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”

- AHEC
- CC-IPECP
- PHCAST
- NHSC
- State Loan Repayment
- Geriatric Ed
- Centers of Excellence
- Title VII 747
- Disadv. Scholarships
- Ped/Centers GME

Birth, 2 year programs, College, Professional School, Clerkships Rotations, Continuing Education, Residency, Retirement, Re-Education
### Matrix of Program Overlap

<table>
<thead>
<tr>
<th>Program</th>
<th>TPCMD</th>
<th>NHSC Loan t</th>
<th>Bioterror Trng Cur</th>
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**Notes:**
- **High** interaction
- **Medium** interaction
- **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

<table>
<thead>
<tr>
<th>Move County</th>
<th>2006-2011</th>
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<tr>
<td>2006-2013</td>
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<td>no</td>
<td>474,469</td>
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<td>yes</td>
<td>108,263</td>
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<td>total</td>
<td>582,732</td>
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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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<td>_cons</td>
<td>391.87</td>
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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. \( \Pi x|y \)
  – Is there a threshold for place x conditional on \( \Sigma (\pi_y) \) 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


• 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.


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

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

% Ch PC MDs

Ratchange

-1.0 - -0.7
-0.7 - -0.3
-0.3 - -0.1
-0.1 - 0.2
0.2 - 0.6
0.6 - 1.1
1.1 - 5.9
5.9 - 11.5
## Categorizing Flows as Dependent Variables

<table>
<thead>
<tr>
<th>Year</th>
<th>Source</th>
<th>Destination</th>
<th>HPSA</th>
<th>NON HPSA</th>
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<tbody>
<tr>
<td>2006</td>
<td>From Urban</td>
<td>To Rural (Whole County)</td>
<td>240,831</td>
<td>1,386</td>
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<td>2013</td>
<td>From Rural HPSA</td>
<td>To Rural (Whole County)</td>
<td>1,960</td>
<td>1,806</td>
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<td>From Rural NON HPSA</td>
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<td>655</td>
<td>109</td>
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</table>
The counties in the Analysis

Rural (Whole County) HPSAs

Rural (WC) NON HPSAs

Rural (Whole County) HPSAs
Attend US Public Med School
Age (years)
Resident in 2006
Female
USMG vs IMG
Osteopath

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
AND SO....THE ENVELOPE PLEASE
Results for Factors Affecting Recruitment and Retention Into Underserved Communities

The NEGATIVE SIDE

Recruitment

NHSC presence
FQHC presence

Program

Person

Female
US Grad v IMG

Place

Retention

Medicare$
Low density
PerCap Inc
More Docs
Results for Factors Affecting Recruitment and Retention Into Underserved Communities

The POSITIVE SIDE

Recruitment

Resident in training

Program

Place

Retention

Person

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?