

THE SILENT EPIDEMIC:

*How Airway Disorders Are Quietly Destroying the Health
of Children & Overwhelming Our Global Health Systems*

*Created by the Children's Airway First Foundation
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THE SILENT EPIDEMIC: CHILDREN'S AIRWAY DISORDERS

There is a silent health epidemic weaving its way throughout the lives of the children of the world. Sleep issues, an inability to focus or concentrate, lack of energy, depression, anxiety, and weakened immune systems are some of the symptoms that are on the rise. While all of these symptoms can be traced back to childhood airway disorders, they are rarely ever connected.

Airway disorders can affect how infants and children breathe, eat, swallow, and sleep. They may be diagnosed before birth or develop over time as the result of an infection or traumatic injury.¹

In many cases, the oral and facial signs of issues, that lead to sleep and breathing disorders, can be visually obvious. The signs include crooked teeth, receding jaws, a gummy smile, and mouth breathing. Unfortunately, however, the signs are being misdiagnosed, mistreated, and in many cases, altogether undiagnosed.

If caught and treated early in children, pain, suffering, and long-term health issues such as ADHD, depression, eczema, high-blood pressure, heart disease, and potentially Alzheimer's disease could be avoided in adults.²

PRIMITIVE HISTORY TO MODERN MEDICAL EMERGENCY

The issues we are seeing in children's mouths is a modern civilization issue and not one that humanity has always endured. In fact, our hunter-gatherer ancestors have been found to have large, roomy jaws with smoothly curved teeth that are perfectly aligned.

It is believed to be wrongly taught that malocclusions are genetically based. More and more research points to our modern culture, particularly in how and what we eat and where we live.³ Additionally, our lifestyles, with a lack of emphases on posture and adequate sleep, are additional factors surrounding our current oral-facial and childhood breathing disorders epidemic.

The increase of crooked teeth and impacted wisdom teeth is an additional sign that, due to what we eat, our jaws are not developing properly and evolving along with the rest of our bodies.⁴

ANCESTRAL BIG MOUTHS

Archeologists have discovered that our earliest ancestors do not show signs of the same airway disorders that modern homosapiens display. It is believed that their lifestyle is the main driver to their Stone Age mouth structures.

¹ Duke Health; *Airway Disorders in Children*, 2021 <https://bit.ly/3C08iPr>.

² Kahn, Sandra and Ehrlich, Paul, *JAWS: The Story of a Hidden Epidemic*, 2018, Stanford University Press, pgs. 6-7.

³ Kahn, Sandra and Ehrlich, Paul, *JAWS: The Story of a Hidden Epidemic*, 2018, Stanford University Press, pg. 9.

⁴ Lin, Steven DR, *The Dental Diet: The Surprising Link Between your Teeth, Real Food, and Life-Changing Natural Health*, 2018, Crescendo Publishing, LLC.

Our hunter-gathering ancestors nursed for longer periods of time than we do today. Additionally, when children were moved to food, they were introduced to foods that required chewing. The act of chewing aided them in developing stronger jaw muscles, straighter teeth with no crowding, and larger mouth cavities. As such, it is believed that they did not experience the same airway disorders children today experience.

Modern indigenous tribes also show this same pattern. Not only do they follow the traditional hunter-gather method of child nursing and weaning, but they also prevent mouth breathing. When Navajo women finish nursing a child, they gently hold the baby's lips together, forcing the child to breathe through their nose and not their mouths, thus preventing mouth breathing and many airway disorders.

MODERN MALOCCLUSIONS, SIGNS, AND ILLNESSES

Contrary to popular belief, malocclusions and badly fitting teeth are not caused by our genetics. Science is now showing that we are simply living in a modern society with jaws that have not evolved, like the rest of our bodies, and are still built using the original Stone Age biological technology. Not only have they not evolved, but they have also actually been shrinking as society has become more and more modernized.

There are four phenotypes that pediatric professionals should look for to identify airway obstruction and disorders in children:

1. Class-II Malocclusion
2. Class-III Malocclusion
3. A High V-Shaped Arch in the Hard Palate
4. Shortened Distance from the Front to the Back of the Oral Cavity

The long-term effects of childhood airway disorders are being seen in our aging population. Termed as the Silver Tsunami, the world is currently faced with the challenge of dealing with a population that is growing in lifespan but not in healthspan.⁵

As humans begin living longer and longer, our health hasn't been made enough of a priority to ensure we have the proper healthspan, and thus, our aging population is facing diseases such as diabetes, heart conditions, cancer, Alzheimer's, and others that can all be traced back to childhood airway disorders that could have been treated or possibly prevented.

OBSTRUCTIVE SLEEP APNEA IN CHILDREN

According to a study conducted by Healthy People 2030, only 65.6% of children between the ages of 4-months and 14-years old get a sufficient amount of sleep each night.⁶ This means that almost 35% of children do not. While there are many contributing factors to this such as environmental and socioeconomic, blocked airways due to undiagnosed issues remains the leading contributor.

Blocked or impacted airways can lead to obstructive sleep apnea (OSA) in children. This is becoming a more common condition in children and can result in significant health complications if left untreated such as ADHD, anxiety and depression, heart issues, and hypoxic brain trauma. Children labeled with

⁵ Alliance for Aging Research, "The Healthspan Imperative: The Aging of America," July 29, 2014. <https://youtu.be/7rGpJDyiUXs>.

⁶ Healthy People 2030; *Increase the Proportion of Children Who Get Sufficient Sleep* EMC-03; 2018-2019); <https://bit.ly/3j56Tj5>.

ADHD caused by obstructive sleep apnea often experience extreme anxiety and depression due to the constant wear and tear on their bodies and brain functions. Unfortunately, many of these children are disregarded as overreacting or exhibiting hypochondriac behavior.

Characteristics of OSA include snoring and an increased respiratory effort due to increased upper airway resistance and weakened oropharyngeal musculature. Snoring is often considered a harmless problem, particularly in children. However, it is one of the most prevalent signs of a more serious upper airway obstruction, such as increased upper airway resistance or Obstructive Sleep Apnea (OSA).

The American Academy of Pediatrics defines Obstructive Sleep Apnea Syndrome as a “disorder of breathing during sleep characterized by prolonged partial upper airway obstruction and/or intermittent complete obstruction that disrupts normal ventilation during sleep and normal sleep patterns.”⁷

The most common cause of OSA is adenotonsillar hypertrophy, however, other anatomical factors such as craniofacial dysmorphism may also be involved. Dentofacial morphology and adenotonsillar hypertrophy in children is associated with mouth breathing and has been reported in the literature.

Children who are chronic mouth breathers will all hyperventilate. In normal nasal breathing, the child will inhale/exhale about every six seconds. Children who are chronic mouth-breathers will inhale/exhale about every three seconds.⁸

When a child has a collapsed airway during sleep, it is necessary to change the body position, head posture, and/or tongue positioning within the oral cavity to breathe. There is a relationship between adenotonsillar hypertrophy and dentofacial morphology in children, and this relationship is often connected to mouth breathing. Children with SDB and OSA often present with a narrower maxilla, deeper palatal height, and a shorter lower dental arch when compared to healthy children with ideal occlusion.⁹

Children with airway issues such as obstructive sleep apnea are often misdiagnosed as having asthma and given inhalers for treatment. Not all children who wheeze have asthma. Most children younger than 3-years who wheeze are not predisposed to asthma. Only 30% of infants who wheeze go on to develop asthma. Reactive airway disease has a large differential diagnosis and must not be confused with asthma.¹⁰

According to a 2016 report by the CDC, approximately 25% of preschool children have behavioral sleep problems and 1% to 20% of preschool-aged children experience sleep-disordered breathing, which spans a continuum from snoring to obstructive sleep apnea.¹¹

⁷ American Academy of Pediatrics, *Clinical practice guidelines on the diagnosis and management of childhood obstructive sleep apnea syndrome*. Pediatrics 2012; 130 (3): 576-684.

⁸ *The Negative Effect of Mouth Breathing on the Body and Development of the Child*. Dr. John Flutter BDS, Queensland, Australia. July 9, 2006; www.jfdental.com.

⁹ *Evaluating the Link between Orofacial Myofunctional Disorders and Obstructive Sleep Apnea and Their Relevance to the Dental Hygiene Clinical Evaluation*; Schmitz, Janice I. University of Bridgeport, ProQuest Dissertations Publishing, 2021. 28322878.

¹⁰ Medscape; Pediatric Reactive Airway Disease; 2021 <https://emedicine.medscape.com/article/800119-overview>.

¹¹ CDC.gov; *Promoting Sleep Health Among Families of Young Children in Head Start: Protocol for Social-Ecological Approach*; Volume 13; September 2016; <https://bit.ly/3FQoCEB>.

CONTRIBUTING FACTORS AND HOW WE SHOULD EDUCATE PARENTS NOW

Why are our children experiencing these signs and symptoms? One of the main reasons has to do with our modern lifestyles. Life in industrialized societies is constantly on the go, fueled by processed foods and eating on the run, and a general lack of sleep.

Additionally, a lack of education and communication between parents, pediatricians, and pediatric dentists, which would create a more holistic approach to treating children, has caused the perfect storm and breeding ground for this silent epidemic to explode worldwide.

That's why Children's Airway First Foundation was created. We are on a mission to educate parents and pediatric professionals and to ensure all children have access to screening, evaluation, and treatment before the age of six.

I. NURSING AND DIETARY HABITS IN A MODERN SOCIETY

Our modern industrialized society promotes the use of bottle-feeding, formula, and processed baby food as a manner of convenience. While seemingly benign, all three can cause long-term health issues for children and jaw development malformities.

Nursing an infant, for a minimum of six-months, allows time for the baby's palate to form properly and will improve the child's muscles in the mouth and tongue. Bottle-feeding, on the other hand, causes a higher rate of malocclusion, which can lead to breathing and sleeping issues as a child grows.

For a child's eating development, the practice of "baby-led weaning" (nursing for a minimum of six months and allowing a child to start eating solid foods once they begin to reach for them) is an ancient practice that has proven itself. This method allows children to develop their muscles through chewing and is more likely to aid in the prevention of malocclusion. Unfortunately, this method is not encouraged by society and the baby food industry.

Instead of the readily available marketed baby food, it is recommended that once a baby is ready for solid foods, that these commercially processed, soft baby foods be avoided. Instead, it is recommended that children be introduced to natural foods that will encourage the use of the mouth and tongue muscles via the act of chewing. The jaw and muscle training that chewing provides will encourage a healthier, more developed jaw for children and aid in the prevention of childhood airway disorders and long-term physical effects and medical issues in their adult lives.

To encourage proper palate development of a healthy u-shape, it is recommended that children avoid the use of pacifiers or thumb-sucking to seek comfort. This is an additionally missed opportunity with parents as new parents are often encouraged to buy pacifiers and other soothing devices for their babies. It has been clinically proven that helping a child self-soothe without the use of either practice at an early age, will help a child's mental and physical health development.

II. LACK OF PROPER BREATHING AND SLEEPING HABITS

Poor sleep in children can be linked to a variety of causes such as sleep environment, the amount of sleep a child is getting, and a child's ability to breathe properly, getting enough oxygen, while sleeping. Any of these can cause a lack of much needed NREM-cycles during sleep which can lead to a variety of health and psychological issues in children and adults.

Children with airway disorders often have sleep issues such as apnea, snoring, bed wetting, frequent awakening, and extreme restlessness. A lack of sleep can damage brain neurons, particularly those in the cortex region, and interfere with the body's restorative process and cause chemical and cellular imbalances that can lead to ADHD, lower development of social skills, inattentiveness, learning disabilities, allergies, asthma, autoimmune and inflammatory diseases, poor school performance, and head-forward posturing.

A child with poor sleep quality at night will exhibit symptoms such as:

- Difficulty getting up at a certain time in the morning
- Complaining of headaches in the morning
- Showing signs of exhaustion such as bags and dark circles under their eyes
- Showing signs of ADHD, anger, and frank aggression
- Needing extra naps or extended nap time during the day

There are over 90 diagnosable sleep disorders. One such class of sleep disorders is sleep-disordered breathing (SDB), which can affect kids' brains, hearts, blood pressure, growth, appetites, tooth, and jaw development. It is estimated that 33% of all children have at least one type of sleep disorder.¹²

Obstructive sleep breathing (OSB) and Obstructive Sleep Apnea Syndrome are two classes of sleep disorders that are often overlooked in children. Obstructive Sleep Apnea Syndrome (OSAS) is defined as the cessation of airflow at the nose and mouth despite respiratory efforts, stemming from airway obstruction. OSAS is primarily caused by six physical abnormalities of the airway structure, including tonsils, adenoids, tongue, palatal size and position, and jaw.¹³

In children, the enlargement of the tonsils and adenoids is the most likely cause of airway obstruction. Morning lethargy and headaches, poor school performance and behavior, failure to thrive, and personality changes, are important daytime symptoms.¹⁴

More obstructive sleep is seen when a child is sleeping on their back.¹⁵ The obstructions could be caused by tonsils, adenoids, or even a child's tongue. Children with OSBs often snore at night, tend to be mouth breathers, and are often labeled as being 'tongue-tied.' Mouth

¹² Witte, Rachel; *The Relationship Between Sleep, Behavior, and Pre-Academic Skills in Pre-Kindergarteners*, 2006, Educational Specialist Department of Psychological and Social Foundations College of Education University of South Florida, pg. 6.

¹³ Bower, C. & Buckmiller, L. (2001). *What is New in Pediatric Obstructive Sleep Apnea*. *Pediatric Otolaryngology*, 9(6), 352-358.

¹⁴ Butt, W., Robertson, C., & Phelan, P. (1985). *Snoring in Children: Is it Pathological?* *Medical Journal*, 143(8), 335-336.

¹⁵ Ingram, David MD; *Sleep Apnea in Children: A Handbook for Families*, 2018, Create Space Independent Publishing Platform, pg. 40.

breathing increases the chance of developing dental cavities, gingival inflammation, and dental erosion, which can lead to chronic dry mouth.¹⁶

According to the World Sleep Society, it is estimated that more than 55% of children have an OSB, and these respiratory disturbances in children directly correlate with more severe residual depressive symptoms in adults.¹⁷ The higher the respiratory disturbance (RDI) experienced, the worse the depressive symptoms. It is believed that this is mainly driven by the respiratory effort-related arousals which were impacted during NREM sleep.

Additionally, lack of sleep can cause a 10-point reduction in a child's IQ. Children need "good sleep" each night.¹⁸ Good sleep means quiet, uninterrupted sleep for the recommended number of hours.

The amount of sleep needed each day by a child depends on their age. It is recommended that children receive the following:

- infants get 12-17 hours of sleep
- toddlers and preschoolers 10-14 hours of sleep
- primary school-aged children 9-12 hours
- teenagers 8-10 hours of sleep within a 24-hour period

III. OUR DISJOINTED AND SILOED APPROACH TO CHILDREN'S HEALTHCARE

While studies continue to highlight the importance of studying and understanding how sleep disorders can impact children's short-term and long-term physical and mental health, many pediatricians, pediatric dentists, professionals working in schools, and parents are unaware of the true impact of these disorders. In fact, it is estimated that pediatricians, on average, receive 4.8 hours of educational training on pediatric sleep disorders.¹⁹

Currently, only a physician can order a sleep lab study in a child. Due to this, millions of children are going on undiagnosed and untreated causing life-long health issues for them as adults and a greater strain on the global health system.

Whole body health depends on a good night's sleep, healthy eating, and regular exercise. This holistic approach to healthy bodies should also be applied to healthy mouths for children.

A holistic approach to mouth development will include proper nursing and weaning, avoidance of pacifiers and thumb-sucking, ensuring children get real food that they chew

¹⁶ Journal of Oral Rehabilitation, "Intraoral pH and Temperature During Sleep with and Without Mouth Breathing," Waddell, J.N., Lyons, K.M., and Kieser, J. A. volume 43; 2016, pg. 356-363.

¹⁷ Robillard, Rebecca; Chase, Teena; Courtney, Darren; Ward, Marcus; De Koninck, Joseph; Lee, Elliott, *Sleep-Related Breathing Disturbances in Adolescents with Treatment Resistant Depression. Sleep Medicine*, Volume 56, April 2019, pgs. 47-51.

¹⁸ Moore, Sharon, "Sleep Wrecked Kids: Helping Parents Raise, Happy, Healthy Kids, One Sleep at a Time." 2020, Morgan James Publishing, pgs. 44.

¹⁹ Mindell, J., Moline, M., Zendell, S., Brown, L, & Fry, J. (1994). *Pediatricians and sleep disorders: Training and practice.* Pediatrics, 94(2), 194-200.

thoroughly before swallowing, and getting enough sleep. Additionally, it will prevent the unnecessary removal of teeth and adding of braces to millions of children as dentists and pediatricians will be able to devise a treatment plan that will open the airway instead of making it smaller (*it is believed that braces reduce the size of a child's mouth and airway*).

It is unusual for pediatric professionals to collaborate on wellness check-ups for children. Because pediatricians, school personnel, and pediatric dentists all refer children to sleep clinics, it is important that all these groups receive training and are knowledgeable about sleep disorders

GLOBAL EPIDEMIC BY THE NUMBERS

It is estimated that 350-million children under the age of 14-years old globally suffer from childhood airway disorders, many of which are improperly diagnosed or undiagnosed by pediatric professionals.²⁰



The 350-million children under the age of 14-years old is a 25% population estimation based on 2019 and 2020 census data collected by the World Health Organization, US Census, The World Bank, and globally acquired information from Statista.com:

I. NORTH AMERICA

- a. 98.9-million children in North America between the ages of 01-14 years old
 - i. 60.2-million in the United States
 - Approximately 11-million have airway disorders
 - ii. 5.7-million in Canada
 - Approximately 1-million have airway disorders
 - iii. 33-million in Mexico
 - Approximately 5.9-million have airway disorders

II. LATIN AMERICA & CARIBBEAN

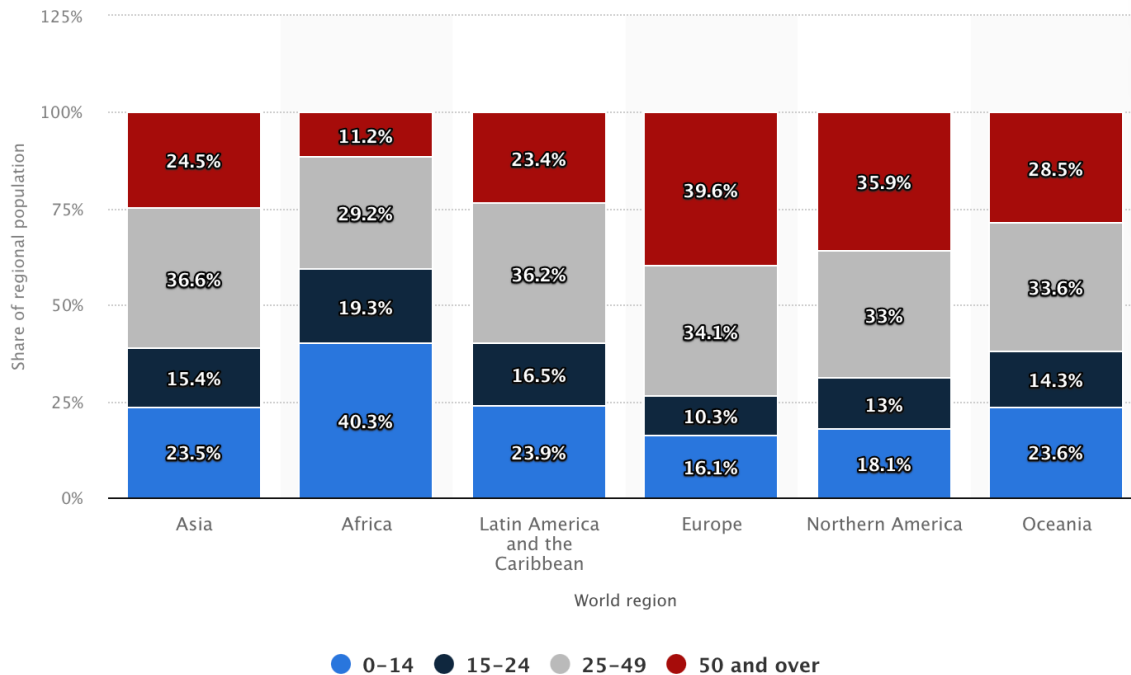
- a. 151.7-million in Latin America and Caribbean between the ages of 0-14 years old
 - i. 44-million in Brazil
 - Approximately 7.9-million have airway disorders
 - ii. 11-million in Argentina

²⁰ Moore, Sharon, "Sleep Wrecked Kids: Helping Parents Raise, Happy, Healthy Kids, One Sleep at a Time." 2020, Morgan James Publishing, pgs. 21-22.

- Approximately 1.9-million have airway disorders
- iii. 11-million in Columbia
 - Approximately 1.9-million have airway disorders
- III. **EUROPE**
 - a. 120-million children in Europe between the ages of 0-14 years old
 - i. 11-million in France
 - Approximately 1.9-million have airway disorders
 - ii. 11-million in Germany
 - Approximately 1.9-million have airway disorders
 - iii. 11-million in the United Kingdom
 - Approximately 1.9-million have airway disorders
- IV. **AFRICA**
 - a. 490-million children in Africa between the ages of 0-14 years old
 - i. 89-million in Nigeria
 - Approximately 16-million have airway disorders
 - ii. 41-million in the Congo
 - Approximately 7.3-million have airway disorders
 - iii. 45-million in Ethiopia
 - Approximately 8.1-million have airway disorders
- V. **ASIA**
 - a. 1-billion children in Asia between the ages of 0-14 years old
 - i. 22-million in Japan
 - Approximately 3.9-million have airway disorders
 - ii. 252.3-million in China
 - Approximately 45.4-million have airway disorders
 - iii. 248.4-million in India
 - Approximately 44.7-million have airway disorders
- VI. **OCEANIA**
 - a. 9.8-million children in Oceania between the ages of 0-14 years old
 - i. 4.6-million in Australia
 - Approximately 828-thousand have airway disorders
 - ii. 950-thousand in New Zealand
 - Approximately 171-thousand have airway disorders
 - iii. 161-thousand in Fiji
 - Approximately 28-thousand have airway disorders

NOTE: It is estimated that 103-million worldwide births are not registered in many of the poorest and most under-developed countries. Our 350-million estimation of children does not include this figure.

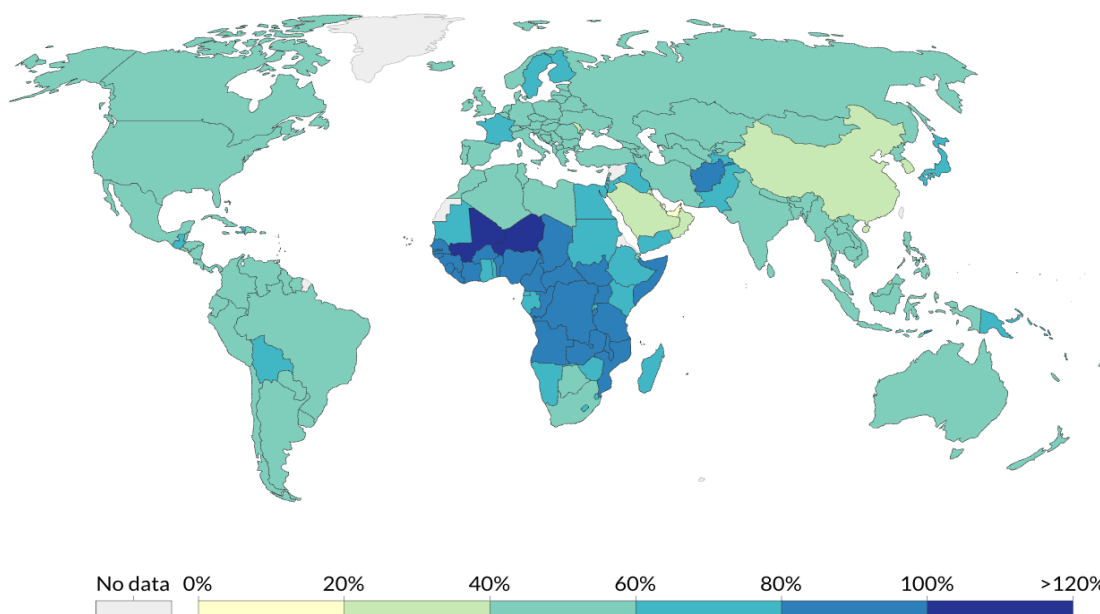
Graphical breakdown of the world's population by age-range according to the World Health Organization:



Largest population of children under the age of 14-years old is in Africa according to the World Bank and Our World:

Age dependency ratio, 2017

The age dependency ratio is the sum of the young population (under age 15) and elderly population (age 65 and over) relative to the working-age population (ages 15 to 64). Data are shown as the number of dependents per 100 working-age population.



Source: World Bank

OurWorldInData.org/world-population-growth • CC BY

MALOCCLUSIONS STATISTICS

Malocclusion is often accompanied by mouth breathing. Together, they will not only impact a child's overall appearance, but they will also reduce the quality of life and make the child far more susceptible to disease and health issues as they grow into adulthood.

- 95% of modern humans have deviations in dental alignment and of that: 30% are recommended to have orthodontic treatment and 50% are recommended to have wisdom teeth removed ²¹
- Worldwide prevalence of malocclusion among children and adolescents is 56%²²
 - In Africa it is 81% of children and adolescents
 - In Europe it is 71% of children and adolescents
 - In America it is 53% of children and adolescents
 - In Asia it is 48% of children and adolescents
- Malocclusion reaches its highest prevalence worldwide in early childhood during the deciduous dentition period (54%) and keeps unvaried in permanent dentition (54%). According to the prevalence data, malocclusion represents a relevant oral health problem as well as an economic burden for families and dental health public services.²³

SLEEP DISORDERS STATISTICS

- Approximately 25% of all children experience some type of sleep problem, and about 12% present snoring and sleep apnea.
 - In contrast, sleep complaints in children with ADHD have been reported in 55% of cases.
 - Children undergoing evaluation for ADHD should routinely be screened for sleep disorders.
- A survey by the National Sleep Foundation found 18-19% of children suffer from sleep disordered breathing (SDB). Many of these children are mouth breathers.
- 46% of sudden deaths occur between 12:00 – 6:00 am and of that, only 21% of the deaths can be attributed to something not related to sleep apnea, which means 79% are related to sleep apnea and those children become adults with sleep apnea.
- Research has shown that 18% of children in the bottom 10% of their class have a sleep disorder.
 - Continual sleep apnea can cause a 10-point median drop on IQ.
- At least 12-14% of children have some form of Sleep Disordered Breathing (SDB), such as snoring or mouth breathing.
 - 95% of children with Obstructive Sleep Apnea (OSA) are never diagnosed.²⁴
 - Kids with OSAs are five-times more likely to be diagnosed with ADHD.

²¹ Kahn, Sandra and Ehrlich, Paul, *JAWS: The Story of a Hidden Epidemic*, 2018, Stanford University Press, pg. 2.

²² Lombardo, G., Vena, F., Negri, P., Pagano, S., Cianetti, S., Orso, M., Colombo, S., Paglia, L. "World Prevalence of Malocclusion in the Different Stages of Dentition: A Systematic Review and Meta-Analysis." (2020) <https://bit.ly/3IP9i2S>.

²³ Lombardo, G., Vena, F., Negri, P., Pagano, S., Cianetti, S., Orso, M., Colombo, S., Paglia, L. "World Prevalence of Malocclusion in the Different Stages of Dentition: A Systematic Review and Meta-Analysis." (2020) <https://bit.ly/3IP9i2S>.

²⁴ Moore, Sharon, "Sleep Wrecked Kids: Helping Parents Raise, Happy, Healthy Kids, One Sleep at a Time." 2020, Morgan James Publishing, pgs. 17.

- In a recent study on US pediatricians, 57% considered sleep disorders a distinct medical specialty, and only 40% reported that sleep disorders were common in their practice²⁵
 - 15% of doctors who had attended lectures about sleep disorders referred significantly more patients to sleep clinics as compared to those who did not have any post-graduate training.
- 10-21% of children aged 6-81 months snore.²⁶
- Three consecutive nights of 4-5 hours of sleep can cause irreversible brain cell damage.²⁷
- Children 6-9 years old with less than 10-hours of sleep per evening are 1.5-2.5 times more likely to be obese, which can lead to many other long-term health in addition to outside of sleep apnea.

Studies looking at school-aged children show that children with mild to moderate sleep disorders breathing have more behavioral problems in school than children without airway impacting sleep issues.²⁸

AIRWAY DISORDER IMPACTS STATISTICS

- Over 350-million children worldwide suffer from compromised airways.
- Between 32-35% of US ADHD teens will drop out of school before graduation, compared to only 15% of teens who don't have a disorder.
- Young adults between the ages of 23 and 32 years-old are 11-times more likely to be unemployed and earn about \$2 less per hour on average as compared to adults without ADHD.
- Only 41% of people over 65 who say their health is very good or excellent, according to the Centers for Disease Control and Prevention. Many of the issues facing the other 59% of this population can be traced back to childhood airway diseases.
- 40% of the world's population is believed to suffer from nasal obstructions.
- Over 90% of children with crooked teeth, teeth grinding, or malocclusion have compromised nasal breathing.²⁹

Untreated airway disorders can impact sleep and thus, wreak havoc on your immune system making children more vulnerable to infection and vaccines less effective.³⁰

SOCIAL AND ECONOMIC IMPACTS ON AIRWAY DISORDERS

There is no denying that undiagnosed and untreated airway disorders in children are having an impact on multiple levels. Cases of ADHD, sleep deprivation, depression, and anxiety are all on the rise in children. According to the CDC:

²⁵ Witte, Rachel; *The Relationship Between Sleep, Behavior, and Pre-Academic Skills in Pre-Kindergarteners*, 2006, Educational Specialist Department of Psychological and Social Foundations College of Education University of South Florida, pgs. 7-9.

²⁶ Gelb, Michael DR and Hindin, Howard DR, *GASP: Airway Health – the Hidden Path to Wellness*, 2016, Create Space Independent Publishing Platform.

²⁷ Sleep-Disordered Breathing-Related Presentation, www.centraldentist.com/research, 2018.

²⁸ Gelb, Michael DR and Hindin, Howard DR, *GASP: Airway Health – the Hidden Path to Wellness*, 2016, Create Space Independent Publishing Platform.

²⁹ Sidlauskienė, M., Smailienė, D., Lopatienė, K., Cekanaukas, E., & Pribisiene, R. (2015). *Relationships Between Malocclusion, Body Posture, and Nasopharyngeal Pathology in Pre-Orthodontic Children*. Medical Science Monitor: International Medical Journal of Experimental and Clinical Research, volume 21, pg. 1765.

³⁰ Dassani, DMD, Meghana. "Airway is Life: Waking Up to Your Family's Sleep Crisis." WellPut Custom Content, (2021), pg. 86-87.

- 9.4% of children aged 2-17 years (approximately 6.1 million) have received an ADHD diagnosis.
- 7.4% of children aged 3-17 years (approximately 4.5 million) have a diagnosed behavior problem.
- 7.1% of children aged 3-17 years (approximately 4.4 million) have diagnosed anxiety.
- 3.2% of children aged 3-17 years (approximately 1.9 million) have diagnosed depression.

The number of children being seen by emergency room providers for airway related issues has increased significantly over the years as well. Most of these issues are being treated as one-off or asthmatic issues and the core cause is not being treated. This causes long-term health impacts on the child and an undue burden on the medical health system.

There are many long-term impacts as children mature into adulthood, including:

- Untreated airway disorders may lead to cardiovascular effects including right and left ventricular dysfunction and systemic hypertension,³¹ heart attacks, and strokes.
- An increase in obesity, type 2 diabetes, and insulin resistance³² as well as Alzheimer's and schizophrenia.³³
- Bone development issues and long-term impacts of Ehlers-Danlos Syndrome.
- Lowering of the global IQ ---- those with sleep disordered breathing and sleep apnea are likely to have a lowering of their IQ by up to 10 points.
- Sleeping five or fewer hours per night instead of the recommended seven to nine hours for adults may increase mortality risk by as much as 15%.³⁴

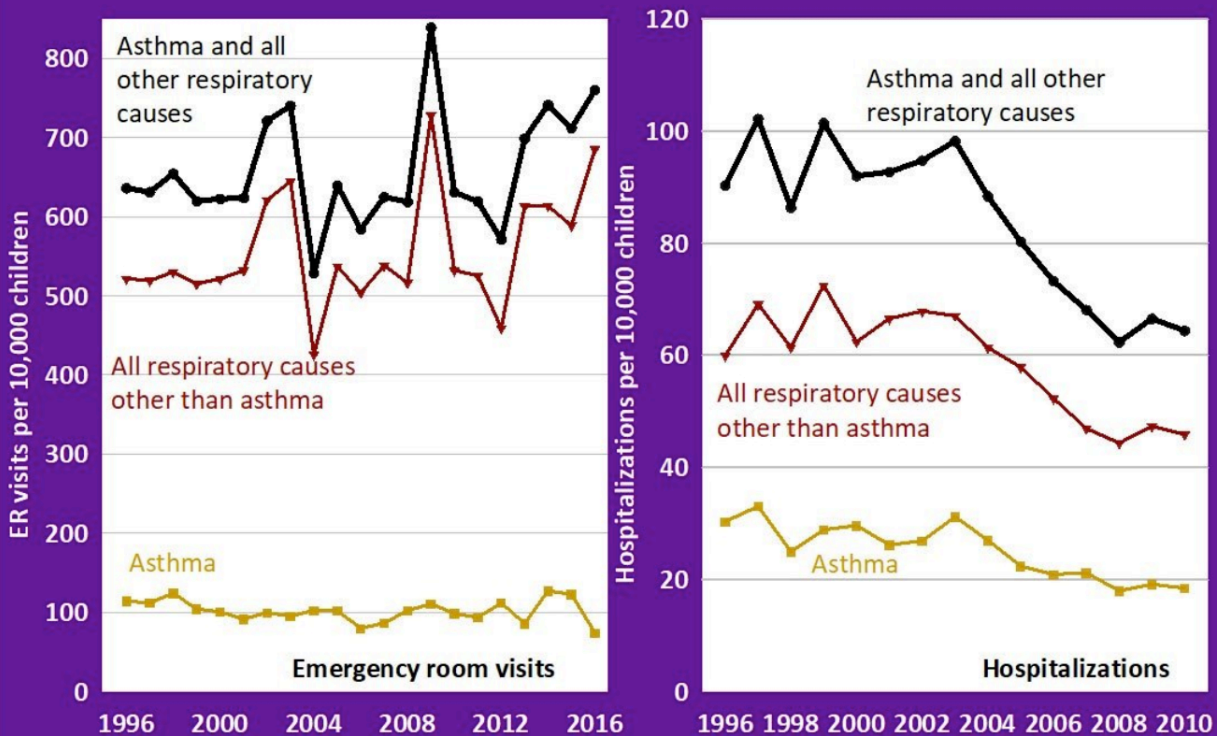
³¹ Paruthi, MD, Shalini (2021) *Evaluation of Suspected Obstructive Sleep Apnea in Children*. Wolters Kluwer. www.uptodate.com.

³² Capdevila, Oscar Sans, Kheirandish-Gozal, Leila, Dayyat, Ehab, & Gozal, David (2007) *Pediatric Obstructive Sleep Apnea: Complications, Management, and Long-Term Outcomes*. Division of Pediatric Sleep Medicine, Department of Pediatrics, University of Louisville; and Kosair Children's Hospital Research Institute, Louisville, Kentucky, pg. 277.

³³ Moore, Sharon, "Sleep Wrecked Kids: Helping Parents Raise, Happy, Healthy Kids, One Sleep at a Time." 2020, Morgan James Publishing, pgs. 25.

³⁴ Colten, HR, "Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem." Institute of Medicine, National Academies Press, 2006.

Children's emergency room visits and hospitalizations for asthma and other respiratory causes, ages 0 to 17 years, 1996-2016



Data: Centers for Disease Control and Prevention, National Center for Health Statistics, National Hospital Ambulatory Medical Care Survey (emergency room visits) and National Hospital Discharge Survey (hospitalizations)

Note: Data for hospitalizations are available only through 2010

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Many with airway disorders causing sleep issues will also complain of having some sort of chronic pain. Chronic pain affects approximately 100-million Americans; more than the combined number of Americans who have heart disease, cancer, and diabetes.³⁵ At the core, pain is most often caused by inflammation. Inflammation can be reduced during restorative sleep; however, a child experiencing an obstructive sleep disorder will not achieve the required restorative experience while sleeping.

Furthermore, children with obstructive sleep disorders will also experience increased heart rates and muscle tension during the microarousals (*moments of sleep interruption*). The microarousals can occur 8 to 15 times per hour, increasing adrenaline and blood sugar, which in turn, alerts the body that it is under attack and excites the body's inflammatory markers, thus causing additional trauma to the body and

³⁵ Institute of Medicine Report from committee on Advancing Pain Research, Care, and Education: *Relieving Pain in America, A Blueprint for Transforming Prevention, Care, Education, and Research*. The National Academies Press, 2011. <https://bit.ly/3p6tVKf>.

increased inflammation and pain for the child when awake.³⁶ For children with OSB, more sleep is not helpful because it is during sleep when their heart, brain, and other organs become more stressed due to oxygen debt and their bodies are in “*sympathetic dystrophy*” with a continuous release of adrenaline.³⁷

HOW MODERN MEDICINE IS MISSING THE MARK

Medical professionals are not being exposed to the importance of oral healthcare during medical school and the importance it can have on a child’s healthspan as they age.

Additionally, medical universities are not training on holistic group collaboration. A holistic approach to a child’s health can ensure optimal healthcare for the child.³⁸ A holistic team approach would be collaboration between pediatricians, pediatric dentists, dental hygienist, lactation consultants, otolaryngologists, osteopaths, and allied health practitioners (such as speech pathologists, dieticians, physiotherapist, sleep coach, etc.).

Our insurance industry is making it additionally complicated for parents seeking medical support for their children as many insurance companies do not cover the necessary surgeries and treatment and often push back on covering them as they consider them to be ‘*cosmetic*’ in nature.

MEDICAL PROFESSIONALS: UNDER PREPARED & MISDIAGNOSING

The most likely medical professionals to diagnose a child with sleep disordered breathing or obstructive sleep apnea is their pediatric dentist, orthodontist, or hygienist. This is directly related to the fact that nasal breathing has a tremendous impact on cranio-facial development, which determines our dental profile and occlusion, and these are the medical professionals dealing with these areas.³⁹

Throughout the 77 dental schools within the United States, current curriculum does not focus on the connection between oral malformities and malocclusions and children’s airway disorders. Many of the easily recognizable signs are being missed by trained professionals as they are not being taught, nor is their importance properly emphasized.

Often overlooked or dismissed indicators for orthognathic surgery include:

- Chronic jaw pain or jaw joint pain (TMJ) and teeth grinding
- Severe headaches associated with jaw pain
- Chronic mouth breathing and dry mouth
- Breathing problems while sleeping (*obstructive sleep apnea*)
- Facial injuries or irregular facial appearance

³⁶ Gelb, Michael DR and Hindin, Howard DR, *GASP: Airway Health – the Hidden Path to Wellness*, 2016, Create Space Independent Publishing Platform.

³⁷ *Understanding Nasal Breathing: The Key to Evaluating & Treating Sleep Disordered Breathing in Adults and Children*. Catalano, Peter MD, FACS, FARS; June 2018. pg. 6.

³⁸ Baxter, Richard DMD, *Tongue-Tied: How a Tiny String Under the Tongue Impacts Nursing, Speech, Feeding and More*, 2018, Alabama Tongue-Tied Center.

³⁹ *Understanding Nasal Breathing: The Key to Evaluating & Treating Sleep Disordered Breathing in Adults and Children*. Catalano, Peter MD, FACS, FARS; June 2018. pg. 9.

- Difficulties biting, chewing, or swallowing
- Not being able to close your lips without straining them
- A lower chin and jaw that recedes

The prevailing belief in Western medicine has long been that the nose was an ancillary organ and that the function of breathing in and out through it was not of imminent importance. This lack of importance can be seen in the training and departments at the National Institute of Health. There are 27 departments devoted to the lungs, eyes, ears, skin diseases and others, but the nose and sinus cavity are not represented in any of them.⁴⁰

While eating well, exercising, and ‘living clean’ can assist in improving a patient’s life, it can only do so much if their airway is still too narrow from an undiagnosed maxilla deficiency.⁴¹

Dentists and hygienists are missing an opportunity to be on the front lines of the pandemic by not including questions about sleep in the health history questionnaires. Additionally, when identifying issues such as a high-arched palate (V-shaped), a retracted jaw, and mouth breathing, children should be red flagged and referred to an airway dental professional immediately. If these signs are found by an orthodontist, an airway dentist should be contacted immediately and any planned treatment including retractable braces should be halted in order to prevent irreversible damage and hypoxic brain trauma.

THE ORTHODONTAL IMPACT ON HYPOXIC BRAIN INJURIES

Unfortunately, too many orthodontics are not trained to look for the signs of airway disease in children. As of 2021, only 4.5 hours of curriculum are included in standard dental and pediatric medical schools program pathways. As such, orthodontics are missing opportunities to correctly diagnose and treat these issues in children.

When not diagnosed and treated properly, airway disorders that are treated with protocols such as retractable braces, can cause irreversible undesired results such as hypoxic brain trauma, lowering a child’s IQ and impacting their long-term memory, bodily functions, and cognitive abilities. Statistically, if a child snores by the age of eight and is left untreated, there is an 80% chance the child will have a permanent reduction in mental capacity.⁴²

In 2009, the American Academy of Sleep Medicine recommended that questions regarding OSA be incorporated into routine health evaluations and that suspicions of OSA should trigger a comprehensive sleep evaluation. However, this is still not part of the standard health assessment process for many dental professionals.

Dental professionals are in a prime position to recognize the signs and symptoms of OSA and make the appropriate referrals for a medical consultation. Due to the amount of time that dental hygienists spend with patients, and the frequency of prophylaxis appointments, the dental office has the potential to

⁴⁰ Nestor, James, *Breath: The New Science of a Lost Art*, 2021, Riverhead Books.

⁴¹ Liao, Felix DDS, *Six-Foot Tiger, Three-Foot Cage: Take Charge of Your Health by Taking Charge of Your Mouth*, 2017, Crescendo Publishing, LLC.

⁴² Owens, J.A. (2009) *Neurocognitive and Behavioral Impact of Sleep Disordered Breathing in Children*. *Pediatric Pulmonology*, 44(5), 417-422.

provide an appropriate setting to conduct OSA screenings. Unfortunately, dental hygienists may be lacking OSA knowledge which impacts their attitudes and screening practices.⁴³

INSURANCE OVERSIGHT

Although there are some medical plans that specifically exclude orthognathic surgery, most insurance plans permit the authorization of orthognathic surgery only “*when medically necessary*”. Furthermore, most non-invasive treatments and diagnostic pathways for airway disorders are not included in the standard medical billing code books, such as the ICD-10-CM-2021. As such, when identified, medical billing professionals are forced to list the issues as idiopathic or unidentifiable, which often leaves the door open for negotiation and arguing with insurance companies.

Orthognathic surgery is covered when medically necessary and the symptoms of skeletal facial deformities present a significant functional impairment for the member. Orthognathic surgery is not a dental insurance matter but may be a covered benefit on the medical insurance. The issue for the insurance carrier is usually to identify the medical necessity. This is the decision of the insurance company based on criteria set by them.

The cost of jaw surgery typically ranges between \$20,000-\$40,000. However, surgery to correct temporomandibular joint dysfunction can cost up to \$50,000. These costs often make the procedure cost-prohibitive for most families.

Children are typically the best candidates for surgery because their jaws are not fully developed; however, getting approval through most insurance companies is cumbersome. Once the jaw fully develops in adulthood, treatment options for severe misalignment are limited.

When applied to carefully chosen patients, the requirements of BCBS, Aetna, Humana, and Cigna produce modest rejection rates of 6 to 12%. UHC is an outlier. Its guideline rejects 86% of patients, a rate about 7 times higher than its peers. Insurance guidelines disqualified patients for 3 different reasons:

- 1) no significant jaw deformity,
- 2) no demonstrable health impairment, and
- 3) the etiology of the condition is not a covered benefit. **44**

OPPORTUNITY AND HOPE FOR THE FUTURE

Why is identifying airway disorders at an early age in children so critical? Not only can proper identification and treatment create a better life-quality for children now, it can also impact their long-term health through adulthood and impact the burden on the medical system.

⁴³ *Evaluating the Link between Orofacial Myofunctional Disorders and Obstructive Sleep Apnea and Their Relevance to the Dental Hygiene Clinical Evaluation*; Schmitz, Janice I. University of Bridgeport, ProQuest Dissertations Publishing, 2021. 28322878.

⁴⁴ Schneider, Sydney DMD; Gateno, Jaime DDS, MD; Coppelson, Kevin DDS, MD; English, Jeryl DDS, MS; Xia, James MD, PhD; *Validity of Medical Insurance Guidelines for Orthognathic Surgery*, *Journal of Oral Maxillofacial Surgery*, November 23, 2020, pgs. 2-4.

Currently more than 25-million people in the United States have asthma. Approximately 14.8-million adults have been diagnosed with COPD, and approximately 12-million people with an airway disorder have not yet been diagnosed.

The burden of respiratory diseases affects individuals and their families, schools, workplaces, neighborhoods, cities, and states. Because of the cost to the health care system, the burden of respiratory diseases also falls on society; it is paid for with tax dollars, higher health insurance rates, and lost productivity. Annual health care expenditures for asthma alone are estimated at \$20.7 billion.⁴⁵

With an eye on the future, we can work towards putting an end to childhood airway disorders and the lowering of long-term health concerns for adults. Teaching the concepts of professional and parental education, making a holistic approach to patient care, and updating of insurance regulations and guidelines can ensure our children live longer, healthier lives in years to come.

HOLISTIC APPROACH TO CHILDREN'S HEALTH

Parents will often discuss issues their children are having with their pediatricians; however, in many instances, if this information were also shared with their pediatric airway dentist, symptoms leading to childhood airway disorders could be identified and treated.

When pediatric professionals who are educated on children's airway disorders signs and symptoms work together and a holistic approach to a child's overall wellness, both body and mouth, are taken, unnecessary procedures such as the removal of teeth can be avoided and treatments such as jaw realignment can take place.

For optimal results, the goal is to create a focus on the first 1,000 days of life and an integrated approach including the pediatrician, pediatric dentists, orthodontist, and airway dentist to screen for breathing and sleep problems.⁴⁶ A holistic approach to a child's body and mouth health is met early on, it can minimize potential negative long-term health effects and maximize a happier, healthier childhood for all children.

To support the holistic approach to children's health, insurance guidelines will need to be addressed making it easier for medical professionals to coordinate, communicate, and work together to treat the patient.

EDUCATION FOR MEDICAL PROFESSIONALS, EDUCATORS, AND PARENTS

Most parents are unaware the array of tools available for them to help determine their child's sleep risk. One such tool is the SDIS survey. The SDIS - Sleep Disorders Inventory for Students, developed by Marsha Luginbuehl, PHD, NCSP in 2004, is a brief screening measure designed to determine if a child or adolescent has a high probability of a major sleep disorder that requires treatment.

⁴⁵ Office of Disease Prevention and Health Promotion (ODPHP): HealthyPeople.gov; 2020 <https://bit.ly/2XgEzT7>.

⁴⁶ Pediatric Airway Roundtable Discussion, ADA Headquarters. August 23, 2018. Dr. Mark Cruz, DDS.

While it is readily available online, most parents are unaware of its existence and thus, never take the survey and can identify and seek treatment for their child's sleep disorder. This type of missed opportunity leads to misdiagnosis and prolong mental and physical impacts on children.

The curriculum used in our medical and dental schools needs to be revamped to incorporate the importance of oral and facial recognition and prevention methods for childhood airway disorders. Additionally, the premises of a holistic approach to patient care needs to be further explored and taught.

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CHILDREN'S AIRWAY FIRST FOUNDATION INFORMATION

Through education, training, and support programs for both parents and medical professionals, the Children's Airway First foundation is driven to end the global epidemic of children.

We are currently focused on several projects that will assist in achieving our goal:

- Coordinate with medical and dental schools across the country to update curriculum with regards to airway disease in children
- Developing a public service campaign (which includes a docuseries, podcasts, medical office collateral, and social media promotion) to educate parents of childhood airway diseases
- Establishing a mandate with the CDC and Surgeon General to address the epidemic of childhood airway diseases in the United States and issue in a new era of medical evaluation, treatment protocols, preventative medicine, APGAR scoring updates, and medical insurance support

OUR MISSION

The Children's Airway First Foundation (CAFF) is dedicated to supporting professional research, education, training, and breakthrough diagnostic tools for screening, evaluating, and treating children with airway disorders before the age of six in an effort to prevent systemic damage to their brains and bodies.

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