Memorandum

CITY OF DALLAS

DATE September 19, 2018

TO Honorable Members of the Quality of Life, Arts & Culture Committee: Sandy Greyson (Chair), Mark Clayton (Vice Chair), Rickey D. Callahan, Jennifer S. Gates, Scott Griggs, B. Adam McGough, Omar Narvaez

SUBJECT Project Highlight: Breathe Easy Dallas

On Monday, September 24, 2018, you will be briefed on the Project Highlight: Breathe Easy Dallas. The briefing materials are attached for your review.

Please feel free to contact me if you have any questions or concerns.

Joey Zapata
Assistant City Manager

c: T.C. Broadnax, City Manager
Chris Caso, City Attorney (I)
Craig Kinton, City Auditor
Bilierae Johnson, City Secretary
Preston Robinson, Administrative Judge
Kimberly Bizor Tolbert, Chief of Staff to the City Manager
Majed A. Al-Ghafry, Assistant City Manager
Jon Fortune, Assistant City Manager
Nadia Chandler Hardy, Assistant City Manager and Chief Resilience Officer
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Directors and Assistant Directors

Breathe Easy Dallas

Healthy air. Healthy kids.

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Dallas Independent School District

OEQ Office of Environmental Quality

The Nature Conservancy Texas

City of Dallas

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- **Project overview**
  - Goal
  - Partners and stakeholders
  - Ph I and Ph II
- **Research context and design**
- **Questions**

Breathe Easy Dallas

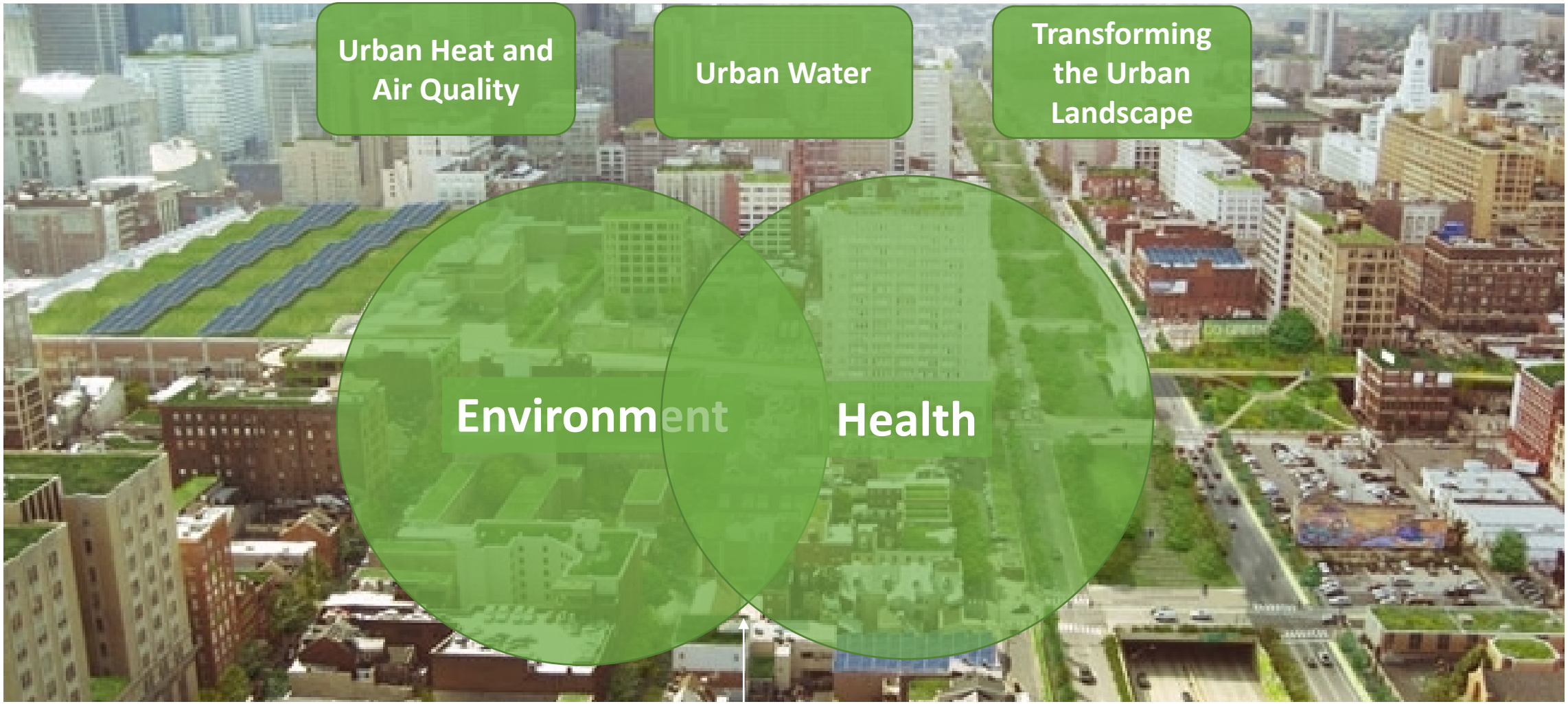
Healthy air. Healthy kids.

Breathe Easy Dallas brings together The Nature Conservancy (TNC), the City of Dallas (the City), Dallas Independent School District (DISD), Texas A&M Transportation Institute (TTI), and public health and other community leaders to improve health, educational, and social outcomes for Dallas children at high risk for asthma-related absenteeism.

- The project will study the impact of selected interventions—reduced idling, school-based health initiatives, and tree plantings—on air quality and asthma-related absenteeism at select schools.
- Gather high quality local data.
- Integrate stakeholders into process & share lessons.
- Project emerged from a collaborative situational analysis of environmental health challenges facing Dallas, facilitated by The Nature Conservancy in 2017.

BUILDING HEALTHY CITIES

The Nature Conservancy



In cities, TNC brings **science**, **collaboration**, and **nature-based solutions** to build cities where both nature and people can thrive.

BUILDING A COOL, CLEAN, RESILENT DALLAS

In 2017, The Nature Conservancy facilitated **a collaborative situational analysis**

- opportunities for widespread, impactful, and scalable solutions
  - air quality
  - urban heat
  - water quality and quantity
  - access to green space

The Nature Conservancy | Texas Trees Foundation | The Trust for Public Land | City of Dallas | Texas A&M AgriLife Research | bc | children's health | Parkland | North Central Texas Council of Governments | Dallas Independent School District

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- **Dallas has a persistent problem with poor air quality and pediatric asthma.**
- The region consistently fails to meet regulatory limits on ozone pollution.
- According to health researchers, DFW "far exceeds both the state and national rates" for childhood asthma.[1]
- Dallas County leads the region for hospitalizations from childhood asthma.[2]
- Respiratory issues are a leading cause of absenteeism among Dallas Independent School District (DISD) students.

[1] *Asthma: Six-county profile*. content from their regular Community-wide Children's Health Assessment and Planning Survey (CCHAPS). https://www.centerforchildrenshealth.org/en-us/HealthIssues/asthma/Pages/Asthma.aspx. Retrieved online May 18, 2018.
[2] Texas Department of State Health Services (2011) in *Asthma statistics and facts from Children's Medical Center Dallas*. Retrieved online May 18,

- **Research indicates that not all children are impacted equally**.

- The Center for Disease Control finds that in the U.S., black children are twice as likely as white children to have asthma, and with greater severity—experiencing higher-than-average rates of hospitalization, emergency room visits and deaths from asthma. [3]

- Recent research further demonstrates "a link between asthma and an increased risk of falling into poverty."[4]

- Local government, education, non-profit and health care leaders in Dallas are eager to improve outcomes for asthmatic children but ***have lacked the data*** to most effectively direct programs and resources to address both health and air quality.

[3] Center for Disease Control and Prevention (CDC). (2017). *Asthma's Impact on the Nation* in Children's Health. Beyond ABC's, Assessing the Well-being of North Texas Children. Retrieved online May 18, 2018.
[4] Callander, E.J.; Schofield, D.J. (2015). Effect of asthma on falling into poverty: The overlooked costs of illness. *Annals of Allergy, Asthma & Immunology*, 374-378. Quoted in Beyond ABC's, Assessing the Well-being of North Texas Children. Published by Children's Health 2017.

- ***Phase I:***
  - *Identify schools- high % students with asthma; high risk;*
  - *Engage Texas A&M Transportation Institute - research design*
    - **Center of Advancing Transportation Emissions, Energy, and Health (CARTEEH)**
  - *Install air quality monitors & connect to COD Smart Cities platform.*
  - *Work with DISD staff to track asthma-related absenteeism*
  - *Baseline measures collected for SY 2018-2019.*
  - *Stakeholders involved in implementation design (Ph II)*

- ***Phase II:***
  - *Continue to collect measures on air quality and asthma-related absenteeism for SY 2019-2020.*
  - *Implement 3 practical measures: trees/vegetation, anti-idling, school based health.*
  - *Analyze results and make recommendations.*

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PLANTING HEALTHY AIR

The Nature Conservancy

- **Air quality benefits of trees & vegetation**
- Global analyses cooling and air quality benefits of trees; localized studies on impacts and cost-benefits.
- Trees remove air pollution by the interception of particulate matter on plant surfaces and the absorption of gaseous pollutants through the leaf stomata.
- PM and cooling benefits documented- *localized* benefits most clear for PM.
- Smart siting of trees important to maximize benefits
- TNC's **Green Heart Project** in Louisville, KY. Pilot school tree planting:
  - Found 60% less PM behind buffer
  - Immune system function increased, inflammation levels decreased

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Phase I: Baseline Measures

School

School

School

* Note: 9 total schools

Phase II: Intervention

School

School

School

* Note: 9 total schools

Aeroqual AQY1; O_3, NO_2, PM 2.5, 10; temperature, relative humidity

- 228 k-12 schools
  - 14,622 students, 9.5% student body, identified with asthma
  - (2.1% - 28.8%) [US mean is 8.3% (<18)]
  - 54% DISD schools have higher than district average rates of students with asthma.
  - 18 k-12 schools (8%) have > 17% of students ID's with asthma.
  - of those 18 schools, 17 (89%) are located below I-30.

- *Design a study to collect local data **to improve the health and educational outcomes** for the many Dallas children suffering from asthma.*

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- Research context
- Research design considerations
- Next steps

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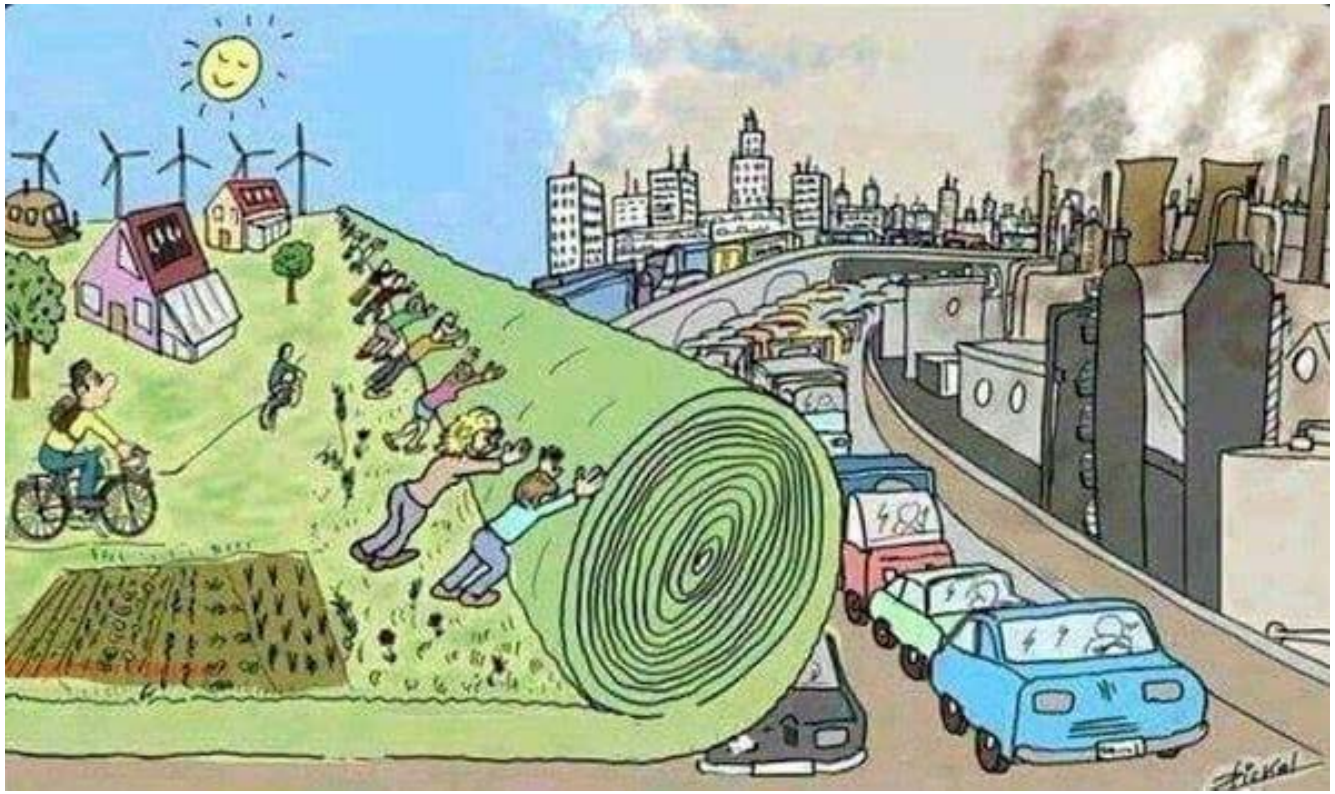

What we know:

Air Quality & Childhood Asthma

- Sufficient evidence that air pollution is associated with the exacerbation of childhood asthma
- Sufficient evidence that traffic-related air pollution is associated with the onset of childhood asthma

PLOS ONE

RESEARCH ARTICLE

Effect of outdoor air pollution on asthma exacerbations in children and adults: Systematic review and multilevel meta-analysis

Pablo Orellano[1,2]*, Nancy Quaranta[2,3], Julieta Reynoso[4], Brenda Balbi[4], Julia Vasquez[4]

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Abstract

Background

Several observational studies have suggested that outdoor air pollution may induce or aggravate asthma. However, epidemiological results are inconclusive due to the presence of numerous moderators which influence this association. The goal of this study was to assess the relationship between outdoor air pollutants and moderate or severe asthma exacerbations in children and adults through a systematic review and multilevel meta-analysis.

Material and methods

We searched studies published in English on PubMed, Scopus, and Google Scholar between January 2000 and October 2016. Studies following a case-crossover design with records of emergency departments and/or hospital admissions as a surrogate of moderate or severe asthma exacerbations were selected. A multilevel meta-analysis was employed, taking into account the potential clustering effects within studies examining more than one lag. Odds rati
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Results

Database sea
tive analysis.
thma exacerb
PM_{10}: 1.024;

OPEN ACCESS

Citation: Orellano P, Quaranta N, Reynoso J, Balbi B, Vasquez J (2017) Effect of outdoor air pollution on asthma exacerbations in children and adults: Systematic review and multilevel meta-analysis. PLoS ONE 12(3): e0174050. https://doi.org/10.1371/journal.pone.0174050

Editor: Qinghua Sun, The Ohio State University, UNITED STATES

Received: September 5, 2016

Accepted: March 2, 2017

Published: March 20, 2017

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Data Availability Statement: All relevant data are within the paper and its Supporting Information files.

Funding: This study did not receive any specific funding, but was supported by the research budget of the Universidad Tecnológica Nacional, Facultad Regional San Nicolas. PO is supported by the Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), and NQ by the Comisión de Investigaciones Científicas (CIC).

HEI

SPECIAL REPORT 17

HEALTH EFFECTS INSTITUTE

January 2010

PRESS VERSION January 12, 2010

Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects

HEI Panel on the Health Effects of Traffic-Related Air Pollution

Environment International 100 (2017) 1–31

Contents lists available at ScienceDirect

Environment International

journal homepage: www.elsevier.com/locate/envint

ELSEVIER

Review article

Exposure to traffic-related air pollution and risk of development of childhood asthma: A systematic review and meta-analysis

Haneen Khreis [a,*], Charlotte Kelly [a,b], James Tate [a], Roger Parslow [c], Karen Lucas [a], Mark Nieuwenhuijsen [d,e,f]

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ARTICLE INFO

Article history:
Received 6 July 2016
Received in revised form 4 November 2016
Accepted 10 November 2016
Available online 21 November 2016

Keywords:
Asthma
Childhood
Traffic-related air pollution
Meta-analysis
Black carbon
Transport policy

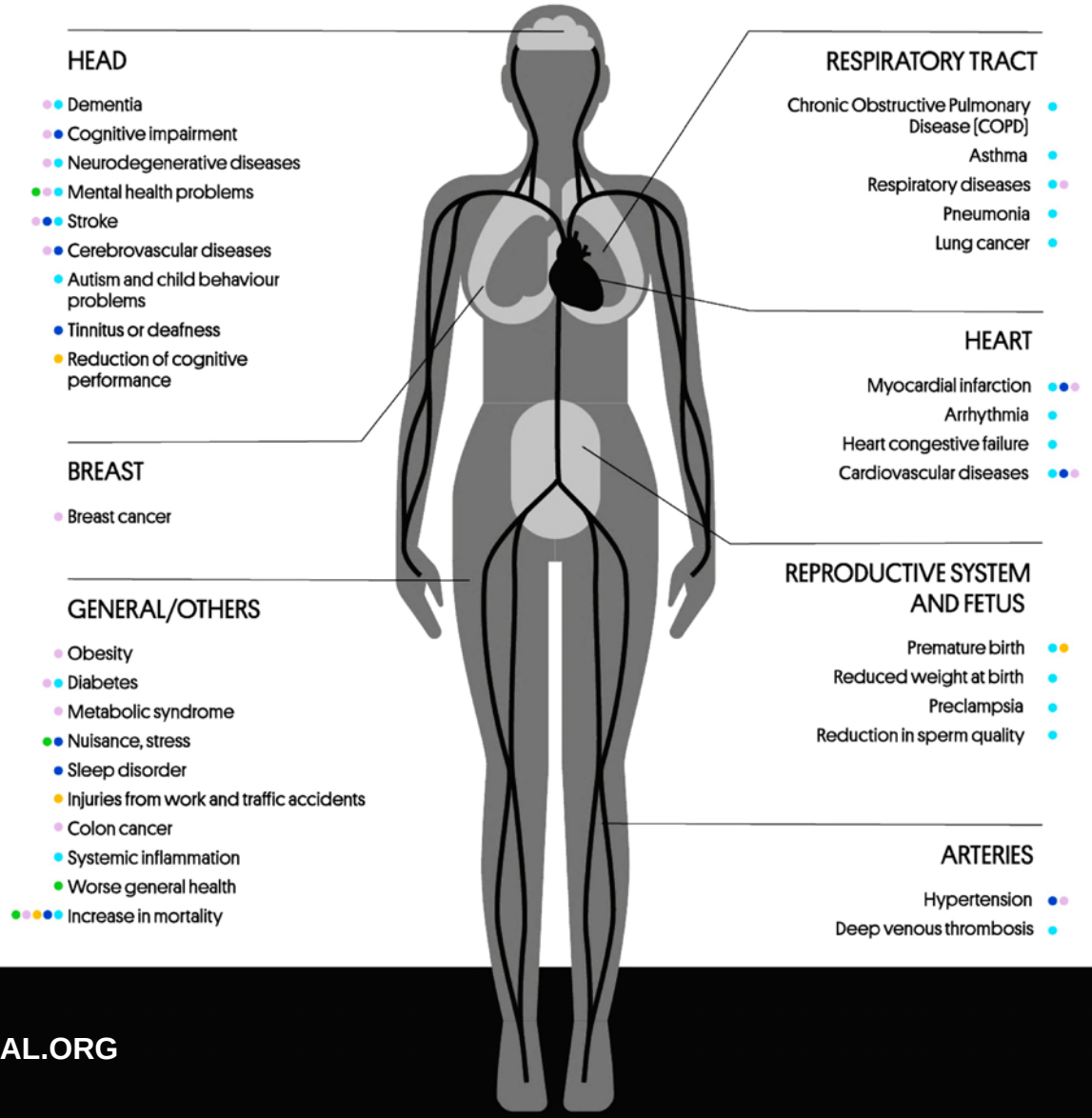
ABSTRACT

Background and objective: The question of whether children's exposure to traffic-related air pollution (TRAP) contributes to their development of asthma is unresolved. We conducted a systematic review and performed meta-analyses to analyze the association between TRAP and asthma development in childhood.
Data sources: We systematically reviewed epidemiological studies published until 8 September 2016 and available in the Embase, Ovid MEDLINE (R), and Transport databases.
Study eligibility criteria, participants, and interventions: We included studies that examined the association between children's exposure to TRAP metrics and their risk of 'asthma' incidence or lifetime prevalence, from birth to age 18 years old.
Study appraisal and synthesis methods: We extracted key characteristics of each included study using a predefined data items template and these were tabulated. We used the Critical Appraisal Skills Programme checklists to assess the validity of each included study. Where four or more independent risk estimates were available for a continuous pollutant exposure, we conducted overall and age-specific meta-analyses, and four sensitivity analyses for each summary meta-analytic exposure-outcome association.
Results: Forty-one studies met our eligibility criteria. There was notable variability in asthma definitions, TRAP exposure assessment methods and confounder adjustment. The overall random-effects risk estimates (95% CI) were 1.08 (1.03, 1.14) per 0.5×10^{-5} m^{-1} black carbon (BC), 1.05 (1.02, 1.07) per 4 $\mu g/m^3$ nitrogen dioxide (NO_2), 1.48 (0.89, 2.45) per 30 $\mu g/m^3$ nitrogen oxides (NO_x), 1.03 (1.01, 1.05) per 1 $\mu g/m^3$ Particulate Matter <2.5 μm in diameter ($PM_{2.5}$), and 1.05 (1.02, 1.08) per 2 $\mu g/m^3$ Particulate Matter <10 μm in diameter (PM_{10}). Sensitivity analyses supported these findings. Across the main analysis and age-specific analysis, the least heterogeneity was seen for the BC estimates, some heterogeneity for the $PM_{2.5}$ and PM_{10} estimates and the most heterogeneity for the NO_2 and NO_x estimates.

ISGlobal

How Urban Environment Impacts our Health

- Air pollution
- Noise
- Heat
- Lack of physical activity
- Lack of natural spaces



DIGITAL REPORT

What we do not know:

- Scarce literature on health effects of implementation measures.
- Few studies have documented health improvements resulting from specific real-life interventions.
- ***"Future research needs to better monitor, evaluate and build a new evidence base for the effectiveness and feasibility of healthy urban and transport interventions as they happen."***

Journal of Transport & Health 6 (2017) 209–227

Contents lists available at ScienceDirect

Journal of Transport & Health

journal homepage: www.elsevier.com/locate/jth

Health impacts of urban transport policy measures: A guidance note for practice

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ABSTRACT

Background: Urban transport related exposures ar
burden of morbidity and premature mortality, wh
practices. Cities now have access to an increasin
which continue to expand. However, the health i
plicitly defined or well understood and therefore
lecting policy measures.
Aims: The aim of this paper is to qualitatively re
indexed in the Knowledgebase on Sustainable Url
provide an indication of their potential health imp
Results: We report that key health impacts of tra
crashes, traffic-related air pollution, noise, heat isl
climate change and social exclusion and communi
expected health impacts of transport policy measur
but not all, can have a positive impact on health. Th
impacts remains largely unknown and warrants fu
Conclusions: Urban transport is responsible for a lar
measures that are beneficial to health need to be i
considerable differences between these policy mea
this should be considered in any transport planning
of all policy measures to provide further evidence
ensure that the most cost-effective solutions, with
risks, are being adopted.

COALITION FOR URBAN TRANSITIONS
A New Climate Economy Special Initiative

Background Paper

The Economic and Social Benefits of Low-Carbon Cities: A Systematic Review of the Evidence

Andy Gouldson, Andrew Sudmant, Haneen Khreis, and Effie Papargyropoulou

CONTENTS

Executive summary

Over half of the population of the world live in urban areas. This means that efforts to meet human development goals and sustain economic growth must be concentrated in cities. However, the pursuit of more prosperous, inclusive and sustainable urban development is complicated by climate change, which multiplies existing environmental risks, undermines the effectiveness of existing infrastructure, and creates new resource constraints.

In this paper, we conclusively demonstrate that there are many synergies between aspirations for urban development and the imperative for climate action. We draw on over 700 papers, focusing on the literature on low-carbon measures in the buildings, transport, and waste sectors. This systematic review clearly shows that low-carbon measures can help to achieve a range of development priorities, such as job creation, improved public health, social inclusion, and improved accessibility.

There is already strong evidence of an economic case for climate action. *The Stern Review: The Economics of Climate Change* demonstrated that the benefits of strong and early action to reduce greenhouse gas emissions far outweigh the economic costs of not acting.[1] Subsequent research for the Global Commission on the Economy and Climate demonstrated that low-carbon measures could be economically attractive on their own merits. One analysis suggested that low-carbon investment in cities might have a net present value of US$16.6 trillion by 2050.[2] This economic case is

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Breathe Easy Dallas:

- Measured (rather than modeled) air pollution data at schools where kids pick up exposure
- Measured (rather than modeled) health data related to asthma exacerbations
- Real-world, practical and feasible interventions which can be transferable
- Stakeholder engagement and public concerns
- Focusing on vulnerable populations in high risk areas

Improve the health and quality of life for Dallas's most vulnerable kids and families

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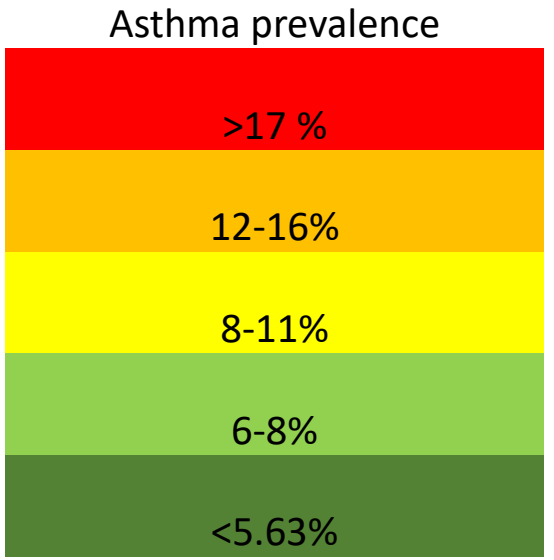
Texas A&M Transportation Institute | Dallas Independent School District | OEQ Office of Environmental Quality | The Nature Conservancy Texas | City of Dallas

Basis for school selection:

How effective are the three proposed interventions/practical solutions in reducing childhood asthma related absenteeism; especially in high risk schools?

Schools selection criteria:



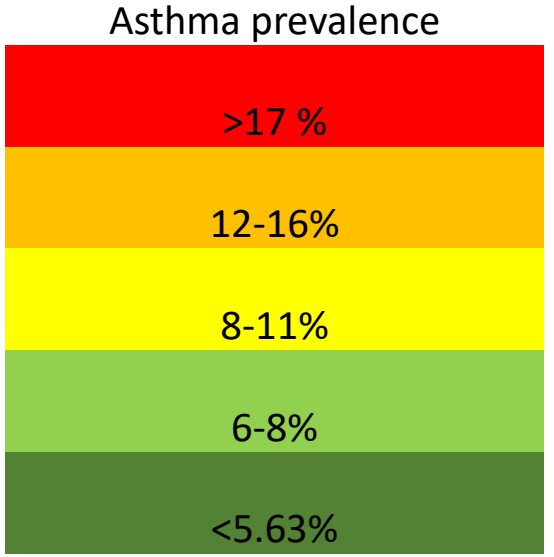
- Elementary schools (ages 5-10).
  - Retention of same pool of kids
  - Diagnosis relatively reliable at 6 years old
  - Younger kids are more susceptible to air pollution
- School is amongst schools with highest number of asthmatic kids as determined by the school records.
  - 11 out of 16 suggested schools were in the red and orange category based on the asthma prevalence/percentage metric
- Design considerations for each of the interventions. *(cont.)*

Intervention design considerations:

- School has the potential for implementing at least one (ideally more than one) of three proposed:
  - **Vegetation**: the school has physical space to plant trees in a suitable location, not very green already, downwind from a major roadway or major industry
  - **Anti-idling**: the school has a high number of students which was considered as a proxy for a high number of school buses and/or passenger vehicles which will be impacted by the anti-idling intervention, the school is close to a major roadway (in the red road category)
  - **Health intervention**: the school has no or minimal health interventions in place and the research team has adequate access to monitoring staff and existing health intervention teams to ensure good coordination

Schools selection criteria (cont.):

- Elementary schools (ages 5-10).
  - Retention of same pool of kids
  - Diagnosis relatively reliable at 6 years old
  - Younger kids are more susceptible to air pollution
- School is amongst schools with highest number of asthmatic kids as determined by the school records.
  - 11 out of 16 suggested schools were in the red and orange category based on the asthma prevalence/percentage metric
- Design considerations for each of the interventions.
- Supplementary quantitative analysis to determine most influential risk factors that impact number and percentage of kids with asthma in schools.
- The identified list of schools was shared with multiple stakeholders in the city of Dallas including Dallas Independent School District, City of Dallas, Texas Trees Foundation, Positive Breathing, Children's Health, and Parkland. The stakeholders provided further valuable insight based on on-the-ground information.



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Recommended schools:

Asthma prevalence category	% Asthma ID Students	# Student with Asthma	# Students	% Poverty	Identified statistically as high risk group?
1	21.81%	89	408	39.90	Yes – group 9
2	21.61%	94	435	44.60	Yes – group 10
3	20.04%	102	509	38.40	Yes – group 9
4	19.22%	104	541	56.20	Yes – group 10
5	17.10%	59	345	44.60	Yes – group 10
6	15.45%	85	550	30.90	Yes – group 7 (medium risk category)
7	13.67%	70	512	30.90	Yes – group 8
8	13.04%	54	414	44.60	Yes – group 10
9	12.45%	61	490	9.60	No – group 4
10	12.16%	81	666	43.60	No – group 3
11	12.04%	65	540	34.80	Yes – group 7 (medium risk category)
12	11.90%	67	563	23.30	Yes – group 8
13	11.22%	46	410	34.80	Yes – group 8
14	10.14%	51	503	35.20	Yes – group 8
15	9.07%	106	1169	30.30	No – group 1
16	8.33%	62	744	35.20	No – group 1

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Status:

- With stakeholder input, 152 schools refined to 16.
- Health measures, training and data collection process refined with DISD Health Services.
- 12 monitors co-located at COD Hinton site.
- Initial calibration completed.

Next Steps:

- Final site selection with DISD.
- Installation of monitors at study sites & connect to City's Open data portal.
- Training of DISD staff.
- Begin data collection.
- Refine implementation design.
- Baseline year analysis.

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Thank You.

Questions?