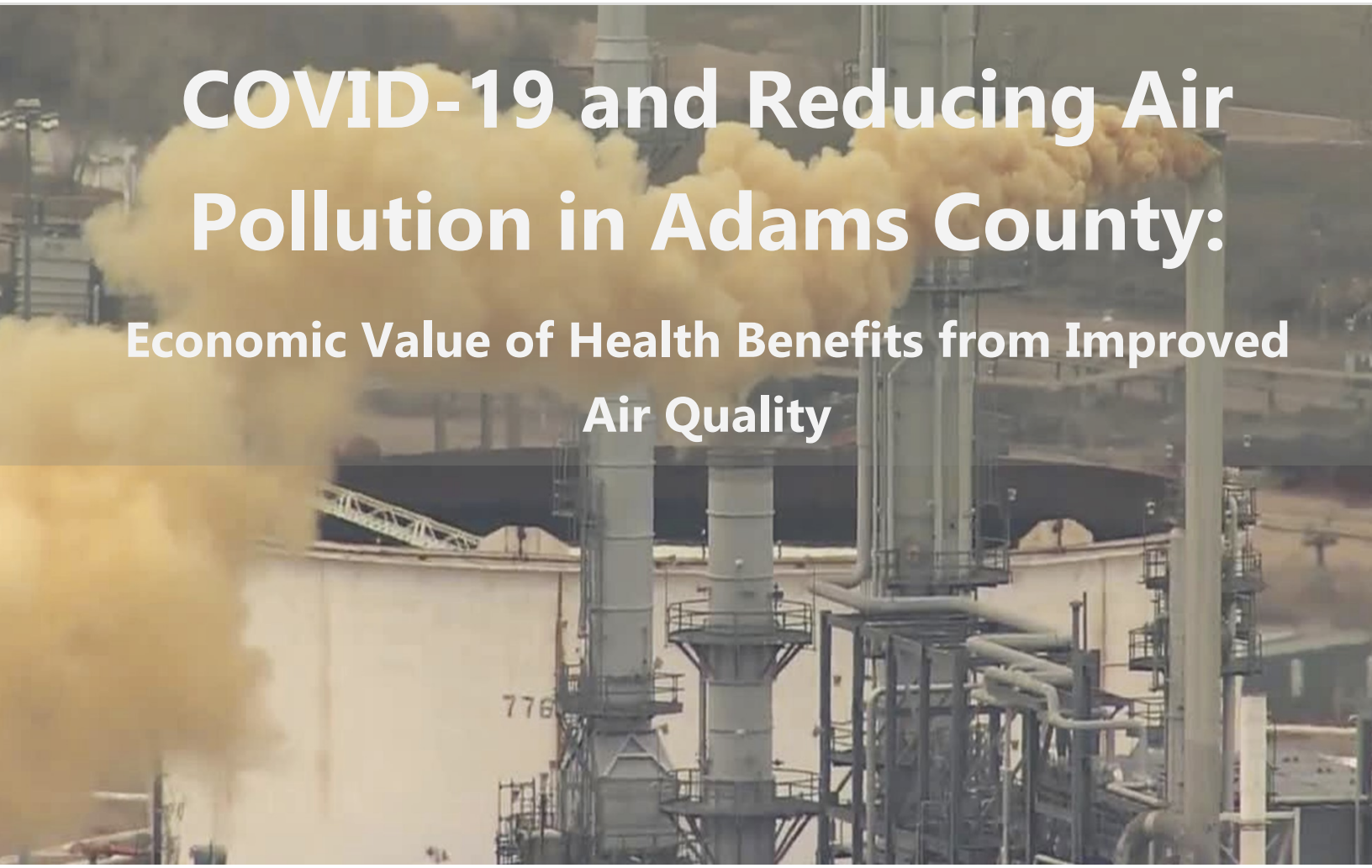
COVID-19 and Reducing Air Pollution in Adams County:

Economic Value of Health Benefits from Improved Air Quality



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The COVID-19 pandemic has highlighted the inequities in our society, including those that we often take for granted, such as our access to clean air. A recent study from the Harvard School of Public Health found that exposure to air pollution is associated with increased risk of death from COVID-19[1]. This is particularly poignant in the 80216 zip code where many residents are minorities and the area has been regarded as the most polluted zip code in the United States[2]. Residents of Commerce City have to contend with multiple sources of pollutants in their backyard including two major interstates and an oil refinery. This, unfortunately, is not uncommon and people of color are more likely to live in communities that are polluted[3]. The disproportionate impact of environmental hazards on people of color is referred to as environmental racism.

The regular exposure to air pollutants is connected with health issues such as asthma, heart attacks, preterm births, and now, increased risk of death during a pandemic. The costs associated with these health issues is then placed on community members and our society through increased healthcare costs. National estimates show that severe hospitalization for COVID-19 is estimated to cost around $88,000 per case; this is especially concerning as more people lose healthcare coverage because they lose their jobs in the resulting economic crisis.[4] The Colorado Department of Public Health and Environment has released data showing that Black and Latinx people are dying from COVID-19 at disproportionate rates.[5] Adams County, which contains Commerce City, already has higher rates of uninsured citizens than Colorado as a whole, increasing its residents' risk to COVID-19 and other health expenses. And Adams County has seen high numbers of COVID-19 cases and deaths.[6]

Selected Demographics 2018

	Adams County	Colorado
Population	511,868	5,758,736
Race		
White, not Hispanic or Latino	49.6%	67.9%
Hispanic or Latino	40.4%	21.7%
Asian	4.4%	3.5%
Black or African American	3.9%	4.6%
Two or More Races	3.2%	3.1%
American Indian and Alaska Native	2.3%	1.6%
Native Hawaiian and Other Pacific Islander	0.2%	0.2%
Foreign Born Persons	15.4%	9.8%
Owner Occupied Housing Unit Rate	65.2%	64.9%
Median Home Value	$273,000	$313,600
Bachelor's Degree or Higher	23.6%	40.1%
Persons Without Health Insurance	10.6%	8.6%
Median Household Income	$67,575	$68,811

Source: US Census Bureau, QuickFacts, Adams County, Colorado, 2018.

Table 1

Colorado Fiscal Institute

There are multiple sources of air pollution in Commerce City including multiple highways and an oil refinery. There is broad debate about the role that the oil refinery plays in contributing to air quality in the city, so we chose to focus on the health impacts of reducing pollutants generated by the oil refinery in the city. We used the Environmental Protection Agency's (EPA) CO-Benefits Risk Assessment (COBRA)[7] tool to measure the health and economic benefits that could come from reducing or eliminating pollutants generated by a discrete source. By eliminating pollutants from the oil refinery alone, Adams County could see health and economic benefits totaling between $5.6 million and $12.7 million, and the state could reap benefits totaling between $15.7 million and $35.4 million (Table 2). This is due to decreased mortality, hospital or emergency room visits, asthma-related events, and missed days of school and work. Achieving a reduction of hazardous pollutants of this magnitude by any other means would require dramatic measures. For instance, in order to create an identical drop in sulfur dioxide, nitrogen oxides, ammonia, volatile organic compounds and fine particulate matter (PM 2.5), the motor vehicle traffic in Adams County would need to be reduced by 56%. Stated differently, eliminating pollutants generated by the refinery alone would create the same health benefits in the surrounding neighborhoods as eliminating all traffic from highways and city streets for over half the year. These savings are based on pre-pandemic conditions and would likely be much higher if COVID-19 related effects were taken into account.

Value of Total Health Benefits (thousands)

Location	Total Health Benefits (low estimate)	Total Health Benefits (high estimate)
Adams County	$5,600	$12,700
Arapahoe County	$1,400	$3,200
Denver County	$400	$900
Colorado	$15,700	$35,400

Table 2

The tables below illustrate the economic value of health benefits gained from improved air quality that results from a decrease in specific air pollutants as well as the number of health incidents avoided. The COBRA model estimates how changes in emissions affect health outcomes. Adult mortality accounts for over 95 percent of monetized health impacts. All of the other health outcomes are estimated in a single year.

Adams County	
Health Incident	Value of Health Incident Avoided
Adult and Infant Mortality	$12,546,200
Non-fatal Heart Attacks	$15,500
Hospital Admits, Respiratory	$4,900
Hospital Admits, Cardiovascular	$7,000
Acute Bronchitis	$800
Respiratory Symptoms	$1,500
ER Visits Asthma	$1,800
Minor Restricted Activity Days	$50,800
Work Loss Days	$20,100
Athsma Exacerbation	$4,000

Table 3

Colorado	
Health Incident	Value of Health Incident Avoided
Adult and Infant Mortality	$35,000,000
Non-fatal Heart Attacks	$24,300
Hospital Admits, Respiratory	$13,400
Hospital Admits, Cardiovascular	$20,500
Acute Bronchitis	$1,700
Respiratory Symptoms	$3,200
ER Visits Asthma	$400
Minor Restricted Activity Days	$113,400
Work Loss Days	$45,000
Asthma Exacerbation	$4,000

Table 4

It is important to note that the COBRA tool only assesses air pollution from criteria pollutants. It does *not* include all hazardous pollutants, for instance hydrogen cyanide, which currently has no EPA set limits, so corporations are able to develop their own limits. Despite corporations setting their own limits, the oil refinery in Commerce City has in the past exceeded its hydrogen cyanide limit. Due to hydrogen cyanide not being captured in the model, it is likely that these estimates are an underestimate of the health and economic benefits that would be associated with closing the oil refinery.

The current public health crisis reveals the devastating, unequal consequences of environmental racism too long ignored. As Colorado moves from grappling with immediate demands of COVID-19 to planning for recovery, reducing the harmful air pollutants that exacerbate the costs borne by these communities should take priority. State legislators and the Administration have the opportunity right now to advance policies to reduce harmful air pollutants and carbon emissions, providing information and justice for at risk communities in Adams County and holding corporate polluters responsible for paying their fair share of costs and clean up.

April Valdez Story [8]

"Growing up in Commerce City, we regularly had to go into something akin to quarantine because it wasn't safe to go outside and breathe the air. It's sad, but it starts to feel normal and people are in survival mode. It's hard to worry about coronavirus when you're trying to survive. A lot of people in my community get used to it and start to think it's normal."

April Valdez is a resident of a frontline community in Denver. She is a mother of 4 children, 2 boys that have asthma and other complications. Her mother suffers from type 1 diabetes and her father has COPD.

"Half of my family is already struggling to live and breathe. I keep working trying to provide food and home sometimes I must choose between medications, copays, utilities, insurance or necessities. I always must choose the basic necessities. "

April shared her testimony in support of creating a Climate Action Plan to the Air Quality Control Commission. State legislators and the Administration have the opportunity right now to advance policies to reduce harmful air pollutants and carbon emissions.

"My story is not unique; almost every family in my community suffers in some way. We need to fight but why do we have to fight to live and to breathe? These are basic human rights we all deserve to breathe clean air, drink clean water and eat healthy and nutritious foods."

Model

The Co-Benefits Risk Assessment Tool (COBRA) Health Impacts Screening and Mapping Tool, developed by the Environmental Protection Agency (EPA), estimates the health-related economic benefits from reductions in emissions or air pollutants that result from clean energy policies and programs.

The COBRA model estimates the following:

- Changes in air quality resulting from changes in specific pollutants.
- Changes in health outcomes.
- Monetary values of those health outcomes.

The air pollutants used by the model to estimate changes include:

- Particulate matter (PM2.5)
- Sulfur dioxide (S02)
- Nitrogen oxides (NOX)
- Ammonia (NH3)
- Volatile organic compounds (VOCs)

For the purposes of this analysis, it is important to clarify that these are conventional air pollutants not greenhouse gases (GHG). For example, carbon dioxide is not estimated in this model because it is classified as a greenhouse gas and not a conventional air pollutant. Because the COBRA does not quantify ozone-related benefits, the results might be underestimated because they don't account for impacts from GHG emissions. COBRA is a screening model that converts air pollutant reductions into changes in air quality and estimates the number of cases of illness and death avoided, as well as the economic value of those benefits to communities.

The health incidents and related economic value calculated by COBRA include:

- Non-fatal heart attacks
- Respiratory-related and cardiovascular-related hospitalizations
- Acute bronchitis
- Upper and lower respiratory symptoms
- Asthma-related emergency room visits
- Asthma exacerbations
- Minor restricted activity days (i.e., days on which activity is reduced, but not severely restricted)
- Work days lost due to illness

Adams County motor vehicle harmful emissions levels are estimated for 2025 conditions in order to be comparable to the estimates in reduction of harmful emissions made by EPA's COBRA model for the closure of the Suncor Refinery. Harmful emissions include sulfur dioxide, nitrogen oxides, ammonia, volatile organic compounds, and fine particulate matter (PM 2.5). Motor vehicle pollution estimates are created by EPA's Motor Vehicle Emission Simulator (MOVES) modeling software. The MOVES modeling software calculates emission totals at the state level. In order to arrive at the emissions total for Adams County, the Colorado total emissions for all harmful pollutants is multiplied by the ratio of the Adams County population by the Colorado population. It is possible that motor vehicle emissions are not distributed according to population and that this methodology underestimates the total harmful motor vehicle emissions in Adams County; in this instance our estimates would represent an upper bound on the percent reduction of Adams County motor vehicle usage.

Assumptions

Baseline: The baseline is the year from which the model will estimate the health and economic impacts of air pollutant changes. COBRA includes baseline projections for 2017 and 2025. To estimate future impacts of a reduction in petroleum and related industry emissions, we selected 2025 as our baseline for the model.

Region: We modeled the air pollutant changes and corresponding health and economic outcomes, both in Adams County where the plants are located, and statewide.

Emissions Change: To calculate the total change in the emission of air pollutants listed above, we use the 2017 National Emissions Inventory published by EPA. This data set collects pollutant emission totals for all individual facilities within the United States. We calculate total emissions for Suncor's principal location at 5801 Brighton Blvd. in Adams County for each of the pollutants listed above. We assume that a closure of the Suncor plant would result in the complete elimination of pollutants emitted by this facility in 2025.

Discount Rate: COBRA allows users to run each analysis with a 3 or 7 percent discount rate (i.e. the calculation used to express future values in current terms). The EPA's "Guidelines for Preparing Economic Analyses" (U.S. EPA, 2010a) recommends calculating monetized health benefits using both discount rates to evaluate whether (and to what extent) the overall outcome of the analysis is affected by the choice of discount rate. The COBRA model notes that a higher discount rate favors investments with immediate benefits and reduces the value of future benefits more than a lower discount rate, which places greater value on future benefits to communities. The 3 percent discount rate was used for this analysis because the total benefits of reduced air pollution are often felt in the long term.

References

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