Equitable access to pharmacy services: A case study of adult vaccination

VCU CPPI Seminar Rachel Wittenauer, MPH, PhD Comparative Health Outcomes, Policy, and Economics (CHOICE) Institute School of Pharmacy, University of Washington August 26, 2024



School of Pharmacy









BACKGROUND



COMMUNITY PHARMACIES ARE VITAL ACCESS POINTS

Intro

Methods



Part 1

Photo: UBC Faculty of Medicine

Background



Results

Photo: General Pharmaceutical Council



Part 2

Photo: Seattle Times

Discussion



References: Hales CM, Servais J, Martin CB, Kohen D. Prescription Drug Use Among Adults Aged 40-79 in the United States and Canada Key findings Data from the National Health and Nutrition Examination Survey and the Canadian Health Measures Survey. NCHS Data Brief | US Department of Health and Human Services. 2019



Conclusion

Background Part 1

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PHARMACIES AND VACCINATIONS

Intro

Adult vaccination coverage is below targets

Pharmacists are well-suited to help

Shingles is a good case study example

Part 2

Shingles

Shingles is a painful, blistering rash that usually appears on one side of the body in older adults who have a history of exposure to varicella (chickenpox). In some patients, chronic pain remains after the rash has resolved, a condition called postherpetic neuralgia (PHN).



Shingles Vaccination A more effective shingles vaccine called recombinant zoster vaccine became available in 2017

- · Approved for adults aged 50 y and older
- 91% effective in prevention of shingles and PHN
- Two-dose series given 2-6 mo apart

low in the US and far below Healthy People 2020 targets 90% 80% 70% 60%

Adult vaccination rates remain

ADULT VACCINATION RATE HEALTHY PEOPLE 2020 TARGET



Photo: Adult Vaccine Access Coalition



Photo: LA Health Care Plan

KNOWLEDGE CHECK!

Why are pharmacists well-suited to improve adult vaccination rates?

A) They often have convenient hours and appointment scheduling

B) Pharmacists are typically well-trusted by their patients & communities

C) Pharmacists are trained and have the authority to administer many adult vaccines

D) All of the above

KNOWLEDGE CHECK!

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PART 1: PHARMACY ACCESS





Part 1 Intro Methods

Results

Discussion Part 2

Chuck Goudie

Conclusion

MITEAM

PHARMACY

DEGERTS

PHARMACY DESERTS?

Kaiser Health News

Rural Americans in Pharmacy Deserts Hurting for Covid Vaccines



Nationwide, 111 rural counties have no pharmacy capable of administering covid-19 vaccines. In many other places, pharmacies exist but locals ... Mar 3, 2021

May 4, 2021

PHARMA, BIOPHARMA

vaccine rollout.

By ANUJA VAIDYA

1 in 3 Neighborhoods in Major U.S. Cities Is a 'Pharmacy Desert'

CNN CNN

RESEARCH ARTICLE HEALTH EOUITY HEALTH AFFAIRS > VOL. 40, NO. 5: CONSOLIDATION, PRIVATE EQUITY & MORE

Fewer Pharmacies In Black And Hispanic/Latino Neighborhoods Compared With White Or Diverse Neighborhoods, 2007-15

Jenny S. Guadamuz, Jocelyn R. Wilder, Morgane C. Mouslim, Shannon N. Zenk, G. Caleb Alexander, and Dima Mazen Qato See fewer authors AFFILIATIONS V

PUBLISHED: MAY 2021 No Acces

https://doi.org/10.1377/hlthaff.2020.01699

🚾 ABC News

'Pharmacy deserts' are new front in the race to vaccinate for COVID-19

COVID-19 vaccine shots at the drugstore. Neighborhood pharmacies with resources for mass vaccination may be harder to find in counties ...

Mar 6, 2021

Nevada Current

'Pharmacy deserts' may be contributing to Nevada vaccine ...

f Chuck Goudie abc7 Iteam | ABC 7 EYEWITNESS NEWS

the White House announced the Federal Retail Pharmacy Program for COVID-19 Vaccination, which will supply coronavirus ... Feb 25, 2021



Like food deserts, pharmacy deserts have cropped up across the nation, which could further hamper the much-maligned Covid-19

During the COVID-19 pandemic pharmacies can be critical, but not everyone in LA County has equal access

From treatment to vaccines, pharmacies can provide information to patients about the coronavirus pandemic, but it can be harder for those living ... Feb 17, 2021





References:







... out when the Covid-19 vaccine becomes widely available next year. .. "pharmacy deserts" -- areas where a substantial number of residents Dec 24, 2020

Report 'Pharmacy deserts' may

significantly hinder vaccine rollout

fear this will lead to inequitable vaccine access



PHARMACY DESERTS: OPERATIONAL DEFINITION

Intro

Methods



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This definition is derived from the expansive literature on food deserts, combined with access requirements in Medicare Part D minimum pharmacy benefits policies



Background

Part 1

References: Levesque et al (2015); Qato et al (2014); Centers for Medicare and Medicaid Services (2011), Link and Phelan (1995)



PHARMACY DESERTS: OPERATIONAL DEFINITION

Intro

Background

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Part 2

Intro

Results >> Discussion

Conclusion

Part 2

PHARMACY DESERTS: EXISTING EVIDENCE

Methods

Identified pharmacy deserts (PDs) at **tract-level** in some **specific geographies** such as Pennsylvania, LA County, and Chicago metro

Part 1





...and at the **county level** for non-metropolitan (rural) counties across the US...

...and **some characteristics of those deserts**: closures increasing over time (Guadamuz 2019), pharmacy closures associated with worse medication adherence (Qato 2019), associated with several social determinants of health (Wisseh 2020), etc.

There is no comprehensive map of pharmacy desert locations in the U.S.



References: Wisseh et al (2020); Qato et al (2014); Pednekar et al (2018); Ullrich et al (2020); Constantin et al (2020); Gua damuz et al (2019); Qato et al 2019)

PART 1: IDENTIFYING PHARMACY DESERTS

Methods

Part 1 Objective:

Results

Discussion

Part 2

Define a nationwide <u>map of pharmacy deserts</u> at the census tract level; <u>characterize</u> the populations that reside in them and the pharmacies that serve them

<u>Part 1 Data</u>: National Council for Prescription Drug Programs (NCPDP); U.S. Census Data (2021 5-year American Community Survey)

Part 1 Hypothesis: None: descriptive and exploratory



Background



Conclusion

Results

Discussion Part 2

Conclusion

DATASET CREATION

Pharmacy Data

Part 1

Census Tract Data





Results

Discussion

Conclusion

KEY MEASURES



Part 1

Variables

Median income, poverty level, vehicle ownership, sociodemographic data

Polygon data, population estimates, age groups

Locations of pharmacies by tract

Urban vs. rural designation

Key Measures

Part 2

% population with median income <80% median income of nearest metro area

% population below the FPL

households own a vehicle

% of population within 1mi radius of a pharmacy (or 0.5mi, 5mi, 10mi radius depending on urbanicity)



Methods

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Part 2

POPULATION LIVING IN PHARMACY DESERTS

 Nationally, 15.82 million (4.7%) of all people in the US live in pharmacy desert communities.

Part 1

- 4,679 (5.5%) tracts were identified to be pharmacy deserts, and 78,723 (93.3%) were designated as not pharmacy deserts (remainder could not be classified)
- States with largest **number** of people living in pharmacy deserts: CA, TX, FL
- States with highest **proportion** of population in pharmacy deserts: NM, AK, AZ

Proportion of adults living in pharmacy deserts, by State





PHARMACY DESERT LOCATIONS

Intro

Part 1

Methods

Results

Pharmacy Access (Categorical)

Pharmacy Desert

- Low Access (But Not Low Income)
- Not a Pharmacy Desert
- NA: Status Undetermined



Urbanicity of pharmacy deserts:

Most often in urban (57.5%) and rural (38.1%) locations rather than suburban (4.4%)

Discussion

Part 2

Conclusion

Pharmacy deserts tracts vs. low-access tracts:

If the low-income component of the pharmacy desert definition was not accounted for → 12,215 tracts representing ~ 34 million (13.2% of) adults are living in areas with low access to pharmacies (>2.5x the standard def.)





Intro Methods

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Part 2

PHARMACY DESERT LOCATIONS

Part 1







Background >> Part 1

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Conclusion

SDOH IN PHARMACY DESERTS

Communities that are pharmacy deserts are associated with a larger proportion of many population-level social determinants of health as compared to non-deserts:

- Lower household income
- Have a high school education or less
- Have no health insurance
- Have public health insurance
- Speak English "not well" or "not at all"
- Have an ambulatory disability
- Identify as racial or ethnic minorities

	Pharmacy Desert (N=4,679)	Not Pharmacy Desert (N=78,723)
Prop. Below FPL ^a	24.6% (14.3)	13.0% (10.8)
Median Household Income ^a	\$46,400 (\$14,900)	\$76,000 (\$37,000)
Prop. With High School Education or Less ^a	33.2% (10.4)	27.6% (11.4)
Prop. With No Health Insurance ^a	15.2% (11.2)	9.89% (8.56)
Prop. With Public Health Insurance ^a	41.9% (15.8)	35.4% (12.9)
Prop. Do Not Speak English ^a	5.73% (9.53)	3.07% (6.78)
Prop. With Ambulatory Disability ^a	10.4% (6.37)	8.34% (4.97)
Prop. Older Adult (Age 65+) ^a	15.0% (10.1)	16.9% (8.80)
Race and ethnicity		
Prop. NH, White ^a	45.5% (32.1)	61.2% (29.3)
Prop. NH, Black ^a	19.1% (26.1)	12.6% (20.4)
Prop. NH, Asian ^a	3.29% (7.03)	5.25% (9.80)
Prop. NH, AIAN ^a	3.50% (1.49)	0.51% (2.78)
Prop. NH, 2 or More Races ^a	3.02% (3.31)	3.16 (3.16)
Prop. Hispanic, White Race ^a	12.0% (16.1)	7.97% (11.6)
Prop. Hispanic, 2 or More Races ^a	4.74% (6.85)	3.47% (5.37)
Prop. Hispanic, Other Race ^a	7.32% (11.5)	4.70% (8.80)

^a Denotes statistically significant difference of characteristic in pharmacy desert versus non-pharmacy desert tracts at p<0.01. All p-values are from a t-test for continuous variables or a chi-squared test for categorical variables, all adjusted for multiple comparisons using the Benjamini-Hochberg correction



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PHARMACIES IN PHARMACY DESERTS

 Among pharmacy desert tracts, the large majority contain zero pharmacies (94.5%), vs. roughly half (54.9%) of tracts in non-desert tracts have zero pharmacies

Part

- Of all community pharmacies nationwide, only 294 (0.5%) are serving pharmacy desert communities
- Pharmacies in pharmacy desert tracts are more often independently owned
- Services vary only slightly: pharmacy desert pharmacies more often have walk-in clinics but less often have immunization services compared to pharmacies not located in pharmacy deserts

	In Pharmacy Desert (N=294)	Not in Pharmacy Desert (N=60,175)	p-value ^a
Pharmacy Ownership			
Independent	121 (41.2%)	22,010 (36.6%)	< 0.001
Chain	165 (56.1%)	37,371 (62.1%)	
Franchise	3 (1.0%)	659 (1.1%)	
Government	5 (1.7%)	135 (0.2%)	
Immunization	221 (75 2%)	48 510 (80 6%)	0.051
Services Available			
ADA Accessible	290 (98.6%)	59,429 (98.8%)	1.000
Multidose Packaging Available	73 (24.8%)	12,056 (20.0%)	0.087
Emergency Services	82 (27 0%)	17 8/11 (20.6%)	0.621
24 Hours			0.02.
Walk-in Clinic Available	40 (13.6%)	3,923 (6.5%)	<0.001
Compounding Pharmacy	172 (58.5%)	37,230 (61.9%)	0.335

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KNOWLEDGE CHECK!

What are some population characteristics associated with pharmacy deserts?

A) A higher proportion of people with lower self-reported English-speaking ability

B) A lower median household income level

C) A higher proportion of people identifying as a racial or ethnic minority

D) All of the above





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Part 2

LIMITATIONS

Part 1



There have been some major pharmacy closures since this pharmacy data extract: the three largest chains have since announced plans to close ~1,500 stores nationwide. We know closures are more likely to happen to independents, and to pharmacies in low-income urban and rural areas (Guadamuz 2020).



Health insurance networks mean that this access map will look different for each person depending on their plan. Ex. Rural pharmacies in Washington are less likely to accept Medicaid (Graves 2017).



Definition of pharmacy deserts in this analysis is rooted in existing definitions and CMS requirements for minimum pharmacy benefits, but little empirical evidence exists to justify this "acceptable threshold" of pharmacy distance.



Long list of non-spatial factors feed into the concept of "access" including language spoken, affordability, hours and appointments, public transit availability, and more. (Levesque 2013)



Statistically: is population-level not individual-level data and are only exploratory associations. Many GIS calculation limitations: linear distance vs. road travel distance, population density, etc.



Discussion

Results

Conclusion Part 2

IMPLICATIONS

Implications for patient

Part 1

Implications for policy

Implications for research





Part 2

IMPLICATIONS

Implications for patient

Part 1

Implications for policy

Implications for research



Photo: KING 5 Seattle

Broadly: many adults in the US do not have good access to pharmacies. This lack of access...

I) ...Signals important barriers in routine healthcare

- Has a demonstrated effect on medication
 adherence
- Most common type of desert is 0 pharmacies
- 2) ...Weakens emergency preparedness infrastructure
 - COVID-19 pandemic as most recent example
 - Hurricane Maria pharmacies were trusted partners and resource hubs for response
- 3) ...Raises health equity concerns
 - Communities already face many access barriers
 - Evidence of association between pharmacy locations today and redlining patterns → legacy
 - If unaddressed → widening health disparities?
 - True in urban and rural areas of the country





Part 2

IMPLICATIONS

Implications for patient health

Part 1

Implications for policy

Implications for research

INT NERSESSION H.R. 2759

To amend title XVIII of the Social Security Act to provide for coverage under the Medicare program of pharmacist services.

IN THE HOUSE OF REPRESENTATIVES

APRIL 22, 2021 K. BUTFERSTELL (for himself, fbr., McKINLEY, M., F. BLILLAKES, M., CARTER of Georgia, M., CUCLLANS, M. CARRER of New York, Mr. COURN, MR., CORWORD, M. & DEGRETZ, M., DEDURSS, M., F. PUTZEZTURCK, M. F. FOR-TER, Mr. GOURDERT, Mr. LENNUH, M. MORES of Wissensin, Mr. O'HLALZEANS, M. S. PUNERE, M. N. M. MORES of Wissensin, Mr. O'HLALZEANS, M. S. PUNER, M. P. PURCE of NORth Cambina, M. R. ROSS, Mr. SJUTTI of Misseari, Mr. TONYO, Mr. WESTERIAN, and Mr. GUSST) introduced the following Bill within was referred to the Committee on Energy and Commerce, and in addition to the Committee on Ways and Mesnas, for a period to be subsequently determined by the Speaker, in each case for consideration of nuch provisions as fall within the jurisdistion of the committee concerned

A BILL

To amend title XVIII of the Social Security Act to provide for coverage under the Medicare program of pharmacist services.

- Be it enacted by the Senate and House of Representa tives of the United States of America in Congress assembled,
- 3 SECTION 1. SHORT TITLE.
- 4 This Act may be cited as the "Pharmacy and Medi 5 cally Underserved Areas Enhancement Act".

Pharmacy and Medically Underserved Areas Enhancement Act (H.R. 2759/S. 1362, US Congress) State and federal policies can halt the growth of pharmacy deserts and address patient care in existing ones by....

) ...Preventing closures of pharmacies especially in underserved areas

- Pharmacy closures ← lack of revenue.
- Provider status for Medicaid, PBM regulation, HPSA-like financial incentives
- PDs have: less pop <65, >public health insurance
- 2) ...Leveraging new technology and care models to reach all patients
 - Telepharmacy, mobile clinics, increased scope of practice, **address staff shortages**
 - Any policy/program that reaches patients through pharmacies will likely have a more minimal effect in pharmacy deserts, unless they are specifically prioritized to address gaps

References: Murphy (2021), Maine (2017); Newlon (2021); Bernstein (2022); Mattingly (2022)



Part 2

IMPLICATIONS

Implications for patient health

Part 1

Implications for policy

Implications for research

JOURNAL ARTICLE

Locations and characteristics of pharmacy deserts in the United States: a geospatial study \Im Rachel Wittenauer , Parth D Shah, Jennifer L Bacci, Andy Stergachis Author Notes

Health Affairs Scholar, Volume 2, Issue 4, April 2024, qxae035, https://doi.org/10.1093/haschl/qxae035 Published: 16 March 2024 Article history •

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Abstract

Pharmacies are important health care access points, but no national map currently exists of where pharmacy deserts are located. This cross-sectional study used pharmacy address data and Census Bureau surveys to define pharmacy deserts at the census tract level in all 50 US states and the District of Columbia. We also compared sociodemographic characteristics of pharmacy desert vs non-pharmacy desert communities. Nationally, 15.8 million (4.7%) of all people in the United States live in pharmacy deserts, spanning urban and rural settings in all 50 states. On average communities that are pharmacy

Now available open-access in Health Affairs Scholar

Beyond addressing this study's limitations, there are several ways that future research can extend this work:

1) Relationship between HPSAs and pharmacy deserts should be better defined

 Many policies use HPSA status as criteria, but it may not be good overlap with pharm. deserts.

2) Consensus is needed on a definition of "low access"

- Appropriate access radius?
- Income criteria or just geographic access?
- 3) What are the root causes of pharmacy deserts?
 - More advanced statistical and causal inference approaches may illuminate root causes → hone potential solutions





KNOWLEDGE CHECK!

How might lack of access to a pharmacy impact patient health?

Methods

A) Patients can face additional barriers to accessing important routine medications

B) Patients will not be able to buy enough Reese's cups for their mental health

C) Patients will get to listen to more podcasts when they need to travel farther to a pharmacy D) All of the above







Discussion Part 2

Conclusion

KNOWLEDGE CHECK!

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PART 2: PHARMACY DESERTS AND VACCINATION





AIM 1B: ACCESS AND SHINGLES VACCINATION

Part 2

Part 2 Objective:

Methods

Results

Discussion

Conclusion

Evaluate the relationship between pharmacy desert status and shingles vaccination receipt

<u>Part 2 Data</u>: Immunization records from multiple State IIS systems; Pharmacy desert dataset

<u>Part 2 Hypothesis</u>: Rate of adults aged 50 years or older with shingles vaccination (outcome) will be lower in census tracts designated as pharmacy deserts (exposure) as compared to census tracts which are not designated as pharmacy deserts but are otherwise alike.



Background

Part 1



Background >> Part 1

Part 2

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ACCESS AND SHINGLES VACCINATION: DATA

Immunization Information System Data



- <u>Where</u>: Data from seven State IIS systems (Convenience sample)
- <u>When</u>: Jan Dec 2022

Intro

- <u>Who</u>: Adults 50+ (ACIP)
- <u>What</u>: Got 2nd dose of Shingrix (fully immunized)
- Assign each patient to a census tract based on residence
- Geographically dispersed, varying demog. characteristics

Pharmacy Desert and Sociodemographic Dataset from Aim 1

Dataset for analysis

- Completed shingles series per population age 50+
- Row level = census tract
- Data = shingles vaccines, sociodemographic data, pharmacy desert status
- Universe = all census tracts in these 7 states





🕨 🖌 Part 2 💦 Intro

HYPOTHESIS AND APPROACH

Part 1

Background

<u>Hypothesis</u>: The rate of adults aged 50 years or older with shingles vaccination (outcome) will be **lower** in census tracts designated as pharmacy deserts (exposure) as compared to census tracts which are not designated as pharmacy deserts but are otherwise alike.

<u>**Challenge**</u>: Residential selection bias \rightarrow confounding concerns

Statistical Approach: Propensity score matching





SAMPLE AND COVARIATES

Part 1

Sample characteristics:

Background

Total dataset: **N = 9,652** census tracts

- **Pharmacy deserts n=646** (6.7%)
- Non-pharmacy deserts n= 9,006 (93.3%)

Unadjusted mean shingles vaccination rate is lower in pharmacy desert tracts (vs. nonpharmacy-deserts):

Non-Ph Desert	Ph. Desert	<i>p</i> -value
48.5	38.2	<i>p</i> <0.001
(per 1000 pop.)	(per 1000 pop.)	

Balancing covariates associated with shingles

Results

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Characteristic (<i>Literature Ref</i>)	ation fract-level covariate	
Older age (Lu 2017)	Prop. population 65+ yrs.	
	Prop. population 50-65 yrs.	
State (Lu 2017, Patterson 2022)	State (state-level)	
Marital status (Lu 2017)	Prop. population married	
Gender (Zhang 2016, Lu 2017, Harpaz 2008)	Prop. female	
Race/ethnicity (Lu 2017)	Prop. by race/ethnicity (various)	
Poverty status, employment (Lu 2017, Harpaz 2008)	Median household income	
	Prop. receiving public assistance income	
	GINI Index	
Healthcare use (Lu 2017, Harpaz 2008,	Prop. no health insurance	
Shuvo 2021, Zhang 2016, Patterson 2022)	Prop. public insurance	
	Population-to-PCP ratio (county-level)	
	Prop. self-reported poor health status	
Education & health literacy (Lu 2017,	Prop. high school degree or less	
Harpaz 2008, Shuvo 2021, Uscher-Pines 2023)	Prop. grad or professional degree	
	Prop. with household internet access	
	Prop. don't speak English well, self-reported	
Political Party (Shuvo 2021)	Voted Dem. in 2020 election (county-level)	



Part 2



Results D

Discussion >> Conclusion

GENERATE AND CHECK PROPENSITY SCORES

Part 2

Intro

Generated propensity scores:

- Generated scores using logistic regression model, with pharmacy desert status as the dependent/outcome variable
- Check overlap of scores visually on plot \rightarrow
- Also check distribution of scores across quintile in each exposure group, confirm not statistically different





Results

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MATCH AND CHECK SAMPLE BALANCE



Matching Approach

<u>Method</u>: nearest-neighbor matching, within caliper of 0.05

Ratio: 2:1 matching, no replacement

Resulting Matched Dataset

Sample sizes:

- Pharmacy deserts: n=628
- Non-pharmacy-deserts: n=1,230
- Unmatched: 18 pharmacy desert tracts, 7,776 non-pharmacy-desert tracts

Balance: all covariates balanced (|SMD| <0.1)





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Intro

EVALUATE THE ATT

Final evaluation:

- <u>Dataset</u>: matched dataset, + weights from sample
- <u>Outcome</u>: shingles vaccinations per 1000 population; <u>Exposure</u>: pharmacy desert tract
- <u>Additional covariates</u>: All balancers were included as covariates in this outcome model as well (doubly robust)
- <u>Model</u>: linear regression (continuous outcome), use cluster-robust standard errors

<u>Results:</u>

- ATT: Effect of pharmacy desert status is -0.4 fewer shingles vax. per 1000 population, among tracts that are pharmacy deserts (i.e., had they not been pharmacy deserts) (95% CI: --3.8, 3.6)
- Not statistically significant, and the effect size is small
- Some covariates were still significant (State, race/eth, gender, a few others)

	Estimate	Std. Error	<i>p</i> value
(Intercept)	33.26	20.81	0.110
Pharmacy Desert	-0.37	1.74	0.830
Prop. Women	47.94	13.82	0.001
Health status: poor	-126.61	24.15	<0.001
Prop. No Health Insur.	-27.95	11.39	0.014
Race Hispanic White	25.44	7.51	0.001
(cont'd)			



SECONDARY ANALYSIS: LOW-ACCESS TRACTS

Part 2

Intro

Sample characteristics: Total dataset: **N = 9,652** census tracts

Part 1

• Low access tracts: n=1,798 (18.3%)

Unadjusted mean shingles vaccination rate is lower in low access tracts (vs. non-low-access tracts):

Non-low- access	Low Access	<i>p</i> -value
49.1 (per 1000 pop.)	42.2 (per 1000 pop.)	<i>p</i> <0.001

<u>Use same covariates as main analysis</u> → <u>generate propensity scores:</u>

Results

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Conclusion





Background



Background >> Part 1

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Results

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SENSITIVITY ANALYSIS: LOW-ACCESS TRACTS





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Results

SENSITIVITY ANALYSIS: LOW-ACCESS TRACTS

Final evaluation:

- <u>Dataset</u>: matched dataset, + weights from sample
- <u>Outcome</u>: shingles vaccinations per 1000 population; <u>Exposure</u>: low-access tract status

Intro

- <u>Additional covariates</u>: All balancers were included as covariates in this outcome model as well (doubly robust)
- <u>Model</u>: linear regression (continuous outcome), use cluster robust standard errors

Results:

- ATT: Effect of "low access tract" status is -2.4 fewer shingles vax. per 1000 population, among tracts that are low access (i.e., had they not been low-access) (95% CI: -3.9, -0.7), effect was statistically significant
- Overall, effect size is larger and more significant than the standard def (-0.4 vs. -2.4)

	Estimate	Std. Error	<i>p</i> value
(Intercept)	31.32	15.58	0.044
"Low Access" Status	-2.35	0.80	0.003
Pop to PCP ratio	0.001	0.0002	<0.001
Health status: poor	-427.01	31.024	<0.001
Vote Dem. 2020	22.897	1.674	<0.001
Race NH NHPI	-399.33	78.146	<0.001
(cont'd)			



LIMITATIONS

T)-

Background

Strengths

Part 1

Part 2

- One of very few studies to examine the effects of pharmacy access on realworld vaccinations/services
- Local-level data is only rarely available, yet crucial for understanding neighborhood effects
- Propensity score matching is well-established statistical approach and we followed best practices



Intro

Limitations

Results

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Conclusion

• IIS data: **reporting is incomplete** in the IIS data, many idiosyncrasies **that add up**: incorrect addresses, etc.

Methods

- Only 7 states, **small number of pharmacy desert tracts**
- State variation in proportion of shingles vax. **delivered in pharmacies vs. primary care**
- **Denominator is a rough approximation** in these calculations
- Unobserved confounding: very possible that other sources of confounding are not included, especially individual-level ones (e.g., plan type, provider recommendation)
- Data looked at **vaccine completions** but not timeliness, etc.



IMPLICATIONS

Part 1

Part 2

Background

• No significant difference in vaccination completions between tracts classified as pharmacy deserts vs. non-pharmacy deserts

Methods

Results

• However, we did find significantly lower vaccination rates in tracts with low geographic access to pharmacies (2.4 per 1000 population, or hypothetical deficit of 36,738 vaccinations missed)

Intro

Results Summary

- Adds to evidence base that poor geographic access to healthcare has real consequences for patient health
- Policies at state and federal levels may alleviate pressures on (prevent closures of) pharmacies
- Programs to better link patients with care at non-pharmacy locations (e.g., hospitals, local clinics)
- Research mplication
- Findings suggest that the income component of the pharmacy desert definition may not add a useful level of precision in identifying areas with gaps in access to pharmacy-based services
- Though, this may not be painting a complete picture (e.g., timeliness of vaccinations, also small sample)
- More research is needed to validate a standardized pharmacy desert definition (income, mileage, etc.)



Conclusion

Discussion

Part 1

Background

KNOWLEDGE CHECK!

Which of the following is not true of the pharmacist role as a vaccinator on the patient care team?

A) Pharmacists are authorized to administer shingles vaccinations in all 50 states

Intro

B) Pharmacists provide over 90% of all shingles vaccinations

Part 2

- C) The role of the pharmacist as an immunizer is becoming less important over time
- D) Pharmacists are authorized to *prescribe* as well as *administer* many adult vaccinations





KNOWLEDGE CHECK!

Part 1

Background

Which of the following is <u>not true</u> of the pharmacist role as a vaccinator on the patient care team?

Methods

Results

A) Pharmacists are authorized to administer shingles vaccinations in all 50 states

Intro

B) Pharmacists provide over 90% of all shingles vaccinations

Part 2

C) The role of the pharmacist as an immunizer is becoming less important over tine

D) Pharmacists are authorized to *prescribe* as well as *administer* many adult vaccinations





Conclusion

Discussion

CONCLUSIONS & NEXT STEPS





Results Discussion

CONCLUSIONS

Background

Pharmacies are important access points for health and, on average, are widely distributed.

Though nationally, there is important heterogeneity in pharmacy access: millions of people do not have easy access to one, as quantified in **Part 1.**

Intro

- Part 1 results confirm that these pharmacy desert neighborhoods are distributed throughout the country, and populations in these neighborhoods differ systematically from those that are not.
 - > Though its operational definition is still developing, pharmacy access has many implications for patient and population health.
 - One of those implications is differential access to pharmacy-based health services, such as routine vaccinations.
 - As one example, Part 2 results indicate that the rate of shingles vaccination receipt may be lower among people living in neighborhoods with low access to pharmacies
 - More research is needed on shingles and other pharmacy-based services to understand, and ultimately address, gaps in patient access to these vital services.

DISSERTATION COMMITTEE FOR THIS RESEARCH



Andy Stergachis Departments of Global Health and Pharmacy

Jennifer Bacci Department of Pharmacy



Parth Shah

Fred Hutchinson Institute for Cancer **Outcomes Research**



Steve Mooney Department of Epidemiology



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THANK YOU





FEEDBACK AND QUESTIONS?





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