

COMMUNITY EXPOSURE TO TEXAS OIL AND GAS EXTRACTION FACILITY VENTING AND FLARING PRACTICES

A PRESENTATION BY:

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PRESENTATION OUTLINE

- **Theoretical Background**
- **Project Description**
- **Findings**
- **Significance**
- **Problems**

PRIOR RESEARCH

- **Disproportionality of Environmental Risks**
 - A small number of facilities are responsible for most pollution
 - Communities are disproportionately exposed to environmental risks
- **Environmental Justice**
 - Age (+)
 - Race (+)
 - Ethnicity (+)
 - Education (-)
 - English Fluency (-)
 - Poverty (+)
 - Income (-)
 - House Value (-)
 - Unemployment (+)
 - Occupation (+)
 - Population Density (-)

WHAT NEEDS TO BE DONE:

- **Research has not examined the oil and gas industry.**
- **Why? Data Access!**
 - Oil and gas extraction industry is exempt from EPA's TRI
 - Oil and gas extraction industry is required to report to the EPA GHGRP at the shale-level only if oil and gas production operations are estimated to emit more than 25,000 metric tons of greenhouse gasses within the year.
- **To fill this gap, this project examines a specific oil and gas industry pollution practice: venting and flaring.**
 - The practice releases a significant amount of methane gas.
 - The practice is on rise.

PROJECT OVERVIEW

Main Purpose:

- This research examines how specific types of environmental risks are disproportionately distributed among communities.

Research Question:

- What are the characteristics of communities disproportionately exposed to Texas oil and gas venting and flaring practices in 2012?

Main Argument:

- There is disproportionality among oil and gas extraction facilities that vent and flare and the communities affected by oil and gas extraction industry venting and flaring practices.

HYPOTHESIS

- The environmental risk of oil and gas well venting and flaring practices are disproportionately distributed among Texas residents.
- Texas oil and gas wells flare at a higher rate in historically marginalized communities.

SAMPLE

All producing Texas oil and gas leases in 2012

- Why 2012?
 - It is the start of the most recent Texas oil and gas boom facilitated by the rise of fracking technology.
- Why Texas?
 - It is the state where most oil and gas production occurs.

VARIABLES

- **Dependent**
 - Amount of gas vented or flared (in mcf)
- **Independent**
 - Poverty
 - Income
 - Race
 - Ethnicity
 - House Value
 - Education
 - Language
 - Age
 - Employment
 - Occupation
 - Population Density

DATA

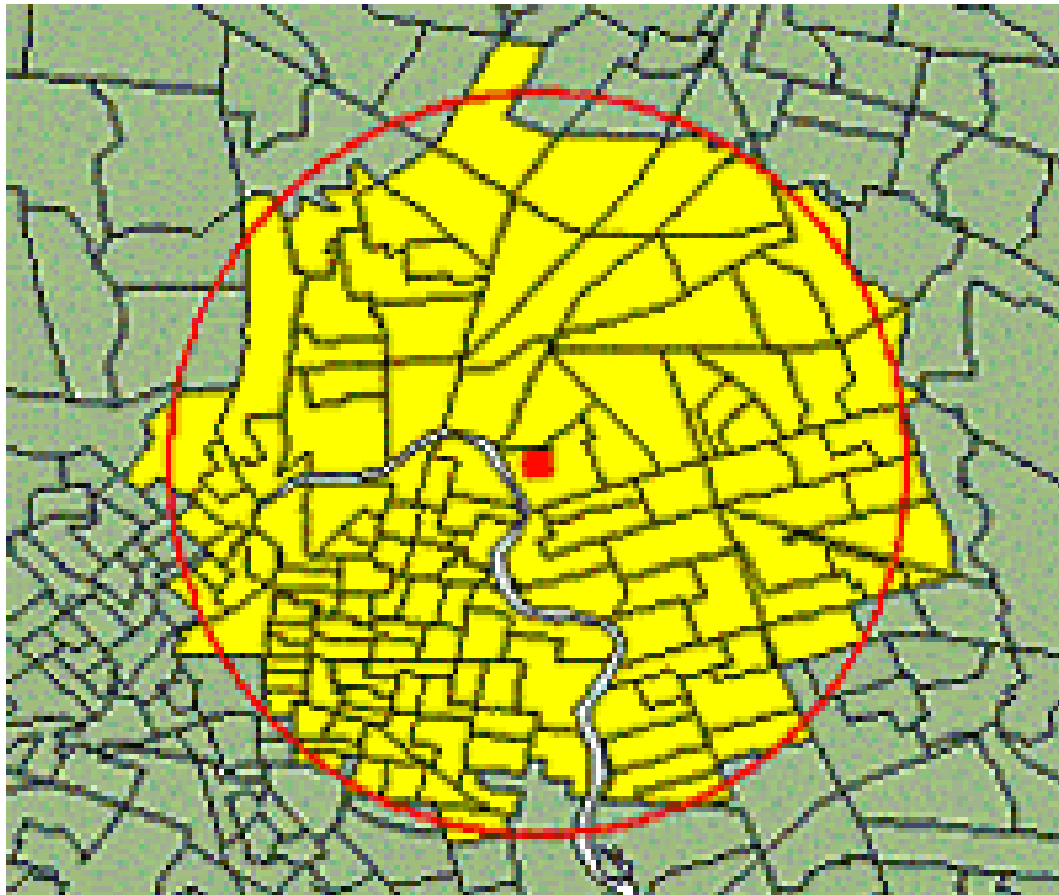
- **American Community Survey 5 Year Estimates, 2010-2014, Geodatabase Format**
- **Texas Railroad Commission Oil and Gas Datasets***
 - Drilling Permit Master and Trailer Plus Latitudes and Longitudes
 - Full Well Bore
 - Production Data Query Dump
 - Digital Map Data
 - Programmed Requests

* Purchased from funds obtained through Texas A&M University Sociology Department Funds to Support Research Related Activities

CONNECTING DATASETS

- Merged Texas Railroad Commission data segments using district, lease, well, and American Petroleum Institute (API) numbers
- Merged American Community Survey data to Texas Railroad Commission data by overlaying Texas Railroad Commission well surface location data with 1 mile buffers to the American Community Survey geodatabase

CENTROID POINT IN BLOCKGROUP POLYGON SPATIAL OVERLAY TO CALCULATE GAS WELL COMMUNITY CHARACTERISTICS



PROJECT OUTCOMES

- Map
- Summary Statistics
- Correlation Matrix
- Tobit Model

FINDINGS: MAP

- <http://tinyurl.com/lp4c8fq>

SUMMARY STATISTICS

Variable	N	Mean	Std. Dev.	Min	Max
Vent Flare	108,822	317.26	4,958.91	0	381,487
Median Inc.	123,026	9.61	2.03	0	365.85
% Black	123,026	4.22	7.60	0	88.07
Med. H. Val	121,391	15.26	3.52	6	24
%No Eng.	123,026	5.01	7.63	0	44.89
%Old	123,027	14.06	6.59	0	59.17

CORRELATION MATRIX

	Vent Flare	Med Inc.	% Black	Med. H. Val	%No Eng.	%Old
Vent Flare	1.0					
Median Inc.	-0.01	1.0				
% Black	-0.01	-0.19	1.0			
Med. H. Val	-0.01	0.59	-0.13	1.0		
%No Eng.	0.04	-0.47	-0.13	-0.37	1.0	
%Old	0.01	0.30	-0.02	-0.31	-0.18	1.0

TOBIT MODEL

Number of Obs = 107,254

F(5, 107249) = 51.87

Prob > F = 0.0000

Pseudo R2 = 0.0132

Pseudo L.I. = -76,601.718

<u>VentFlare</u>	<u>Coef.</u>	<u>Rob. S.E.</u>	<u>T</u>	<u>P> t </u>	<u>[95% Conf. Interval]</u>	
Med. Inc.	2,356.49*	187.82	12.55	0.00	1,988.36	2,724.61
% Black	-52.05	31.13	-1.67	0.10	-113.05	8.96
Med.H.V.	-131.40*	65.73	-2.00	0.05	-260.23	-2.56
%NoEng.	1,093.72*	69.03	15.84	0.00	958.41	1,229.02
%Old	387.30*	36.78	10.53	0.00	315.20	459.38
_cons	-78,904.9	5,084.72	-15.52	0.00	-88,870.9	-68,939.0
/sigma	27,176.1	1,695.33			23,853.29	30,498.92

Obs. Sum.: 101,758 Left-censored Obs.at Volume Gas Vented or Flared <= 0

5,496 Uncensored Observations

SIGNIFICANCE

- Employs geospatial methods to estimate the community characteristics surrounding oil and gas extraction facilities
- Examines an industry (i.e., oil and gas extraction) which contributes a significant amount of greenhouse gasses, yet is often exempt from EPA reporting requirements
- Uses an underutilized dataset (i.e., Texas Railroad Commission oil and gas records) which includes facilities that do not report emissions to the EPA's Toxic Release Inventory or Greenhouse Gas Report

PROBLEMS

- **Due to data availability, research cannot differentiate between gas that was vented and the gas that was flared.**
 - I urge state managers to require operators to differentiate between the two when filing disposition reports.
 - I also urge state managers to make the data more public.
- **Due to data availability, research does not include gas vented or flared at oil and gas processing plants**
 - I urge state managers to more quickly respond to my emails/phone calls and better consider waiving the fee to obtain this “public” data.
- **Due to the research design, we cannot determine why those are disproportionately exposed (if communities move into these areas, or if they are dumped upon).**
 - Future research should examine this phenomenon using a longitudinal research design.
- **While this research focuses on the facility, it does not include facility or operator characteristics.**
 - Future research should examine if facility or operator characteristics or community characteristics better explain variation of industrial venting and flaring practices at gas wells.

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QUESTIONS?

COMMENTS?

CONTACT ME!