A Geospatial Analysis of Psychiatric Mental Health Nurses

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Outline

- Mental Health
- Access to PMH-APRNs
- Objectives
- Data
- Methodology
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- Summary and Implications
Mental Health

- 26% of all adults have mental illness or substance use disorders (NIMH, 2009).

- 6% constitute serious disorders (Kessler, Chiu et al. 2005) that pose a profound and long term effect on the quality of life.

- Vulnerable to other illnesses resulting in a life span that is approximately 9 years shorter than the general population (Cournos et al, 2005).

- Potential for chronic disability. In the National Comorbidity Survey Replication, Kessler, Berglund and colleagues found that the 50% of all mental and/or substance use disorders started by age 14 and 75% by age 24.
Access to PMH-APRNs

- Despite the high prevalence and impact of mental and substance use disorders, there are significant problems accessing treatment.

- Average delays in accessing mental health treatment are over a decade (Wang et al., 2005).
  - Stigma of mental illness.
  - Stymied by long wait lists and/or travel to find a provider due to an inadequate supply of mental health professionals (Thomas et al., 2009).
  - Uneven geographic distribution of providers.
Objectives

- Understand the pattern of geographic distribution of Psychiatric Mental Health Advanced Practice Nurses (PMH APRNs)
  - One of the two mental health professional groups who can provide both psychotherapy and prescriptive services
- Describe rural-urban differences in the distribution of PMH-APRNs
- Discuss implications of the uneven geographic distribution of PMH-APRNs
Data Sources

• American Nurses Credentialing Center’s (ANCC) complete listing of employment zip codes of certified PMH APRNs in the year 2007
  • n = 10452

• In the same year, task force of the American Psychiatric Nurses Association (APNA) and the International Society of Psychiatric- Mental Health Nurses (ISPN) surveyed certified PMH-APRNs who provided e-mail addresses to the ANCC (Drew & Delaney, 2009).
  • n = 1899
Data Sources

- Survey Data
  - Certification levels of PMH-APRNs
    - Adult PMH Nurse Practitioner
    - Adult PMH Clinical Nurse Specialist
    - Child and Adolescent PMH Clinical Nurse Specialist
    - Family PMH Nurse Practitioner
  - Information about employment (zip codes)
  - Demographic characteristics of PMH-APRNs
  - Treatment type
  - Types of patient treated
Data Sources

- Geographic Information Science (GIS) boundary files from ESRI’s TIGER Line data
  - Zip Codes
  - County
  - State

- Rural-Urban classification for counties from National Center for Health Statistics (NCHS).
Methodology

- Joining the datasets

![Diagram showing joining datasets process]
Methodology

- Spatial Exploratory Data Analysis (ESDA)
  - Using ESRI’s ArcGIS 9.3.1 mapping the distribution of PMH-APRNs at state and county level
  - Rural-Urban distribution of PMH-APRNs using the hot-spot cluster analysis technique of ArcGIS and R statistical software package
- Demographic analysis of PMH-APRNs using the R statistical software package
Spatial Distribution of Certified Psychiatric Mental Health Nurses per 100,000 population

Number of Nurses:
- 0
- 1
- 2 - 5
- 6 - 10
- 11 - 15
- 16 - 20

Note: For visualization purposes Alaska and Hawaii are not on scale
Results ~ ESDA
Results ~ ESDA

Proportion of Two Certification levels of Psychiatric Mental Health Nurses
Levels: Clinical Child and Family Nurse Practitioners

- 50 Clinical Child and Family Nurse Practitioners
- Clinical Child Nurse Practitioners
- Family Nurse Practitioners

Note: For visualization purposes Alaska and Hawaii are not drawn on scale.
Results ~ ESDA

Spatial Distribution of Certified Psychiatric Mental Health Nurses per 100,000 population

Number of Nurses

- Yellow: 0
- Light Green: 1 - 50
- Medium Green: 51 - 100
- Dark Green: 101 - 300
- Dark Blue: 301 - 500
- Dark Purple: 501 - 700

Note: For visualization purposes, Alaska and Hawaii are not on scale.
Results ~ ESDA
## Results ~ Urban-Rural

<table>
<thead>
<tr>
<th>Urban-Rural Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Urban</strong></td>
<td><strong>Large Central Metro</strong> Counties in a metropolitan statistical area of 1 million or more population: 1) that contain the entire population of the largest principal city of the metropolitan statistical area, or 2) whose entire population resides in the largest principal city of the metropolitan statistical area, or 3) that contain at least 250,000 of the population of any principal city in the metropolitan statistical area</td>
</tr>
<tr>
<td><strong>Large Fringe Metro</strong></td>
<td>Counties in a metropolitan statistical area of 1 million or more population that do not qualify as large central</td>
</tr>
<tr>
<td><strong>Medium Metro</strong></td>
<td>Counties in a metropolitan statistical area of 250,000 to 999,999 population</td>
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<tr>
<td><strong>Small Metro</strong></td>
<td>Counties in a metropolitan statistical area of 50,000 to 249,999 population</td>
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<tr>
<td><strong>Rural</strong></td>
<td><strong>Micropolitan</strong> Counties in a micropolitan statistical area</td>
</tr>
<tr>
<td></td>
<td><strong>Noncore</strong> Counties that are neither metropolitan nor micropolitan</td>
</tr>
</tbody>
</table>
Results ~ Urban-Rural Distribution

Urban-Rural Distribution of PMH-APRNs

- Adult CNS: 25% Large Central Metro, 10% Large Fringe Metro, 10% Medium Metro, 15% Small Metro, 11% Micropolitan, 7% Micropolitan, 7% Rural
- Adult NP: 25% Large Central Metro, 11% Large Fringe Metro, 11% Medium Metro, 15% Small Metro, 11% Micropolitan, 10% Micropolitan, 7% Rural
- Child and Adol. CNS: 25% Large Central Metro, 18% Large Fringe Metro, 10% Medium Metro, 7% Small Metro, 10% Micropolitan, 6% Micropolitan, 6% Rural
- Family NP: 25% Large Central Metro, 27% Large Fringe Metro, 12% Medium Metro, 15% Small Metro, 15% Micropolitan, 10% Micropolitan, 5% Rural
- All Types: 20% Large Central Metro, 20% Large Fringe Metro, 10% Medium Metro, 10% Small Metro, 15% Micropolitan, 5% Micropolitan, 8% Rural
Results ~ Cluster Analysis

Clustering pattern of Certified Psychiatric Mental Health Nurses

Cluster Type
Statistical Significance level
- Very Low at 0.01 level of significance
- Low at 0.05 level of significance
- No statistically significant pattern
- Medium at 0.1 level of significance
- High at 0.05 level of significance
- Very High at 0.01 level of significance

Note: For visualization purposes Alaska and Hawaii are not on scale.
Results ~ Cluster Analysis

1 – Large Central Metro
2 – Large Fringe Metro
3 – Medium Metro
4 – Small Metro
5 – Micropolitan (Rural)
6 – Rural
Results ~ Demographics of PMH-APRNs

Age, Gender, and Race/Ethnicity (from Task Force survey)
Results ~ Demographics of PMH-APRNs

Years Since First Certified PMH APRN (from Task Force survey)
Results ~ Treatment

Proportion of Prescriber Vs Non-Prescriber Psychiatric Mental Health Nurses
Data: Weighted Results from the Task Force Survey

Note: For visualization purposes Alaska and Hawaii are not drawn on scale.
● **Uneven geographic distribution** of PMH-APRNs:
  ● Significantly higher proportion of workforce in the northeastern United States
  ● Very low numbers in the states of Alabama, Oklahoma, Louisiana, and the Appalachian region.

● Rural-urban differences in the distribution are illustrated with **significantly fewer** PMH-APRNs employed in rural versus urban areas.

● Based on the survey data
  ● more than 50% of PMH-APRNs are in the age group of 51-60 years
  ● 90% of the workforce are white
  ● PMH-APRNs who **prescribe** are also **unevenly distributed** across the states
Implications

- Disparities in access to mental health services can, in part, be addressed
  - Increasing the number of applicants to PMH APRN educational programs
  - Development of additional graduate programs, extension of program offerings into rural areas, and/or collaboration of universities to share resources
  - Intensification of recruitment of RNs into PMH graduate programs
  - Increased financial support to graduate students
References


