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”

Birth	College	Clerkships	Continuing Education	Retirement

2 year programs	Professional School	Rotations	Education	Re-Education

School	AHEC	CC-IPECP	State Loan Repayment	Geriatric Ed

PHCAST	NHSC	Centers of Excellence	Title VII 747	Ped/Centers GME

Disadv. Scholarships	HCOP

State Loan Repayment	Centers of Excellence
Matrix of Program Overlap

<table>
<thead>
<tr>
<th>Program Category</th>
<th>TPCMD</th>
<th>NHSC Loan</th>
<th>Bioterror Trng Cur</th>
<th>PH Training Center</th>
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**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, 206-2013 (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 3 years, 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 Version 1)

• 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

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let’s see who were movers
**A prelim regression of any county move, \( r^2 = .088 \)**

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Simplified Results: any county move, \( r^2 = 0.088 \)

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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. $\prod x | y$
  – 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

Recruitment

Person

Program

Place

Retention
Others have been and are working on this


• 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.


Relative Supply of Physicians by State
A State-to-State Diffusion Matrix
(squint and you can see your state)
Net **LOSS** vs **GAIN**, total MDs 2006-2011
Migration into North Carolina

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

Percent Change
-100% to -70%
-70% to -30%
-30% to -10%
-10% to 20%
20% to 60%
60% to 110%
110% to 590%
590% to 1150%

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

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The counties in the Analysis
AND SO....THE ENVELOPE PLEASE
Retention
Recruitment
Program
Place
Person

Results for Factors Affecting Recruitment and Retention Into Underserved Communities
The NEGATIVE SIDE

Recruitment
- NHSC presence
- FQHC presence

Program
- Medicare
- Low density
- PerCap Inc
- More Docs

Place
- Female
- US Grad v IMG
Results for Factors Affecting Recruitment and Retention Into Underserved Communities

The **POSITIVE SIDE**

- Resident in training
- Public Med Sch
- Older doc
- High IMR
- Hi % no H Ins
- + PC Ratio
- CAH in cty
Power of prediction

18%-25%

Is that enough to provoke investment?