

CHILDHOOD ALLERGIES IN AMERICA

Severe Allergic Reactions Causing More
Emergency Room Visits for U.S. Children

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BLUE CROSS BLUE SHIELD, THE HEALTH OF AMERICA REPORT

EXECUTIVE SUMMARY

In this report, the Blue Cross Blue Shield (BCBS) Association, in collaboration with Blue Health Intelligence, examines American children diagnosed with different kinds of allergies and allergic reactions.^{1,2} Nearly 1.7 million, or 18 percent, of children suffer from one or more allergy. This report specifically studies anaphylaxis (a severe allergic reaction characterized by a sudden drop in blood pressure and difficulty breathing), dermatitis (inflamed skin or skin rash) and rhinitis (runny, stuffy nose).^{3,4} The study analyzes how many young BCBS members were diagnosed with any type of allergy and the number of emergency room visits those members made from 2010 to 2016. The scope of the research includes approximately 9.6 million commercially insured American children age 18 and under per year.

Specific allergic reactions studied in this report:

Anaphylaxis



Dermatitis



Rhinitis

ALLERGIES
now affect

18%

of children in the U.S.

1. Allergies can range from a simple seasonal nuisance to a life-threatening condition. Allergies can cause a range of reactions and symptoms and are not mutually exclusive. For more information, see: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4427208/>
2. In recent years, public health campaigns have focused on ensuring children have access to epinephrine, which can be a life-saving drug for those who suffer from anaphylaxis. Injecting epinephrine during an allergic reaction can immediately reverse anaphylaxis effects. Additional efforts focus on placing “public” epinephrine in schools, parks and other public places, but much work remains to ensure that this medication is available in emergency situations.
3. While some reports have noted that allergies and anaphylaxis are increasing, the number of children suffering from various allergies across a broad population has not been well documented.
4. For more information, see: [http://www.annallergy.org/article/S1081-1206\(15\)00315-4/fulltext](http://www.annallergy.org/article/S1081-1206(15)00315-4/fulltext)

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Specific Findings

- Children diagnosed as “at risk” for an anaphylaxis episode increased 104 percent during the study period, rising from 23 per 10,000 children in 2010 to 47 per 10,000 children in 2016. The corresponding rate of emergency room visits due to anaphylaxis reactions increased by 150 percent, from 1.4 visits per 10,000 children to 3.5 visits per 10,000 children. While these children represent a small portion of all commercially insured children, diagnosis rates continue to increase.
- Allergic reactions to specific foods are responsible for nearly half (47 percent) of anaphylaxis episodes. The most common foods that trigger allergic reactions are peanuts (22 percent), tree nuts and seeds (15 percent), and milk and eggs (6 percent). However, 53 percent of these allergic reactions are due to unknown foods or other unspecified causes (such as insect bites), which highlights the need for parents of at-risk children to be prepared for a reaction at any time.
- Approximately 18 percent of children suffered from any type of allergy in 2016, increasing slightly from 17 percent in 2010. Two of the most common allergies found in these children are rhinitis (affecting 9 percent of children) and dermatitis (affecting 5 percent of children).⁵ Rhinitis shows yearly peaks that correspond with plant and dust allergy seasons in the spring and fall, while dermatitis remains relatively stable over the study period.
- Diagnosis of any type of allergy decreases as all children get older, as 25 percent of all children ages 0 to 2 are diagnosed with one or more allergy compared to only 14 percent of children ages 14 through 18 in 2016. Allergy rates drop considerably more for boys as they grow older than for girls. Boys under the age of 3 have the highest rate of diagnosis of any age group at 26 percent, while boys ages 14 through 18 have the lowest rates of allergy diagnosis of any age group at 13 percent.

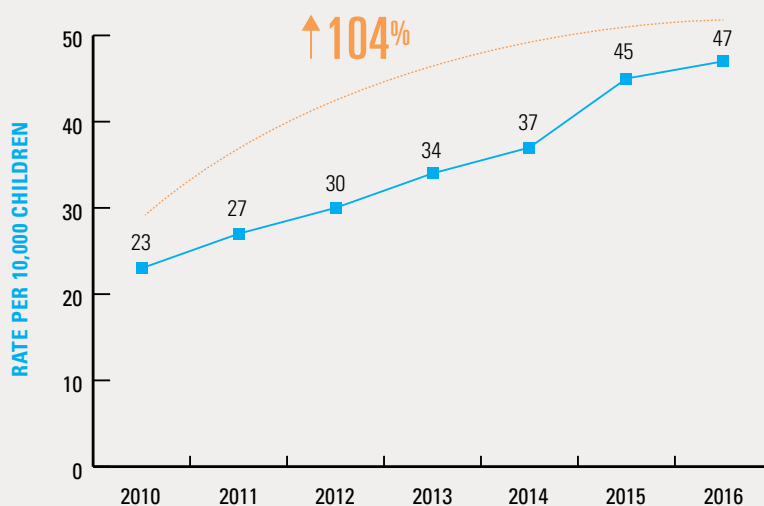
5. The remaining 4 percent that comprise other types of allergies were not included in the scope of this report.

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Anaphylaxis: Diagnosis and Emergency Room Visits

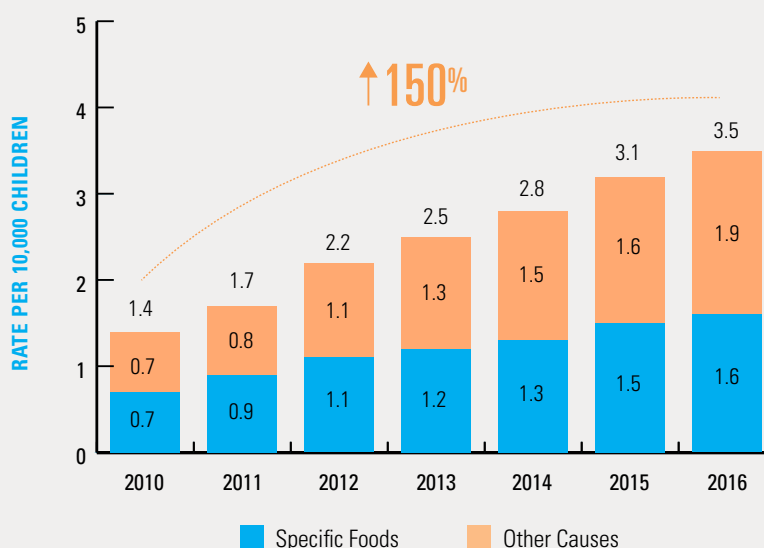
Children diagnosed as “at risk” for an anaphylaxis episode increased 104 percent in the past seven years, a cause for concern for this potentially life-threatening condition. Anaphylaxis diagnoses rose from 23 per 10,000 children in 2010 to 47 per 10,000 children in 2016 (see Exhibit 1). Forty-seven percent of childhood anaphylaxis diagnoses are due to exposure to specific foods, while the remaining 53 percent are due to unidentified sources.

EXHIBIT 1:
RATE OF DIAGNOSIS
OF ALL ANAPHYLAXIS
IN CHILDREN BY YEAR,
PER 10,000 CHILDREN



While anaphylaxis is relatively rare, children can be especially vulnerable to serious allergic reactions since an allergy is not necessarily known until a reaction occurs. Children visited the emergency room (ER) with anaphylaxis in increasing rates, from 1.4 visits per 10,000 children in 2010 to 3.5 visits per 10,000 children in 2016, a growth of 150 percent (see Exhibit 2).

EXHIBIT 2:
RATE OF EMERGENCY
ROOM VISITS DUE
TO ANAPHYLAXIS IN
CHILDREN BY YEAR,
PER 10,000 CHILDREN



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The steep increase in ER visits among children calls for continued awareness around the dangers of severe allergic reactions. Gaining knowledge about a child's allergic symptoms and specifics around the anaphylaxis health condition allows parents to take steps to keep their children safe from harm—and out of the emergency room. In 2016, the average ER visit for anaphylaxis costs \$1,419, with an average patient out-of-pocket cost of \$373.

Positive health outcomes for children with anaphylaxis can be achieved by ensuring necessary medications are on hand during a life-threatening situation. Once children are identified as at risk for having serious anaphylactic reactions, a physician can prescribe medicine to counteract the effects while traveling to the emergency room.

Epinephrine auto-injector medications alleviate severe allergy symptoms and are available as both name-brand and generic drugs. The steep increase in price of the most commonly prescribed Mylan EpiPen® over the past several years (from \$129 in 2010, to \$645 in 2016, for a pack of two auto-injectors) motivated healthcare leaders and parents alike to ensure that children have access to this life-saving medication. Several generic drugs now offer users lower prescription costs and affordable options to keep medication available in case of emergency.⁶ The average price paid for EpiPen auto-injectors declined to \$493 and the generic version of the Adrenaclick® auto-injector has also seen its price fall to \$234. It is also gaining market share, rising to 21 percent of the epinephrine auto-injector market in 2017. Continued usage and support of generic drug alternatives can help keep costs down while providing children with effective medications during unexpected allergic incidents.



Gaining knowledge on a child's allergic symptoms and specifics around the anaphylaxis health condition allows parents to take steps to keep their children safe from harm—and out of the emergency room.

6. In addition, discount coupons are available from manufacturers which can further decrease prices.

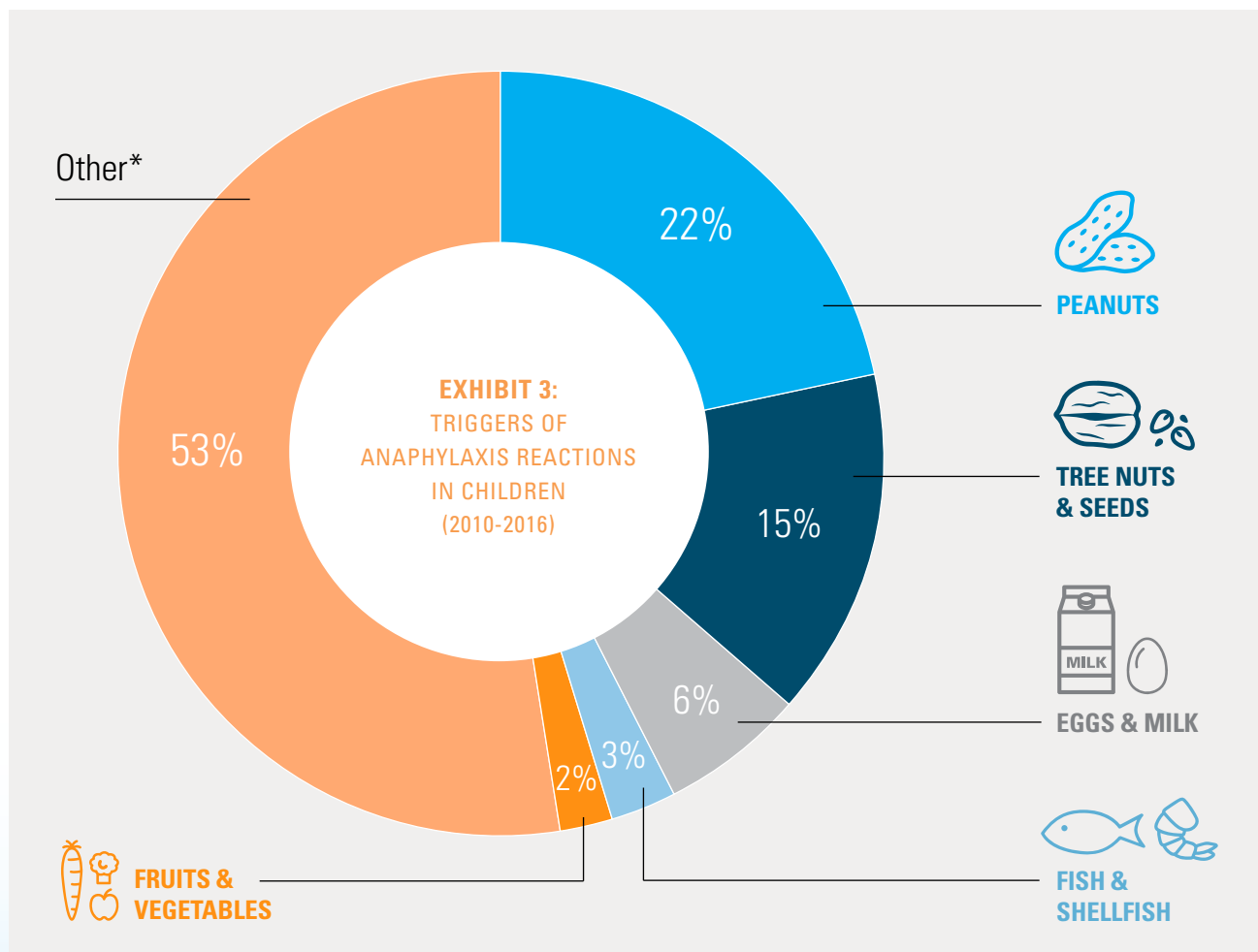
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Triggers of Anaphylaxis Reactions in Children

When examining the triggers for severe anaphylaxis reactions in children, reactions to various foods are responsible for 47 percent of allergic incidents. Identifying both common foods associated with allergic reactions and those children most at risk are important steps to help prevent dangerous reactions.

An in-depth breakout of foods commonly associated with allergic reactions reveals that peanuts (22 percent), tree nuts and seeds (15 percent) and milk and eggs (6 percent) make up the majority of foods responsible for anaphylaxis. Fish and shellfish (3 percent) and fruits and vegetables (2 percent) cause smaller numbers of reactions.

However, 53 percent of all anaphylaxis reactions are due to unspecified causes (see Exhibit 3). Children in this category may have consumed one or more of the common foods associated with anaphylaxis, or had a reaction initiated by another cause. Other reasons for anaphylaxis reactions can include bee stings, insect bites and various unidentified sources.



*Unknown foods, insect bites/stings, not specified, etc.

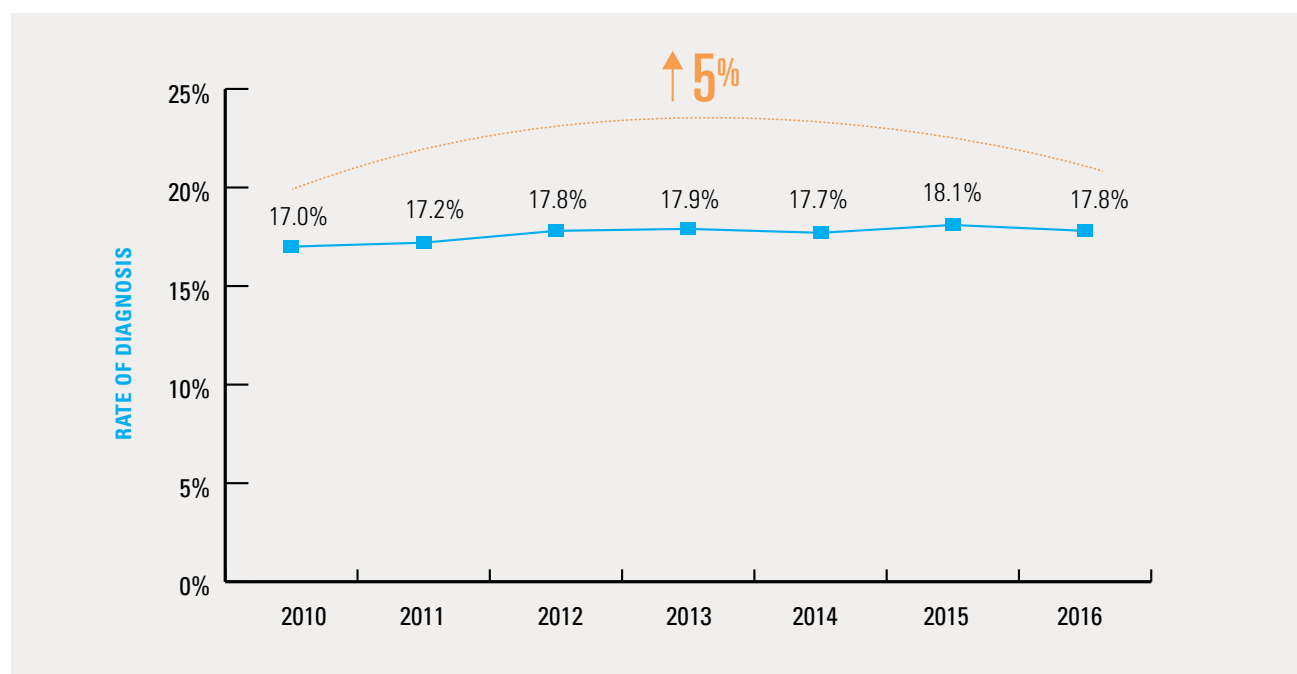
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Overall Allergy Diagnoses

In a wider scope, the rate of children suffering from any type of allergy across the U.S. increased modestly from 2010 to 2016. Diagnoses for children who have any type of allergy increased 5 percent during this period from 17 percent in 2010 to 18 percent over the course of the study (see Exhibit 4). For specific common allergies, 9 percent of children suffered from rhinitis and 5 percent of children suffered from dermatitis in 2016.⁷

Assessment of allergy diagnosis rates with varying income and education levels across the nation reveals no strong relationship between these two factors and the overall rates of allergy diagnosis in children.

EXHIBIT 4: RATE OF DIAGNOSIS OF ANY ALLERGY IN CHILDREN (0-18 YEARS OF AGE) BY YEAR



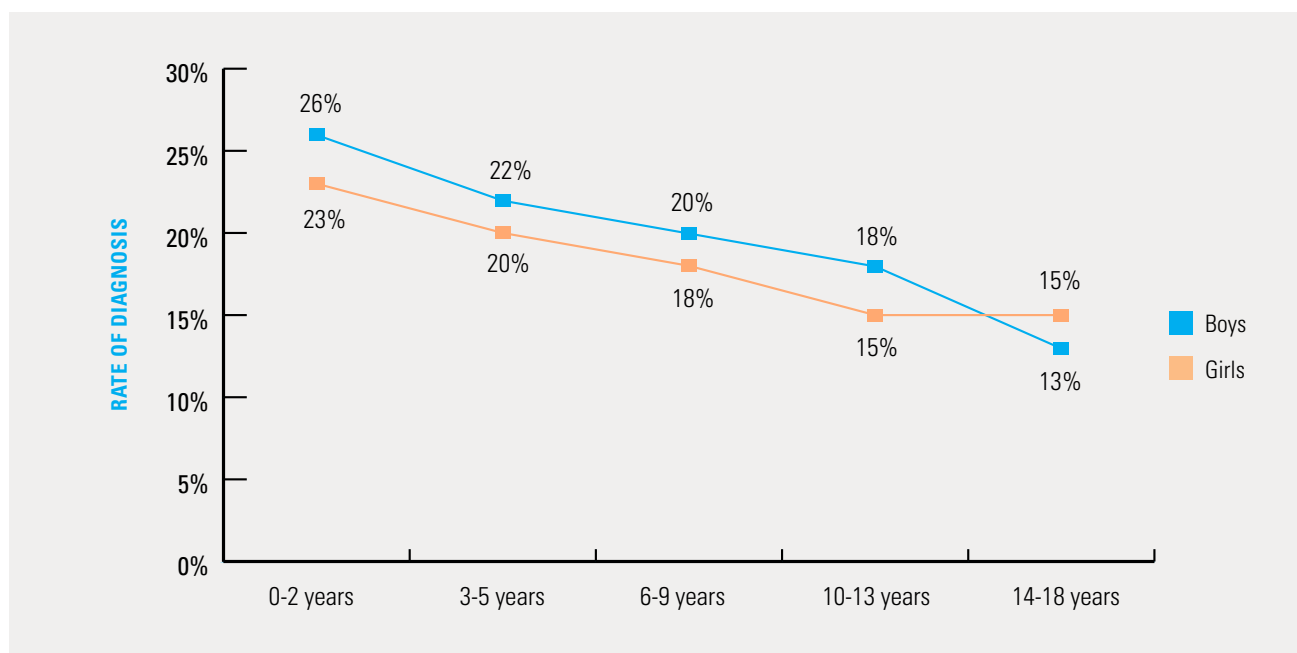
7. The estimated number of children with allergies presented in this report is substantially less than that reported by other sources. (See, for instance: <https://acaai.org/news/facts-statistics/allergies>.) There are at least two reasons for the difference in estimations. First, this report does not include asthma, which accounts for approximately one-quarter of all childhood allergies. Second, other sources often use a survey-based methodology for estimating the prevalence rate of allergies, which may account for minor allergy cases not captured in claims data.

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When examined by gender and age, distinct allergy diagnosis patterns occur. Diagnosis of any type of allergy decreases as all children get older, as 24.7 percent of all children ages 0 to 2 are diagnosed with one or more allergy compared to that of only 14 percent of children ages 14 to 18 in 2016.

Allergy rates drop considerably more for boys as they grow older than for girls. Boys under the age of 3 have the highest rate of diagnosis of any age group at 26 percent. Boys ages 14 to 18 have the lowest rates of allergy diagnosis of any age group at 13 percent (see Exhibit 5).⁸

EXHIBIT 5: RATE OF DIAGNOSIS OF ANY ALLERGY IN CHILDREN BY AGE AND GENDER (2016)



8. For more information about the decline in allergy diagnosis, see: <http://www.nejm.org/doi/full/10.1056/NEJMoa1414850>

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Rhinitis Allergies: Seasonality and Geographic Distribution

Different allergic reactions tend to follow different seasonal patterns. Rhinitis shows a strong diagnosis peak in the spring and a more modest peak in the fall, likely reflecting the seasonal pattern in plant, dust and pollen allergies (see Exhibit 6). Geographically, rhinitis diagnosis stretches from coast to coast across the southern portion of the U.S., with a greater impact in Alabama, Delaware, Kentucky, New Jersey, Oklahoma, Tennessee, Texas and West Virginia (see Exhibit 7). (See Appendix A for more detailed information by state.)

EXHIBIT 6: RATES OF DIAGNOSIS OF RHINITIS IN CHILDREN BY MONTH (2010-2016) COMPARED TO THE YEARLY AVERAGE

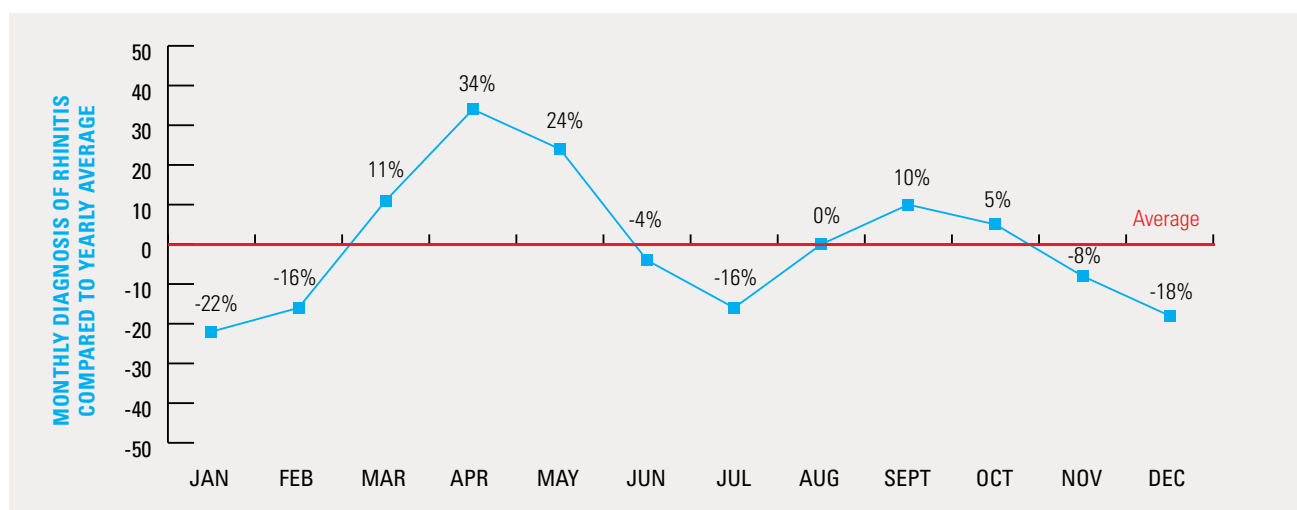
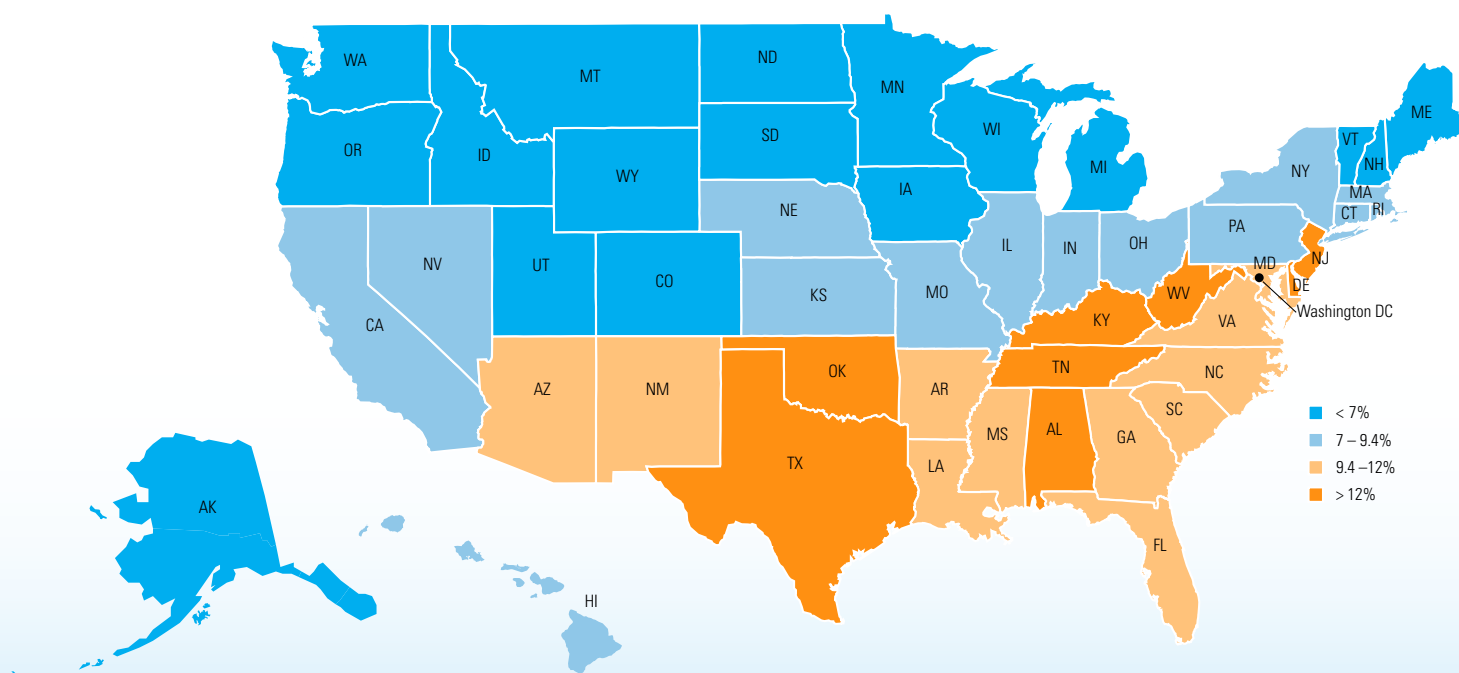


EXHIBIT 7: RATES OF DIAGNOSIS OF RHINITIS IN CHILDREN BY STATE (2010-2016)

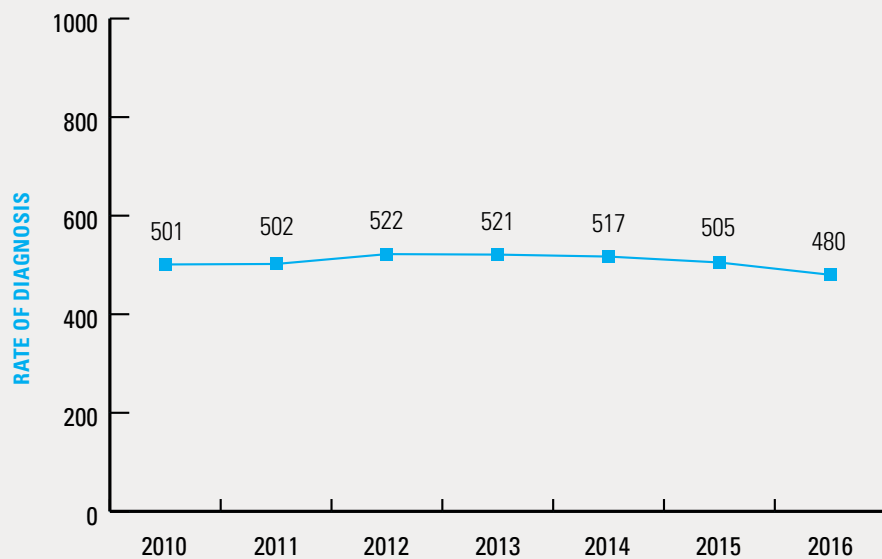


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Dermatitis Allergies

Unlike the significant increase in diagnoses of anaphylaxis since 2010, the diagnosis of dermatitis has remained comparably stable at approximately 500 diagnoses per 10,000 children, or 5 percent (see Exhibit 8). (See Appendix B for more detailed information by state.)

EXHIBIT 8: RATE OF DIAGNOSIS OF ALL DERMATITIS IN CHILDREN BY YEAR, PER 10,000 CHILDREN



CONCLUSION

Nearly 1.7 million, or 18 percent, of commercially insured American children suffer from one or more allergy. While a small portion of overall allergies, there has been a substantial increase in the most severe anaphylaxis allergic reactions in children which has largely been triggered by foods. This increase in severe anaphylaxis reactions coincides with a steep rise in ER visits for this condition. Other regularly diagnosed allergies of rhinitis and dermatitis did not change markedly throughout the study period but remain a common complaint of those suffering from allergies. As a whole, the rate of all children diagnosed with one or more type of allergy increased moderately during the study timeframe, with boys more likely to be diagnosed with an allergy than girls.

Continued focus on proper identification and diagnosis of childhood allergies remains an important step to help keep children safe. The availability of and access to epinephrine auto-injector medication and ER costs associated with treating children in emergencies remains a topic of public health discussion. As more children are found to suffer from food allergies and are at risk of life-threatening anaphylactic reactions, the availability of affordable medication and ER care will be critical in safeguarding the health of American children.

METHODOLOGY NOTES

This is the nineteenth study of the Blue Cross Blue Shield, The Health of America Report series, a collaboration between Blue Cross Blue Shield Association and Blue Health Intelligence, which uses a market-leading claims database to uncover key trends and insights into healthcare affordability and access to care.

The report examines the medical claims of more than 9.5 million Blue Cross Blue Shield commercially insured members age 18 and under per year (non-Medicare) from 2010 through 2016, approximately 1.7 million of whom have some type of allergy. Rates are calculated on a yearly basis by unique patient counts and broken out by particular types of allergy agents and reactions using ICD coding logic.

Children at risk for having an anaphylaxis episode were determined by finding unique yearly patient counts of children with a matching ICD code on a claim at any site of care. The cause of each anaphylaxis episode is based on the specific diagnostic code supplied by the medical provider. Approximately 53 percent of the time an “unspecified” code is provided. All emergency room visits counted with the same ICD coding logic are included.

All U.S. states and cities (metropolitan statistical areas) had a sample size of 300 or more children.

For more information and to read past reports from The Health of America Report series, visit www.bcbs.com/the-health-of-america.



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APPENDIX A

Rates of Diagnosis of Rhinitis in Children by State (2010-2016)

State	Percent of children diagnosed with rhinitis
AK	4.7%
AL	12.9%
AR	10.9%
AZ	9.8%
CA	8.2%
CO	6.5%
CT	8.4%
DC	11.1%
DE	12.1%
FL	9.8%
GA	10.7%
HI	7.7%
IA	6.5%
ID	4.4%
IL	8.1%
IN	7.4%
KS	8.8%
KY	13.9%
LA	11.3%
MA	7.2%
MD	11.2%
ME	5.2%
MI	6.9%
MN	4.9%
MO	9.3%
MS	10.8%

State	Percent of children diagnosed with rhinitis
MT	3.8%
NC	10.6%
ND	5.4%
NE	8.9%
NH	6.0%
NJ	12.1%
NM	10.1%
NV	7.8%
NY	9.3%
OH	8.2%
OK	13.7%
OR	4.9%
PA	9.0%
RI	7.8%
SC	11.1%
SD	5.6%
TN	12.0%
TX	13.9%
UT	4.2%
VA	11.5%
VT	4.5%
WA	6.3%
WI	5.1%
WV	12.6%
WY	5.9%
National	9.4%

APPENDIX B

Rates of Diagnosis of Dermatitis in Children by State (2010-2016)

State	Percent of children diagnosed with dermatitis
AK	4.8%
AL	5.0%
AR	4.8%
AZ	3.9%
CA	5.1%
CO	4.1%
CT	6.5%
DC	8.2%
DE	6.1%
FL	4.6%
GA	5.0%
HI	5.5%
IA	4.7%
ID	3.3%
IL	5.1%
IN	4.9%
KS	4.3%
KY	5.6%
LA	5.0%
MA	7.1%
MD	6.4%
ME	4.7%
MI	4.5%
MN	4.4%
MO	5.2%
MS	4.5%

State	Percent of children diagnosed with dermatitis
MT	2.8%
NC	5.5%
ND	4.0%
NE	4.4%
NH	5.8%
NJ	7.4%
NM	3.1%
NV	4.1%
NY	4.8%
OH	5.4%
OK	5.1%
OR	3.8%
PA	5.9%
RI	5.8%
SC	5.1%
SD	4.2%
TN	5.4%
TX	4.5%
UT	3.0%
VA	6.4%
VT	4.2%
WA	5.1%
WI	3.9%
WV	6.4%
WY	2.9%
National	5.0%