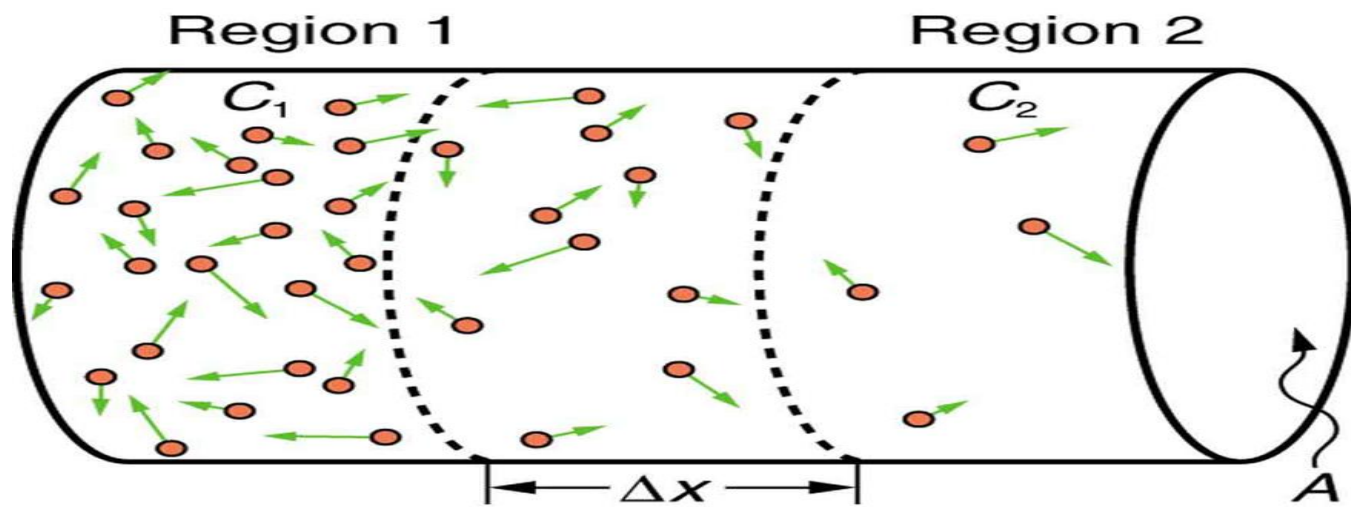




# **Understanding How the Diffusion of Physicians Affects Areas of Underservice**

The central hypothesis of this analysis is that physician diffusion can be estimated (*anticipated*) based on the characteristics of the **places** physicians go to and come from as well as from the characteristics of the **physicians**.



## The Policy Angle:

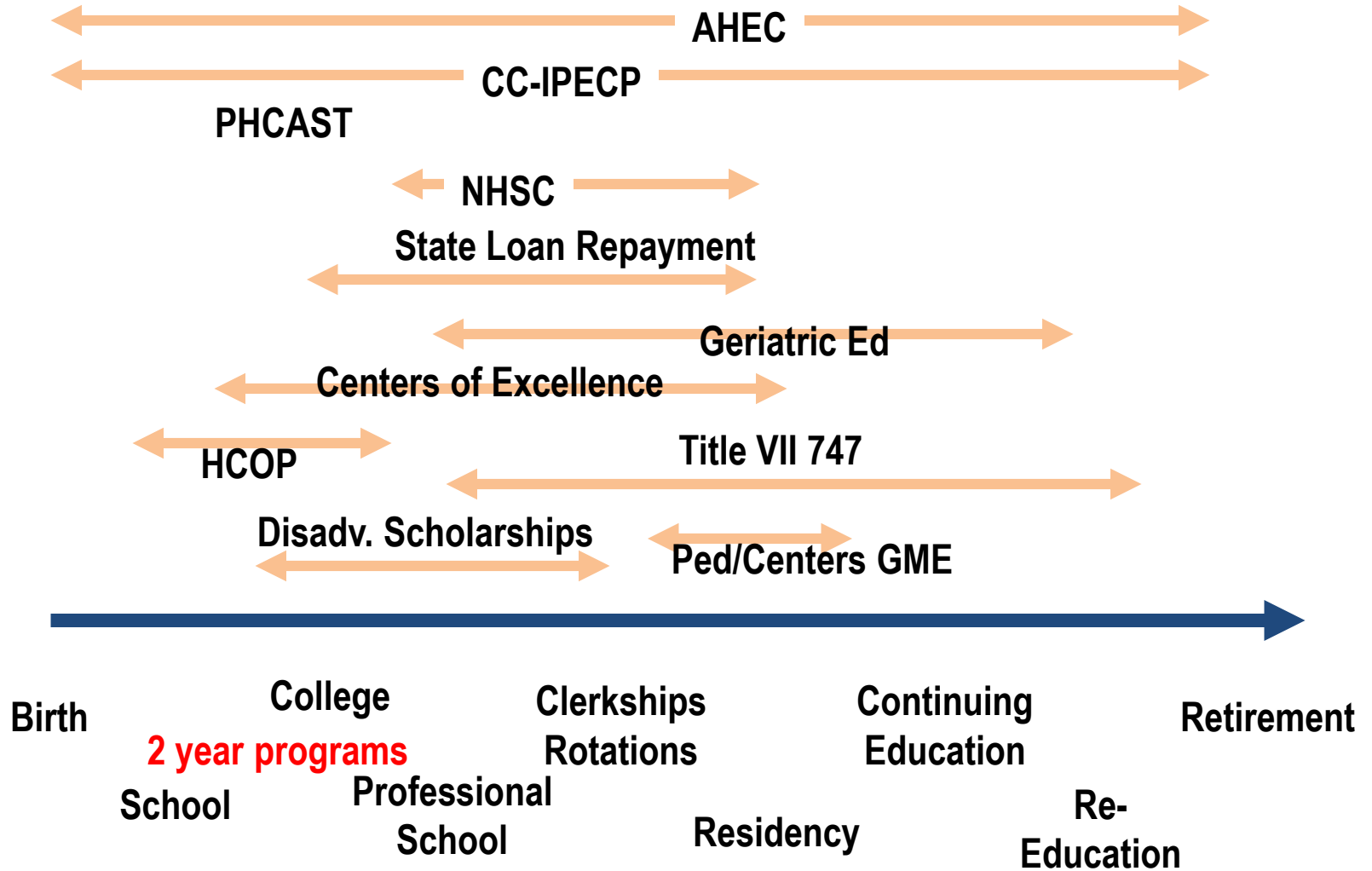
*We can combine places  
and people with the best  
programs to optimize  
recruitment and retention  
in rural underserved areas  
(for primary care)*



# Policies/Programs:

- Recruitment of people with likelihood of going into rural, primary care
- Recruitment via focused content in rural settings or applicable to rural problems
- Recruitment via loan repayment, scholarships, incentives, potential support
- Retention via bonus payments
- Retention via practice support

# Overlap of Selected Federal Programs and the “Life Course”



# Matrix of Program Overlap

	TPCMD	NHSC Loan t	NHSC Scholarship	Bioterror Trng Cur	PH Training Center	HETCs	Burdick	NPDB	AHEC	PH Trainees	HADM	Prev Med	SLRP	Allied Health	HCOP	Dental PubH
TPCMD Program	H	H	L	L	M	M	L	H	L	L	H	H	L	H	L	
NHSC Loan Repayment Program	H	H	L	L	H	H	L	H	L	L	M	H	L	H	L	
NHSC Scholarship Program	H	H	L	L	H	H	L	H	L	L	M	H	L	H	L	
Bioterrorism Training and Curr Dev	M	L	L	H	H	M	L	H	H	M	M	L	M	L	L	
PH Training Center Program	L	L	L	M	H	M	L	H	H	H	M	L	L	M	M	
Health Education Training Centers	M	M	H	M	H	H	L	H	M	M	M	H	L	H	M	
Quentin N. Burdick Rural Intdis Prog	M	M	M	L	M	H	L	H	M	M	M	H	H	H	M	
Nat. Practitioner Data Bank	L	L	L	L	L	M	L	M	L	L	M	L	L	L	L	
AHEC Program	H	H	H	H	M	H	H	L	M	M	H	H	H	H	M	
Public Health Traineeships	L	L	L	M	H	M	M	L	M	H	M	M	L	M	H	
Health Administration Traineeships	L	L	L	M	H	M	M	L	H	H	M	H	L	H	M	
Prev Medicine Residency Program	H	H	M	L	M	H	M	L	H	H	L	M	L	H	L	
State Loan Repayment Program	H	H	H	L	M	H	H	L	H	H	L	M	M	H	M	
Allied Health Projects	L	L	L	L	M	M	H	L	H	L	L	L	M	H	M	
Health Careers Opportunity Program	M	H	M	L	M	M	M	L	H	M	M	M	H	M	M	
Dental Public H Resid Training Prog	L	M	L	L	M	M	L	L	M	L	L	L	M	M	L	

Recruitment

Retention

High, Medium or Low interaction



Bob Konrad calls programs:

***Mercenary,  
Military or  
Missionary***

Program **Mechanisms**-what HRSA and other programs do to influence distribution and supply

 **Compulsion/Coercion (military\*)**


 NHSC, SLRP, *J-1 Visa obligation*

 **Normative (missionary\*)**

 HCOP, Rural Interdisciplinary

 Title VII-VIII, Geriatric Training

 **Utilitarian (mercenary\*)**

 Bonus payments, *J-1 Visa-Incentive for employer*

(\*T. R. Konrad's Models)



# The Analysis

# Data & Stuff

- AMA concatenated files, 2006-2013 (with reference/comparison to 2011)
- HPSA files (ZIP, County, AHRF, “Kitchen Sink”)
- GIS basemaps for adjacency and distance
- ZIP imputed files (Medicare stuff)
- .....
- Tried to use PCSA files, but....

# A comment on the concatenated files

- Physician records in AMA Masterfile have a unique ID
- Data are updated annually on perhaps 30% of records
- The data “lag” a bit, when a doctor moves, the data may catch up in 3years, or in 3 days...

# All docs, preliminary findings...

620,390 active in 2006 *and* 2013

(Excl fed, res, <80)

& **185,207 (29.8%)** moved to  
a different county over 7 years

620,096 active in 2006 *and* 2011

(Excl fed, res, <80)

& **158,709 (25.5%)** moved  
to a different county over 5  
years

# Conclusions (Diffusion Version1)

- Physician supply is **dynamic**
- Policies should recognize the dynamic nature of the supply when considering:
  - Evaluation of programs (e.g.: retention rates in context of normal flows)
  - Placement (prepare physicians for inevitable geographic change)
  - The economic argument that diffusion meets needs is ***confirmed*** but conditioned
- So what? Which policy is implicated?

# Total movement increased from 213,750 to 290,030

*36.4% of all docs active in both series*

Move County					
				2006-2011	
2006-2013	no	yes	total		
no	474,469	31,993	506,462		
yes	108,263	181,757	290,020		
total	582,732	213,750	796,482		

let's see who were movers

# A prelim regression of any county move, $r^2=.088$

movefips0613	coeff.	std. err.	t	p>t	95%L	95%U
yr2011_primcare	-0.0648155	0.0011749	<b>-55.17</b>	0	-0.0671183	-0.0625127
yr2011_surgeon	-0.0439563	0.001372	<b>-32.04</b>	0	-0.0466455	-0.0412672
yr2011_doflg	0.0223312	0.0020921	<b>+10.67</b>	0	0.0182307	0.0264318
yr2011_age	-0.0123393	0.0000473	<b>-260.82</b>	0	-0.012432	-0.0122466
female	0.0053607	0.0011596	<b>+4.62</b>	0	0.0030878	0.0076335
_cons	1.005935	0.002567	391.87	0	1.000903	1.010966

# Simplified Results: any county move,

$r^2=.088$

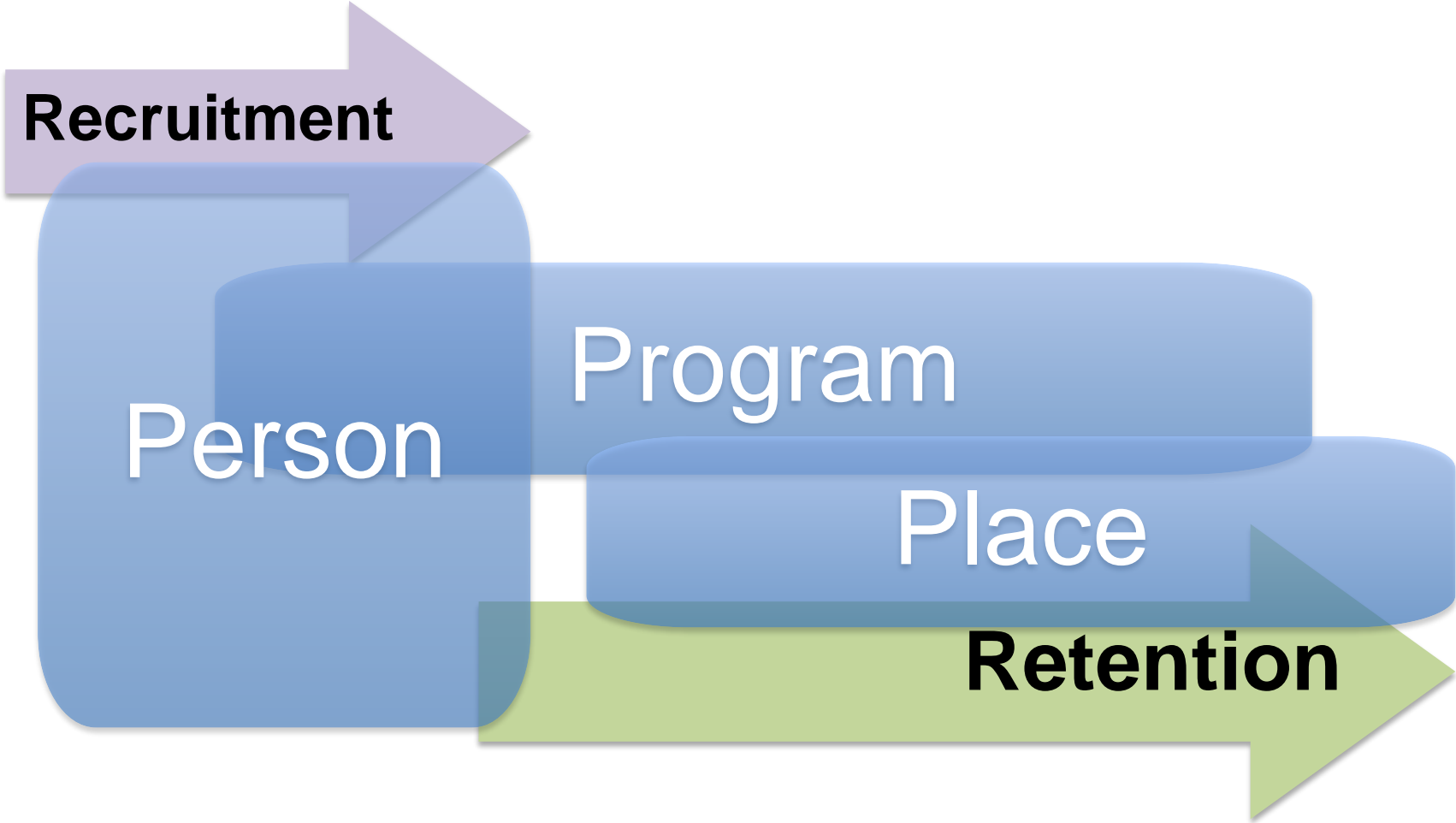
<b>movefips0613</b>	<b>t</b>
<b>Primary Care</b>	<b>-55.17</b>
<b>Surgeons</b>	<b>-32.04</b>
<b>Osteopathic MD</b>	<b>+10.67</b>
<b>Age</b>	<b>-260.82</b>
<b>Female</b>	<b>+4.62</b>
<b>_cons</b>	<b>391.87</b>



# Would it be good to know...

- Who goes **into** and **out** of a HPSA
- What type of place loses or gains docs?
- ***Then what?***
  - Probability place  $x$  gets physician  $y$ .  $\Pi x|y$
  - Is there a threshold for place  $x$  conditional on  $\sum (\pi y)$  probabilities
- These calculations can be done, via regression analysis of movers versus non movers, yes?

# Domains of Factors Affecting Recruitment and Retention Into Underserved Communities

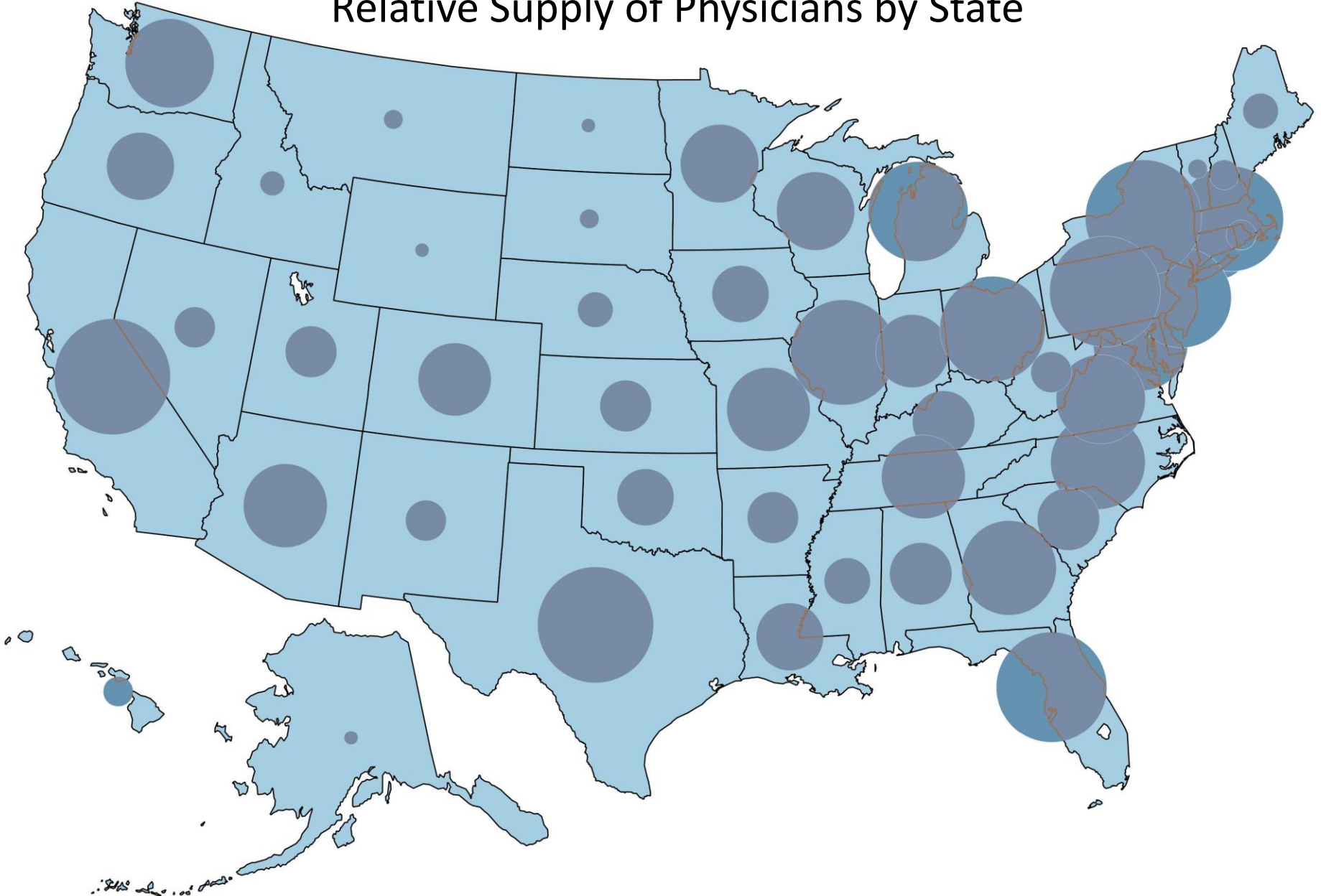


# Others have been and are working on this

- Fruen, M. A., J. Hadley, and S.P. Korper. 1980. Effects of financial incentives on physicians' specialty and location. *Health Policy and Education* 1(2):143-59.
- Steiber, S. R. 1980. Geographic mobility of physicians, 1971-1975. *Profiles of Medical Practice*:67-78.
- Ernst, Richard L., and Donald E. Yett. 1985. *Physician Location and Specialty Choice*. Ann Arbor, MI: Health Administration Press.
- McConnel, Charles E., and Lori A. Tobias. 1986. Distributional change in physician manpower, United States, 1963-80. *American Journal of Public Health* 76(6):638-642.

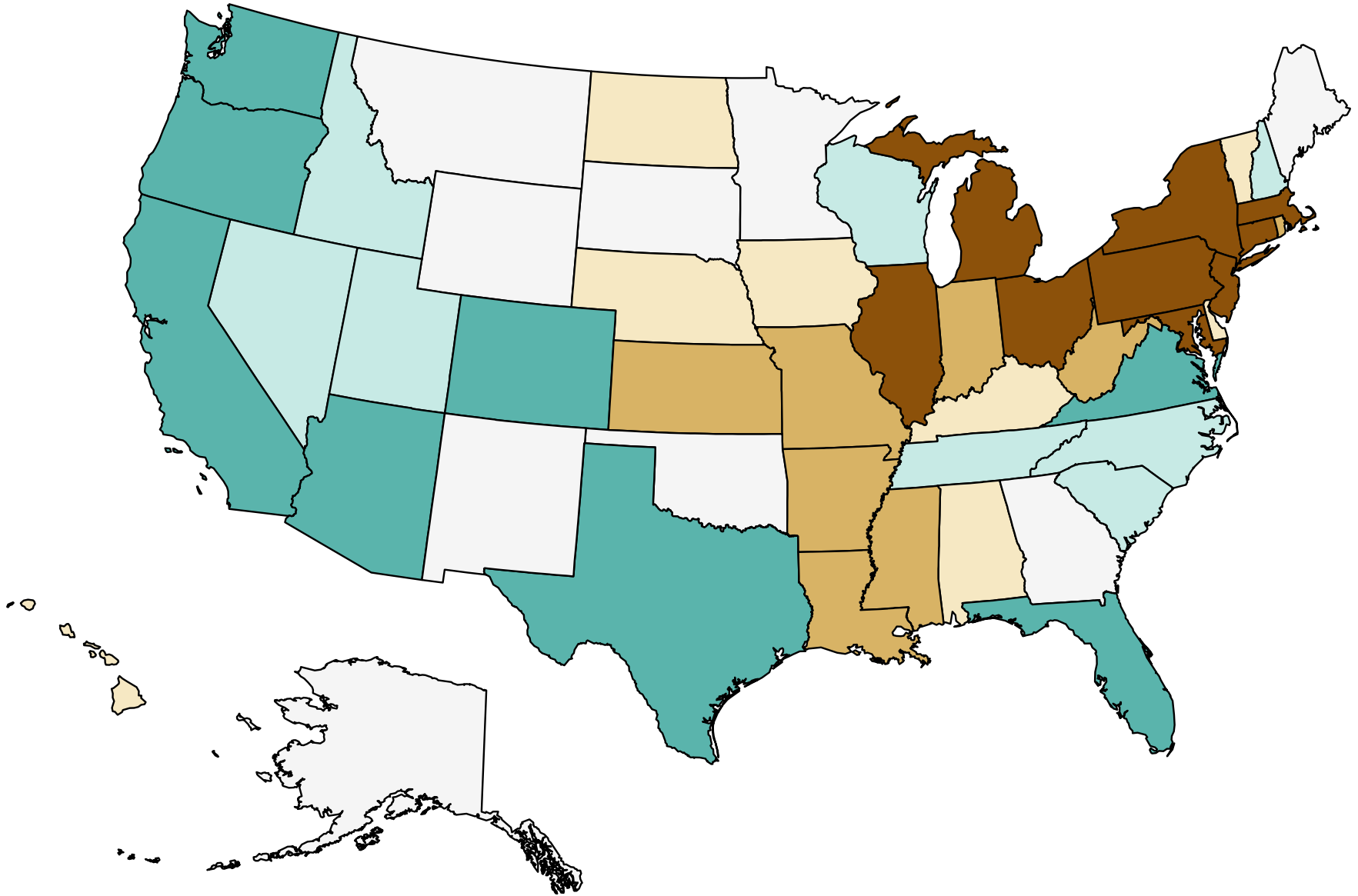
- Krishnan, V. 1992. A macro model of change in specialty and spatial distribution of physicians. *Socioeconomic Planning Sciences* 26(2):111-27.
- Henderson, Tim, Carrie Farmer, and Suzanne Szwarc. 2003. Practice location of physician graduates: Do states function as markets? National Conference of State Legislatures Institute for Primary Care and Workforce Analysis.
- Rosenthal, Meredith B., Alan Zaslavsky, and Joseph P. Newhouse. 2005. The Geographic Distribution of Physicians Revisited. *Health Services Research* 40(6 pt. 1):1931-1952.
- Ricketts, T. C., and R. Randolph. 2007. Urban-rural flows of physicians. *J Rural Health* 23(4):277-85.
- Ricketts, T. C. 2008. The diffusion of physicians. *Health Aff (Millwood)* 27(5):1409-15.
- Gray, Bradford H., Karen Stcokley, and Stephen Zuckerman. 2012. American primary care physicians decisions to leave their practice: evidence from the 2009 Commonwealth Fund survey of primary care doctors. *Journal of Primary Care & Community Health*.

# Relative Supply of Physicians by State

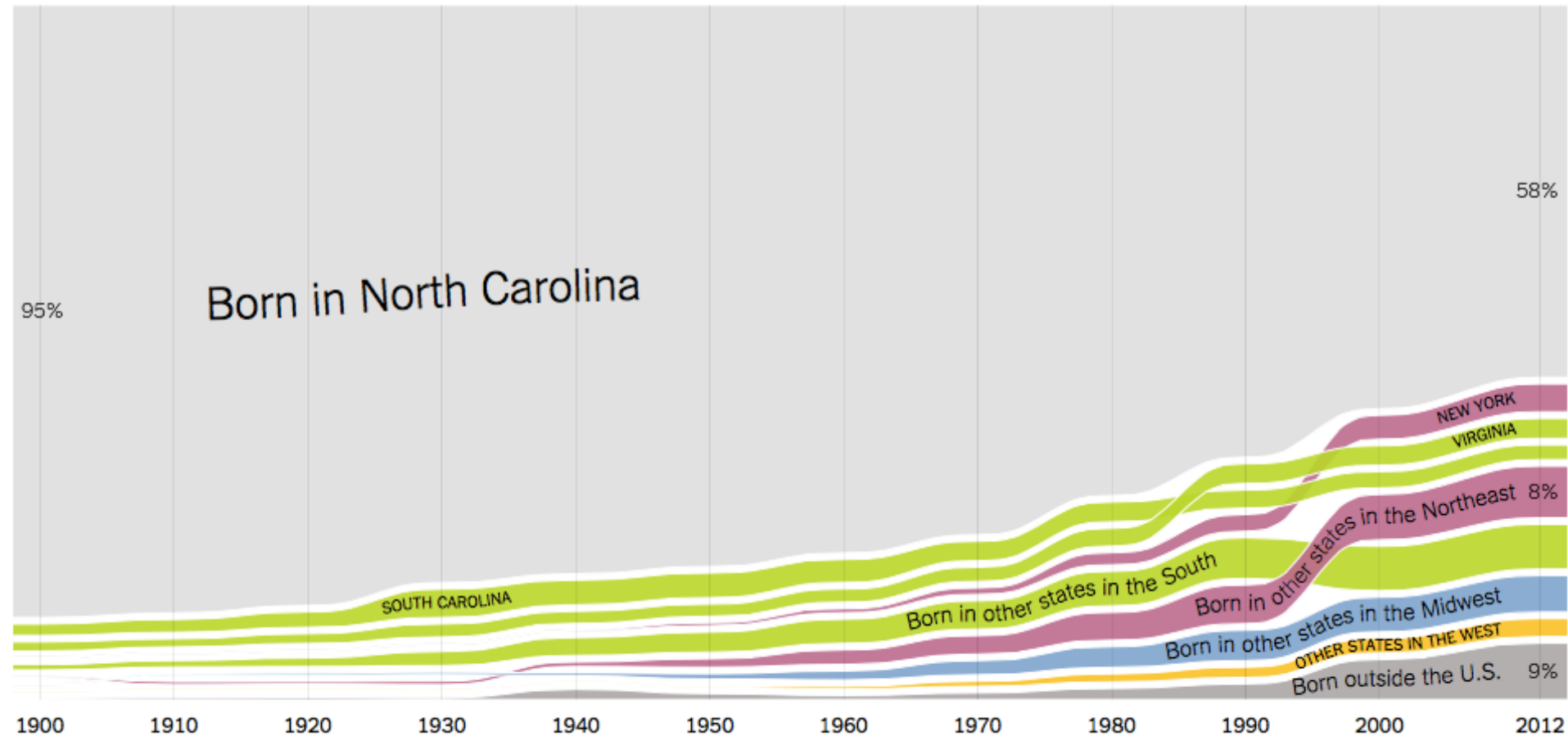




# Net **LOSS** vs **GAIN**, total MDs 2006-2011



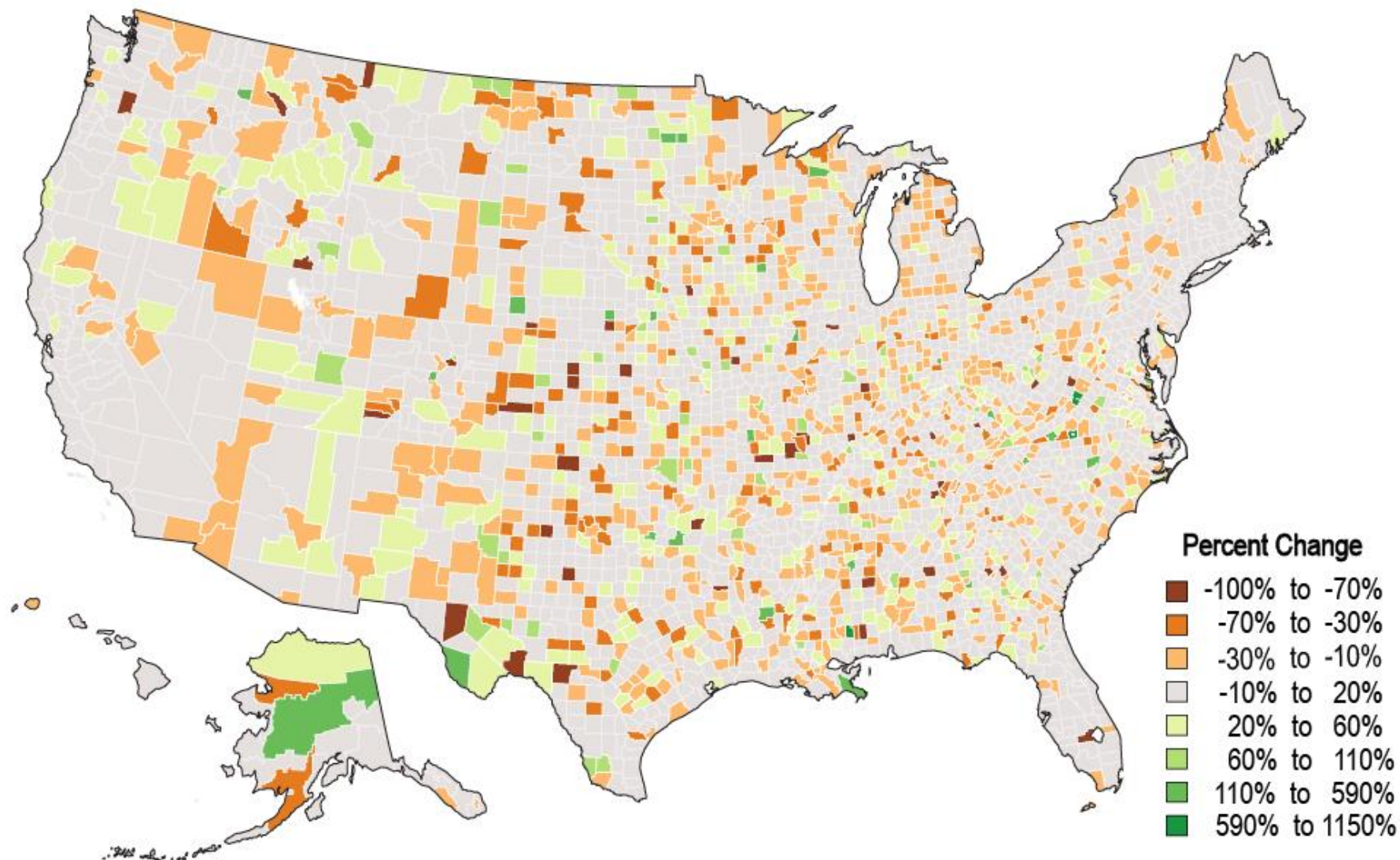
# Migration into North Carolina



[http://www.nytimes.com/interactive/2014/08/13/upshot/where-people-in-each-state-were-born.html?action=click&contentCollection=The%20Upshot&module=RelatedCoverage&region=Marginalia&pgtype=article#North\\_Carolina](http://www.nytimes.com/interactive/2014/08/13/upshot/where-people-in-each-state-were-born.html?action=click&contentCollection=The%20Upshot&module=RelatedCoverage&region=Marginalia&pgtype=article#North_Carolina)

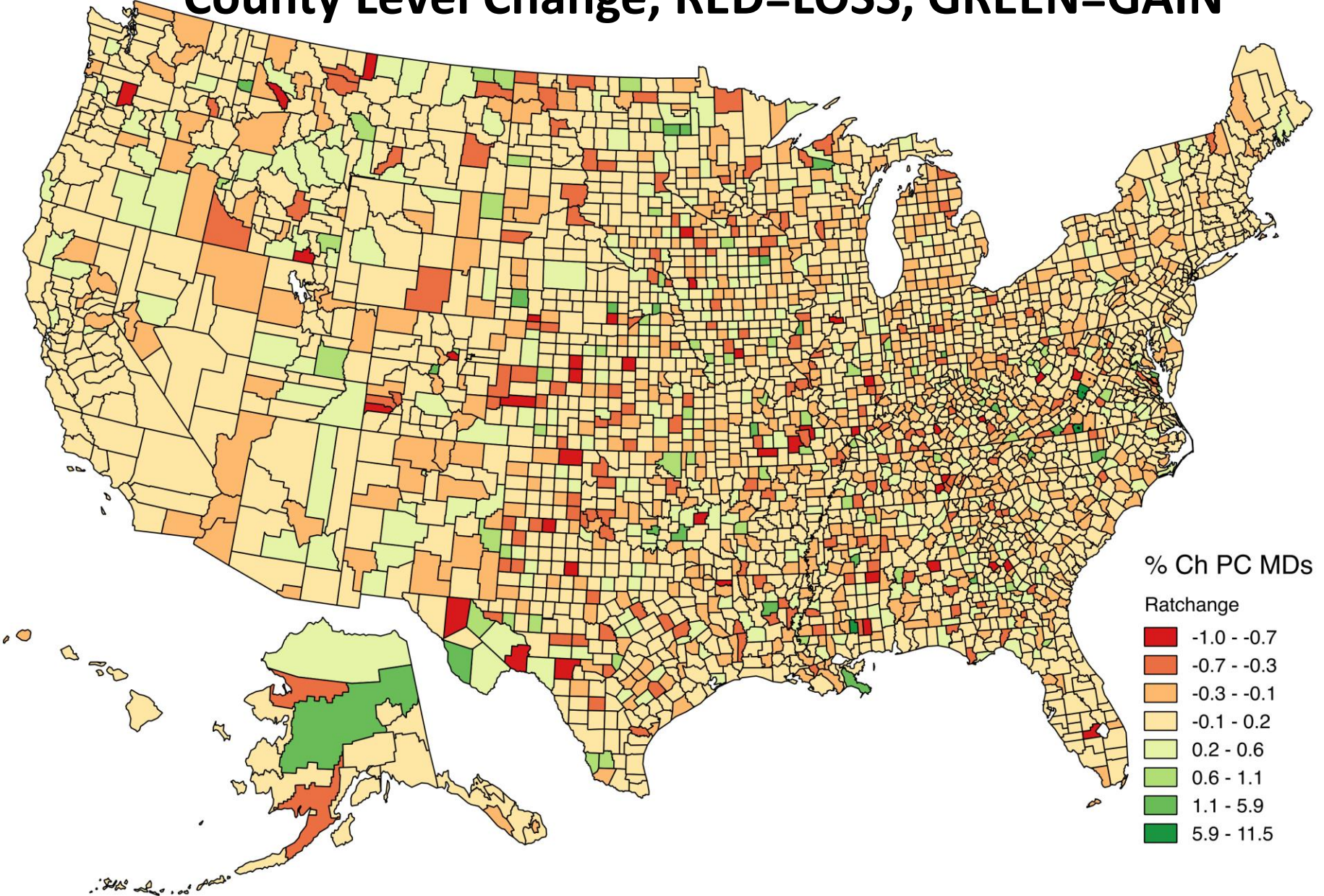


**Figure 2.** Percent Change in Primary Care Physician to Population Ratio, 2010-2013, US Counties



Source: Carolina Health Workforce Research Center, Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill, with data derived from the American Medical Association Physician Masterfile, 2010-2013.

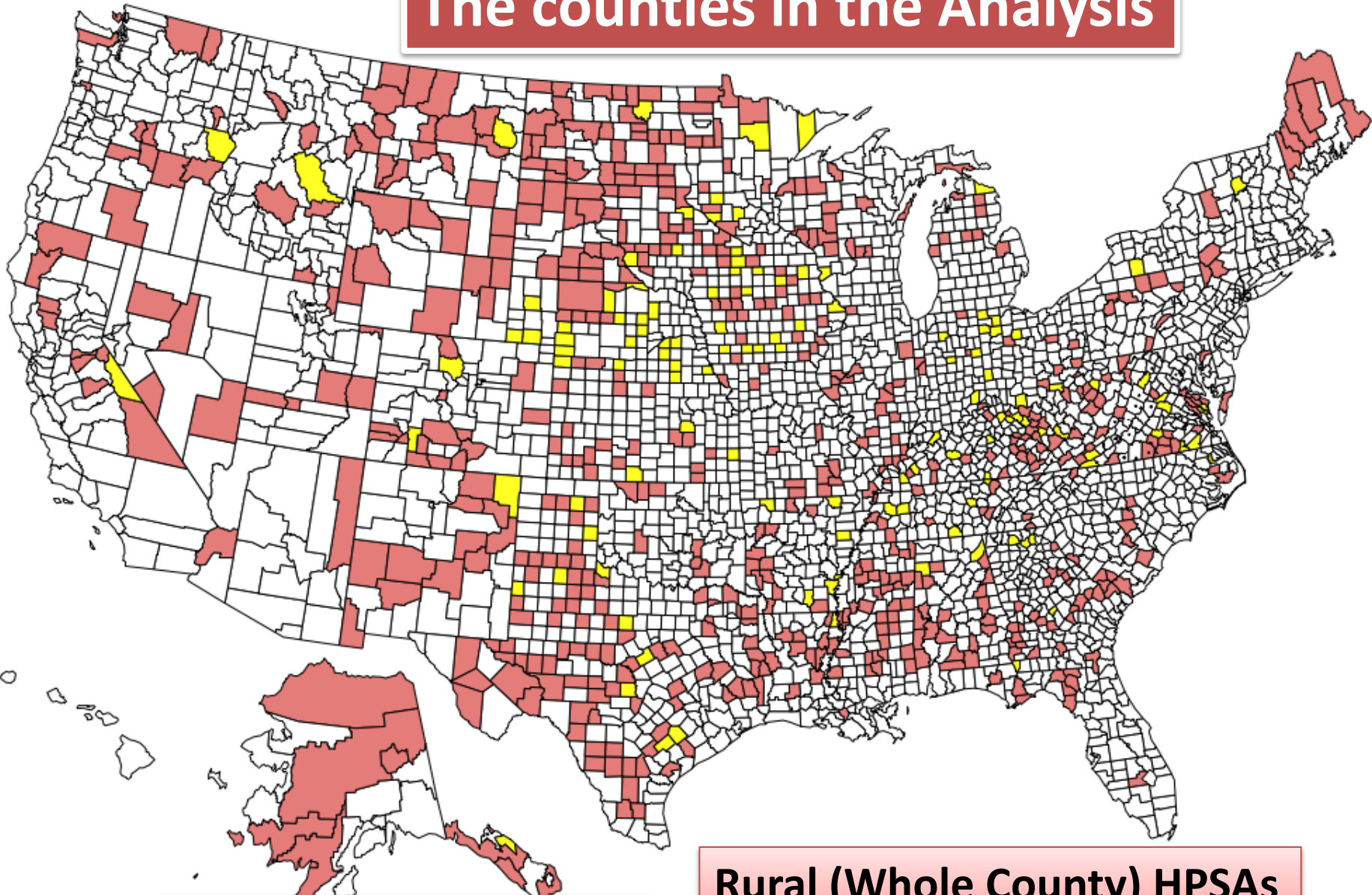
# County Level Change, RED=LOSS, GREEN=GAIN



# Categorizing Flows as Dependent Variables

		2013		
2006	To Urban	To Rural (Whole County) HPSA	To Rural (Whole County) NON HPSA	
	From Urban	240,831	<b>1,386</b>	412
	From Rural HPSA	<b>1,960</b>	1,806	83
	From Rural NON HPSA	655	109	571

# The counties in the Analysis



**Rural (WC) NON HPSAs**

**Rural (Whole County) HPSAs**

**Attend US Public Med School**

**Age (years)**

**Resident in 2006**

**Female**

**USMG vs IMG**

**Osteopath**

**People**

**Per ben. Medicare payment 2007**

**Std. Medicare payment 2013**

**Number of CAHs in county, 2011**

**FQHCS in county, 2012**

**NHSC Site in county 2013**

**Infant Mortality Rate, 2006-20**

**Per capita income, 2012**

**Unemployment rate, 2012**

**County area, (Sq miles)**

**Pop to Primary care 2012**

**Change in PC-Pop ratio 2010-12**

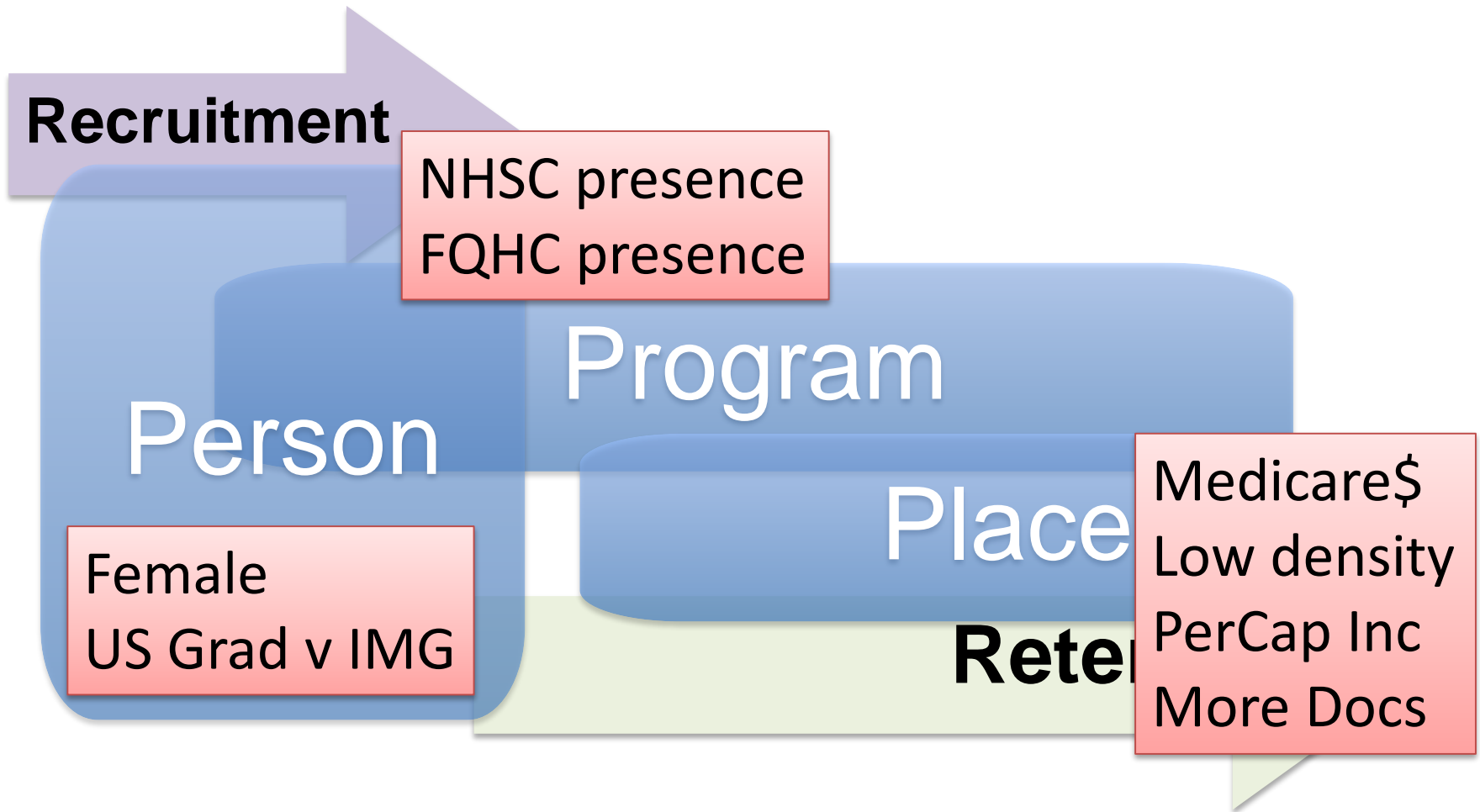
**Percent with no Health Ins, 2012**

**Place &  
Program**

**AND SO...THE ENVELOPE PLEASE**

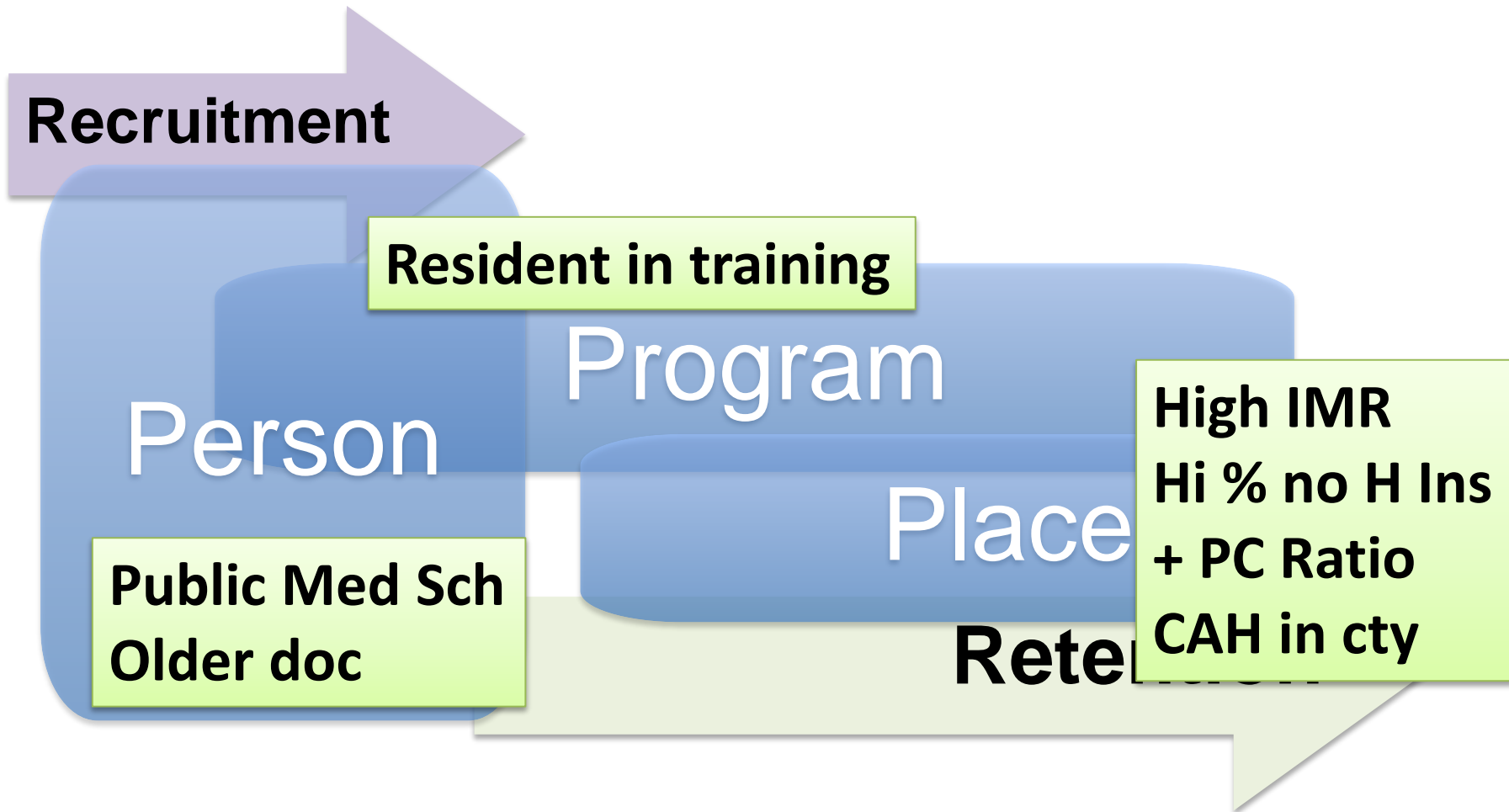
# Results for Factors Affecting Recruitment and Retention Into Underserved Communities

## The **NEGATIVE SIDE**



# Results for Factors Affecting Recruitment and Retention Into Underserved Communities

## The POSITIVE SIDE





# Power of prediction

**18%-25%**

Recruitment

**Is that enough to provoke  
investment?**

Person

Program

Place

Retention