Rural/Urban Variation in Mortality in China

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Introduction

Urban and rural residents have different health experiences
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In developing countries, there are usually sharp distinctions between urban/rural life
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In China, division between urban and rural is clear

Economic development in China is accompanied by a widening of the urban/rural gap
Current Study

Studies show an urban advantage in mortality in China
(Fang 1993; Li and Sun 2003; Lili 1993; Zeng 1990)
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Mechanisms are suspected to include:
- higher socioeconomic status
- superior access to health service
- better endowed communities
- greater availability of service
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- superior access to health service
- better endowed communities
- greater availability of service

Questions:

1. Is there an urban mortality advantage among the 50 and older population in China?

2. To what extent can this be accounted for by socioeconomic and health service characteristics that differentiate people and communities?
China Health and Nutrition Survey (CHNS)


* 9 Provinces: Guangxi, Guizhou, Heilongjiang, Henan, Hubei, Hunan, Jiangsu, Liaoning, Shandong

* Household survey: Collects information on individuals

* Community survey: Collects information about the community
## CHNS Episodes

<table>
<thead>
<tr>
<th>Interval</th>
<th>N</th>
<th>Survived</th>
<th>Moved</th>
<th>Died</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989 → 1991</td>
<td>2,799</td>
<td>2,435</td>
<td>105</td>
<td>109</td>
<td>150</td>
</tr>
<tr>
<td>1991 → 1993</td>
<td>2,742</td>
<td>2,351</td>
<td>52</td>
<td>131</td>
<td>208</td>
</tr>
<tr>
<td>1993 → 1997</td>
<td>2,708</td>
<td>1,826</td>
<td>104</td>
<td>185</td>
<td>593</td>
</tr>
<tr>
<td>1997 → 2001</td>
<td>3,190</td>
<td>2,464</td>
<td>129</td>
<td>153</td>
<td>444</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11,439</strong></td>
<td><strong>9,076</strong></td>
<td><strong>390</strong></td>
<td><strong>578</strong></td>
<td><strong>1,395</strong></td>
</tr>
</tbody>
</table>
Methods

1. Calculate Age-Specific Mortality Rates by residence

2. Cox Proportional Hazards Models
   (survival time = months)

   i. Base (U/R residence + Age + Sex)
   ii. Single covariates (Base + 1 covariate)
   iii. All covariates (Base + all covariates)
   iv. Parsimonious model
       (Base + statistically important covariates)
## Covariates

**Individual level**

<table>
<thead>
<tr>
<th>Education</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Cadre status</td>
<td></td>
</tr>
<tr>
<td>Has health insurance</td>
<td></td>
</tr>
<tr>
<td>Individual level</td>
<td>Community level</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------------------------</td>
</tr>
<tr>
<td>Education</td>
<td># amenities*</td>
</tr>
<tr>
<td>Occupation</td>
<td>Average wage</td>
</tr>
<tr>
<td>Cadre status</td>
<td>Number health facilities</td>
</tr>
<tr>
<td>Has health insurance</td>
<td>Distance from center of community to nearest facility</td>
</tr>
</tbody>
</table>
### Covariates

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<th>Individual level</th>
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<tr>
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</table>

* Telegraph, Telephone, Post office, Electricity, Paved roads, Movie theatre, Newspaper*
Standardized Death Rates Per 1,000 Persons*

* Standardized for age and sex distribution of the 2000 Chinese Census
# Cox Model Hazard Ratios for Dying

<table>
<thead>
<tr>
<th>Factor</th>
<th>Hazard Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural residence</td>
<td>1.30**</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>55-59</td>
<td>1.40*</td>
</tr>
<tr>
<td>60-64</td>
<td>1.77***</td>
</tr>
<tr>
<td>65-69</td>
<td>3.69***</td>
</tr>
<tr>
<td>70-74</td>
<td>5.49***</td>
</tr>
<tr>
<td>75-79</td>
<td>9.40***</td>
</tr>
<tr>
<td>80 +</td>
<td>17.55***</td>
</tr>
<tr>
<td>Male</td>
<td>1.46***</td>
</tr>
</tbody>
</table>
## Single Covariate Significance

<table>
<thead>
<tr>
<th>Individual Level</th>
<th>Community Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupation</td>
<td>Number amenities</td>
</tr>
<tr>
<td>Cadre Stats</td>
<td>Log average wage</td>
</tr>
<tr>
<td>Insurance</td>
<td>Number facilities</td>
</tr>
<tr>
<td>Education</td>
<td>Distance facilities</td>
</tr>
<tr>
<td>-ve</td>
<td>-ve</td>
</tr>
<tr>
<td>-ve</td>
<td>n.s.</td>
</tr>
<tr>
<td>-ve</td>
<td>n.s.</td>
</tr>
<tr>
<td>n.s.</td>
<td>n.s.</td>
</tr>
</tbody>
</table>
## Cox Model Hazard Ratios for Dying

<table>
<thead>
<tr>
<th></th>
<th>Base</th>
<th>Parsimonious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural residence</td>
<td>1.30**</td>
<td>1.18*</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>55-59</td>
<td>1.40*</td>
<td>1.41*</td>
</tr>
<tr>
<td>60-64</td>
<td>1.77***</td>
<td>1.79***</td>
</tr>
<tr>
<td>65-69</td>
<td>3.69***</td>
<td>3.72***</td>
</tr>
<tr>
<td>70-74</td>
<td>5.49***</td>
<td>5.45***</td>
</tr>
<tr>
<td>75-79</td>
<td>9.40***</td>
<td>9.26***</td>
</tr>
<tr>
<td>80 +</td>
<td>17.55***</td>
<td>17.24***</td>
</tr>
<tr>
<td>Male</td>
<td>1.46***</td>
<td>1.50***</td>
</tr>
<tr>
<td>Is a cadre</td>
<td></td>
<td>0.41**</td>
</tr>
<tr>
<td>Number medical facilities</td>
<td>0.95***</td>
<td></td>
</tr>
<tr>
<td>Δ-2LL from base</td>
<td>14.3***</td>
<td></td>
</tr>
</tbody>
</table>
Underlying Survival Curve for 65-69 Year Old Woman

S(x)

Urban-Base

Rural-Base

Months

0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48
Underlying Survival Curve for 65-69 Year Old Woman

S(x)

0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48

Months

0.90 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00

.9489
Underlying Survival Curve for a 65-69 Year Old Woman

S(x)

Urban - Base

Rural - Base

.9605

.9489

Months

0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48
Underlying Survival Curve for a 65-69 Year Old Woman

\( S(x) \)

0.90
0.91
0.92
0.93
0.94
0.95
0.96
0.97
0.98
0.99
1.00

0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48

Months

Urban Base

Rural Base

0.9489
0.9605
0.0116
Underlying Survival Curve for a 65-69 Year Old Woman
Underlying Survival Curve for a 65-69 Year Old Woman

$S(x)$

Urban - Parsim.

Rural - Parsimonious

0.9589

0.9514

0.0075

Months
Underlying Survival Curve for a 65-69 Year Old Woman

$S(x)$

Urban-Parsim.

Rural - Parsimonious

$0.0075$ $0.0116$
Underlying Survival Curve for a 65-69 Year Old Woman

~ 40% Explained

Months

S(x)

0 3 6 9 12 15 18 21 24 27 30 33 36 39 42 45 48
Underlying Survival Curve for a 65-69 Year Old Woman

- ~40% Explained
- ~60% Unexplained

S(x) vs. Months
## Hazard Ratios for Single Amenities*

<table>
<thead>
<tr>
<th>Amenity</th>
<th>Hazard Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telegraph</td>
<td>0.82</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.84</td>
</tr>
<tr>
<td>Telephone</td>
<td>0.85</td>
</tr>
<tr>
<td>Paved roads</td>
<td>0.89</td>
</tr>
<tr>
<td>Post office</td>
<td>0.95</td>
</tr>
<tr>
<td>Movie theatre</td>
<td>0.96</td>
</tr>
<tr>
<td>Newspaper</td>
<td>1.00</td>
</tr>
</tbody>
</table>

* Adjusting for age and sex
Conclusion

Policy treats urban and rural China differently
Conclusion

Policy treats urban and rural China differently

We find a baseline 30% higher mortality in rural China
Conclusion

Policy treats urban and rural China differently

We find a baseline 30% advantage in mortality for urbanites

Two characteristics explain ~40% of the advantage:
1. Cadre status
Conclusion

Policy treats urban and rural China differently

We find a baseline 30% advantage in mortality for urbanites

Two characteristics explain ~ 40% of the advantage:

1. Cadre status
2. Community amenities (infrastructure)
Conclusion

Policy treats urban and rural China differently

We find a baseline 30% advantage in mortality for urbanites

Two characteristics explain almost 40% of the advantage:
1. Cadre status
2. Community amenities (infrastructure)
   - Telegraph, Telephone, Electricity, Paved roads
Thank-you
Dank u
谢谢