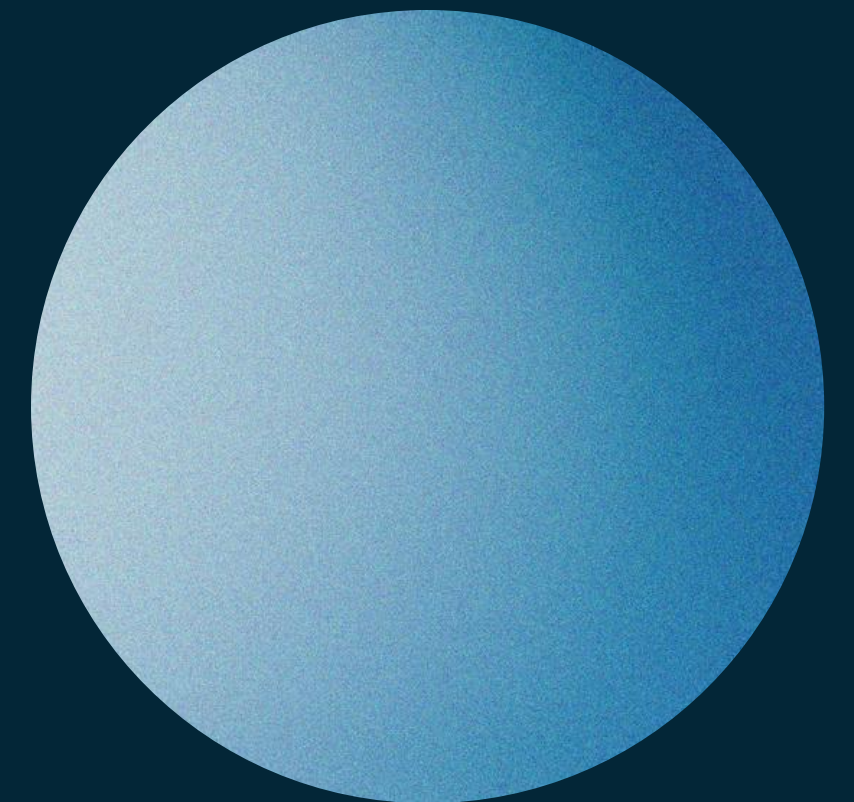




Trends in Pediatric Care in the United States

Aaron Leong
Mentor: Emily Gregory MD, MHS



Introductions



Emily Gregory
MD, MHS



Aaron Leong

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primary care for
children in the
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and determinants
of pediatric visits
using NAMCS data

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implications and
next steps

Primary care for children in the United States



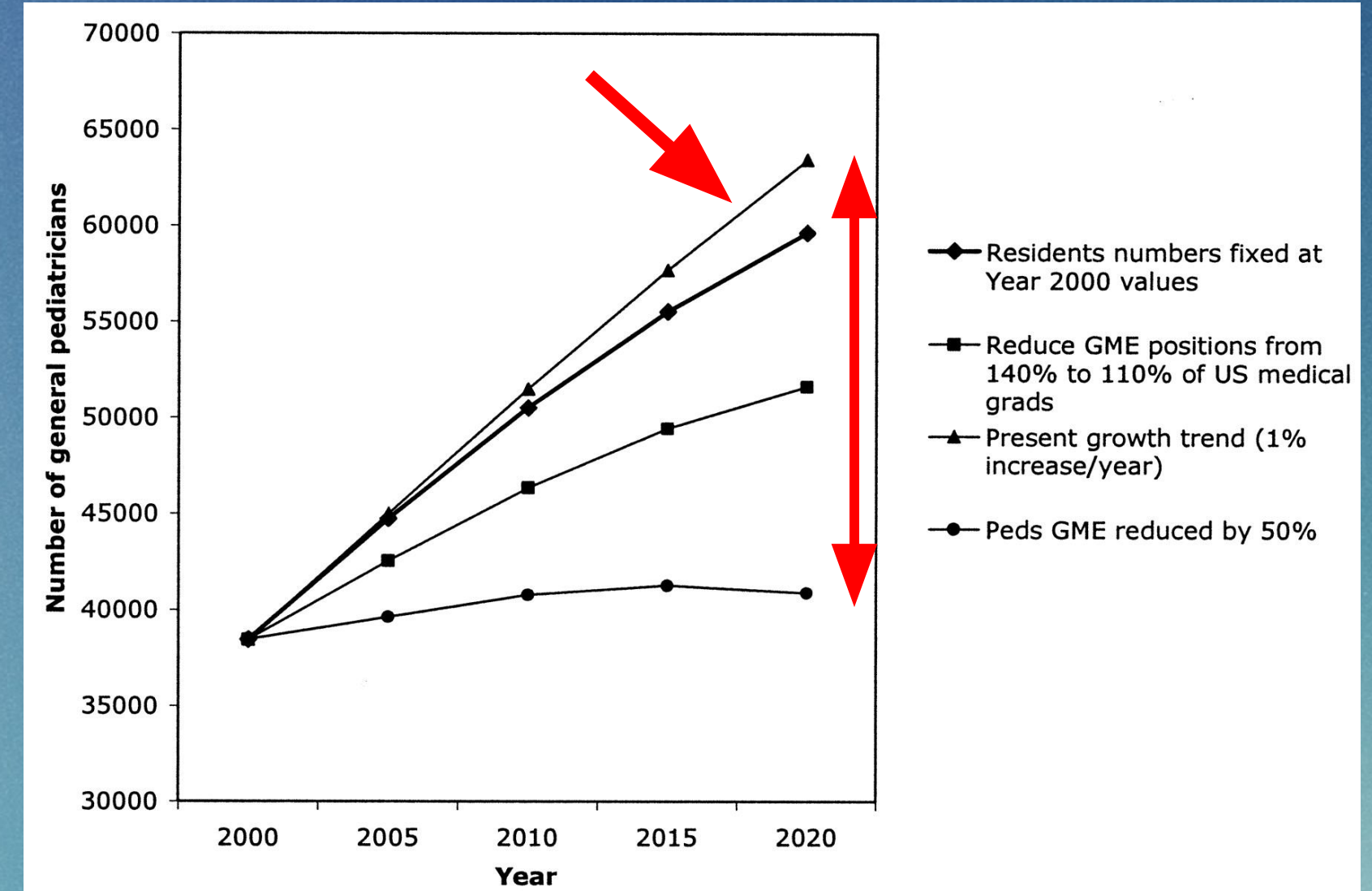
General pediatricians:
primary care doctors
specializing in children's health



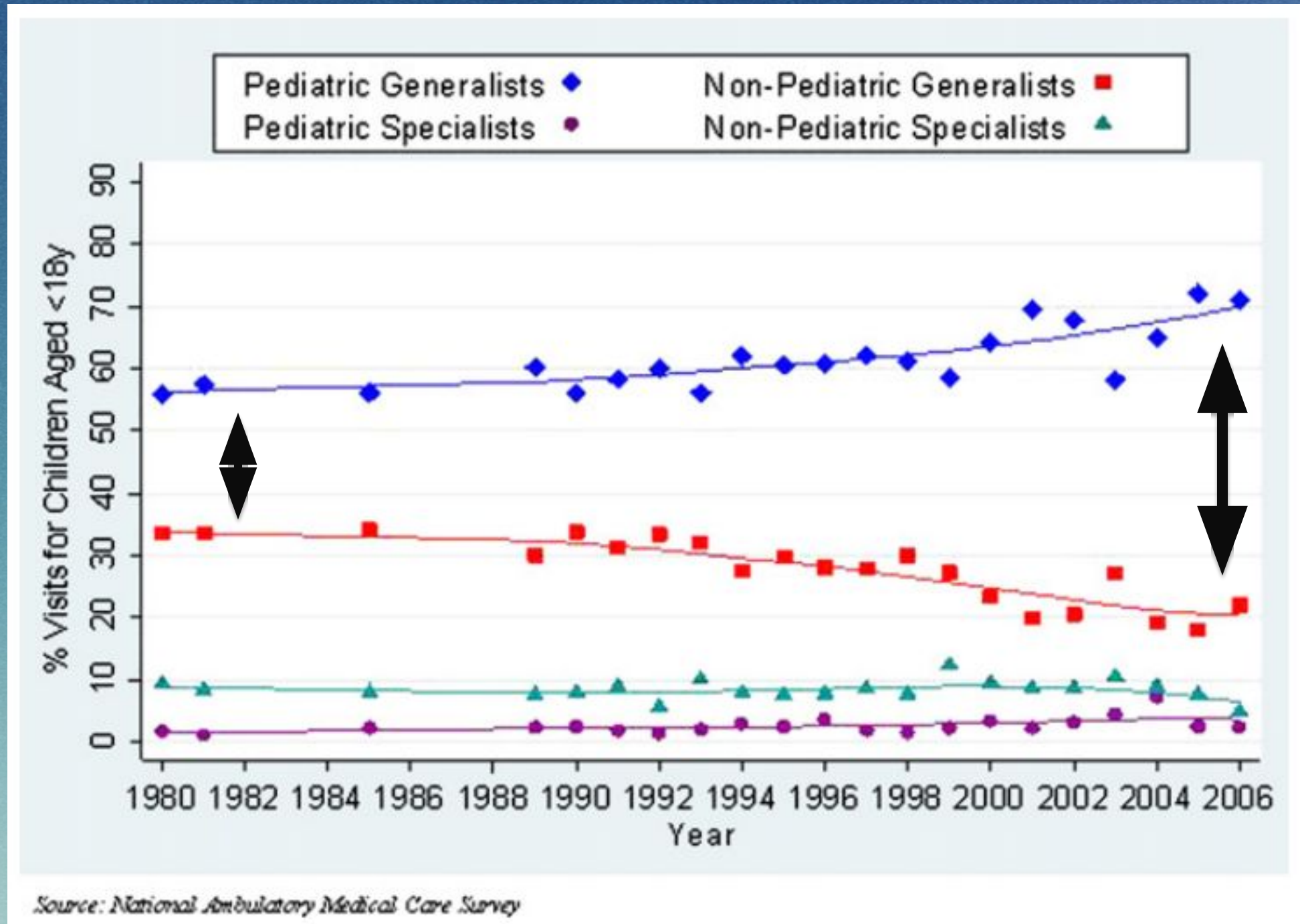
Family physicians:
primary care doctors who
care for all ages (including
children)

Background: The pediatric workforce

- 2005 paper: by 2020, pediatrician workforce to grow by ~6x rate of child population → oversupply?
- Options for pediatricians: expand services for children, expand coverage to young adults, **compete with family physicians for patients?**



Source: Shipman et. al, 2005



Source: Freed et. al, 2010

2010 paper: **more and more children** are visiting **pediatricians** instead of family physicians over time

- maybe because of more pediatricians?
- what other factors?
- has this continued past 2006?

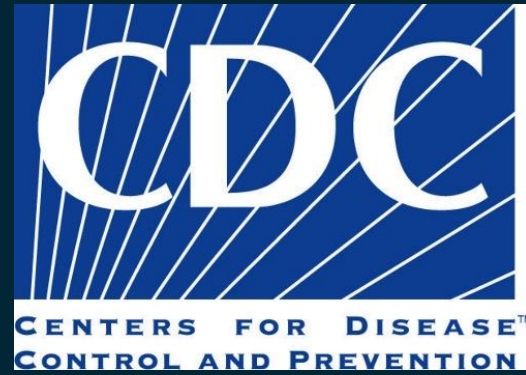
What are the implications of these proportion changes between pediatricians and family physicians?

Variation in patterns of care, specialty referral behavior, provision of preventive care, etc.

Among others,

- Testing for preventable diseases (e.g. pertussis/whooping cough)
- Provision of childhood immunizations (rural children)
- Contextualizing care for parents (smoking cessation for children, plan for financial costs of chronic medications)

NAMCS



What is the data?

- **Cross-sectional** cohort study of patient visits to physicians
- Physicians **randomly sampled**
- Each visit is **weighted** to make the sample **representative** of all US physician visits
- Data from **1993** to **2019**. No data from 2017

What is the scope of our analysis?

- Considered only **nonsurgical** visits by patients **aged under 18** (children)
- Classified physicians into 4 categories:
 - **pediatric generalists**
 - **nonpediatric generalists**
 - pediatric specialists
 - nonpediatric specialists

pediatric generalists = general pediatricians


nonpediatric generalists = family physicians

NAMCS

Our aims:

1. **Describe trends** in child visits to pediatricians vs family physicians beyond previous studies (>2006)

2. **Determine** which variables significantly **predict** visits to pediatricians from our sample

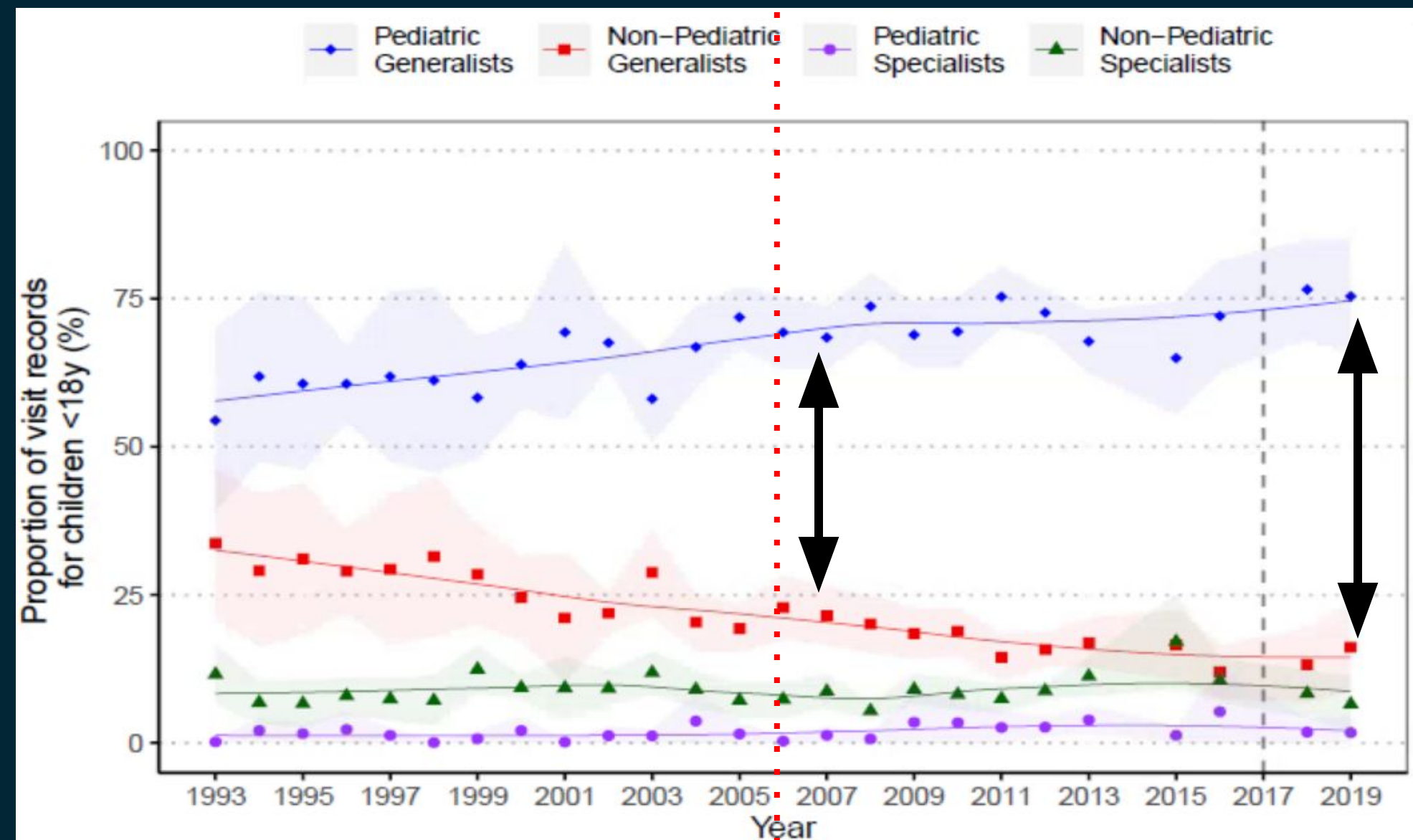
- 
- Time series of proportion of child visits
 - Time series by variables: race, ethnicity, geographic residence, payment type

- 
- Binary response models with “ as explanatory variables

Results I: Overall time series

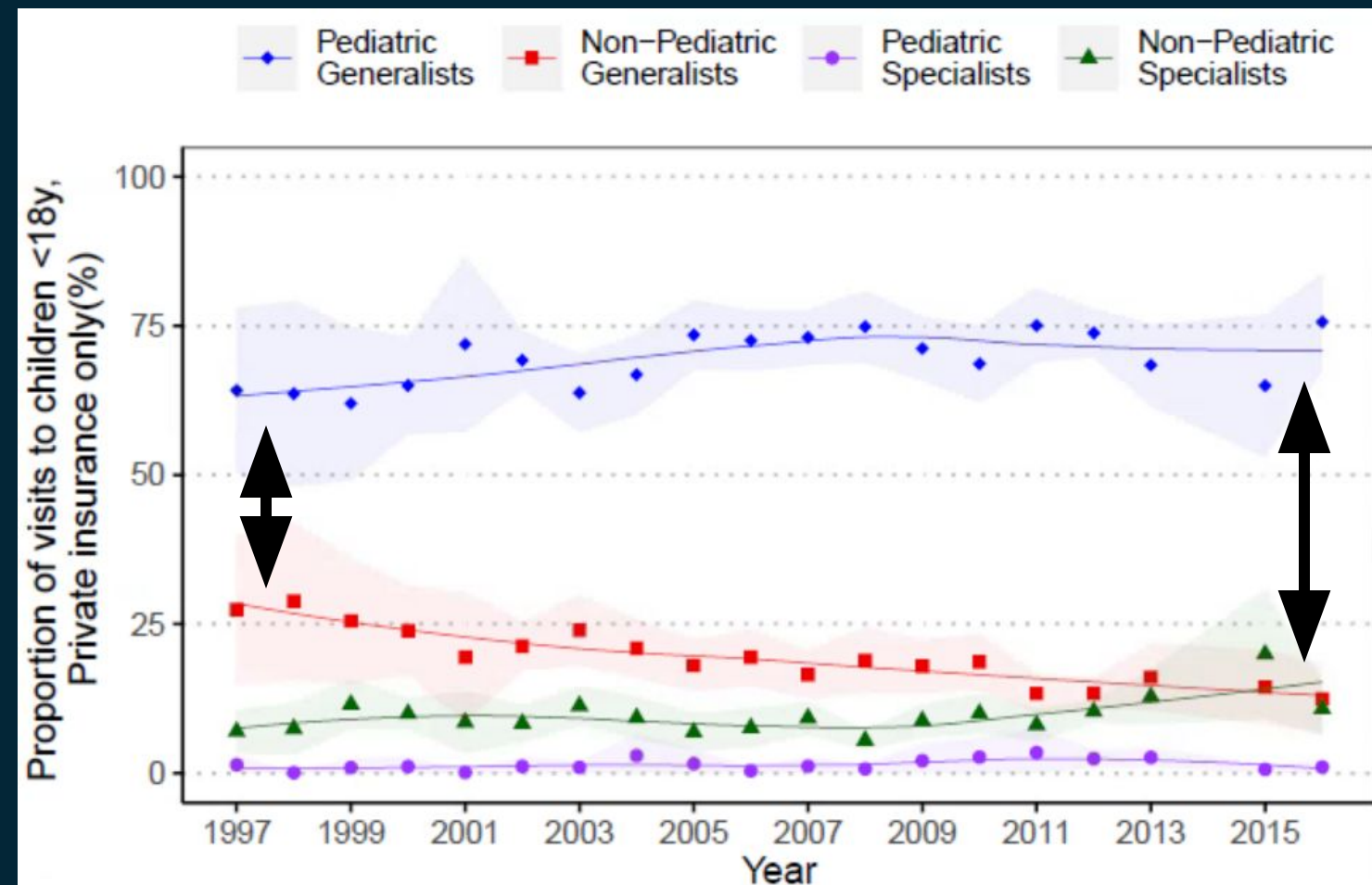
Proportion of child visits to each physician category, 1993 – 2019

- % of visits to **general pediatricians** have continued to **rise**
- % visits to **family physicians** have continued to **fall**

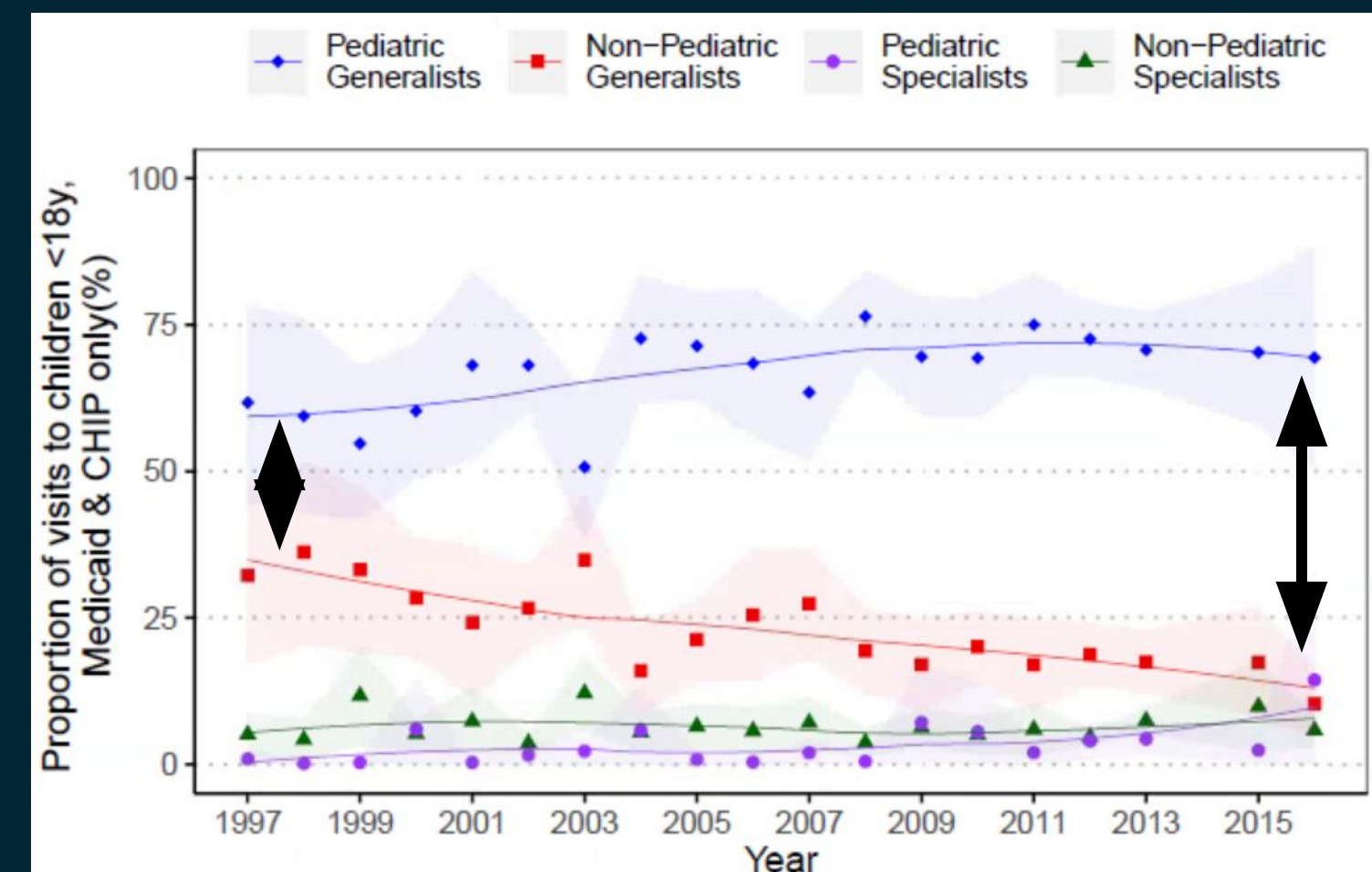


Results II: Individual time series: payment type

Proportion of child visits to each physician category, 1993 – 2016*



Privately insured children

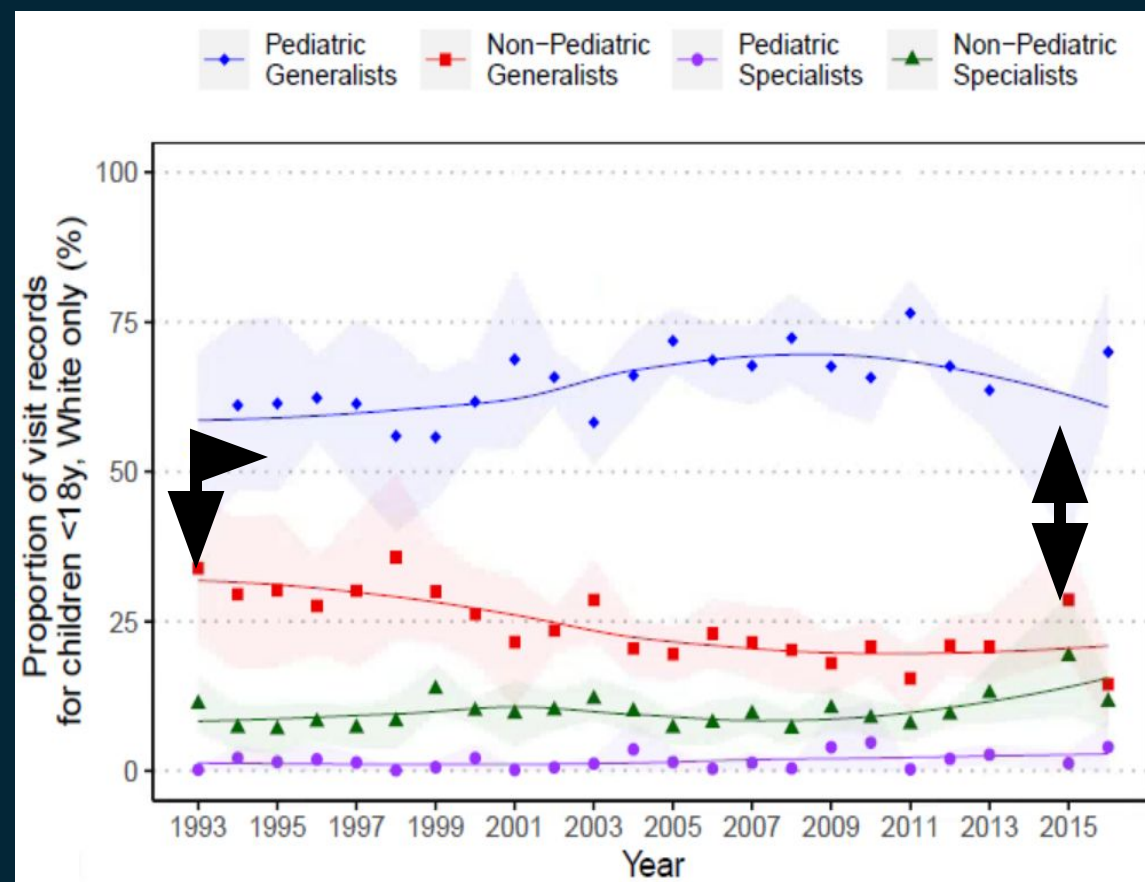


Children under Medicaid

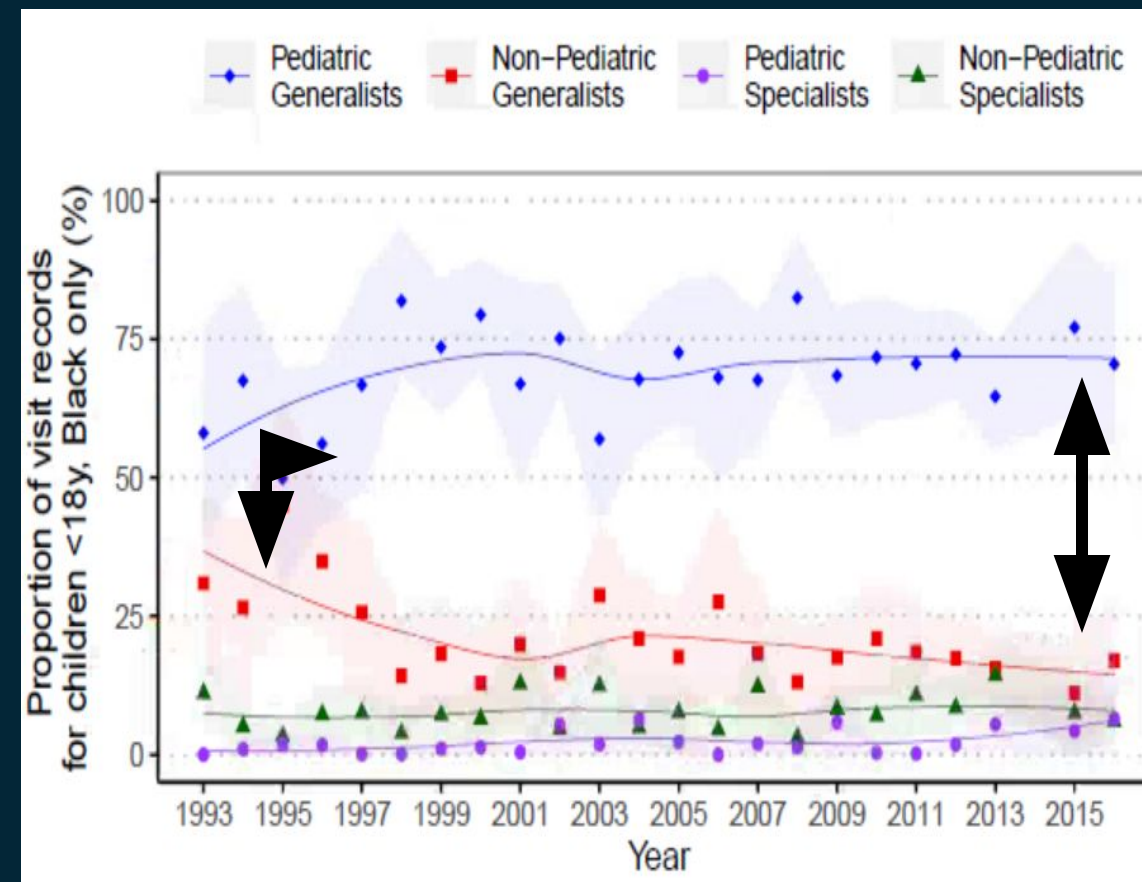
*Data only up until 2016 because of large CIs when using categorized 2018, 2019 data due to smaller sample sizes

Results II: Individual time series: race/ethnicity

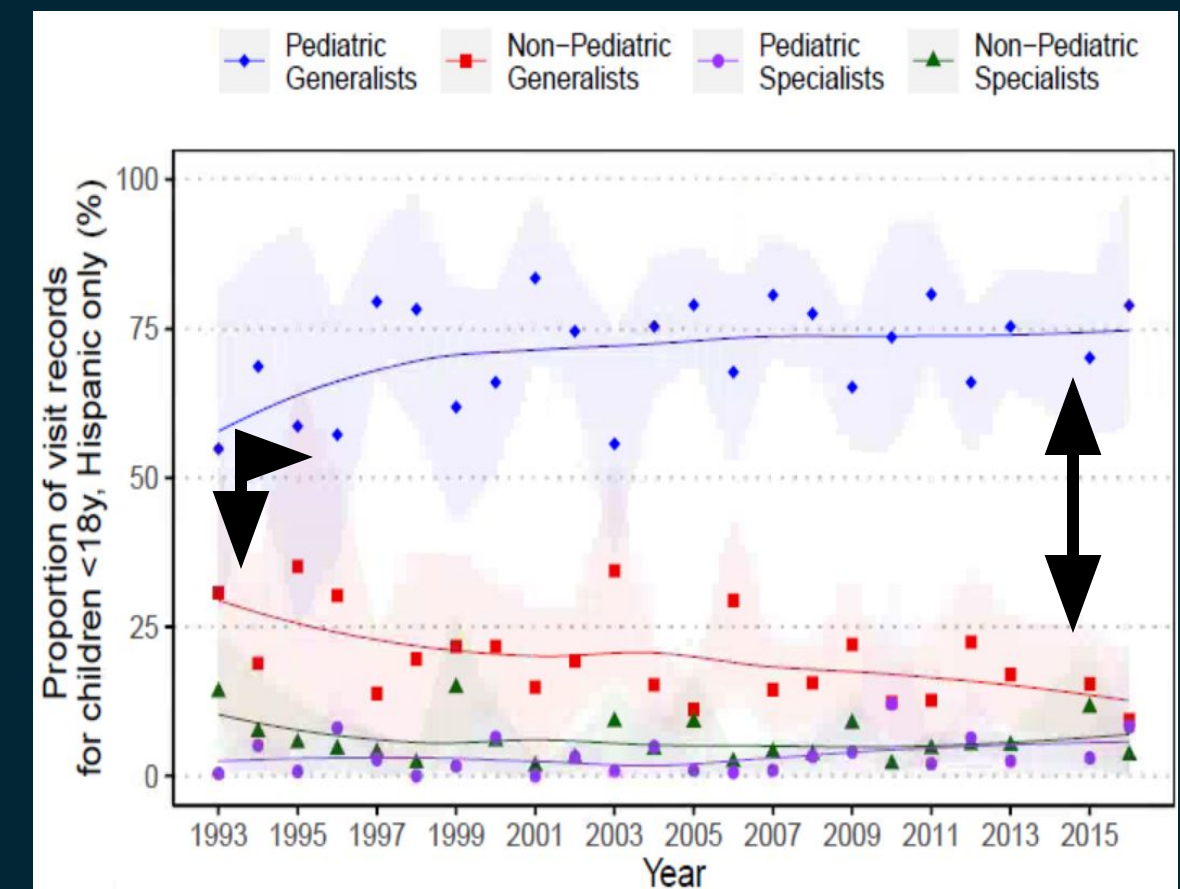
Proportion of child visits to each physician category, 1993 – 2016



Race: White



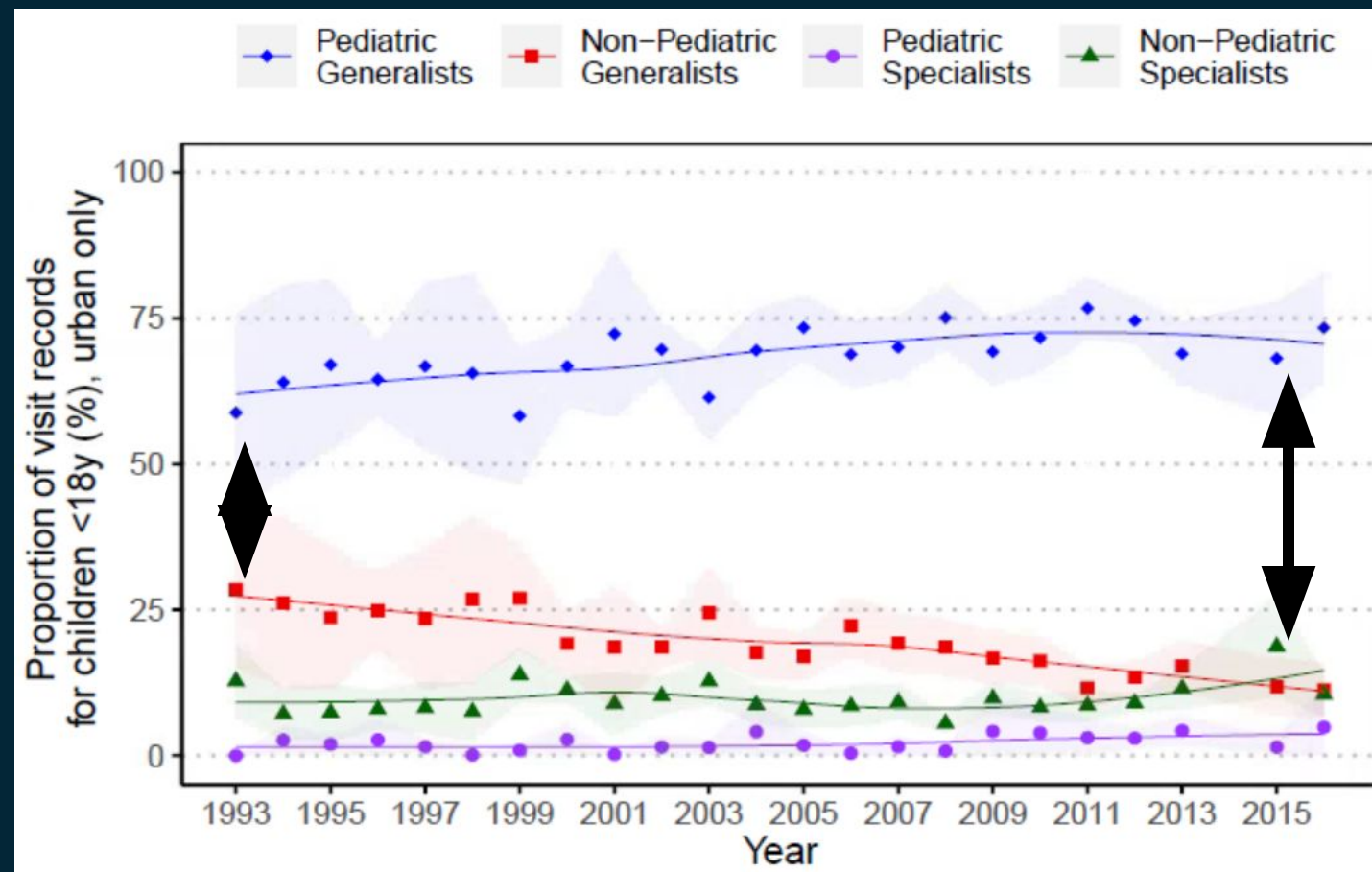
Race: Black



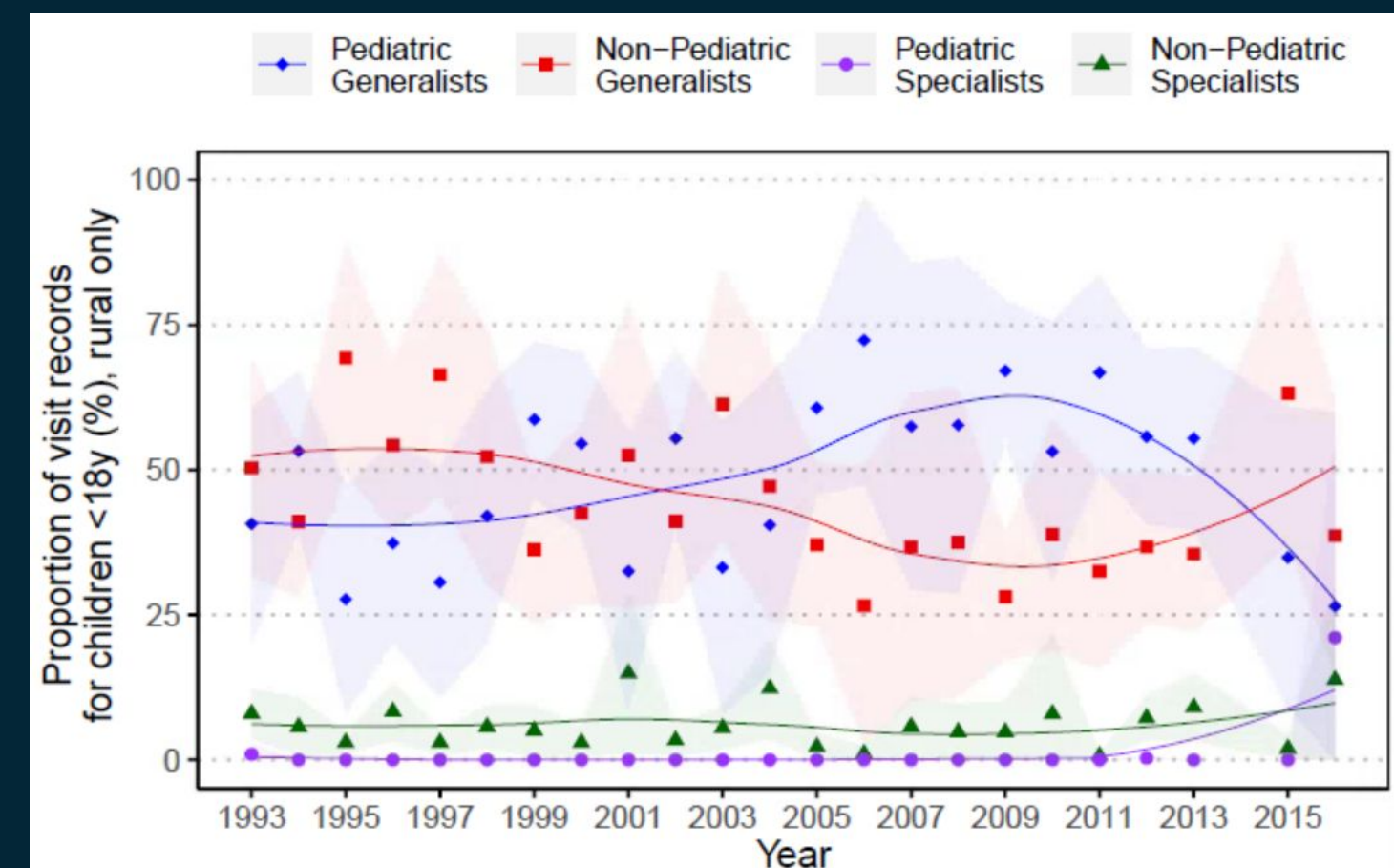
Ethnicity: Hispanic

Results II: Individual time series: urban/rural residence

Proportion of child visits to each physician category, 1993 – 2016



Residence: urban (MSA)



Residence: rural (non-MSA)

Results III: Binary response models

Response: **probability of child visit to pediatrician**, among child visits to generalists (pediatrician / family physician), excluding all specialists, data from 1997–2016

visit to pediatrician ~ race + ethnicity + residence + payment type + year

- race: white (base) / black
- ethnicity: non-hispanic (base) / hispanic
- residence: urban (base) / rural
- payment type: private insurance (base), medicaid
- year: categorical dummy variables with 1997 as base year

Results II: Binary response models

Response: **probability of child visit to pediatrician**, among child visits to generalists (pediatrician / family physician)

	LPM	logit	probit
variables			
intercept	0.72 *** (0.06)	0.98 ** (0.30)	0.61 *** (0.18)
race: Black	0.07 *** (0.02)	0.44 *** (0.12)	0.24 *** (0.07)
ethnicity: Hispanic	0.04 * (0.02)	0.26 * (0.12)	0.15 * (0.07)
rural	-0.23 *** (0.03)	-1.09 *** (0.14)	-0.66 *** (0.09)
medicaid	-0.02 (0.01)	-0.13 (0.08)	-0.08 (0.04)
Years (insignificant years omitted)			
year: 2011	0.14 * (0.07)	0.80 * (0.37)	0.46 * (0.22)
year: 2014	-0.21 ** (0.08)	-0.93 * (0.37)	-0.56 * (0.22)
Deviance	8087.37	49222.85	49240.33
Dispersion	0.17	1.01	1.00
Num. obs.	46538	46538	46538

*** p < 0.001; ** p < 0.01; * p < 0.05

Note: Logit and probit coefficients are similar to linear model when scaled (AME)

- Black and Hispanic children likelier to visit pediatricians (why?)
- Medicaid – enrolled children slightly less likely to visit pediatricians than privately insured children, but not significant
- Rural children substantially less likely to visit pediatricians (-23%!)

Why are pediatricians taking up a bigger share of child visits over time?



Ageing
demographic
trends

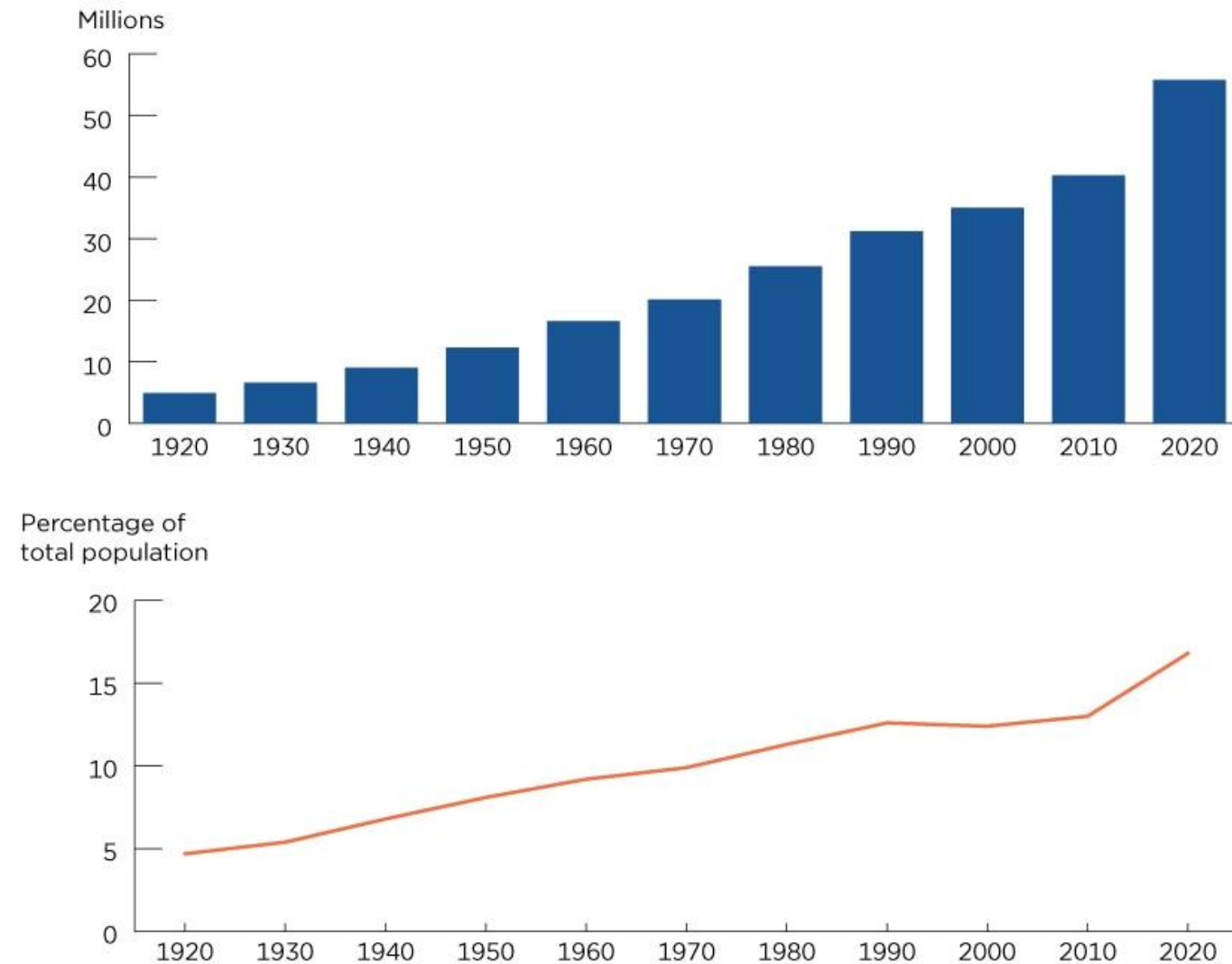
Continued
disparity
between
Medicare and
Medicaid
reimbursements

Decline in
number of family
physicians
offering care for
children

Rise in proportion
of children in
urban
(pediatrician-rich
) areas

Increased
supply of
pediatricians
relative to
family
physicians

Figure 1.
Population 65 Years and Over by Size and Percentage of Total Population:
1920 to 2020



Note: For information on data collection, confidentiality protection, nonsampling error, and definitions, refer to <https://www2.census.gov/programs-surveys/decennial/2020/technical-documentation/complete-tech-docs/demographic-and-housing-characteristics-file-and-demographic-profile/2020census-demographic-and-housing-characteristics-file-and-demographic-profile-techdoc.pdf>.

Source: U.S. Census Bureau, Decennial Census of Population, 1900 to 2000; 2010 Census Summary File 1, and 2020 Census Demographic and Housing Characteristics File (DHC).

Source: US Census Bureau, 2020

Ageing demographic trends

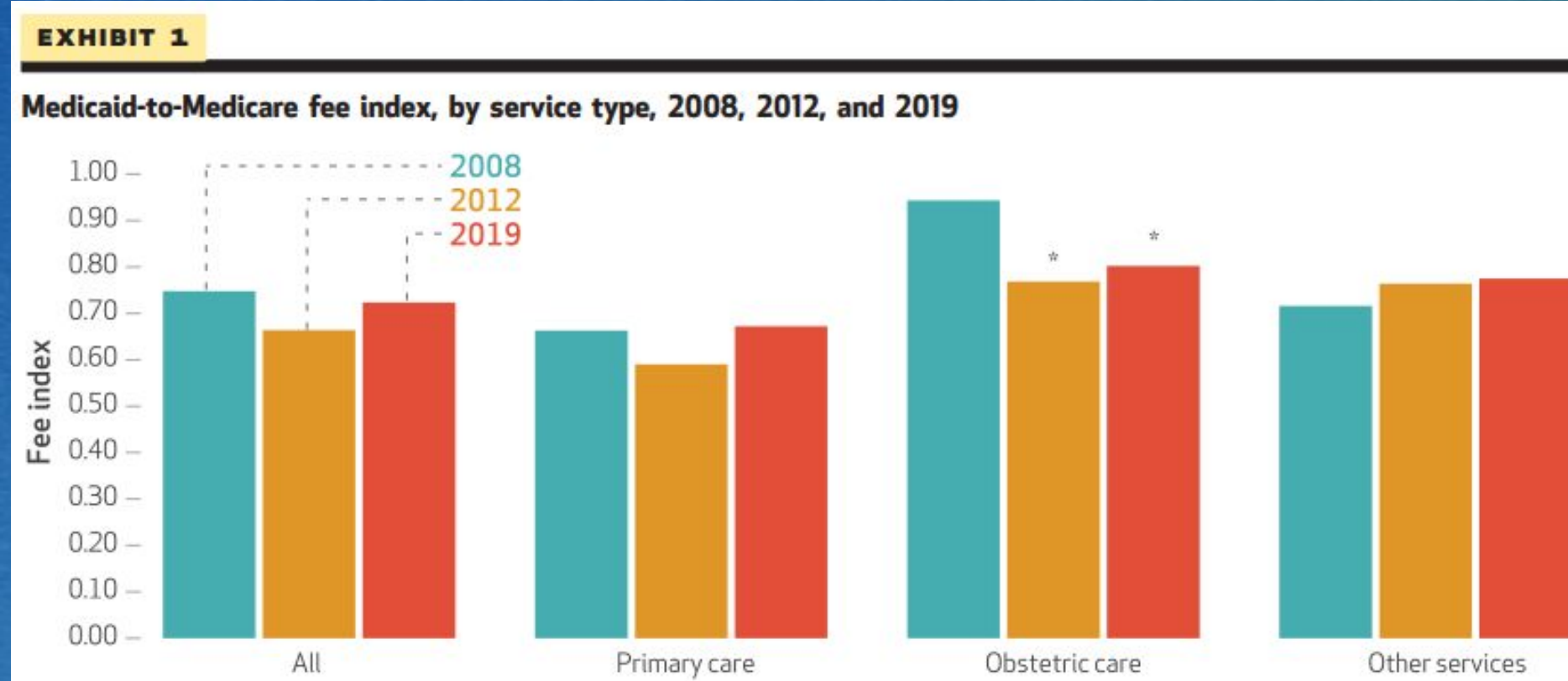
URGENCY OF PROBLEM

By Chad Boulton, Steven R. Counsell, Rosanne M. Leipzig, and Robert A. Berenson

The Urgency Of Preparing Primary Care Physicians To Care For Older People With Chronic Illnesses

DOI: 10.1377/hlthaff.2010.0095
HEALTH AFFAIRS 29,
NO. 5 (2010): 811-818
©2010 Project HOPE—
The People-to-People Health
Foundation, Inc.

Source: Boulton et. al, 2010



Source: Zuckerman et. al, 2021

MEDICAID EXPANSION

By Sharon K. Long

Physicians May Need More Than Higher Reimbursements To Expand Medicaid Participation: Findings From Washington State

Source: Long, 2013

Disparity

between

Medicare and

Medicaid fees

Decline in

the

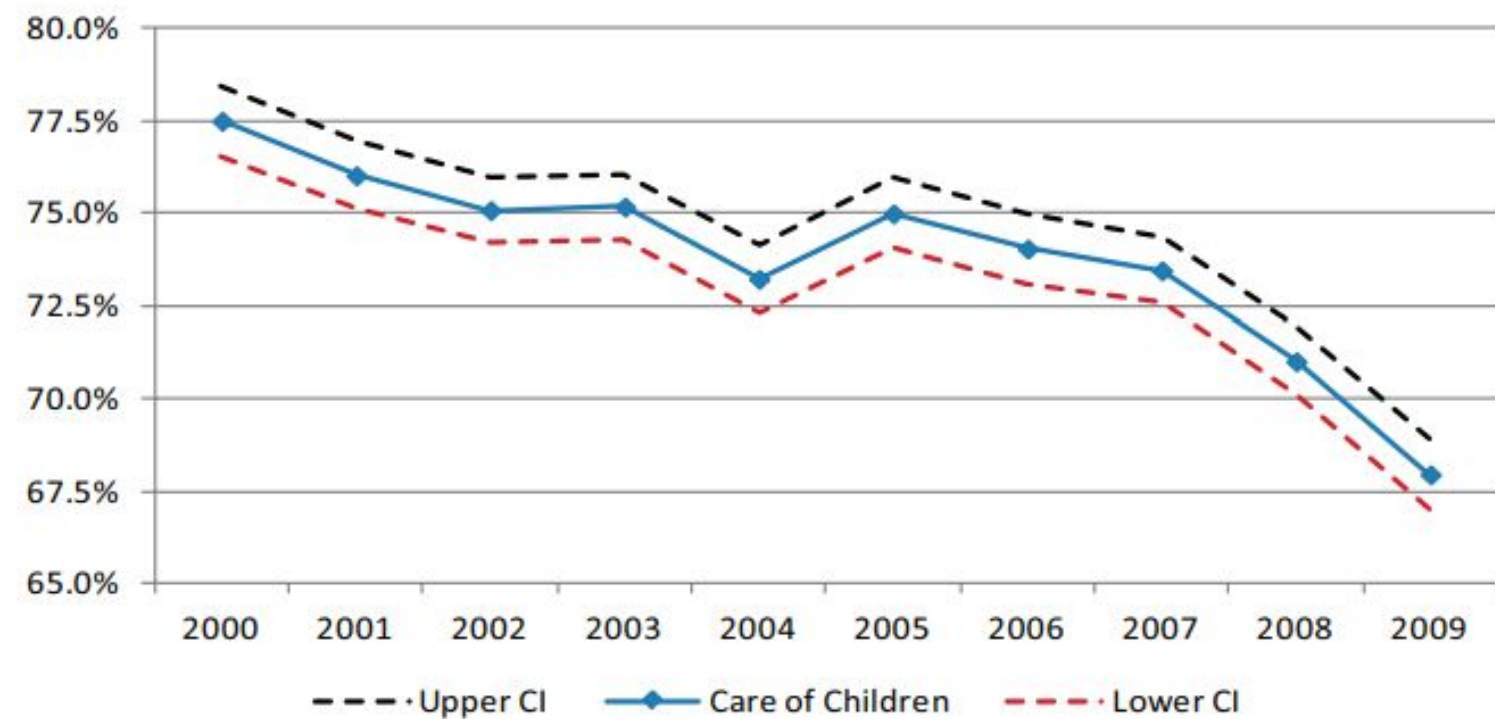
proportion

of family

physicians

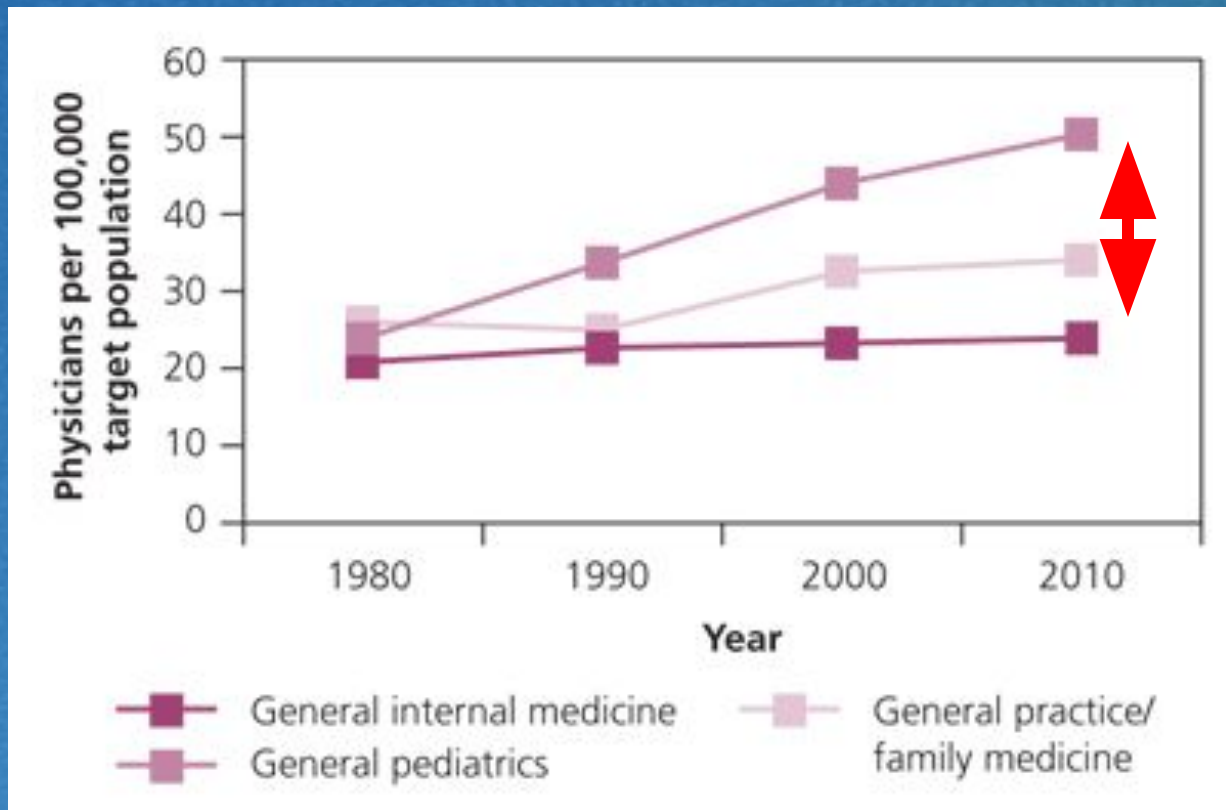
offering

Figure 1. Declining percent of family physicians caring for children. From the American Board of Family Medicine Examination Application.

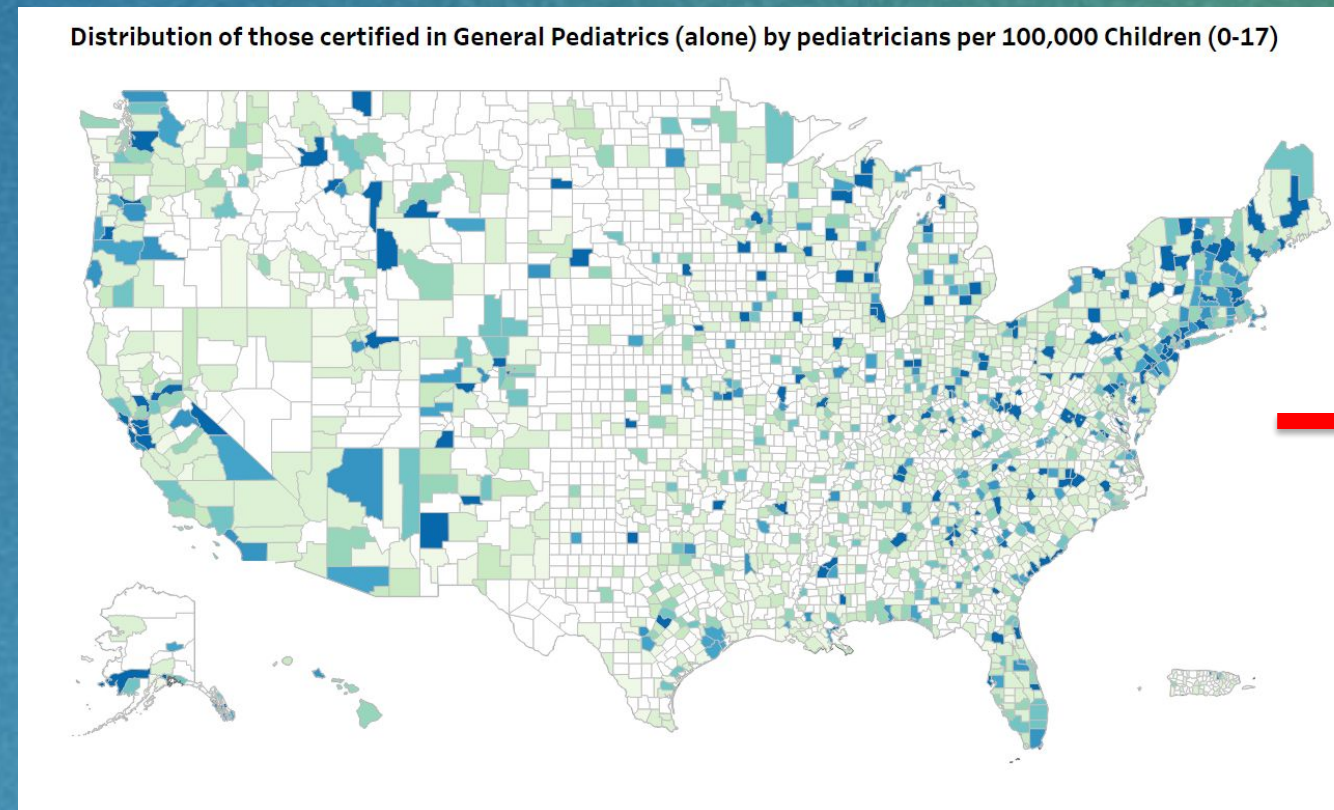


Source: Bazemore et. al, 2012

Increased supply of pediatricians relative to family physicians ???



Source: Makaroff et. al, 2013



Source: ABP, 2023

TABLE 1 National General Pediatrician and Family Physician Supplies

	1996 Supply	2006 Supply
General pediatricians^a		
<i>n</i>		
Overall	25 894	38 981
<45 y of age	15 157	20 132
45–54 y of age	7142	11 424
55–65 y of age	3595	7425
Female, %	47.4	59.3
International medical graduate, %	29.2	25.6
Practicing in rural community, % ^b	8.4	8.9
Family physicians^a		
<i>n</i>		
Overall	61 509	83 081
<45 y of age	31 946	36 001
45–55 y of age	17 767	29 182
55–65 y of age	11 796	17 898
Female, %	20.3	33.0
International medical graduate, %	16.9	16.0
Practicing in rural community, % ^b	23.1	22.3

Source: Shipman et. al, 2010

Further research

- NAMCS: obtain individual patient incomes, census tract data (restricted access)
- Examine each explanatory mechanism in isolation:
 - effect of Medicare – Medicaid fee disparity
 - decline in physicians offering pediatric services
 - relative supply of pediatricians vs family physicians

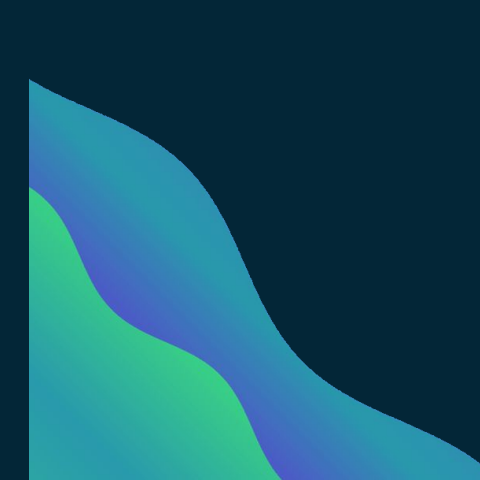
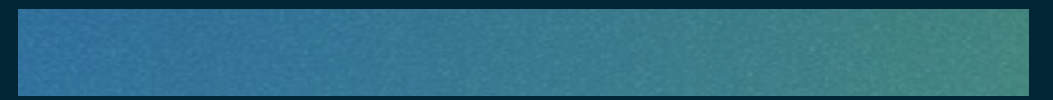
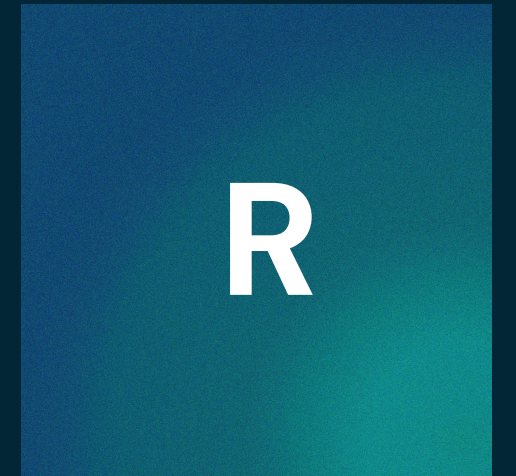
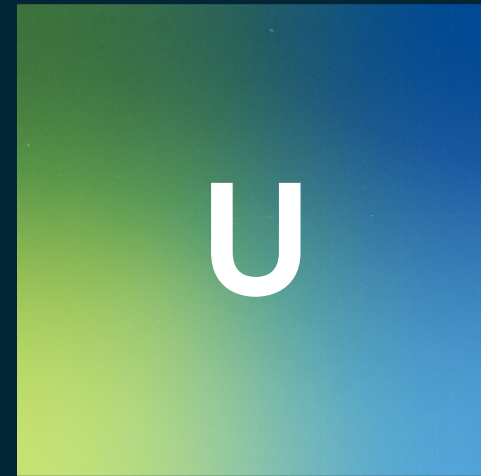
Lessons learned

- Self discipline
 - Mentorship
- Research takes a long time + a lot of grunt work

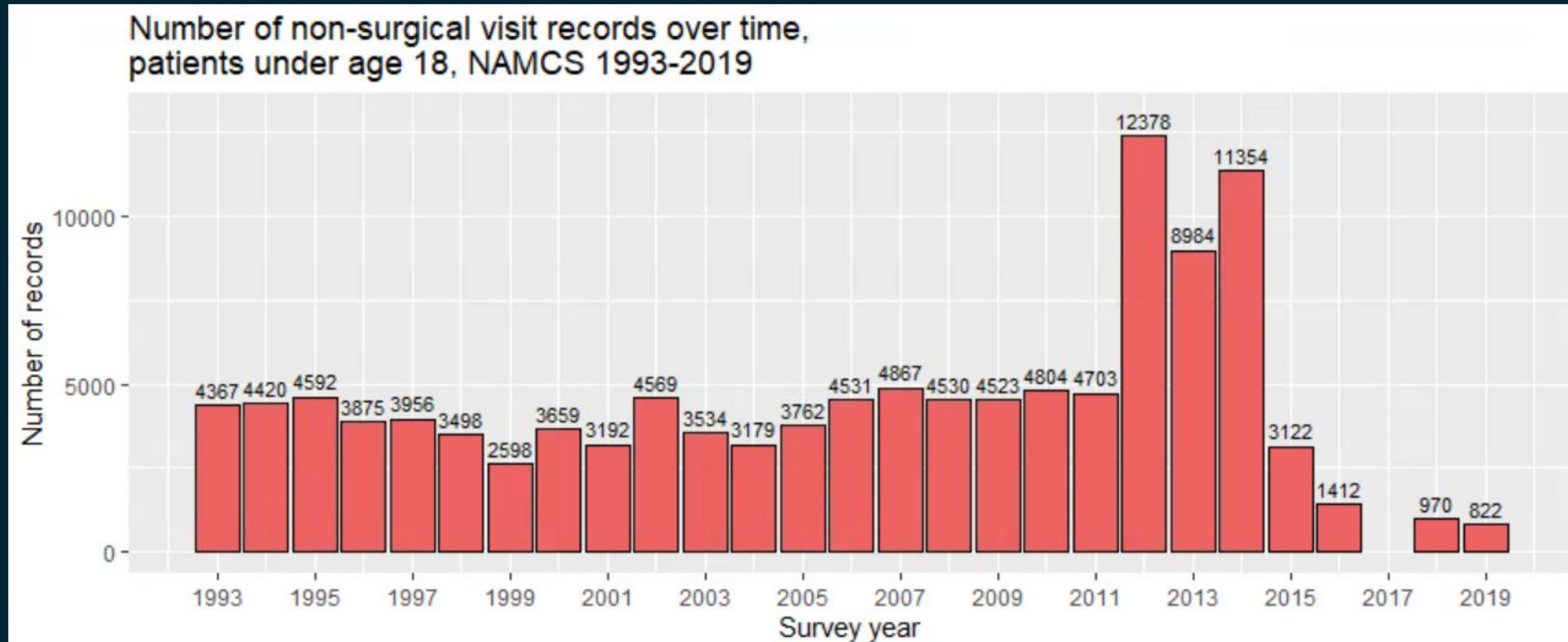
Acknowledgements

- Dr. Gregory
 - Adya
- Joanne and ChiChi
 - SUMR cohort

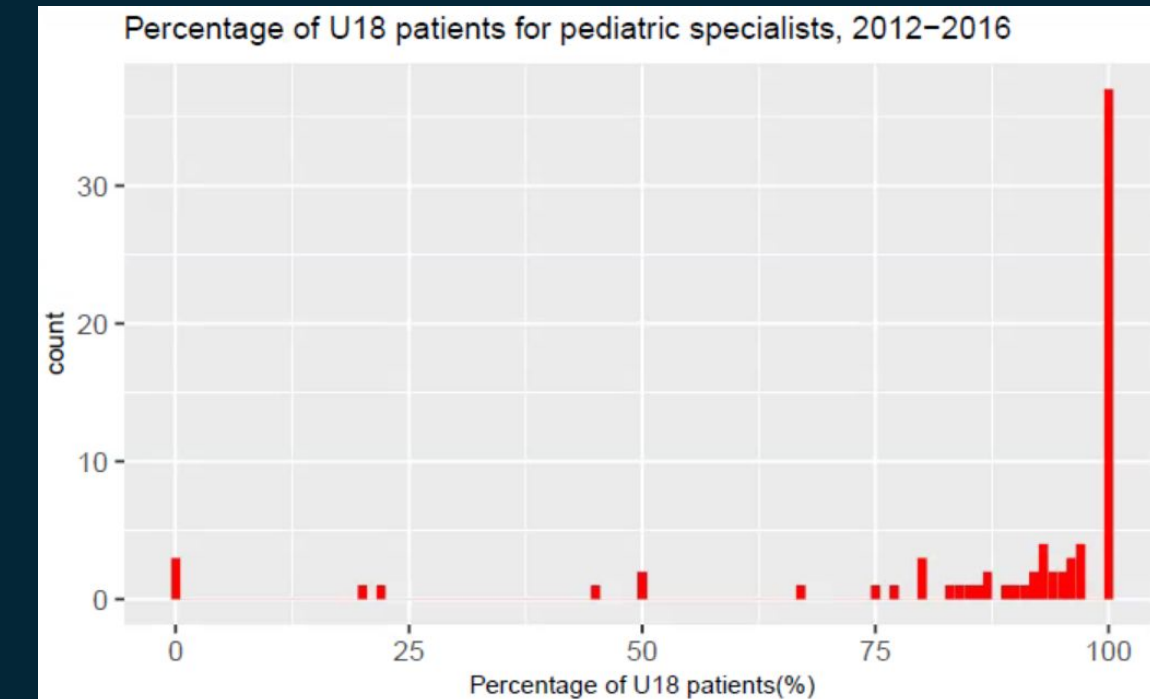
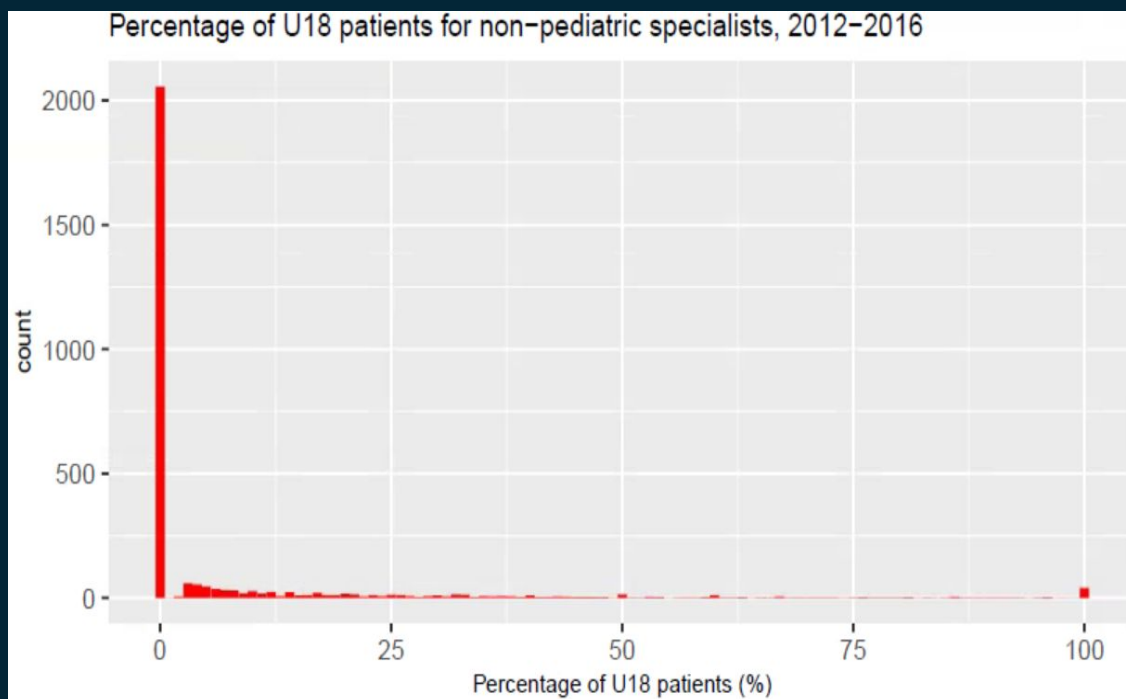
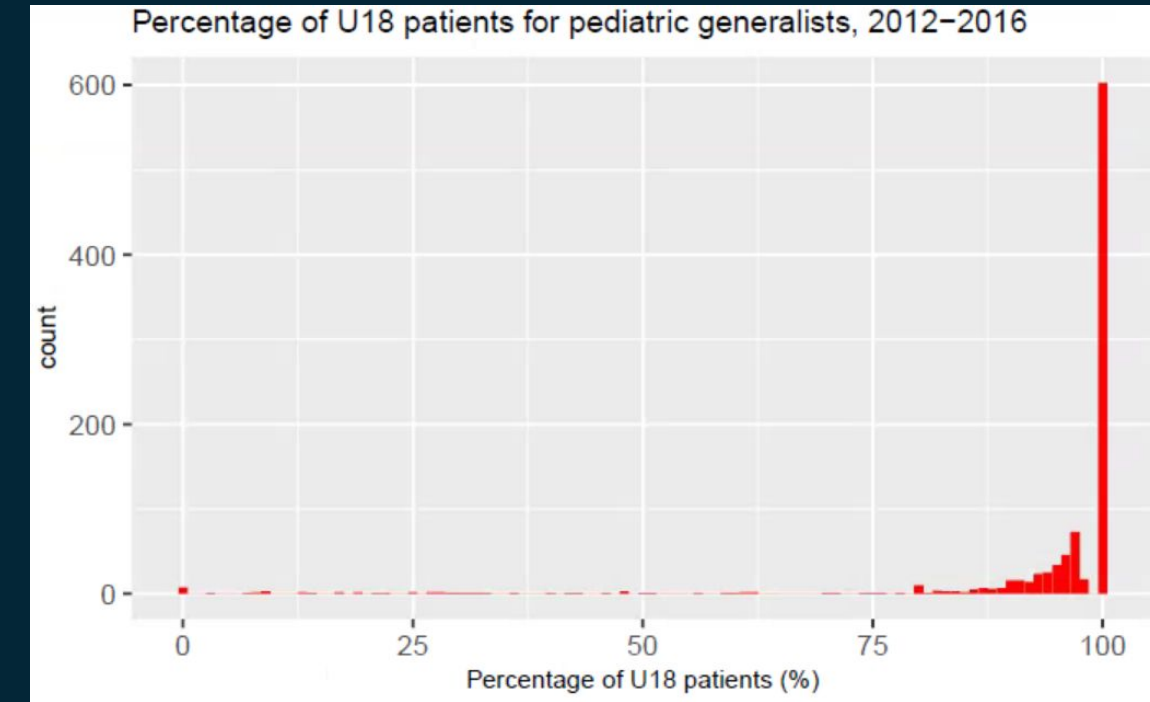
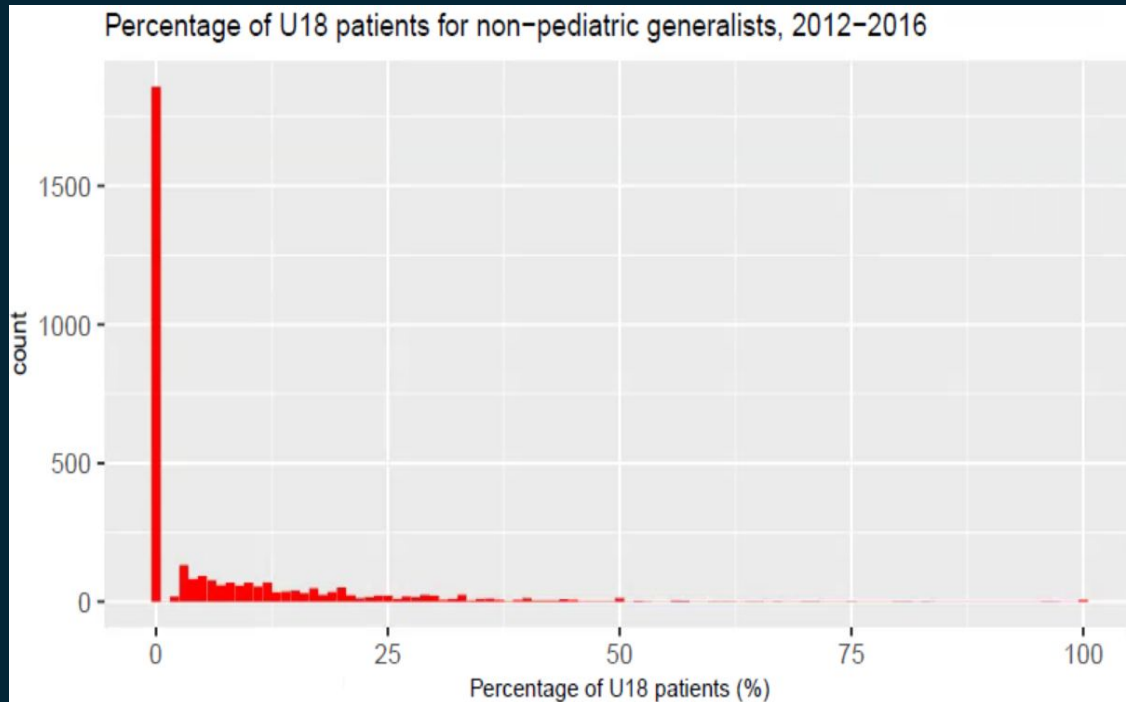
Questions /
suggestion
s?



Appendix



Appendix



Appendix

Frequencies
regress_df_combined\$PEDGEN
Type: Numeric

	Freq	% Valid	% Valid Cum.	% Total	% Total Cum.
0	13045	28.03	28.03	28.03	28.03
1	33493	71.97	100.00	71.97	100.00
<NA>	0			0.00	100.00
Total	46538	100.00	100.00	100.00	100.00

```
=====
                                logit AME    probit AME
-----
variables
-----
ethnicity: Hispanic              0.05 *      0.04 *
                                (0.02)     (0.02)
rural                          -0.23 ***  -0.23 ***
                                (0.03)     (0.03)
medicaid                      -0.02      -0.02
                                (0.01)     (0.01)
race: Black                     0.07 ***  0.07 ***
                                (0.02)     (0.02)

Years (insignificant years omitted)

year: 2011                      0.13 *      0.13 *
                                (0.07)     (0.07)
year: 2014                     -0.21 **   -0.21 **
                                (0.08)     (0.08)

-----
Deviance (Null)                 51564.53   51564.53
df.null                        46537     46537
AIC                            50140.35   50158.79
BIC                            49480.80   49498.28
Deviance                       49222.85   49240.33
DF Resid.                      2362.00   2362.00
nobs                           46538     46538
=====
*** p < 0.001; ** p < 0.01; * p < 0.05
```

Frequencies

	Freq	% Valid	% Valid Cum.	% Total	% Total Cum.
1	39619	85.13	85.13	85.13	85.13
2	6919	14.87	100.00	14.87	100.00
<NA>	0			0.00	100.00
Total	46538	100.00	100.00	100.00	100.00

Frequencies
regress_df_combined\$ETHUN
Type: Factor

	Freq	% Valid	% Valid Cum.	% Total	% Total Cum.
1	8753	18.81	18.81	18.81	18.81
2	37785	81.19	100.00	81.19	100.00
<NA>	0			0.00	100.00
Total	46538	100.00	100.00	100.00	100.00

Frequencies
regress_df_combined\$MSA
Type: Factor

	Freq	% Valid	% Valid Cum.	% Total	% Total Cum.
1	38375	82.46	82.46	82.46	82.46
2	8163	17.54	100.00	17.54	100.00
<NA>	0			0.00	100.00
Total	46538	100.00	100.00	100.00	100.00

Frequencies
regress_df_combined\$PAYTPER
Type: Factor

	Freq	% Valid	% Valid Cum.	% Total	% Total Cum.
1	27834	59.81	59.81	59.81	59.81
3	18704	40.19	100.00	40.19	100.00
<NA>	0			0.00	100.00
Total	46538	100.00	100.00	100.00	100.00