Impact of China’s ‘Zero-markup Policy for Essential Drugs’ on patients, county hospital revenue, and government subsidy levels

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Publications


Preview of results

- **Patients**
  - Outpatient services: Total expense per visit reduced by 3.12 USD
  - Inpatient services: Total expense per admission reduced by 65.6 USD

- **Hospitals**
  - Increased health care provision and a sustained total hospital income despite a decrease in drug revenue.

- **Governments**
  - With minimal or no subsidy, the government can catalyze the zero-markup policy and generate positive outcomes for patients and county hospitals.
Background
Global drug policies

- 1980s: Cost recovery mechanism
- 1987 Bamako Initiative, the African Ministers of Health conference
  - Drug Revolving Funds (DRFs) in Nigeria
- Sustainable supply of essential drugs
  - Asia experience
China Healthcare Reform over the Years

- **Post 1949**
  - Barefoot doctors
  - LE: increased from 35 years to 68 years (1949-1978)

- **1994**
  - 1st round healthcare system reforms: Divided hospitals into non-profit public organizations and commercial hospitals

- **1998**
  - Urban employee health insurance (UEHI)

- **2002**
  - Criticism of health system reform: "basically unsuccessful"

- **2005**
  - The State Council led a joint working team to draft a new health reform plan

- **2007**
  - Urban resident health insurance (URHI): children and the elderly
  - UEHI covered 180 million

- **2008**
  - NCMS covered more than 804 million rural population
  - Released reform draft for public debate

- **2009**
  - The reform plan was officially released for implementation
  - Basic healthcare Service as Public Goods

- **2010**
  - Drop in public investment in health care

- **2013**
  - SARS
  - New cooperative medical system (NCMS)

- **2014**
  - 1st round healthcare system reforms: Divided hospitals into non-profit public organizations and commercial hospitals

- **2015**
  - SARS
  - New cooperative medical system (NCMS)

- **2016**
  - 1st round healthcare system reforms: Divided hospitals into non-profit public organizations and commercial hospitals

- **2017**
  - SARS
  - New cooperative medical system (NCMS)

- **2018**
  - 1st round healthcare system reforms: Divided hospitals into non-profit public organizations and commercial hospitals

- **2019**
  - SARS
  - New cooperative medical system (NCMS)

- **2020**
  - 1st round healthcare system reforms: Divided hospitals into non-profit public organizations and commercial hospitals

- **2021**
  - SARS
  - New cooperative medical system (NCMS)

- **2022**
  - 1st round healthcare system reforms: Divided hospitals into non-profit public organizations and commercial hospitals

- **2023**
  - SARS
  - New cooperative medical system (NCMS)

- **2024**
  - 1st round healthcare system reforms: Divided hospitals into non-profit public organizations and commercial hospitals

- **2025**
  - SARS
  - New cooperative medical system (NCMS)
5 Key Areas of Focus

1. Insurance System
2. Essential Drug System
3. Healthcare Delivery System
4. Public Health System
5. Pilot Hospital Reform

2009-2011
Goal of HC 2020 Reform and Masterplan

- **Goals -2020**
  - Everyone will have access to basic health services
  - Safe, effective, convenient, and affordable health services for urban and rural residents

- **Goals -2011**
  - Improve access to basic health services
  - Reduce financial burden due to healthcare

- **3-year Implementation Plan (2009-2011)**
  - Incremental $125 billion investment
  - 5 Reform Programs to address “Kanbingnan and Kanbinggui”
    (inaccessibility and unaffordability of healthcare)
Objectives
Objectives

- Assess Zero-markup Policy for Essential Drugs (ZPED) for county hospitals
  - Patients
  - Hospitals
  - Governments

- Literature:
  - Villages and townships
  - Pre-post comparison or difference-in-differences (Chen et al., 2013)
  - Lack of comprehensive evaluation of stakeholders
ZPED

Reduction of drug price

Supply side

Reduction of per-visit drug expense

Demand side

Reduction of drug expense per outpatient visit

Reduction of per-visit outpatient expense

Reduction of the proportion of drug expense out of outpatient expense

Reduction of drug expense per inpatient visit

Reduction of per-visit inpatient expense

Reduction of the proportion of drug expense out of inpatient expense
Methods
Difference-in-differences

- The treated: Ningshan, 2010
- Control county: Zhenping
- Assessment of DID assumption, using pre-treatment data from 2007 to 2010
- DID with control variables in regressions
Outcome measure

- Patients
  - Outpatient services: Per-visit total expense and drug expense
  - Inpatient services: Per-admission total expense and drug expense

- Hospitals
  - Health care provision
  - Total hospital income
  - Drug revenue

- Governments
  - Subsidy level
Data
## Sampling

<table>
<thead>
<tr>
<th></th>
<th>Ningshan county</th>
<th>Zhenping county</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrative district</td>
<td>Ankang, Shaanxi province</td>
<td>Ankang, Shaanxi province</td>
</tr>
<tr>
<td>Location</td>
<td>South foot of Qin mountain</td>
<td>North foot of Daba mountain</td>
</tr>
<tr>
<td>Acreage</td>
<td>3678 square kilometers</td>
<td>1503 square kilometers</td>
</tr>
<tr>
<td>Population</td>
<td>74 thousand</td>
<td>56 thousand</td>
</tr>
<tr>
<td>Income per capita for county/town residents</td>
<td>16,609 CNY</td>
<td>16,560 CNY</td>
</tr>
<tr>
<td>Income per capita for villagers</td>
<td>4,498 CNY</td>
<td>4,450 CNY</td>
</tr>
<tr>
<td>Number of beds per one thousand for hospitalization</td>
<td>3.35</td>
<td>4.36</td>
</tr>
<tr>
<td>Number of healthcare professionals per one thousand</td>
<td>3.62</td>
<td>3.43</td>
</tr>
</tbody>
</table>
## Sampling cont’d

<table>
<thead>
<tr>
<th></th>
<th>Ninghsan county</th>
<th>Zhenping county</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year of establishment</strong></td>
<td>1950</td>
<td>1950</td>
</tr>
<tr>
<td><strong>Hospital certificate</strong></td>
<td>Non-profit secondary general Hospital</td>
<td>Non-profit secondary general Hospital</td>
</tr>
<tr>
<td><strong>Floor area</strong></td>
<td>6,492 square meters</td>
<td>15,000 square meters</td>
</tr>
<tr>
<td><strong>Clinical departments</strong></td>
<td>Medical department, surgical department, department of gynecology and obstetrics, emergency department, anesthesia department, Chinese medicine department, ophthalmology and otorhinolaryngology, department of stomatology, clinical laboratory, radiology department and functional department</td>
<td>Medical department, surgical department, department of gynecology and obstetrics, pediatrics, Chinese medicine department, ophthalmology, department of stomatology, dermatological department and department of physiotherapy</td>
</tr>
<tr>
<td><strong>Number of staff</strong></td>
<td>196</td>
<td>173</td>
</tr>
<tr>
<td><strong>Doctors</strong></td>
<td>99</td>
<td>68</td>
</tr>
<tr>
<td><strong>Nurses</strong></td>
<td>70</td>
<td>63</td>
</tr>
<tr>
<td><strong>Number of beds</strong></td>
<td>151</td>
<td>150</td>
</tr>
</tbody>
</table>
Data

- Hospital-level data
- Individual-level data
Results
Pre-treatment trends
Main results: medical expenses

<table>
<thead>
<tr>
<th></th>
<th>Baseline expense in 2010(CNY)</th>
<th>Absolute change(CNY)</th>
<th>Relative change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hospital-level DID</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient expense</td>
<td>168</td>
<td>-19.02</td>
<td>-11%</td>
</tr>
<tr>
<td>Inpatient expense</td>
<td>3418.78</td>
<td>-389.11</td>
<td>-11%</td>
</tr>
<tr>
<td><strong>Regressions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outpatient expense</td>
<td>166.79</td>
<td>-15.32</td>
<td>-9%</td>
</tr>
<tr>
<td>Inpatient expense</td>
<td>3482.98</td>
<td>-399.6</td>
<td>-11%</td>
</tr>
</tbody>
</table>
Main results: service provision

<table>
<thead>
<tr>
<th>Year</th>
<th>Ningshan</th>
<th>Zhenping</th>
<th>Ningshan</th>
<th>Zhenping</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>33,967</td>
<td>46,955</td>
<td>2729</td>
<td>4416</td>
</tr>
<tr>
<td>2011</td>
<td>43,666</td>
<td>46,957</td>
<td>3185</td>
<td>4474</td>
</tr>
<tr>
<td>D1</td>
<td>9699</td>
<td>2</td>
<td>456</td>
<td>58</td>
</tr>
<tr>
<td>DID</td>
<td>9697</td>
<td></td>
<td>398</td>
<td></td>
</tr>
</tbody>
</table>
Main results: hospital revenues

<table>
<thead>
<tr>
<th></th>
<th>Total revenue (thousand Yuan)</th>
<th>The proportion of drug revenue (%)</th>
<th>The proportion of subsidies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ningshan</td>
<td>Zhenping</td>
<td>Ningshan</td>
</tr>
<tr>
<td>2010</td>
<td>19,928.5</td>
<td>20,093.8</td>
<td>38.59</td>
</tr>
<tr>
<td>2011</td>
<td>22,467.1</td>
<td>21,731.2</td>
<td>35.05</td>
</tr>
<tr>
<td>D1</td>
<td>2538.6</td>
<td>1637.4</td>
<td>−3.54</td>
</tr>
<tr>
<td>DID</td>
<td><strong>901.2</strong></td>
<td><strong>−5.61</strong></td>
<td></td>
</tr>
</tbody>
</table>


Main results: government subsidy

- **15% mark-up principle**
  
  Government subsidy
  = total drug revenue × proportion of revenue of zero-markup drug out of total drug revenue × the markup rate in drug sale
  = \(7874.7 \times 0.158 \times 0.15\)
  = 186.7 thousand Yuan
  
  This result is close to the hospital-reported loss due to the zero-markup policy in the year of 2011, which was 194 thousand Yuan.

- **Natural growth principle**
Discussion
Discussion

• Provider behavior: Non-drug expense increased by 8.18 CNY (1.34 USD) for outpatient services

• Controlling for unobservable confounders vs. observable demographic characteristics
  • Inpatient services
  • Outpatient services
Limitations

- Data:
  - Lack of individual outpatient records in Zhenping
  - Segmented health record system for inpatient service in Zhenping
  - All drugs rather than specifically on zero-markup drugs at individual level data
  - Short-term vs. long-term impact
Conclusions

- Advancement for patients, hospital, and government
  - Lower cost for patients
  - Higher revenue for hospital
  - Greater access of health care
- Behavioral change of healthcare providers and patients
Thank you!

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PS, Data shared via Harvard Dataverse Network