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Intended use statement

This document is intended for use by communities, groups or individuals who choose to address childhood asthma issues.

The action guide provides starting points to:

- Identify key stakeholders.
- Define wide impact among all those affected.
- Provide a shared understanding.
- Identify common themes.
- Focus actions on strategic uses of resources.

Reported by Larry Tubb, MBA, senior vice president, System Planning, Cook Children's Health Care System

Reviewed by think tank participants listed on page 24.

An ecosystem approach to childhood asthma: a guide to action

Introduction

In a one-day, “think tank” setting, 32 people used a novel ecosystem model for children’s health to provide strategic focus in understanding the complex interactions that characterize the universe of a child with asthma. The work group populated the model with various interactions between a child with asthma and that child’s surrounding ecosystem: environment (natural, built and social), business, school, government, public policy, public health, medical providers and the faith community, among others. This process eased the way to identifying core themes and common ground among those interactions. A series of brief examples about successful asthma programs paved the way to developing more strategically focused action plans for communities to consider when working on improving the health of children with asthma.

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Basic facts about asthma

- Asthma is a disorder of the lungs and airways that causes wheezing and other breathing problems.
- The exact cause of childhood asthma is not completely known. It is believed to be partially inherited, but it also involves many environmental, allergen, infectious and chemical factors that trigger asthma.
- Genetics play a role with the risk of developing asthma at 6 percent if neither parent has asthma, 20 percent if one parent has asthma, and 60 percent, if both parents have asthma.¹
- After a child is exposed to a certain trigger, the body releases histamine and other agents that can cause inflammation in the child’s airways. The body also releases other factors that can cause the muscles of the airways to tighten, or become smaller. There is also an increase in mucus production that may clog the airways
- Some children have exercise-induced asthma, which is caused by varying degrees of exercise. Symptoms can occur during, or shortly after, exercise.
- Each child has different triggers that cause the asthma to worsen.

Note that these facts only describe asthma in basic terms and any concerns for a specific child must be discussed, diagnosed and addressed by a physician.

¹ Family concordance of IgE, atopy, and disease, *Journal of Allergy and Clinical Immunology*, vol. 73, no. 2, February 1984.
Accessed December 2010 via: <http://www.libraryindex.com/pages/2232/Genetics-Environment-NATURE-VERSUS-NURTURE.html>

Background

While a great deal is known about childhood asthma, there is little evidence about its cause and even less agreement. Without a full understanding of its cause, efforts at prevention or cure are severely limited. Fortunately, medical science provides a wide-range of interventions and medications that work to both reduce the frequency and severity of asthma and to reduce or remove asthma triggers.

The Community-wide Children's Health Assessment & Planning Survey [CCHAPS] estimates there were 111,000 children with asthma of the 612,000 children living in Denton, Hood, Johnson, Parker, Tarrant and Wise Counties in north central Texas in 2008. That survey of 7,439 households with a child aged 0-14 years, is the first of its kind effort to ask parents and children about their health issues in order to be able to clearly define the children's health issues in our communities.

One thing is immediately clear from the survey - children's health issues are complex. The first issues identified in the survey findings are all well-known: asthma, obesity, mental health, dental health, abuse, access to care and safety from injury. Every issue has excellent medical programs and community actions under way to improve them. However, the very persistence of these issues strongly suggests that they are not only extremely complex, but that any one group acting alone cannot address them.

This creates a dual challenge. How can a community address the complexity of a given health issue while managing the complexity of close collaboration with others? Systems theory suggests that using an ecosystem model provides the best answer to both challenges.

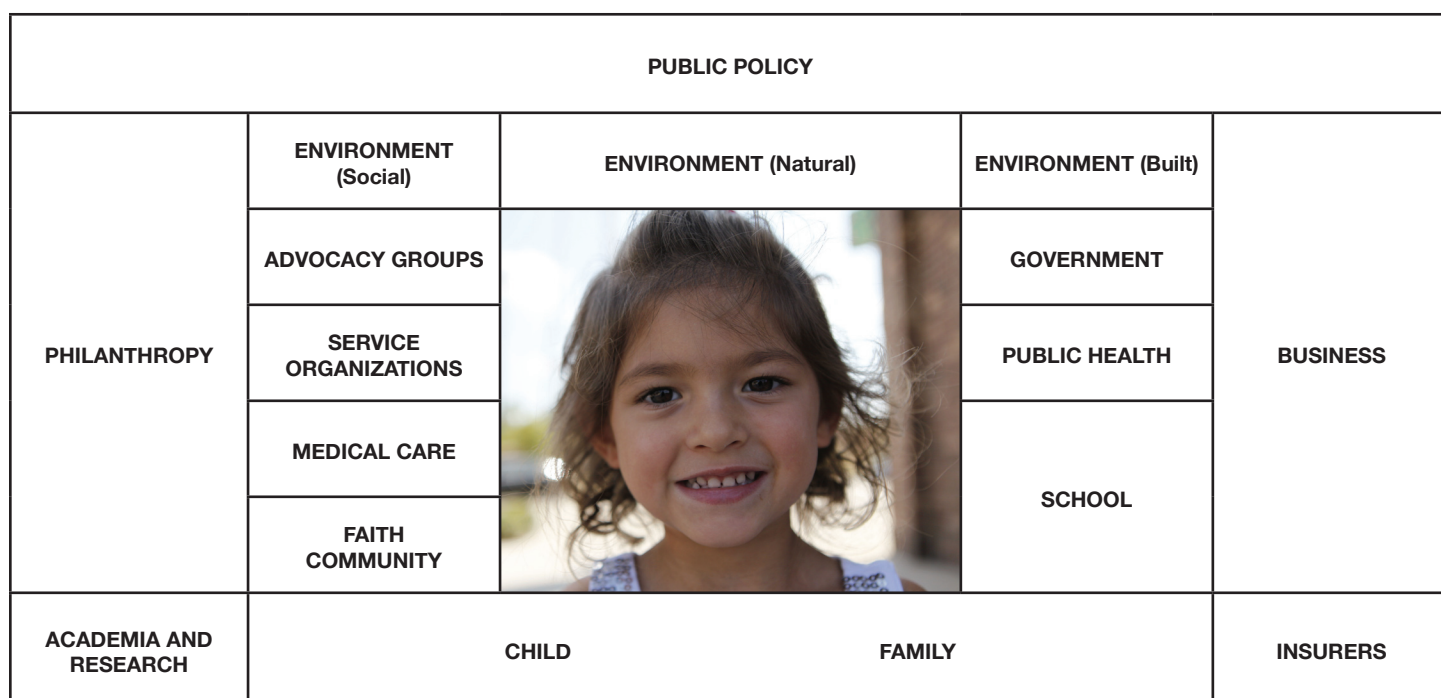
An Ecosystem Model of Children's Health

Ecosystem models are used to understand complex systems², where many parts are free agents and not predictable. Everyone within the system comes with his or her own ideas/agenda and the way the parts mesh is uncontrollable. While there is no recipe for a complex system, there are guidelines and lessons to learn. These models seem to provide an ideal method to define the complex issues and interactions involved in children's health and collaborative solutions.

A search of the current literature shows that while there are some excellent uses of ecosystem modeling, none specifically addresses the health of children. With no practical model, a new ecosystem model was created. It is intended to be a practical tool to describe and understand children's health issues.

The core of the model is the child and the child's family. Around the core are those individuals and organizations that interact most closely with the child and family: schools, faith community, doctors, community services and the environment (natural, built and social). Farther away from the core, but with significant influence are businesses, health insurers, philanthropy and academia/research. Overarching the ecosystem is the body of public policy. The model is also in Appendix A and may be copied for use.

Figure one. An Ecosystem Model for Children's Health



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Important note: When using the ecosystem model as a tool to understand complex children's health issues, each time the tool is used, a different result will likely occur depending upon the composition of the group. Remember that there are no wrong results, only new opportunities to build a healthier future for children.

A think tank approach

To be truly useful to local communities, the ecosystem model needs to use the best resources available in those communities to populate each of the elements of the model. To do that, 32 individuals from the six-county CCHAPS region were invited to represent the individuals and organizations that affect children with asthma. There is a known bias of expertise introduced by the composition of the group since the members self-selected themselves based on their expressed interest in children's health issues and, particularly, childhood asthma. Please refer to the list of participants at the end of this document.

Divided into four, eight-member teams and facilitated by two members of the CCHAPS team, the CCHAPS data on asthma was the starting point for the think-tank discussions. The data is accessible at www.cchaps.org along with a special report titled "Selected Survey Findings on: Asthma" and one-page asthma-specific fact sheets called "KidBits." All are found under the "Library" tab.

Applying the model

The practical application of the ecosystem model unfolds in four progressive steps:

1. Explore the relationship between children with asthma and their interactions with a wide range of other people and organizations.
2. Determine common themes among those interactions.

3. Use the ecosystem model to catalog resources and actions that have the greatest likelihood of improving the health of children with asthma.
4. Recommend an action plan or plans to address childhood asthma.

1. Impacts and interactions

The first step identifies the various impacts childhood asthma has throughout the ecosystem and begins to determine where there may be interactions. Building on the facts from the parents' responses to CCHAPS, think tank members developed the impact of childhood asthma for each of the relevant ecosystem groups and individuals. The top findings are:

Public policy plays a significant role in childhood asthma by:

- Providing funds for research and reimbursement.
- Establishing and enforcing environmental control regulations, like pollution and emission standard.
- Permitting children to carry rescue inhalers in schools designated “drug free.”

Similarly, there are significant **environment** elements to childhood asthma:

The **social environment**

- Must deal with increased tax burdens when other funding fails.
- Faces the loss of social interaction³ when asthmatic children are stigmatized and withdraw.
- Advertising media (television and print) draw attention to asthma and respiratory medications and required disclosure information about side effects, which may contribute to parent misunderstandings and fear about using prescribed medications.

The **natural environment**

- Contains risks to the child with asthma in the form of potential triggers, such as roach droppings, animal dander and dust mites.
- North Central Texas is an allergy “belt” for pollen and spores which are also potential triggers.

The **built (man-made) environment**

- Contains potential triggers from airborne pollutants and emissions from rail, auto⁴, manufacture and oil/gas drilling.

City, county, state and federal governments:

- Fund medical care for asthma when needed (charity care).
- Incur increased costs as the payer for government-sponsored programs like Medicaid and CHIP.
- Local governments bear the added expense of emergency medical management and ambulance services when used in response to severe asthma episodes.
- Must seek to balance their budgets within the appropriate sustainable tax base and rate.

³ Trollvik. Children's Experiences of Living with Asthma: Fear of Exacerbations and Being Ostracized. *Journal of Pediatric Nursing* (2010) article in press

⁴ McConnell, et al. Childhood Incident Asthma and Traffic-Related Air Pollution at Home and School. *Environmental Health Perspectives* • volume 118 | number 7 | July 2010

Service organizations:

- Reach kids after school and during summer – including summer camps.
- Can follow or support the child's individualized asthma action plan.
- Sponsor camps specific to children with asthma, like Camp Broncho, with appropriate asthma education and activities.

Note: during the discussion, think tank participants identified **advocacy groups** as another element of the ecosystem model. Advocacy groups support and promote asthma issues, but do not offer specific services to the asthma community.

Philanthropy:

- Provides funding for research and programs.
- Fills “gaps” where the governments and public policy fail to fund.

Academia is a critical resource which:

- Provides research resources which include facilities, expertise and access to funding.
- Through publications and sponsoring professional meetings, offers an objective forum for open discussion about asthma.
- Offers the opportunity for community based participatory research, which accelerates the adoption of solutions that work.

Businesses are directly impacted by childhood asthma by:

- Lost productivity when employees miss work caring for their child with asthma.
- Increases in out-of-pocket medical expense, if self-insured, or medical insurance premiums.

Similarly, **medical insurers** bear increased costs of care.

Medical providers such as physicians, nurses, hospitals and clinics:

- Provide the diagnostic and treatment expertise.
- Craft individualized asthma action plans for each child and their family.
- Offer the first line of education about asthma.

The **faith community** is impacted by childhood asthma by:

- A loss of social interaction when asthmatics are stigmatized and withdraw.
- Dealing with kids after school and during summer, including day care, after-school care and summer camps.

Childhood asthma affects **school systems**, of all types, in several ways:

- Student absence due to asthma affects both attendance and academic performance.
- Absence reduces the schools' access to average daily attendance (ADA) funding.
- Poorer academic performance reduces the schools' access to funding tied to school performance.
- Social isolation when children are stigmatized by asthma also creates related academic and behavior problems in the school.

- Access to individualized asthma action plans can help identify children “at risk,” but are not always available to the school.

At the heart of the ecosystem model and the most heavily impacted by childhood asthma **are the child and his or her family:**

Child

- An individualized asthma action plan that is an integral part of his or her life.
- Generally less healthy and at greater risk for long-term poorer health.
- Increased absence from school and related falling behind academically.
- Social isolation and related loss of developing social skills.
- Life-long impact of being asthmatic such as restrictions in some careers.

Family

- Family “norms,” culture and belief systems that affect how asthma is viewed and managed.
- Support and coordinate the child’s individualized asthma action plan.
- Potential loss of income when absent from work to care for the child with asthma – in extreme cases loss of job.
- Balancing the family dynamic with siblings of the asthmatic child.

Conclusion:

The ecosystem model clearly demonstrates that childhood asthma is a complex issue, with multiple impacts and interactions across the entire ecosystem.

2. Common themes

The natural progression from recognizing the impacts and interactions of childhood asthma within the ecosystem is to then identify areas that share “common ground” and which may represent core relationships to aid understanding this complex health issue. This may provide the base for action plans to improve the health of children with asthma. The think tank participants found the following common themes:

Individualized asthma action plan

Knowing that each child has different asthma triggers which requires an individualized asthma action plan, makes this a good place to search for places within the ecosystem where the plan is or should be important. There are several excellent formats for this action plan which can be tailored to the child’s needs. No matter what plan is used, all individualized asthma action plans should have the following components:⁵

- Types, doses and frequencies of medicines.
- How to adjust medicines at home in response to particular signs or symptoms.
- Symptoms indicating the need for closer monitoring or acute care.
- Emergency telephone numbers for the doctor, emergency department, rapid transportation and family/friends for support.
- A list of triggers that may cause an asthma attack. This can help inform others and the child of what triggers to avoid.

⁵ Based upon National Heart, Lung and Blood Institute Guidelines for the Diagnosis and Management of Asthma (reviewed and updated in 2007). Adaptation and other content provided through the Asthma Initiative of Michigan accessed December 2010 at http://www.getasthmahelp.org/actionplan_components.asp.

- For moderate or severe asthma, a list of the child's breathing measurements (peak expiratory flow or PEF) including personal best PEF and calculated PEF zones.

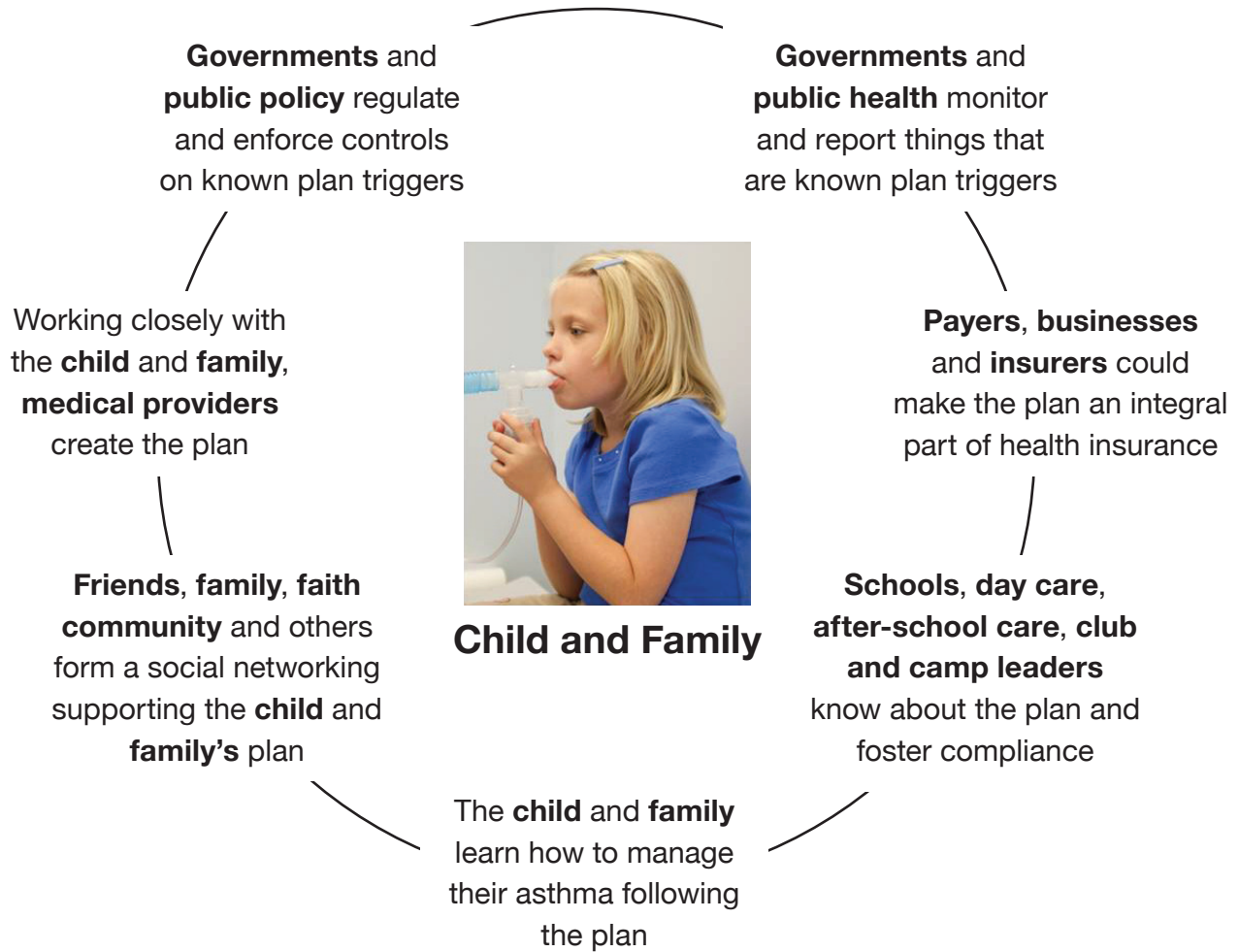
A copy of a child's individual asthma action plan should be:

- Carried with the child.
- Kept in the child's medical chart.
- Provided to the child's day care, school or work site.
- Provided to the child's coach/physical education teacher.
- Provided to other contacts of the child, as needed.

Starting with the individualized asthma action plan, the think tank participants identified the following areas where the plan appears:

- Working closely with the **child** and **family, medical provider** create an evidence-based plan that recognizes every child's asthma can have different triggers and different responses.
- The **child** and **family** must learn how to manage their asthma following the plan, carrying and sharing the plan with their "support system."
- Everyone providing supervision of the child, **schools, day care, after-school care, club** and **camp leaders**, should know about the individualized asthma action plan and foster compliance.
- **Friends, family, faith community** and others should work with the **child** and **family** to find ways to create a social network to support following their plan.
- **Payers, businesses** and **insurers** can find ways to make the individualized care plan an integral part of health insurance by funding it, developing compliance measures and reducing premiums as costs decline.
- **Governments** and **public health** should monitor and report – in real time – things that are known plan triggers such as pollen, ozone, atmospheric particulates and volatile organic compounds.
- **Governments** and **public policy** regulate and enforce controls on known plan triggers, like emission limits on automobiles, manufacturing, etc.

Figure two. Individualized asthma action plan roles



Emotional well-being, behavior and mental health

The next area of common ground relates to the effects asthma has on the child, family and society's emotional well-being. CCHAPS data shows that there are behavioral relationships between asthma and both school performance and conduct, including bullying. However, the experience of the think tank participants provided different insights into asthma's role and relationship with well-being and mental health.

- The **child** may be isolated socially due to limited activity, absence, and stigma and may not develop the normal social skills for success.
- This may place undue pressure on a multi-child **family** to balance the asthmatic child's care and needs with those of non-asthmatic siblings.
- In **school**, peer interactions may include being identified as "different" and stigmatized. Adding to isolation and behavior, including being bullied and bullying others, some participants noted that in order to "fit-in," asthmatic children may "act-out" in ways that seek peer acceptance, but are outside the "norm" for school behavior.
- The **social environment**, society at-large, may foster an environment of social stigma for asthma further isolating the **child** and **family**.
- The **faith community** was identified as a natural venue to restore some balance through social relations, combining peer support for children and families in a social network.

Social, cultural and family “norms”

Bringing new insight, the think tank participants identified a common theme not directly revealed by the CCHAPS data. What families and society view as “normal” can play a significant role in asthma.

- **Family** may view certain asthma symptoms as familial norms: grandpa coughed/wheezed, dad coughs/wheezes, so it’s OK if junior coughs/wheezes.
- Familiar norms may be complicated by **family** cultural beliefs, such as we do not seek medical care unless we are sick or we need to hide this so we are not seen as “different.”
- Seeking medical care may mean taking medicine, which foster **family** concerns about side effects potentially fueled, in part, by advertising disclaimers required by **government** and **public policy**.
- **Family** smokers may not accept the **social environment** and **public policy** guidelines for smoking cessation. CCHAPS data surprisingly shows little difference in the rates of smoking between parents of asthmatics and non-asthmatic children.
- The **social environment, schools** and others, may not recognize or value these individual **family** “norms” adding to social isolation and stigmatization.
- Of note is the observation that being “tagged” as asthmatic may have life-long consequences for the **child** such as limitations on military service or career choices.

Asthma education

Not surprisingly, the participants identified that more asthma education is a critical element of every part of the ecosystem.

- **Medical care providers** must increase asthma education efforts for the child and parents, in culturally appropriate and literacy compatible ways to perhaps lower the barrier to the **child** and **family** “owning” the course of their health.
- **Public health** must increase asthma education and provide assistance to those in need and manage asthma triggers.
- The **school, day care, after-school care, faith community, club and camp leaders** all must contribute to and support the **child** and **family’s** continual learning process about managing their asthma.

Other common themes identified

In addition to these four areas, think tank participants singled out other themes where there is sufficient common ground to build actions:

- Increasing asthma research activity.
- Improving indoor and outdoor air quality at home and throughout public buildings and environments.
- Funding research and education, including reimbursement from insurers.
- Establishing a public policy environment like that around diabetes management.

Conclusion:

The ecosystem model shows that there are many common themes within the system that, when understood, may provide a basis to create a strategic focus for system and policy changes to improve the health of children with asthma.

3. Catalog resources and “things that work”

From data, to impact and through common themes, the next step is to survey what resources are available and really “work” to improve the health of children with asthma. Participants presented their own success stories to the group. They included:

U.S. Environmental Protection Agency, Region 6

Web site: www.epa.gov/asthma

Paula Selzer, children’s environmental health coordinator

EPA’s focus is on environment asthma triggers – accomplished through a comprehensive plan addressing both medical management and environmental triggers. The program has four components:

1. Community outreach and education at www.asthmacommunitynetwork.org/.
2. Asthma grants funding four to six Asthma Tools for Schools grants at \$50,000 each year.
3. National public awareness and media campaigns, free publications.
4. IAQ Tools for Schools – indoor air quality program (see Keller Independent School District).

Asthma programs that are working:

- Asthma Network of West Michigan – demonstrated 63 percent decrease in asthma-related hospitalizations, 30 percent decrease in emergency department (ED) visits and reductions in health care costs of \pm \$800 per child per year.
- Cambridge Health Care Alliance – 3,100 in an asthma registry with 45 percent reduction in hospital admissions and a 50 percent reduction in asthma-related ED visits.
- Children’s Medical Center (Dallas) – 261 children provided a six-month education program with 74 percent reduction in missed school days and 81 percent reduction in asthma-related ED visits.

Southwest Center for Pediatric Environmental Health

Web site: www.swcpeh.org

Larry K. Lowry, Ph.D., director

The center provides education and outreach, consultation by phone and advocacy for children’s health to health care providers, parents and public officials in Texas, New Mexico, Oklahoma, Arkansas and Louisiana.

Resources include:

- Texas Asthma Camp for Kids – Lake Tyler at www.texasasthmacamp.com.
- Breath of Life Mobile Asthma Clinic at www.uthct.edu/patientcare/clinical/allergy/breathmobile.

Other Web-based resources:

- Asthma Coalition of Texas at www.asthma.org.
- Texas Asthma Control Program at www.dshs.state.tx.us/asthma.

The foundation [AAFA-TX] helps asthma and allergy sufferers successfully manage and control their diseases through education, information, training and referrals including presentations and educational games.

Professional education programs:

- “Applying NHLBI Guidelines to Diagnosing & Managing Adult and Adolescent Asthma, a Team Approach” is a category 1 CME symposium for primary care physicians, pharmacists, nurse practitioners, physician assistants and nurses.
- “Asthma Management & Education” is a CE program for nurses and respiratory therapists.
- “The Recognition and Treatment of Anaphylaxis” is a CE program for nurses.
- “Asthma & Allergy Essentials For Childcare Providers” is a CE program for teachers.

Patient & caregiver education programs:

- “Allergy & Asthma Worksite Wellness Programs,” physician-led presentations for patients.
- “Tools to Manage Asthma & Allergies,” simultaneous education programs for kids and parents.

Educational services for patients, caregivers and medical professionals:

- “Tools To Manage Asthma & Allergies,” an educational online presentation for nurses, faculty, patients, parents and caregivers.
- “Air It Out,” monthly electronic newsletter.
- www.aafatexas.org for additional education and information.

Patient support and public awareness:

- Helping Kids Breathe Easier, medication and healthcare assistance for those in need.
- The AAFA-TX Kareem Bacchus Memorial Scholarships, three academic scholarships for Texas students with asthma.
- Free asthma devices for children in need, patient referrals and disease resource center.

North Texas Asthma Consortium

Anne Crowther, board member

The consortium is a project-focused group of professionals across the Dallas-Fort Worth region that is currently focused on three projects:

1. Camp Broncho. A cooperative project between Cook Children’s Medical Center and Children’s Medical Center (Dallas) that is funded by the Ben Hogan Foundation. The camp gives children with asthma, ages 7-12, the opportunity to experience summer camp in a medically safe and educationally supportive environment.

2. The Flag Program provides schools with flags to fly based on each days air quality and a workbook of communication and education materials, including alternative activities.
3. Rules of Two® poster campaign provides schools and primary care offices with posters in English and Spanish that describe the rules for recognizing when asthma is not in control.

Boys and Girls Club of Greater Fort Worth
Daphne Barlow Stigliano, president

Web site: www.fortworthkids.org

Clubs are located in areas of high need in Fort Worth (ZIP codes 76102, 76105, 76104 and 76106) and provide enrichment programs that include:

- Tobacco prevention – funded in part by the Texas Department of State Health Services, prevention educators used Texas-approved curricula to provide information directly to youth about the dangers of tobacco use.
- Health and fitness – daily physical fitness activities involve more than 800 kids with organized sports, games and drills throughout the summer. Triple Play educates youth about remaining active.

Keller Independent School District
Cindy Parsons, BSN, RN, director of health services

Keller ISD's indoor air quality program features a strong asthma management component, including changes to the physical buildings, such as removing all carpeting from classrooms and utilizing green cleaning products. The school district is implementing a comprehensive asthma trigger education program, developed by the Centers for Disease Control and Prevention, on all district campuses to help proactively manage health risks. The program won the 2010 EPA National *Indoor Air Quality Tools for Schools* Excellence Award.

Keller ISD is now working with personnel from various departments, parents, local physicians and community partners to develop and implement a five-year strategic plan to reduce the negative impact of asthma and improve the overall health of Keller students.

healthimo™
Kevin McMahon, president⁷

Web site: www.healthimo.com

healthimo™ is a broad set of integrated technologies and programs that in combination have proven effective through nine years of randomized controlled clinical trials. Currently, 20,000 patients use this approach.

Based on current technology and social networking theory, the only knowledge needed is to understand how to turn on a mobile phone. This approach allows the child and family to make changes in their lives and help others in their social network support them in that effort.

Major health plans recognize this and have offered healthimo™ programs as a covered medical benefit for their members since 2009.

healthimo™ is the winner of the Mobile Health Expo 2010 Award for “Outstanding Contribution to the Growth and Success of Mobile Health.”

UNT Health Science Center, School of Public Health

David Sterling, Ph.D., chairman, Environmental and Occupational Health

“Explore. Define. Measure: An Integrated Curriculum for the Elementary Classroom – A Unit Aligned with Missouri’s Show Me Standards Using Asthma as a Real World Example” is a 15-lesson curriculum meant to enhance students’ knowledge in math, science, and communication arts using asthma as the main theme. This curriculum was developed to be taught in 3rd through 6th grade classrooms and has been aligned with Missouri’s Show Me Standards and grade level expectations.

This curriculum was developed as a part of the Controlling Asthma in St. Louis [CASL] grant and

1. Encourages schools to adopt long-term policies and procedures that minimize the effects of asthma on their students in accordance with CDC’s publication *Strategies for Addressing Asthma within a Coordinated School Health Program* at www.cdc.gov/HealthyYouth/asthma/strategies.htm.
2. Is intended to reduce asthma morbidity and improve quality of life through the identification of and outreach to children with asthma in schools.
3. Promotes the use of a consulting physician model and works to integrate asthma management and control strategies with schools and school nurses to reduce school absenteeism and the number of children sent home due to asthma or illness.

The development of this curriculum was made possible through support from a grant from the Missouri Department of Health and Senior Services’ Diabetes Prevention and Control program (CDC U32/ CCU722693-02) and the “Controlling Asthma in American Cities” project, a Centers for Disease Control and Prevention (CDC) cooperative agreement. The CDC grant (U59/ CCU723263) was awarded to the St. Louis Regional Asthma Consortium in 2001.

Cook Children’s Health Care System

Elizabeth Johnson, Community Health Outreach regional coordinator

A survey of successful community asthma actions found the following models:

- **The Children’s Hospital of Philadelphia:** Community Asthma Prevention Program (CAPP) initially targeted specific underserved areas in Philadelphia and has expanded with grant support from Merck’s Childhood Asthma Initiative. Selected as one of the top asthma programs by University of Michigan Asthma Health Outcomes Projects and received the EPA Children’s Environmental Health Excellence Award.

Web site: www.chop.edu/service/community-asthma-prevention-program-capp/home.html

- **Children's Hospital of Boston:** Community Asthma Initiative (CAI) provides case management with home visitation, community education and public policy advocacy. Focused on children indentified through ED and hospital admission, the initiative is funded by the Bank of America, Health Tomorrows Partnerships for Children and the CDC. The program received the EPA Children's Environmental Health Excellence Award.
Web site: www.childrenshospital.org/clinicalservices/Site1951/mainpageS1951P0.html
- **Allies Against Asthma:** Community coalitions in seven locations with evidence of improved access to care, reduced asthma symptoms and asthma education through collaborative efforts. Developed and funded by the Robert Wood Johnson Foundation and managed by the University of Michigan Center for Managing Chronic Diseases. The project is now closed; however, the coalition sites are still running. They have demonstrated sustainability from a diverse group of organizations.
Web site: www.asthma.umich.edu/
- **Monroe Plan for Medical Care Pediatric Asthma Management Program:** Initially funded by the Robert Wood Johnson Foundation to improve access and care for Medicaid and CHIP children with asthma, it is now funded by the Monroe Plan. Home visits with face-to-face education and care management, demonstrates improved outcomes and quality of life while reducing ED and inpatient asthma care.
Web site: www.pediatricasthma.org/medicaid_managed_care/rochester
- **University of Michigan Health System:** Comprehensive Asthma Management Program provides a patient registry with standardized asthma education and customized action plans. The effort reduced ED visits and hospitalizations, and is funded by third-party payers.
Web site: www.innovations.ahrq.gov/content.aspx?id=2345
- **Medical College of Wisconsin:** Asthma Parent Mentor Program improved parent self-efficiency by pairing parents of asthmatic African-American and Latino children with a trained parent mentor. The program significantly reduced asthma symptoms, missed school and workdays and ED visits while lowering the families' medical costs by \$657. Funded by fees of \$60 per month.
Web site: www4.utsouthwestern.edu/parentmentor/

Conclusion:

Actions that include the following elements are more likely to improve the health of children with asthma^{1,2,3}:

- **Collaboration within the community and across agencies.**
- **Medical care providers' involvement and engagement.**
- **Tailored to the individual community.**
- **Encompass the entire ecosystem.**

1 Clark, N., Lachance, L., Milanovich, A.F., Stoll, S., & Awad, D.F. (2009). Characteristics of successful asthma programs. *Public health reports*, 124(6), 797-805.

2 Clark, N. M., Mitchell, H.E., & Rand, C.S. (2009). Effectiveness of educational and behavioral asthma interventions. *Pediatrics*, 123(Suppl 3), S185-92.

3 Li, P., & Guttman, A. (2009). Recent innovations to improve asthma outcomes in vulnerable children. *Current opinion in pediatrics*, 21(6), 783-788.

4. Recommend an action plan or plans to address childhood asthma

The last step of this progressive process is to combine the results from each of the prior steps into a course, or courses, of action that provide a strategic focus and have the greatest likelihood of building a healthier future for children with asthma.

The plan(s) must lower or eliminate barriers that keep a child with asthma from achieving their full physical, mental and emotional potential.

With almost unlimited ways to begin to improve the health of children with asthma, prevention and treatment are key elements of childhood asthma. However, two other clear plans emerged from the think tank discussions – education and support – with both being critical elements in the ecosystem of childhood asthma that currently need to be addressed in support of prevention and treatment. These recommendations are a “menu” from which communities who have identified childhood asthma as a primary target can:

- Strategically focus their effort.
- Tailor their collaborative efforts to build a healthy future for children.

As a byproduct of this process, Appendix B contains all of the impacts of asthma as identified by the think tank for each element of the ecosystem. Addressing these impacts should lead to other ways to act to improve the health of children with asthma.

Education and information sharing

Develop or support a universal access to asthma information. These plans may work best with an advocacy-based approach, a local champion’s model or a combination of the two.

1. Find ways to help physician and clinical providers adopt and use standardized:
 - Evidence-based/fact-based uniform care plans that can be individualized.
 - Guidelines for HIPAA that permit and foster communication among diverse care-givers.
 - Processes and forms to improve communication – example: a common individualized asthma action plan format.
 - Approaches to child and family informed empowerment for their own care that balances social/family “norms” and risks/benefits.
2. Help implement tools and resources that empower other caregivers such as school nurses, day care providers or club and camp directors by:
 - Duplicating successful school-based asthma programs such as Keller Independent School District’s or use the Environmental Protection Agency’s “Tools for School” model.
 - Incorporating direct translation of research such as putting St. Louis’ findings into action.
 - Promoting funding for system and program resources through increased average daily attendance (ADA) funding.

3. Provide children, families and their “social support systems” with:
 - Age and role appropriate education materials supporting asthma self-management.
 - An adapted version of the EAP’s Indoor Air Quality [IAQ] Tools for Schools program for home use.
 - Information that dispels social and family “norms,” such as coughing or wheezing being just a family trait.
 - Support that will help them find the balance between the worry arising from warnings about prescribed medication side effects and that medication’s intended benefits.
4. Help educate public policy makers about ways to:
 - Make asthma as much a part of public policy as immunizations or diabetes.
 - Foster asthma education as a covered benefit from insurers (government and private).
 - Promote appropriate rules that empower children to manage their own asthma.
 - Understand and manage asthma triggers not within an individual child or family’s control, such as emission controls.

Child and family support systems

Children and families generally receive very specific but intermittent and often time constrained support for helping deal with asthma. The think tank participants identified the need for year-round, more nearly on-demand support systems. Once established these systems can be promoted by hospitals, health systems, insurers, asthma camps and physicians – all helping parents and children better manage asthma.

1. Develop and sustain child and parent mentoring programs by:
 - Providing training for parent mentors, who mentor other families with an asthmatic child.
 - Including nurturing non-asthmatic siblings as part of the asthmatic child’s support network.
 - Holding a “child-focused” education event about asthma using first responders, sports figures or other “heroes” who children emulate.
 - Providing mentoring training for teens with asthma to help younger children.
2. Adapt the “wrap around” program model to asthma management by the family’s entire social network, including:
 - Formal services and interventions.
 - Community services.
 - Interpersonal support and assistance provided by friends, kin and other people.
 - Determining the best use of and adopt social media technology relevant to a “wireless” society using cell phones, text messages, email, Facebook, Twitter and similar modes of communication.
3. Provide training and support systems of persons to help families manage asthma, including:
 - Asthma educators.
 - Case managers or disease managers.
 - Parish nursing programs in the faith community.
 - Promotores or other community health workers.
 - Creating a 24/7 “hotline” to assist families dealing with childhood asthma.

Summary

Results of needs assessments provide a fact base, but implementing a plan to act on those findings is often a challenge. This challenge is the direct result of the complexity of children's health issues and the absolute need for collaboration among an often widely diverse group of people.

Ecosystem modelling, specially adapted to children's health, provides a way to describe those issues with a renewed level of understanding about complex interactions. The think tank process demonstrates that the ecosystem model can have a significant role in understanding the complexities of children's health issues – like childhood asthma – and providing strategic focus around which groups may better collaborate in a mutually supportive manner.

Goal: To reduce or eliminate children's health issues that keep children from achieving their full physical, mental and emotional potential.

The ecosystem model can clearly demonstrate the complexity of children's health issues, and catalog specific impacts and interactions across the entire ecosystem for each issue.

The ecosystem model shows that there are common themes within the system that, when understood, may provide a basis to create a strategic focus for system and policy changes to improve the health of children.

Actions that include the following elements are more likely to improve the health of children:


- **Collaboration within community and across agencies.**
- **Medical care providers' involvement and engagement.**
- **Tailored to the individual community.**
- **Encompass the entire ecosystem.**

Finally, this process creates a way to design plans to improve children's health that can be tailored to fit the needs and resources of individual communities acting together.

The result? An increased likelihood of building a healthier future for all children!

Appendix A. An Ecosystem Model for Children’s Health

APPENDIX A. AN ECOSYSTEM MODEL FOR CHILDREN’S HEALTH

PUBLIC POLICY					
PHILANTHROPY	ENVIRONMENT (Social)	ENVIRONMENT (Natural)	ENVIRONMENT (Built)	BUSINESS	
	ADVOCACY GROUPS		GOVERNMENT		
	SERVICE ORGANIZATIONS		PUBLIC HEALTH		
	MEDICAL CARE		SCHOOL		
	FAITH COMMUNITY				
ACADEMIA AND RESEARCH	CHILD		FAMILY		INSURERS

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Appendix B. Identified impacts that may suggest ways to act to improve the health of children with asthma.

Introduction: Identifying the various impacts that asthma has throughout the Children’s Health Ecosystem Model is the cornerstone of the think tank process. Cataloging these impacts provides:

- Keys to understanding the complexity of children’s health issues.
- Opportunities for a diverse community to understand their respective role(s).
- An understanding of common themes, which in turn allows a more strategic approach for potential solutions and therefore a more efficient use of resources.

For these reasons the compiled work sheets are shown here to support this document’s content and to foster new understanding and approaches for communities to address childhood asthma.

[✓ = the number of times a specific impact was identified]

Family		Child	
✓✓✓✓✓	Family behaviors and activity (smoking)	✓✓✓✓	Individualized care plan
✓✓✓✓✓	Family culture and belief system(s)	✓✓✓	↓ Health (co-morbidities)
✓✓✓✓✓	Individualized care plan	✓✓✓	↑ Social isolation - adherence
✓✓✓✓	Own the “intervention” i.e., accountability	✓✓	Life-long impact of “asthma” diagnosis
✓✓	Household hygiene (indoor air and environmental quality)	✓✓	Own the “intervention” i.e., accountability
✓✓	“Helicopter” parenting	✓	Family culture and belief system(s)
✓✓	↑ Social isolation	✓	Access to care and medications
✓✓	↓ Income (work absence)	✓	↑ Awareness = ↓ stigma
✓✓	Heredity (cough/wheeze is the “norm”)	✓	Medications produce hyperactivity
✓	↑ Cost for school	✓	↓ Social skill development
✓	↑ Out-of-pocket medical costs	✓	↑ Limited activity
✓	Access to care and medications	✓	↑ School absence
✓	Allergen isolation (“untrained” immune system)	✓	↓ Quality of life
✓	Seek care at appropriate site (ED avoidance)	✓	↓ Academic performance
✓	Sibling issues due to focus on asthmatic child	✓	↑ Behavior issues = “acting-out” to “fit-in”
	↓ Quality of life	✓	What to do in summer?
	Job loss (extreme)	✓	Trauma from unmanaged episode
		✓	↑ Bullying
			↑ Long-term health risks
Public policy			
✓✓✓	Reimburse/fund research, management piece		
✓✓	Pollution/emission regulations/enforcement		
✓✓	Legislation on asthma like that related to diabetes		
✓✓	Research used to guide asthma		
✓	Registry process similar to immunization		
✓	Policy advocacy group for asthma		
✓	Insurance regulation specific to asthma		

Environment (social)

- ✓✓✓✓✓ ↑ Tax burden
- ✓✓✓✓ ↓ Social interaction (social isolation)
- ✓✓ Advertising media (reduce stigma)
- ✓✓ Societal culture and belief system(s) - what's normal
- ✓ Reporting air quality
- ✓ Social networking and using technology to communicate

Environment (natural)

- ✓✓✓ Triggers (roach droppings, animal dander, dust mites)
- ✓✓ Allergy belt for pollen and spores

Environment (built)

- ✓✓✓✓✓ Air quality (in and out)
- ✓✓✓ Responsive to research
- ✓✓ Awareness of impact of life styles (e.g., smoking ban)
- ✓ Ozone level awareness and pollen count
- ✓ ↑ Pollutants/emissions (rail, auto, manufacture, oil/gas drilling)
- ✓ More safe walking/biking trails

Government

- ✓✓✓ Reimburse (fund) research, management piece
- ✓✓✓ Asthma as a health priority
- ✓✓ ↑ Medical costs (Medicaid payer)
- ✓ Monitor air quality
- ✓ Track incidence
- ✓ Funding from tobacco tax proceeds
- ✓ ↑ EMT expenses incurred

Public health

- ✓✓✓✓ Public education
- ✓✓ Studies and research
- ✓✓ Outreach
- ✓ Advocacy

Service Organizations

- ✓✓✓ Reach kids during summer
- ✓✓✓ Individualized care plan
- ✓✓ Health issue-based camps (Camp Broncho) with activities
- ✓✓ Education (tobacco use prevention)
- ✓ Advocacy
- ✓ Provider role when providing child care
- Rules of 2 campaign
- Flag campaign

[✓ = the number of times a specific impact was identified]

Medical care providers

- ✓✓✓✓✓ ↑ Medical service adherence to evidence-base practices
- ✓✓✓✓✓ Individualized care plan
- ✓✓✓✓✓ Appropriate site of care/use of resources (ED avoidance)
- ✓✓✓ Asthma education
- ✓ Access to care and medications
- ✓ Consider environment
- ✓ Medication over-use
- ✓ Family culture and belief system(s) - delay seeking care
- ✓ Better grasp of HIPAA

Faith

- ✓✓✓✓✓ ↑ Education for congregants
- ✓✓✓✓✓ Social relations; peer support/pressure
- ✓✓✓ "Message center"
- ✓✓ Individualized care plan
- ✓✓ Outreach opportunities
- ✓ Adverse impact on giving
- ✓ Parrish nursing opportunities
- ✓ Provider role when providing child care
- ↓ Engagement
- ↓ Attendance

Schools

- ✓✓✓✓✓ Individualized care plan
- ✓✓✓✓✓ Improve indoor air quality
- ✓✓✓ ↑ Isolation (emotional consequences)
- ✓ ↓ \$\$\$ under pay for performance
- ✓ ↑ Absence ↓ Average daily attendance payment
- ✓ ↑ Bullying
- ✓ Alternate activity plan
- ✓ Issues with school busses
- ✓ Asthma education
- ✓ Engage School Health Advisory Committees (SHACs)
- ✓ Fund full-time school nurses
- ↓ Academic performance
- ↑ Behavior issues
- ↑ Liability

[✓ = the number of times a specific impact was identified]

Business

- ✓✓✓✓ ↓ Worker productivity (absence)
- ✓✓✓ ↑ Technology/therapies/treatments
- ✓✓ ↑ Medical cost (self-insured)
- ✓✓ ↓ (long term) in work force talent/limitation
- ✓✓ PHARMA: media influence
- ✓✓ Business sponsored programs
- ✓✓ Carpooling initiatives
- ✓ ↑ Medical premiums
- ✓ PHARMA: Research funding
- ✓ PHARMA: Corporate giving policy
- ✓ New business opportunity? - parenting help

Insurers

- ✓✓✓ Comprehensive coverage
- ✓✓✓ Cover the costs of:
 - ✓✓ ↑ Medical costs
 - ✓ ↑ Medical premiums
- ✓ Individualized care plan
- ✓ Affordability
- ✓ Case manage asthma ED visits
- ✓ Reimburse only evidence-based asthma plans

Philanthropy

- ✓✓✓ Research funding
- ✓✓ Fill gaps that government fails to fund
- ✓ Program funding (camps)
- ✓ ↑ Strained to meet needs
- ✓ Appropriate use of limited resource

Academia/research

- ✓✓✓✓✓ Research (including community-based participatory research)
- ✓ Outcome tracking
- ✓ Health forums

[✓ = the number of times a specific impact was identified]

Appendix C. Healthy People 2020 Respiratory Objectives edited to focus on Children's Health

Healthy People 2020 Objectives		Target	Baseline	Unit of measure	Our target?
Reduce asthma deaths					
	Persons <35 years old	None	3.4	Asthma deaths per 1 million pop	
	Our measured baseline				
Reduce hospitalizations for asthma					
	Children <5 years old	18.1	41.4	Hospitalizations per 10,000 pop	
	Persons <35 years old	8.6	11.1	Hospitalizations per 10,000 pop	
	Our measured baseline				
Reduce ED visits for asthma					
	Children <5 years old	95.5	132.7	ED visits per 10,000 pop	
	Persons <35 years old	49.1	56.4	ED visits per 10,000 pop	
	Our measured baseline				
Reduce activity limitations among persons with asthma					
	All persons	10.2	12.7	% with current asthma who limit activity	
	Our measured baseline				
Reduce the proportion of persons with asthma who miss school or work days					
	Children ages 5-17	48.7	58.7	% who missed school due to asthma	
	Our measured baseline				
Increase the proportion of persons with current asthma who receive formal patient education					
	All persons	14.4	12.1	% with current asthma who rcv'd edu	
	Our measured baseline				
Increase the proportion of persons with current asthma who receive appropriate asthma care according to National Asthma Education and Prevention Program (NAEPP) guidelines:					
	receive written asthma management plans	36.8	33.4	% who receive written asthma management plan	
	Our measured baseline				
	with prescribed inhalers who receive instruction on their use	None	95.9	% who received inhaler instruction	
	Our measured baseline				
	receive education about appropriate response to an asthma episode	68.5	64.8	% who received response education	
	Our measured baseline				
	do not use more than one canister of short-acting inhaled beta agonist per month	90.2	87.9	% who did not use > 1 canister	
	Our measured baseline				
	who have been advised to change things in their home, school to reduce exposure	54.5	50.8	% advised on changes to reduce exposure	
	Our measured baseline				
	have had at least one routine follow-up visit in the past 12 months	developmental			
	Our measured baseline				
	whose doctor assessed their asthma control in the past 12 months	developmental			
	Our measured baseline				

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