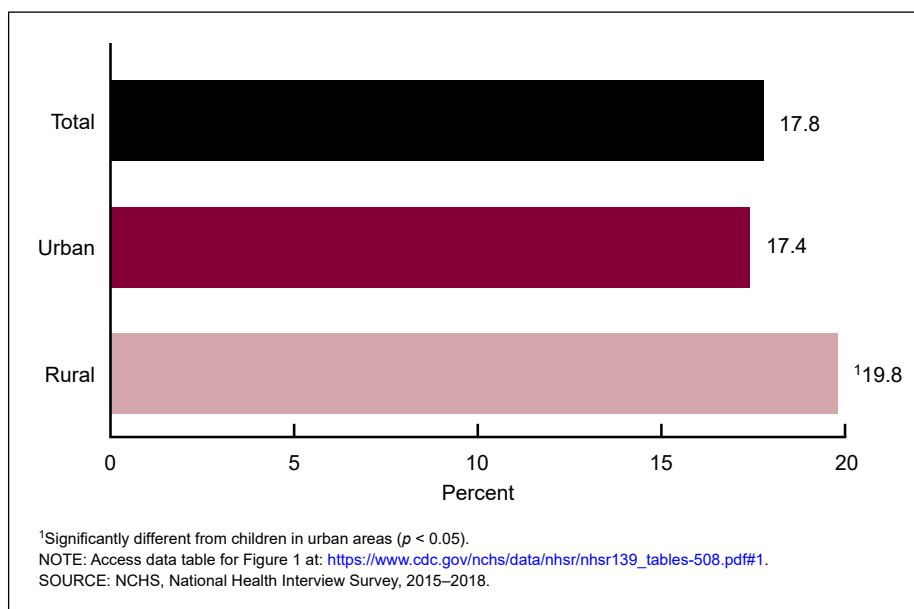


Figure 1. Prevalence of children aged 3–17 years ever diagnosed with a developmental disability, by urbanicity: United States, 2015–2018

Table. Prevalence of any developmental disability and selected developmental disabilities in children aged 3–17 years, by urbanicity: United States, 2015–2018

Condition	n (unweighted)	Total		Urban		Rural	
		Estimate (95% CI)	SE	Estimate (95% CI)	SE	Estimate (95% CI)	SE
Any developmental disability	6,067	17.8 (17.3–18.4)	0.28	17.4 (16.8–18.0)	0.30	†19.8 (18.5–21.2)	0.66
ADHD	3,360	9.6 (9.2–10.0)	0.21	9.2 (8.8–9.7)	0.22	†11.4 (10.4–12.4)	0.51
Autism spectrum disorder	856	2.5 (2.2–2.7)	0.12	2.5 (2.2–2.7)	0.14	2.5 (2.0–3.1)	0.26
Blind or unable to see at all	50	0.2 (0.1–0.2)	0.03	0.2 (0.1–0.2)	0.03	0.1 (0.0–0.3)	0.05
Cerebral palsy	92	0.3 (0.2–0.4)	0.04	0.2 (0.2–0.3)	0.04	†0.5 (0.3–0.9)	0.14
Moderate to profound hearing loss	204	0.6 (0.5–0.7)	0.06	0.6 (0.5–0.8)	0.06	0.6 (0.4–0.8)	0.11
Learning disability	2,665	7.7 (7.3–8.1)	0.21	7.6 (7.2–8.1)	0.23	8.1 (7.3–9.1)	0.46
Intellectual disability	422	1.2 (1.1–1.4)	0.08	1.2 (1.0–1.4)	0.09	1.2 (0.9–1.6)	0.18
Seizures, past 12 months	265	0.8 (0.7–0.9)	0.06	0.8 (0.6–0.9)	0.07	0.9 (0.6–1.3)	0.17
Stuttered or stammered, past 12 months	655	2.1 (1.9–2.3)	0.10	2.1 (1.9–2.4)	0.12	1.9 (1.5–2.4)	0.22
Other developmental delay	1,361	4.1 (3.8–4.3)	0.14	4.0 (3.7–4.3)	0.15	4.5 (3.9–5.2)	0.33

† Significantly different from children in urban areas ($p < 0.05$).

NOTES: CI is confidence interval. SE is standard error. ADHD is attention-deficit/hyperactivity disorder.

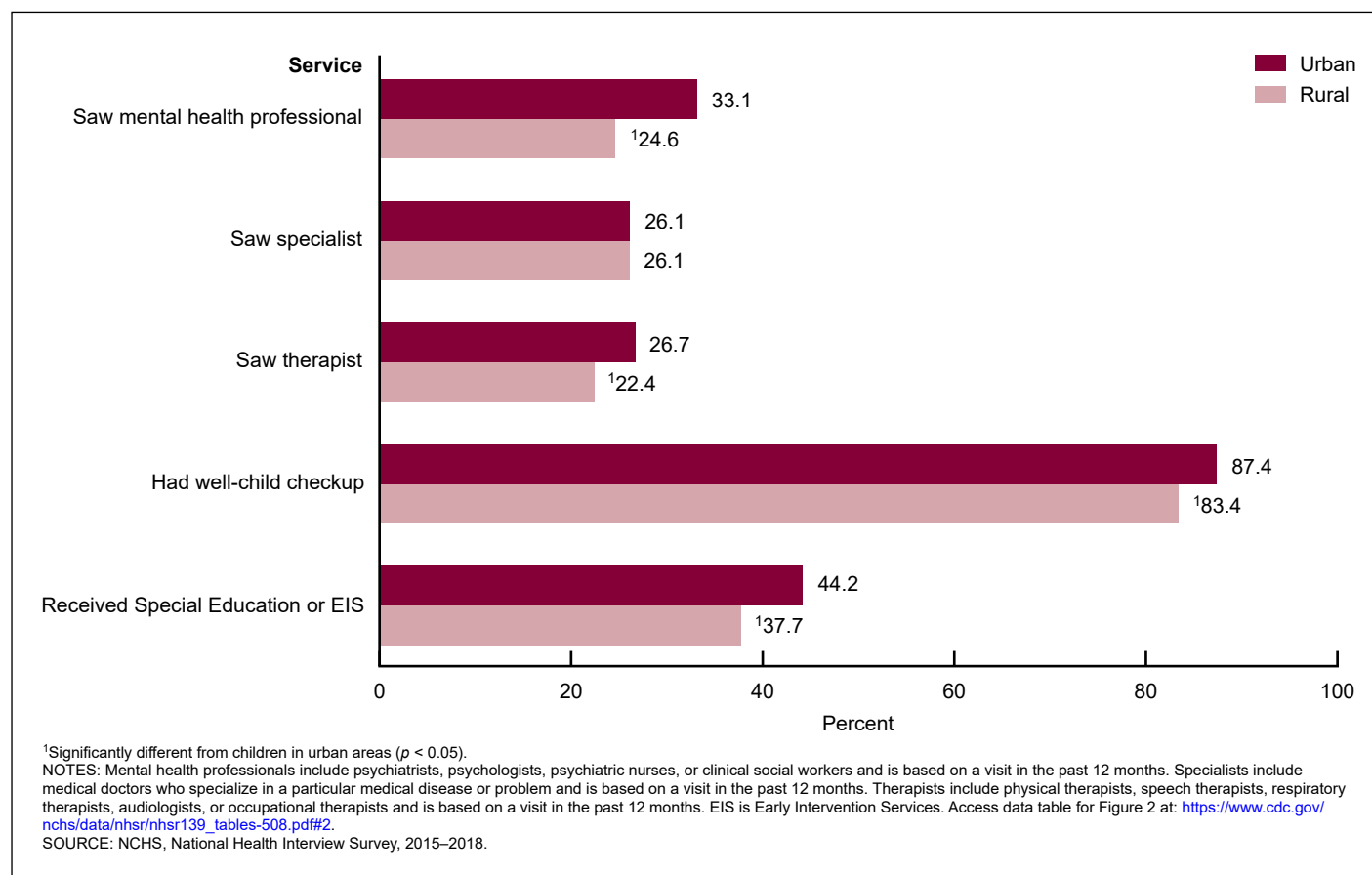
SOURCE: NCHS, National Health Interview Survey, 2015–2018.

have seen a mental health professional (24.6% [95% CI: 21.5–27.8] compared with 33.1% [95% CI: 31.3–34.9], $p < 0.05$); therapist (22.4% [95% CI: 19.2–25.8] compared with 26.7% [95% CI: 25.0–28.4], $p < 0.05$); or have had a well-child checkup (83.4% [95% CI: 80.6–86.0] compared with 87.4% [95% CI: 86.1–88.6], $p < 0.05$) in the past 12

months when compared with children living in urban areas (Figure 2). Children in rural areas were also less likely to be currently receiving Special Education or EIS (37.7% [95% CI: 34.1–41.4] compared with 44.2% [95% CI: 42.2–46.1], $p < 0.05$).

A further examination of specialty care revealed that nearly one-half of

children with developmental disabilities living in rural areas (49.4% [95% CI: 45.7–53.0]) did not use any of the three specialty providers (mental health professional, specialist, or therapist) in the past 12 months. This was significantly more than children with developmental disabilities living in urban areas (41.8% [95% CI: 40.0–43.7], $p < 0.05$) (Figure 3).

**Figure 2. Health care and educational service utilization among children aged 3–17 years with any developmental disability, by urbanicity: United States, 2015–2018**

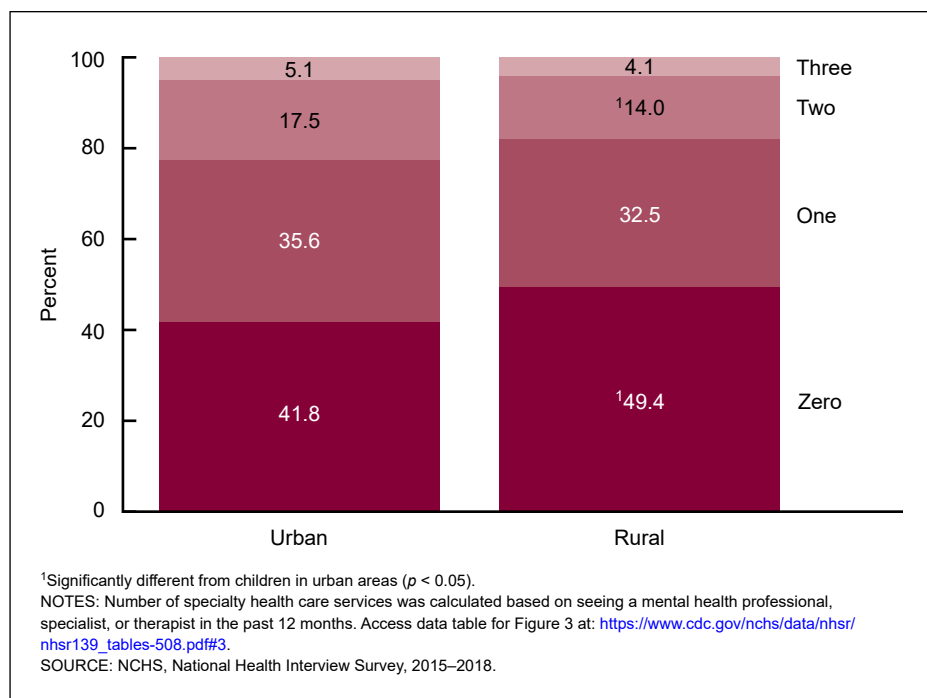


Figure 3. Percent distribution for number of specialty health care services utilized in the past 12 months among children aged 3–17 years with any developmental disability, by urbanicity: United States, 2015–2018

Discussion

Findings from this study highlight differences in the prevalence of developmental disabilities among children aged 3–17 years by rural and urban residence, as well as the use of health care and educational services in the past 12 months among the population of children with developmental disabilities. Overall, developmental disabilities were more prevalent in children living in rural areas than urban areas. This difference appears to be largely attributable to the higher prevalence of ADHD seen among children living in rural areas, although children living in rural areas were also more likely to be diagnosed with cerebral palsy.

Differences were also seen in the receipt of some, but not all services, among children who were diagnosed with a developmental disability by urbanicity. More specifically, children with a developmental disability living in rural areas were less likely to have seen a mental health professional or therapist in the past year. They were also less likely to receive Special Education or EIS or have received a well-child checkup in the past year.

Receipt of a well-child checkup represents one element of the medical home (10) and may provide a setting for clinicians to address health issues and provide necessary referrals to specialists. Given the high co-occurrence of mental health disorders among children with developmental disabilities (11), the need for referrals to mental health professionals and specialty care therapists may be increased (12), and a lack thereof may contribute to the unmet medical needs previously reported in this population (13). Additional research exploring questions of unmet need and the accessibility of services and interventions (14,15) may help to better understand the disparities seen between children with developmental disabilities living in urban and rural areas.

Previous research has found that children living in rural areas are more likely to experience family adversity, potentially in the form of poor parental mental health and financial difficulties (16). This, in combination with a lack of individual and community level resources for treatment, may lead to higher rates of persistent behavioral problems (17). Consistent with this, these analyses found a higher prevalence of developmental disabilities, particularly ADHD, among

rural children. Furthermore, children living in rural areas often lack physical and social resources (6), fueled by accessibility problems, such as reliable transportation, that may play a key role in care coordination and accessing health care services (18,19).

Limitations

Diagnoses for all conditions were parent-reported and were not validated either through clinical evaluation or educational records. Parental report is susceptible to recall biases, particularly among parents of older children. Despite this, NHIS has several notable strengths in both its large sample size and high response rate for a national survey.

Conclusions

There was a higher prevalence of children with developmental disabilities in rural areas compared with urban areas. Furthermore, among children with developmental disabilities, those living in rural areas were less likely to use a range of health care and educational services compared with their urban peers. Additional research may elucidate mechanisms that may contribute to alterations in developmental differences and use of services by urban or rural status, including lack of resources to pay for health care and educational services and access to trained specialty providers that may vary by geographic location.

References

1. Zablotsky B, Black LI, Maenner MJ, Schieve LA, Danielson ML, Bitsko RH, et al. Prevalence and trends of developmental disabilities among children in the United States: 2009–2017. *Pediatrics* 144(4):1–11. 2019.
2. Arim RG, Miller AR, Guèvremont A, Lach LM, Brehaut JC, Kohen DE. Children with neurodevelopmental disorders and disabilities: A population-based study of healthcare service utilization using administrative data. *Dev Med Child Neurol* 59(12):1284–90. 2017.
3. Boulet SL, Boyle CA, Schieve LA. Health care use and health and functional impact of developmental disabilities among U.S. children, 1997–2005. *Arch Pediatr Adolesc Med* 163(1):19–26. 2009.

4. Bitsko RH, Holbrook JR, Robinson LR, Kaminski JW, Ghandour R, Smith C, et al. Health care, family, and community factors associated with mental, behavioral, and developmental disorders in early childhood—United States, 2011–2012. *MMWR Morb Mortal Wkly Rep* 65(9):221–6. 2016.
5. Cheak-Zamora NC, Thullen M. Disparities in quality and access to care for children with developmental disabilities and multiple health conditions. *Matern Child Health J* 21(1):36–44. 2017.
6. Meit M, Knudson A, Gilbert T, Yu AT, Tanenbaum E, Ormson E, et al. The 2014 update of the rural-urban chartbook. Bethesda, MD: Rural Health Reform Policy Research Center. 2014. Available from: <http://worh.org/sites/default/files/2014-rural-urban-chartbook.pdf>.
7. National Center for Health Statistics. 2018 National Health Interview Survey (NHIS) public use data release: Survey description. 2019. Available from: https://ftp.cdc.gov/pub/Health_Statistics/NCHS/Dataset_Documentation/NHIS/2018/srvydesc.pdf.
8. United States Census Bureau. 2010 Census urban and rural classification and urban area criteria. Available from: <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2010-urban-rural.html>.
9. Parker JD, Talih M, Malec DJ, Beresovsky V, Carroll M, Gonzalez JF Jr, et al. National Center for Health Statistics data presentation standards for proportions. National Center for Health Statistics. *Vital Health Stat* 2(175). 2017.
10. American Academy of Pediatrics. The medical home: Medical home initiatives for children with special needs advisory committee. *Pediatrics* 110(1):184–6. 2002.
11. Munir KM. The co-occurrence of mental disorders in children and adolescents with intellectual disability/intellectual developmental disorder. *Curr Opin Psychiatry* 29(2):95–102. 2016.
12. Fox RA, Keller KM, Grede PL, Bartosz AM. A mental health clinic for toddlers with developmental delays and behavior problems. *Res Dev Disabil* 28(2):119–29. 2007.
13. Brown NM, Green JC, Desai MM, Weitzman CC, Rosenthal MS. Need and unmet need for care coordination among children with mental health conditions. *Pediatrics* 133(3):e530–7. 2014.
14. Vohra R, Madhavan S, Sambamoorthi U, St Peter C. Access to services, quality of care, and family impact for children with autism, other developmental disabilities, and other mental health conditions. *Autism* 18(7):815–26. 2014.
15. Lindly OJ, Chavez AE, Zuckerman KE. Unmet health services needs among U.S. children with developmental disabilities: Associations with family impact and child functioning. *J Dev Behav Pediatr* 37(9):712–23. 2016.
16. Robinson LR, Holbrook JR, Bitsko RH, Hartwig SA, Kaminski JW, Ghandour RM, et al. Differences in health care, family, and community factors associated with mental, behavioral, and developmental disorders among children aged 2–8 years in rural and urban areas—United States, 2011–2012. *MMWR Morb Mortal Wkly Rep* 66(8):1–11. 2017.
17. Aber JL, Jones SM, Cohen J. The impact of poverty on the mental health and development of very young children. New York, NY: The Guilford Press. 2000.
18. Smalley KB, Yancey CT, Warren JC, Naufel K, Ryan R, Pugh JL. Rural mental health and psychological treatment: A review for practitioners. *J Clin Psychol* 66(5):479–89. 2010.
19. Gamm LD, Hutchison LL, Dabney BJ, Dorsey AM. Rural healthy people 2010: A companion document to healthy people 2010. College Station, TX: The Texas A&M University System Health Science Center, School of Rural Public Health, Southwest Rural Health Research Center. 2003. Available from: <https://srhrc.tamhsc.edu/docs/rhp-2010-volume2.pdf>.

Technical Notes

Definition of terms

Attention deficit/hyperactivity disorder (ADHD)—Based on a positive response to the survey question, “Has a doctor or health professional ever told you that [sample child] had Attention Deficit Hyperactivity Disorder (ADHD) or Attention Deficit Disorder (ADD)?”

Autism spectrum disorder—Based on a positive response to the survey question, “Has a doctor or health professional ever told you that [sample child] had autism, Asperger’s disorder, pervasive developmental disorder, or autism spectrum disorder?”

Blind/unable to see at all—Based on a positive response to the survey question, “Is [sample child] blind or unable to see at all?”

Cerebral palsy—Based on a positive response to the survey question, “Has a doctor or health professional ever told you that [sample child] had cerebral palsy?”

Developmental disability—A composite measure based on the responses to a series of survey questions that asked whether the parent had ever been told by a doctor or health professional that the child had attention-deficit/hyperactivity disorder, autism spectrum disorder, blindness, cerebral palsy, moderate to profound hearing loss, learning disability, intellectual disability, seizures, stuttering or stammering, or other developmental delay.

Intellectual disability—Based on a positive response to the survey question, “Has a doctor or health professional ever told you that [sample child] had an intellectual disability, also known as mental retardation?”

Learning disability—Based on a positive response to the survey question, “Has a representative from a school or a health professional ever told you that [sample child] had a learning disability?”

Moderate to profound hearing loss—Respondents were asked to describe the child’s hearing without the use of hearing aids or other listening devices. Based on the survey question, “Which statement best describes [sample child]’s hearing: Excellent, good, a little trouble hearing, moderate trouble, a lot of trouble, or

is [sample child] deaf?” Responses of “moderate trouble,” “a lot of trouble,” and “deaf” were considered to have moderate to profound hearing loss.

Seizures—Based on a positive response to the survey question, “During the past 12 months, has [sample child] had seizures?”

Stuttering or stammering—Based on a positive response to the survey question, “During the past 12 months, has [sample child] had stuttering or stammering?”

Other developmental delay—Based on a positive response to the survey question, “Has a doctor or health professional ever told you that [sample child] had any other developmental delay?”

Receipt of Special Education or Early Intervention Services—Based on a positive response for the sample child to the survey question, “Do any of these family members, [list of children’s names], receive Special Educational or Early Intervention Services?”

Receipt of specialty care—A composite measure based on a positive response to either use of a mental health professional, specialist, or therapist.

Urbanicity of residence—Based on the location of residence. Urban was defined as areas consisting of urbanized areas of 50,000 or more people and urban clusters of 2,500–49,999 persons; rural was defined as all other areas; see <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2010-urban-rural.html>.

Use of mental health professional—Based on a positive response for the sample child to the survey question, “During the past 12 months, have you seen or talked to any of the following health care providers about [sample child]’s health? A mental health professional such as a psychiatrist, psychologist, psychiatric nurse, or clinical social worker.”

Use of specialist—Based on a positive response for the sample child to the survey question, “During the past 12 months, have you seen or talked to any of the following health care providers about [sample child]’s health? A medical doctor who specializes in a particular medical disease or problem (other than obstetrician/gynecologist, psychiatrist, or ophthalmologist).”

Use of therapist—Based on a positive response for the sample child to the survey question, “During the past 12 months, have you seen or talked to any of the following health care providers about [sample child]’s health? A physical therapist, speech therapist, respiratory therapist, audiologist, or occupational therapist?”

Well-child checkup—Based on a positive response for the sample child to the survey question, “During the past 12 months, did [sample child] receive a well-child checkup—that is, a general checkup when he/she was not sick or injured?”

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