# Measuring Healthcare Quality in Rural China: An Undercover Study of Clinician Behavior
## Pilot Study

Yaojiang Shi[1], **Sean Sylvia**[2], Hao Xue[1], Xin Tian[1], Huan Wang[1], Qingmei Liu[3], Alexis Medina[4], and **Scott Rozelle**[4]

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NSDRC NW China Solving
NW China's Problems
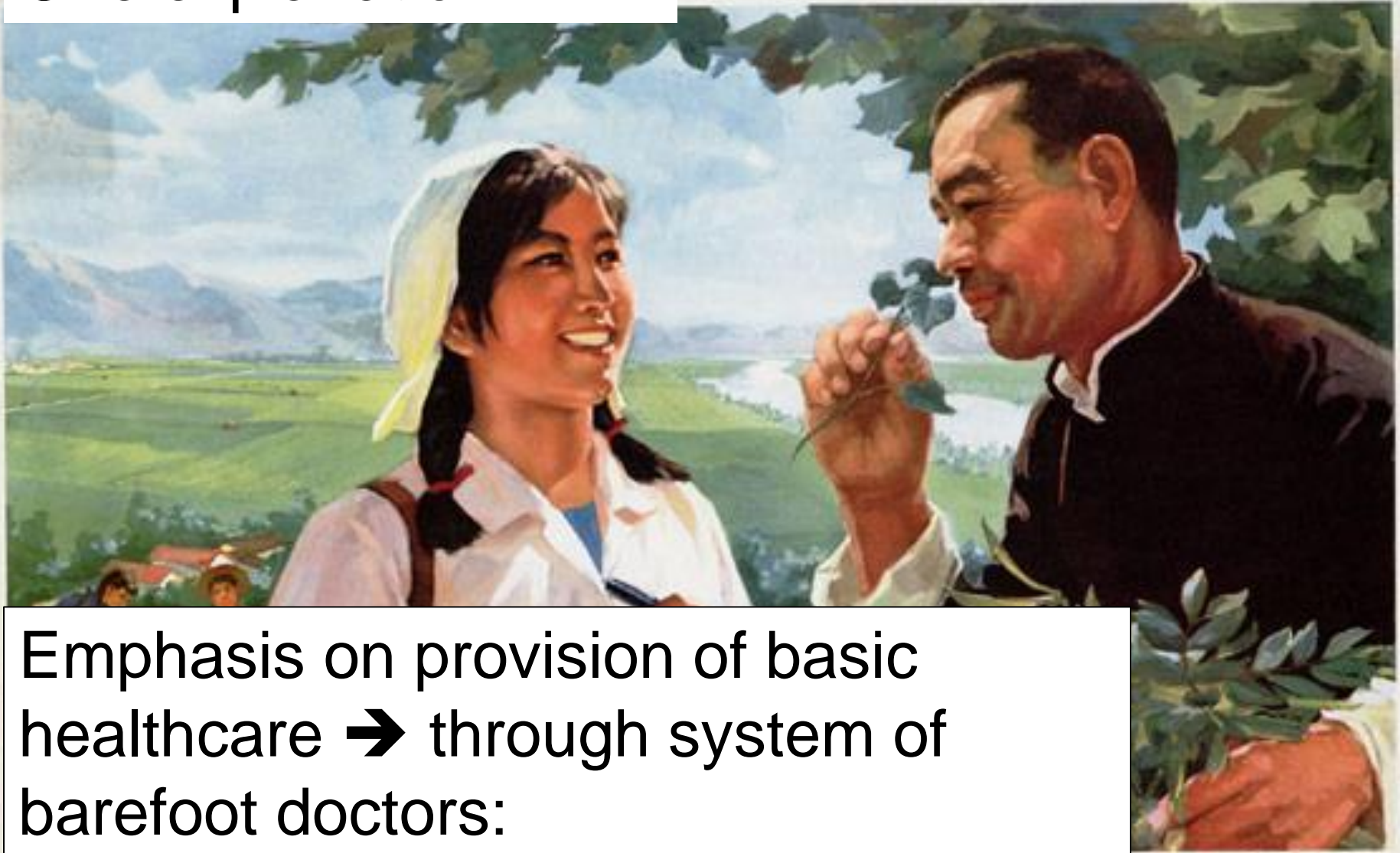西北社会经济发展研究中心

# 1950s, 1960s and 1970s
## Great Leap Forward
## Great Cultural Revolution
## Socialism with Chinese Characteristics

- Puzzle:
  - Life expectancy increased by 20 years:
    - From around 45 to 65
  - Income per capita / wages ➜ increased by 0

One explanation:



Emphasis on provision of basic healthcare ➜ through system of barefoot doctors:

赤脚医生遍山村　合作医疗气象新

# Reforms in 1980s / 1990s

- Incomes rose fast …
- Health care in decline …

- Almost no increase in average life expectancy …
- Health care crisis (especially in rural areas)

- Precipitated by fiscal crisis and decentralization:
  - Collapse of fiscal system (especially in rural areas)
  - Collapse of health system

# 1980s and 1990s Health Care

- 3 words describe the changes:
  - Privatization
  - Privatization
  - Privatization

- Virtually 1 million village barefoot doctors became private clinic operators … no salary / little public health duties / little training …

- No insurance … all fee for service

- At high levels (township health centers and county hospitals ➜ all independent, profit-oriented businesses)
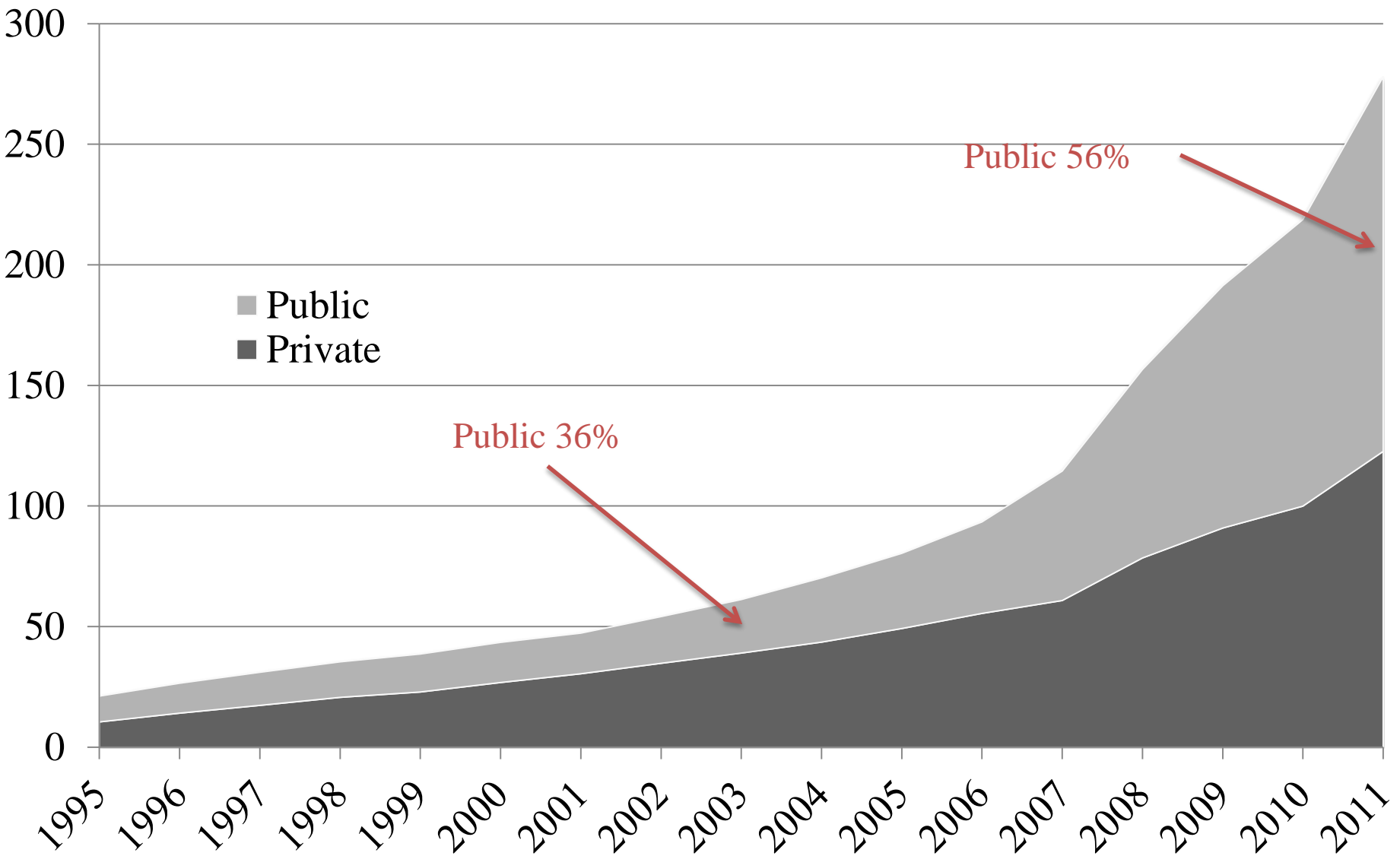
# Healthcare Reforms

**Beginning in early 2000s:**

• **Focus: Expanding Healthcare Coverage and Access**

• By 2010, 96% of the rural population had insurance coverage under the New Cooperative Medical Scheme (NCMS)

• Public expenditure in healthcare to $155 US per capita in 2011

• Impact of NCMS?

– Boosted access and utilization

# Healthcare Reforms

Impact of NCMS?

- – Boosted access and utilization

- – Evidence that little to NO impact on financial protection

- – No clear evidence that NCMS improved health

# Private and Public Health Expenditures (Current USD per capita)

# Healthcare Reforms

Impact of NCMS?

- Boosted access and utilization

- Evidence that little to NO impact on financial protection

  New paper from the World Bank

- No clear evidence that NCMS improved health

*All spending has been taken up with rises in prices and increase in quantity of health care treatments/examines/etc.*

# Healthcare Reforms

Impact of NCMS?

- Boosted access and utilization

- Evidence that little to NO impact on financial protection

- **No clear evidence that NCMS improved health**

Alternative explanation:

*Even if gov't health insurance provides more health care, it may not improve health outcomes if the quality of care is poor*

# What about provider quality?

- Little is known about the quality of healthcare in rural areas
  - Have the reforms expanded access to POOR QUALITY care?

- Two Concerns:
  - Low competence of village and township clinicians
    - Low educational attainment/Little formal medical training?
    - Are providers prepared to handle China's "epidemiological transition" to prevalence of non-communicable disease?
  - Low/Misdirected effort
    - Incentives for unnecessary care and waste?
    - Under referral of cases to upper tiers?

# Study Objectives

- **Provide** an objective measure of the quality of care delivered in rural areas

- **Compare** quality of care provided at different tiers of the health system (village, township, county) and with results of a similar study in India

- **Evaluate** the determinants of quality: how to provide quality care? Do resources, physician human capital, incentives matter?

- **Recommend** policy approaches to improve care

# Outline for Rest of Presentation

- ~~Measuring Healthcare Quality~~

- ~~Standardized Patient Methodology~~

- Pilot Study
  - Sample and Data Collection
  - Results
- Implications and Future Research

# Case I: Childhood Dysentery

- 800 million diarrhea episodes annually in China
- Inflammatory disorder of the intestine brought on by infection (viral, bacterial or parasitic)
- Third highest notified communicable disease after TB and HepB
- 2 Types: Amoebic and **Bacillary**
- Symptoms: severe diarrhea containing blood and mucus in the feces with fever, abdominal pain, feeling of incomplete defecation
- Treatment
  - Dehydration: ORT, IV
  - When no lab for testing: antibiotic
    - Evidence that strains of Shigella becoming resistant in China (Zhang et al 2011)

# Case II: Unstable Angina

- Cardiovascular disease is #1 cause of death in China, accounting for 41% of deaths annually (3 million per year)
- Irregular chest pains brought on by heart not receiving enough blood flow/oxygen (coronary artery disease)
    - Can evolve into heart attack
- Symptoms
    - Chest pain possibly extending to shoulder, arm, back
    - Tightness/squeezing/burning sensation
    - Shortness of breath
    - Occurs at rest, not brought on by exertion
- Tests: Electrocardiogram
- Treatment
    - Blood thinners/Nitroglycerine during event
    - Asprin
    - *Village doctors should refer to upper level facility

# Dysentery and Angina in Village Clinics

**Table 2: Clinic statistics on diseases used for SP cases**

|  | Dysentery | Angina |
|---|---|---|
| Clinic has the necessary equipment to treat | | |
| Serious cases | 5.6% | 0% |
| Moderate cases | 88.9% | 47.2% |
| Does not have the necessary equipment | 5.6% | 52.8% |
| | | |
| Patients seen in past 2 weeks with condition (patients) | 1.17 (1.84) | 0.83 (1.4) |
| Patients referred to other providers in 2012 (patients) | 4.9 (9.4) | 2.4 (2.5) |

*Notes:* Provider responses. Source is author survey conducted approximately 6 months before SP visit.

# Method: Case Scripts and Protocols

- Case Scripts
  - Developed with doctors in Xi'an
  - 2 diseases: Dysentery and Unstable Angina
    - No obvious physiological symptoms
    - Low risk of invasive procedures/tests
    - Note: Child dysentery case was proxy (SP was parent of absent child)
  - Detailed  history, symptoms
  - Individual background story
- Protocols for avoiding invasive procedures

# SP Recruitment and Training

- ## Standardized Patient (SP) Recruitment
  - 4 SPs recruited from northern Shaanxi
  - 2 male patients for Unstable Angina Case and 2 female patients for Childhood Dysentery Case

- ## SP Training
  - Covered:
    - Background on study
    - Basic overview of diseases
    - Memorization of scripts and protocols
    - Rehearsal and test runs near Xi'an
  - SPs wore **concealed wire/tape recorder** so minimal recall training necessary ➤
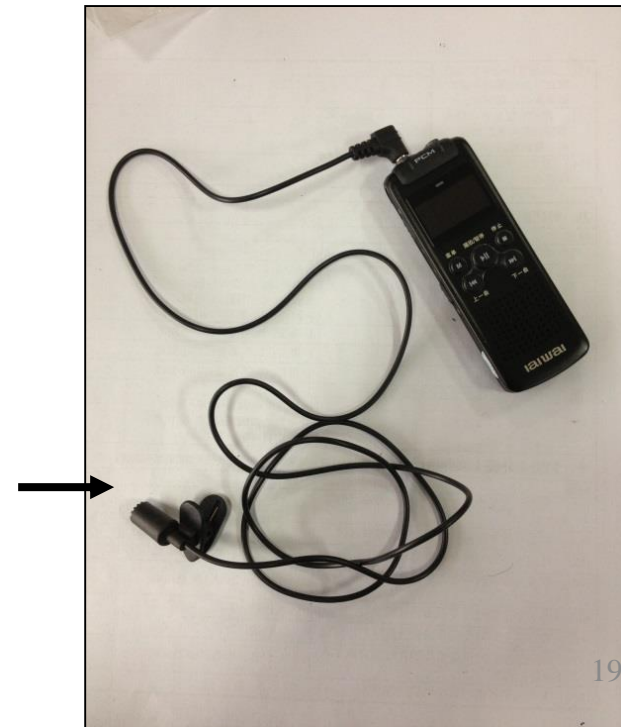
# Data Collection



- Location/Sample
  - 6 counties in Shaanbei
    - 12 township clinics
    - 36 village clinics
  - x 2 Diseases = 96 interactions total
- Previous Facility Survey in Fall 2012
  - Clinic infrastructure
  - Provider characteristics
  - Community characteristics

- SP visits during Spring Festival 2013 (Feb 9 to 15)
  - Transcripts of interactions (from recordings)
  - Exit Questionnaire: SP Impressions
  - Bought any medicines prescribed
  - Paid any service fee

# Provider Characteristics

| | Township Clinics (n=12) | | Village Clinics (n=36) | |
|---|---|---|---|---|
| | *Mean* | *(SD)* | *Mean* | *(SD)* |
| Age (years) | 43.78 | (8.565) | 45.85 | (10.87) |
| Male | 83.3% | | 73.3% | |
| Experience (years) | 20.89 | (8.575) | 23.33 | (9.523) |
| Education | | | | |
| Middle school | 0% | | 19.5% | |
| Vocational middle | 41.7% | | 60.5% | |
| Vocational high | 40.3% | | 10% | |
| General high | 4.2% | | 10% | |
| College | 13.9% | | 0% | |
| Qualification | | | | |
| None | 5.6% | | 0% | |
| Practicing Physician | 66.7% | | 10% | |
| Physician assistant | 27.8% | | 5.7% | |
| Rural Physician | -- | | 84.3% | |
| Medical Training | | | | |
| None | -- | | 25.7% | |
| Informal training at medical school | -- | | 25.2% | |
| Formal training at medical school | -- | | 49% | |
| Hours worked per day | -- | | 9.943 | (4.311) |
| Base salary (yuan) | -- | | 351.2 | (377.7) |
| Total income (yuan) | -- | | 1355.2 | (1400.7) |

80% of village providers have lower secondary education or less; 41% of township providers

10% PPs in village; 66.7% in township

On average, 74% of income from drug sales/fees ➔ only small share from "base salary" …

# Standardized Patient Quality Measures

1. Process Quality (or "checklists")
   - Transcripts evaluated against "clinical checklist" of recommended questions and tests
   - Checklists for each disease developed with Xi'an doctors, based on national recommended practice

2. Diagnosis
   - Completely correct /or/ partially correct /or/ incorrect

3. Treatment
   - Appropriate drugs?
   - Referral (yes or no?)

# Clinical Checklists

| Dysentery |
|---|

**QUESTIONS**

- ☐ Age of child
- ☐ Stool type
- ☐ Duration of illness
- ☐ Stool frequency
- ☐ Medicines taken
- ☐ Vomiting
- ☐ Abdominal Pain
- ☐ What child has eaten
- ☐ Urination
- ☐ Fever
- ☐ Stool amount
- ☐ Child mood
- ☐ Child wellness before this illness
- ☐ Drinking water source
- ☐ Drug allergies
- ☐ Cooking method
- ☐ Child drinking fluids
- ☐ Family situation
- ☐ Environmental Factors

| Unstable Angina |
|---|

**QUESTIONS**

- ☐ Pain location
- ☐ When started having pain
- ☐ Type of pain
- ☐ Similar pain previously
- ☐ Age
- ☐ Pain start time (this episode)
- ☐ Pain severity
- ☐ Strenuous Activity
- ☐ Pain when breathing
- ☐ Activity when pain started
- ☐ Shortness of breath
- ☐ Pain radiation
- ☐ Drinking Alcohol
- ☐ Smoking
- ☐ Nausea
- ☐ Diarrhea
- ☐ Normal Stool
- ☐ Acid reflux
- ☐ Sweating
- ☐ Constipation
- ☐ Stomach pains
- ☐ Family History

**EXAMS**

- ☐ EKG
- ☐ Auscultation
- ☐ Pulse
- ☐ Blood pressure
- ☐ Temperature

# Clinical Checklists

| Dysentery | Unstable Angina |
|---|---|

## Dysentery

**QUESTIONS**

- ☐ **Age of child**
- ☐ **Stool type**
- ☐ Duration of illness
- ☐ **Stool frequency**
- ☐ Medicines taken
- ☐ Vomiting
- ☐ Abdominal Pain
- ☐ What child has eaten
- ☐ Urination
- ☐ **Fever**
- ☐ Stool amount
- ☐ Child mood
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## Unstable Angina

**QUESTIONS**

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- ☐ When started having pain
- ☐ **Type of pain**
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# Standardized Patient Quality Measures

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## 2. Diagnosis
- Completely correct /or/ partially correct /or/ incorrect

## 3. Treatment
- Appropriate drugs?
- Referral (yes or no?)

# Evaluating Diagnoses

|  | **Dysentery** | **Unstable Angina** |
|---|---|---|
| Correct | Bacillary dysentery, dysentery, bacteria | Angina, coronary heart disease |
| Partially Correct | Enteritis | Heart problem, heart disease |
| Incorrect (Diagnosis offered by providers) | Dyspepsia/indigestion, weather, cold, intestinal ulcer, cramps, acidity | Sprain, intercostal neuralgia, Pleurisy, injury/trauma, tendon hemorrhage, pancreatitis, pneumonia, chest congestion |

# Standardized Patient Quality Measures

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3. Treatment
   – Appropriate drugs?
   – Referral (yes or no?)

# Evaluating Treatments

|  | **Dysentery** | **Unstable Angina** |
|---|---|---|
| Correct | ORS, rehydration, antibiotic | Aspirin, anti-platelet agents, statins, beta blockers, ACE (Angiotensin Converting Enzyme) Inhibitors, referral. |
| Incorrect (Diagnosis offered by providers) | Albumin tannate powder，norfloxacin capsules，belladonna sulfamethoxazole and trumerhoprim tablets，multienzyme tablets，other medicine for digestion，pediatric oral liquid，loperamide hydrochloride，combined bacillus subtilis and enterococcus faecium，probiotics，smectite Powder | Notoginseng tablets，salvia miltiorrhiza，tongmai particles，wantong，erythromycin ethylsuccinate tablets，coenzyme Q10 capsules，acetylspiramycin tablets，isosorbide mononitrate，blood pressure medication，oryzanol，yuan yu anodynes, nimesulide tablets，cephradine capsules, pain killers |

# Results

# Adherence to Checklist: Dysentery
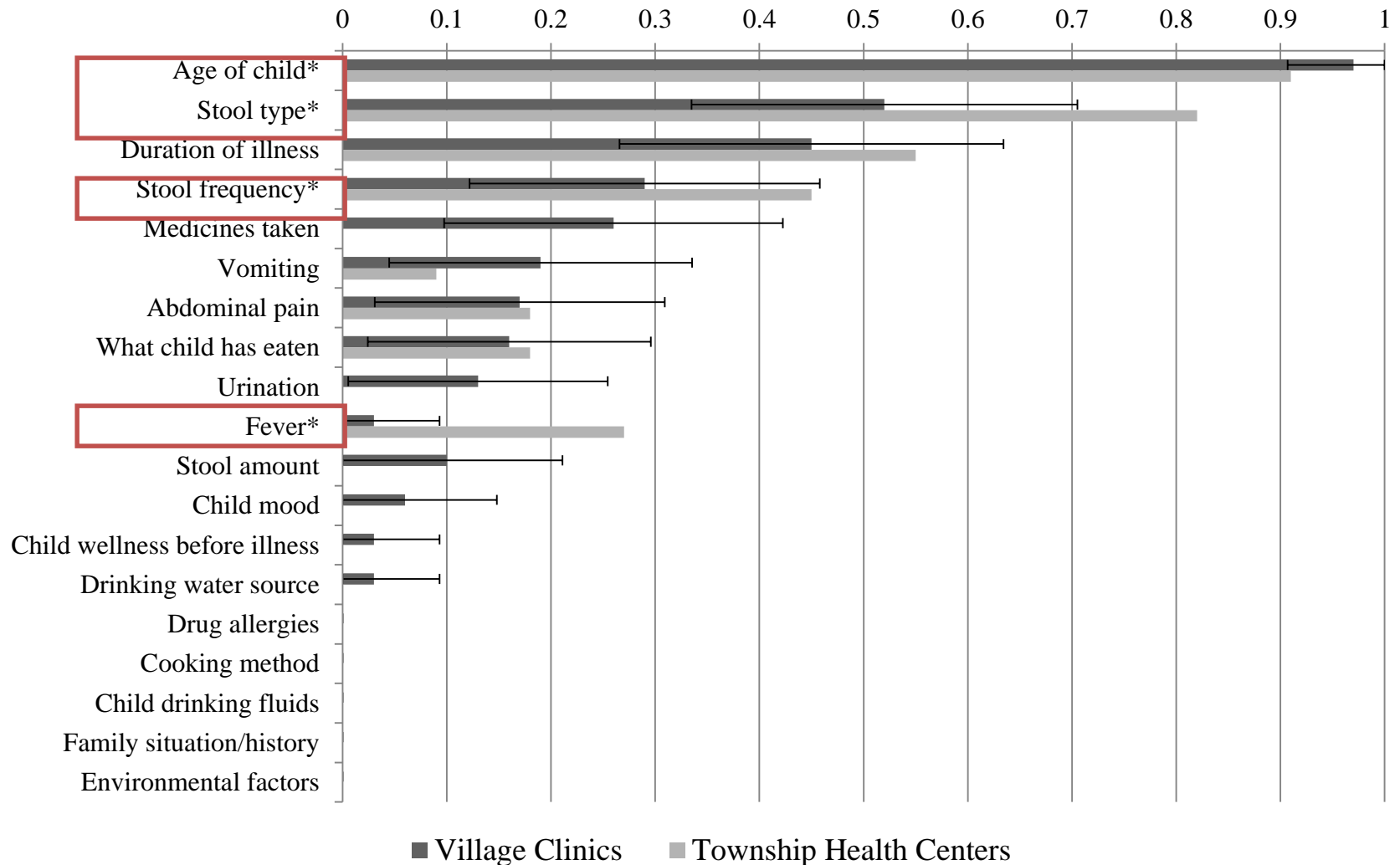
# Adherence to Checklist: Unstable Angina

■ Village Clinics   ■ Township Health Centers
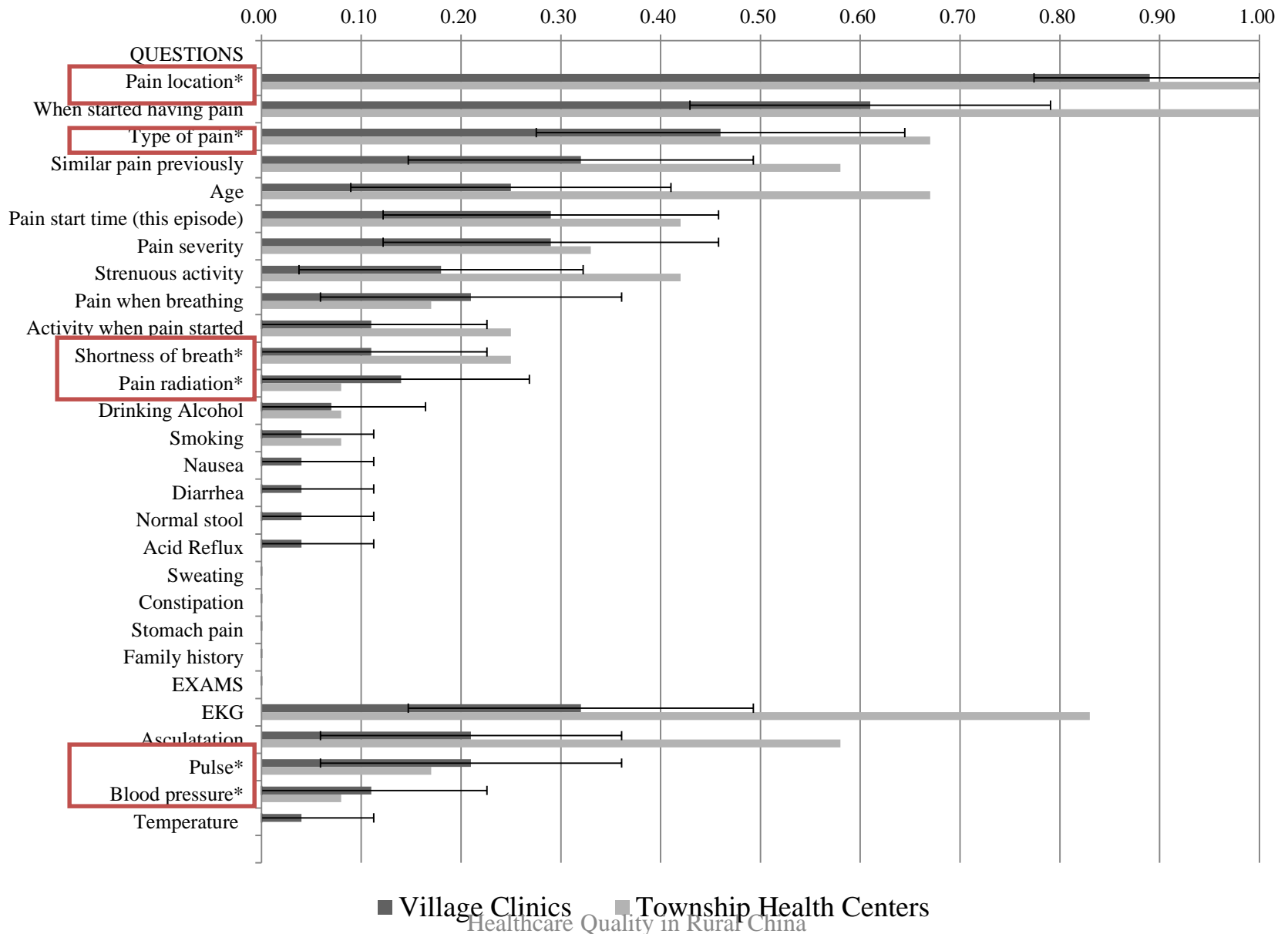
# Summary: Process Quality

- On average, village clinicians perform 18% of the recommended checklist items

- Of "essential" items (those necessary to provide a correct diagnosis and treatment), village clinicians perform 36%.
  - NO village doctors got all essential items.

- Township doctors do slightly better than village docs on angina case
  - % of checklist items the same for dysentery

# Quality of Diagnosis and Care: Dysentery
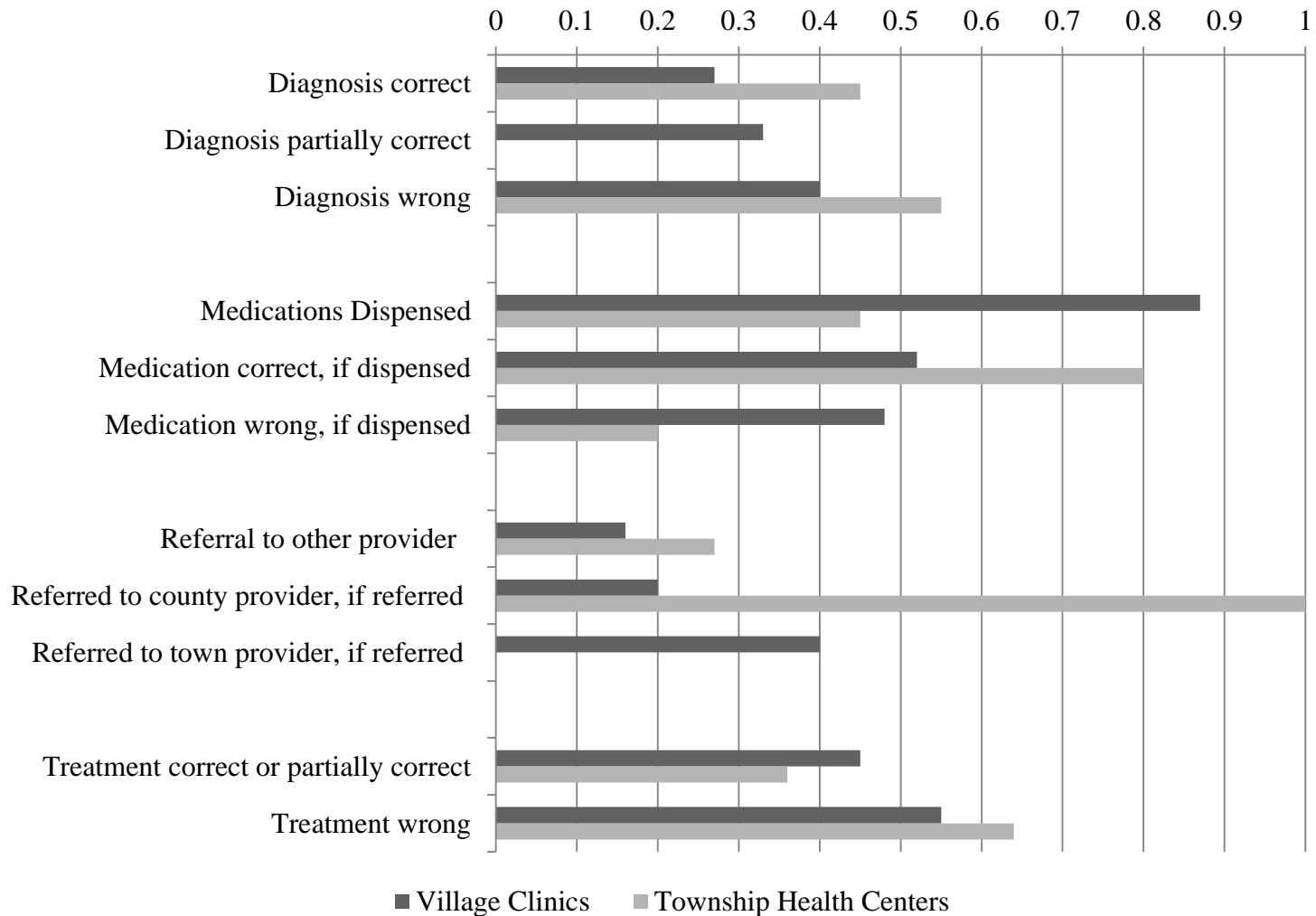
# Quality of Diagnosis and Care: Unstable Angina



Village Clinics ■ Township Health Centers
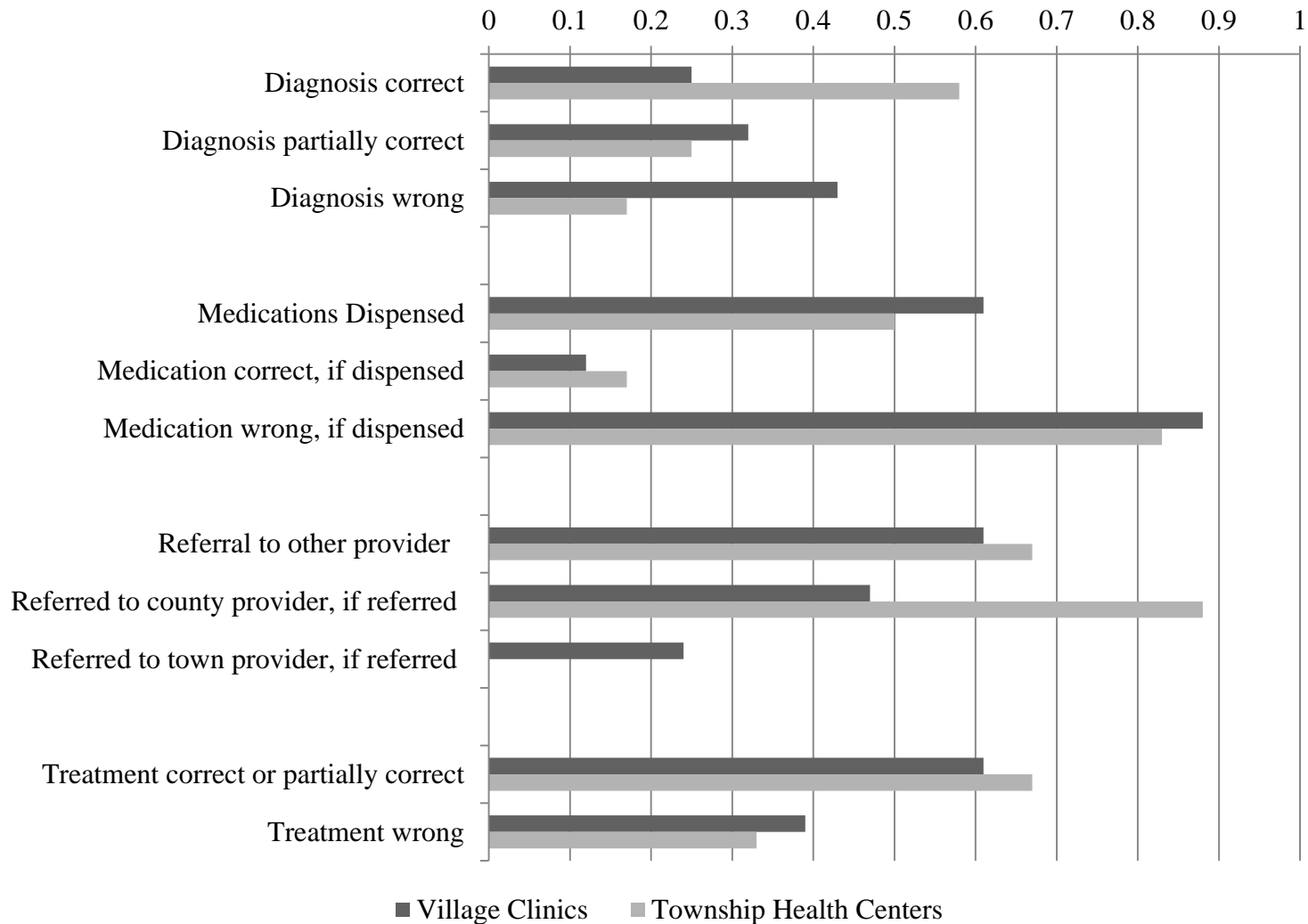
# Summary: Quality of Diagnoses and Treatment

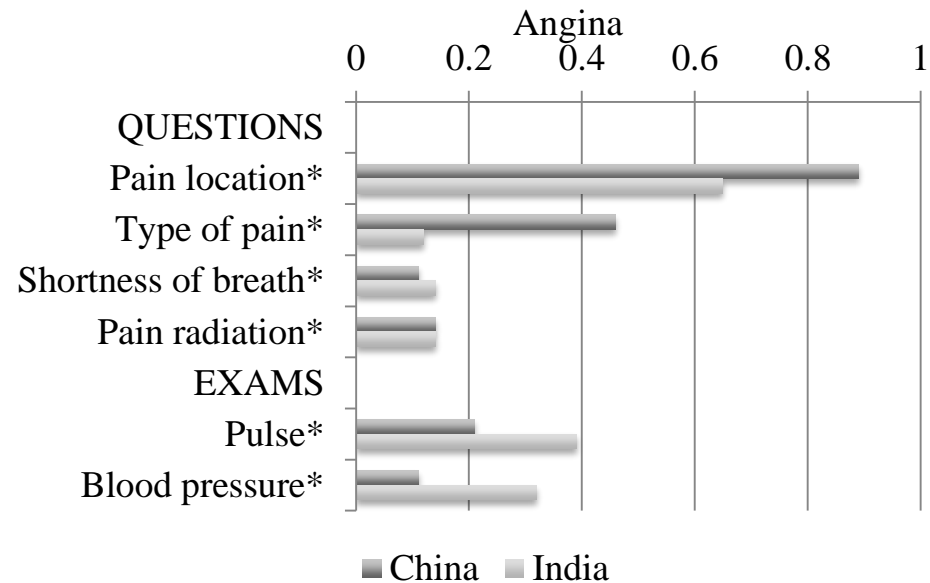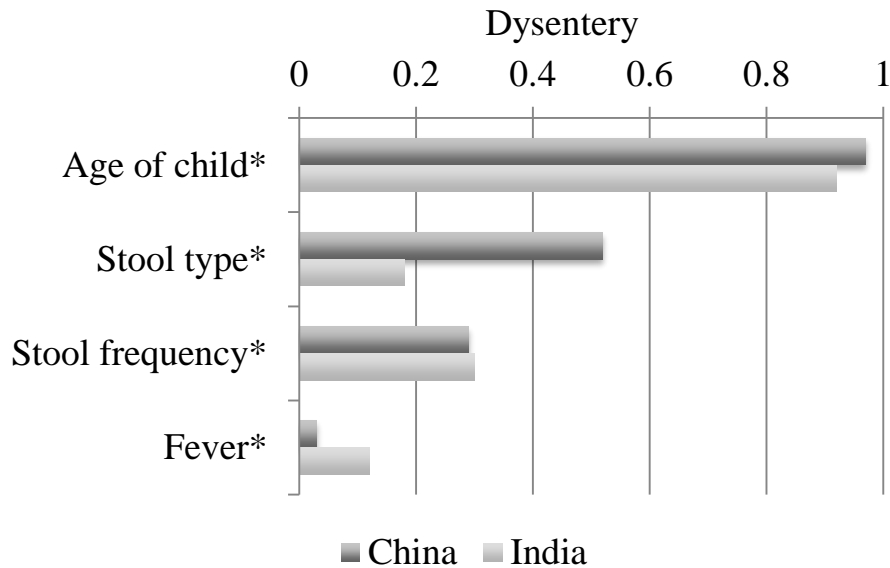**Diagnosis**

- Village doctors get 26% of diagnoses correct
  - Township doctors do better: 52%
  - Mirrors process quality results

- 75% of village doctors dispense medication, but these are correct only 36% of the time

**Treatment**

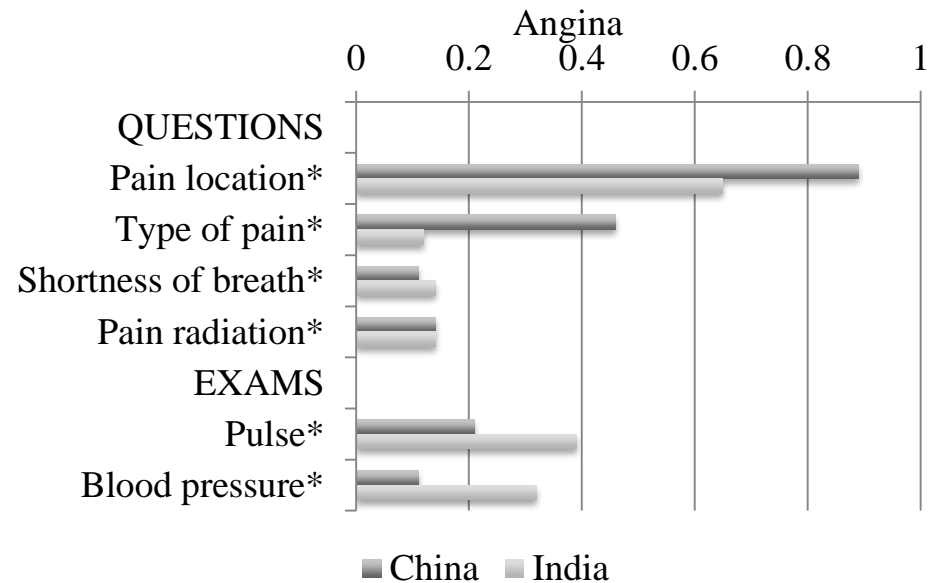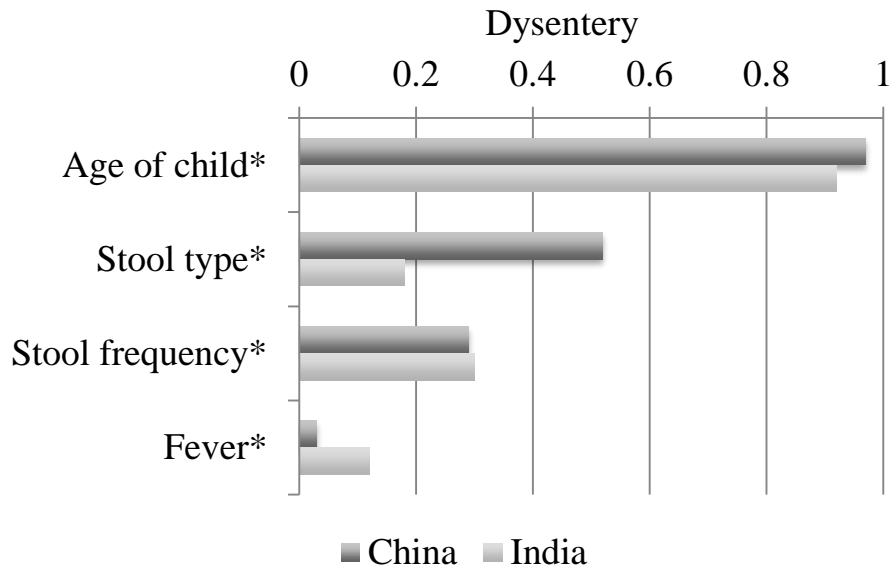- Around 50% of treatments are <u>completely</u> unnecessary ➔ some were determined to be harmful.

# Is this good or bad? China vs. India



- Essential Checklist Items (same): China 36%, India 33%
- Diagnosis Correct or Partially Correct: China 59% , India 53%
- Treatment Correct or Partially Correct: China 53% , India 30%
  - Diagnosis and treatment standards different, so difficult to compare

# Is this good or bad? China vs. India



Dysentery chart — China vs. India:
- Age of child*
- Stool type*
- Stool frequency*
- Fever*



Angina chart — China vs. India:
- QUESTIONS
- Pain location*
- Type of pain*
- Shortness of breath*
- Pain radiation*
- EXAMS
- Pulse*
- Blood pressure*

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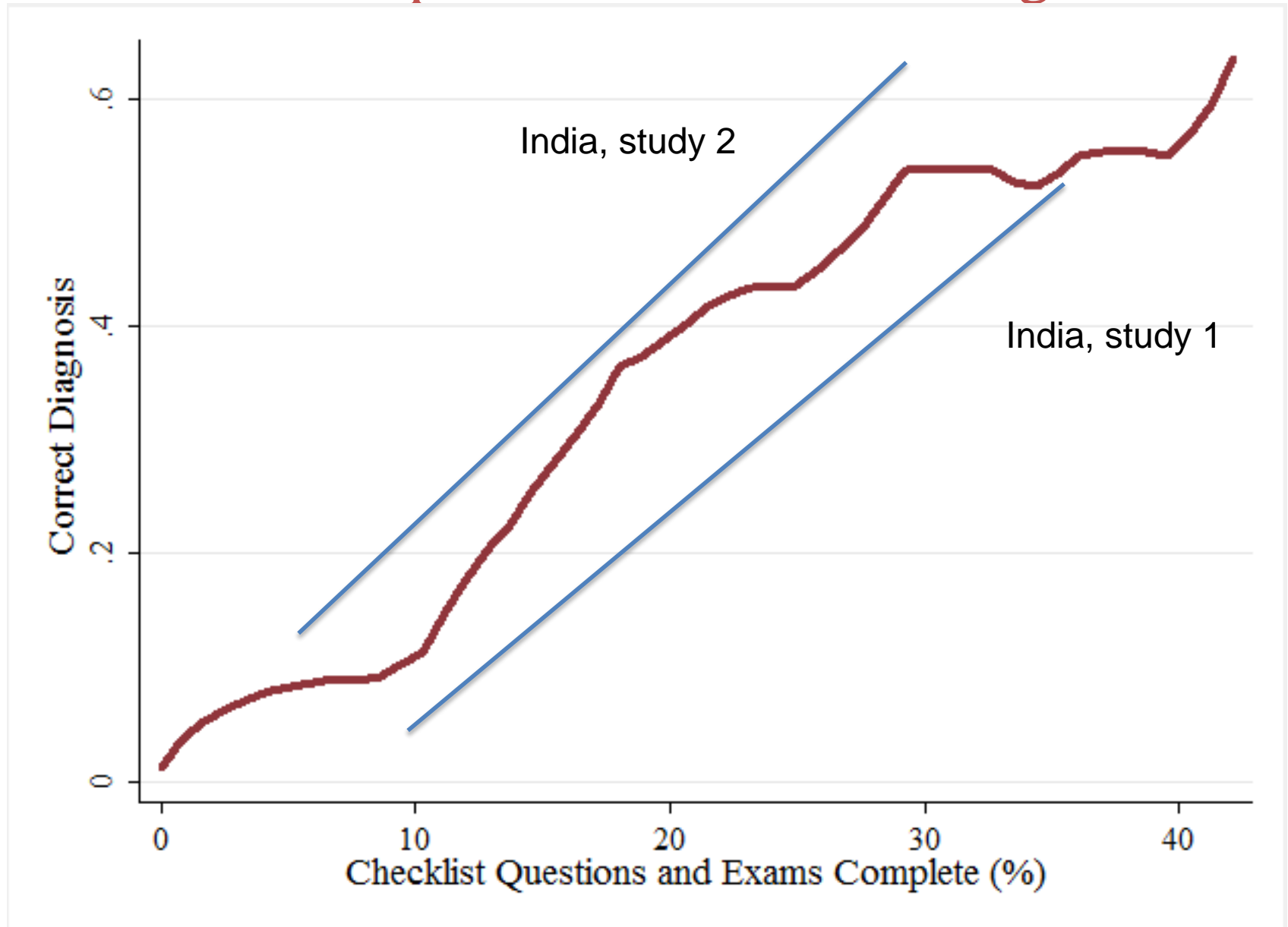
Per Capita GDP in 2011: Shaanxi $3,179, Madhya Pradesh $583

How good of a measure is "check-list"?

# Checklist Completion and Correct Diagnoses
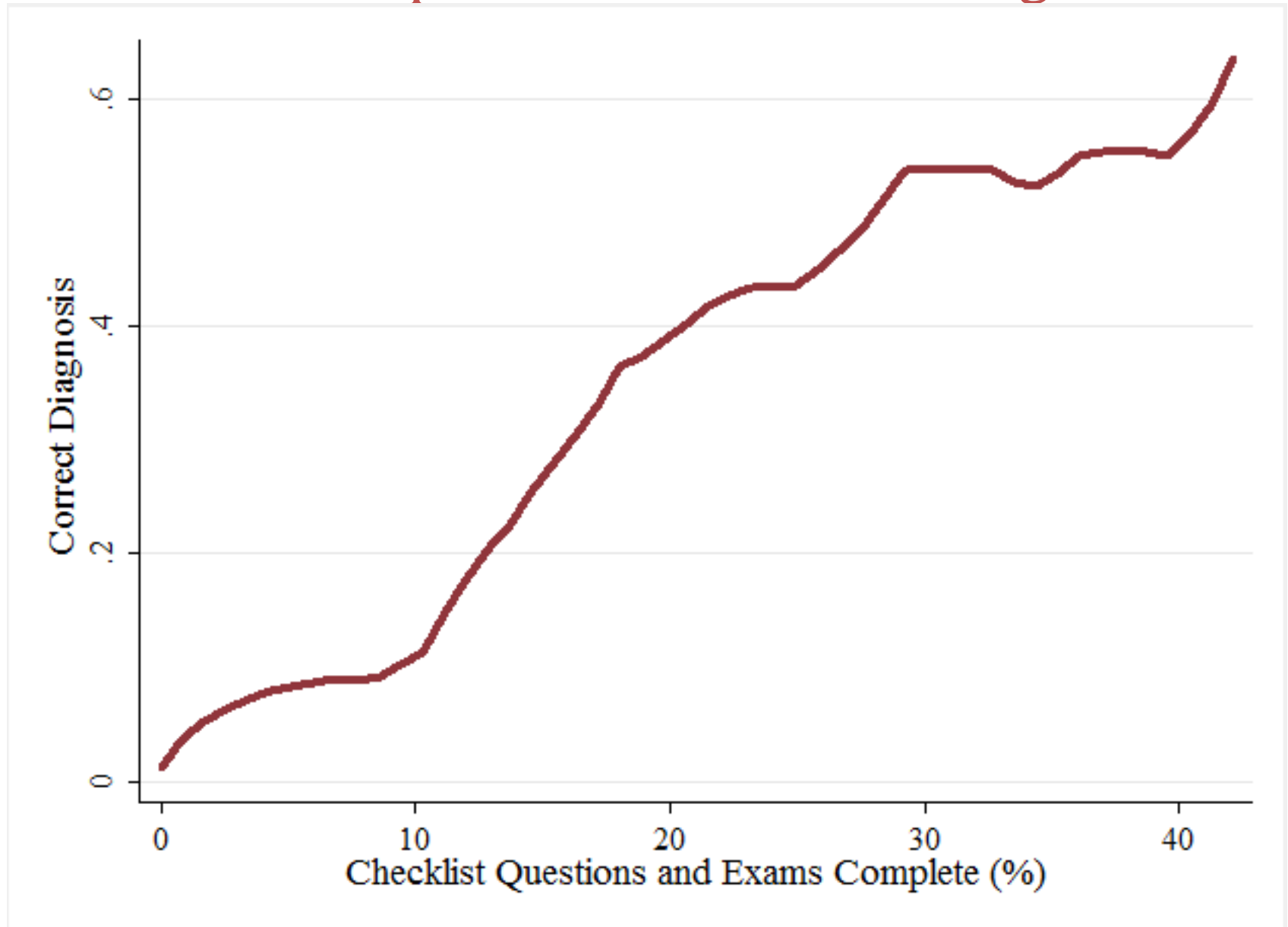
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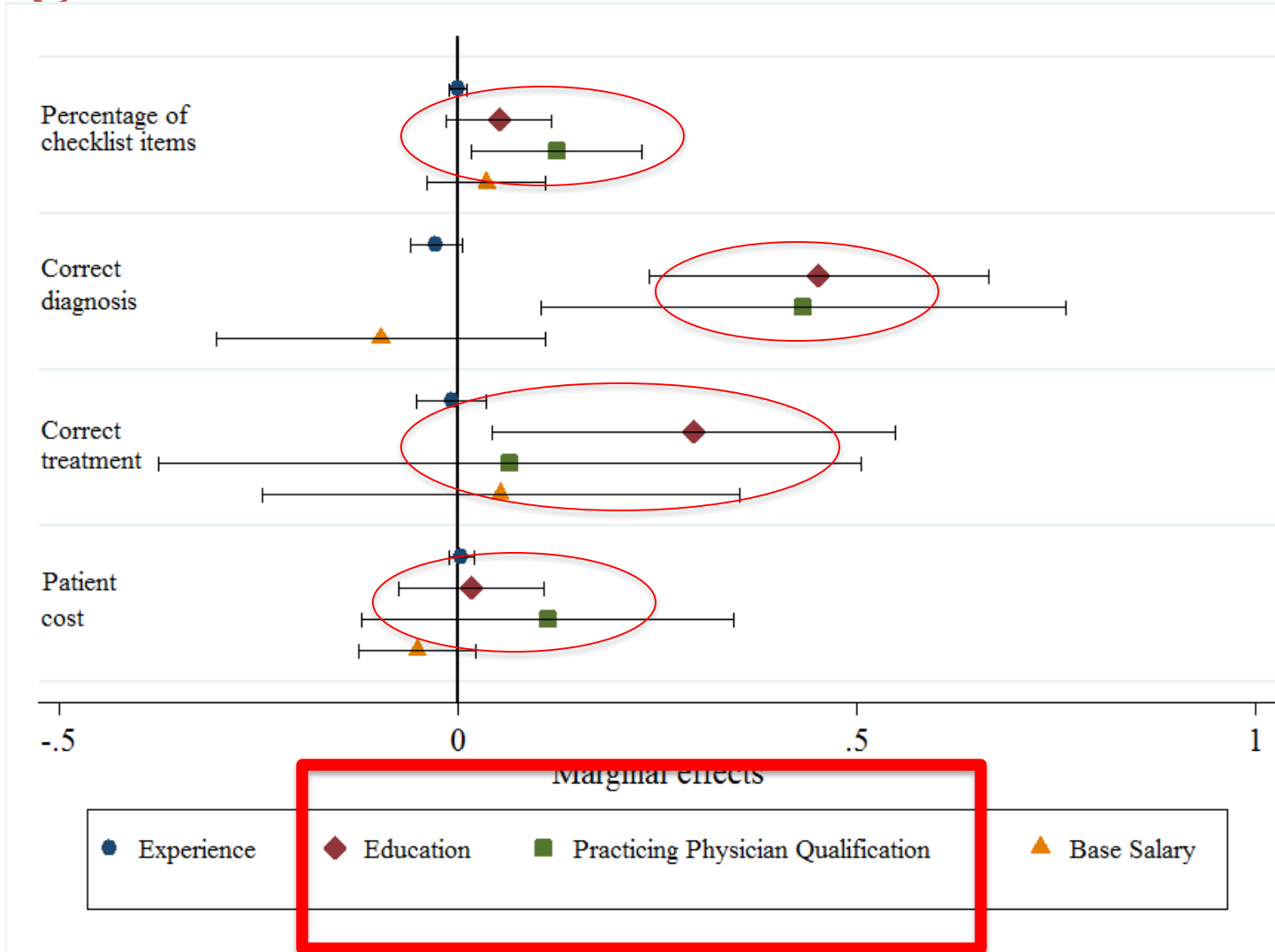
# Correlates of Quality

# Correlates of Quality in Village Clinics

| | Percent of Recommended Questions and Exams (%) | Diagnosis Correct (0/1) | Correct Treatment (0/1) | Total Fees Charged (yuan) |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Provider age | 0.074 | 0.027* | 0.005 | -0.213 |
| | (0.440) | (0.014) | (0.018) | (0.692) |
| Male provider | 0.370 | -0.193 | -0.417** | -2.894 |
| | (4.647) | (0.145) | (0.189) | (4.946) |
| Provider experience | -0.052 | -0.028* | -0.009 | 0.346 |
| | (0.568) | (0.017) | (0.022) | (0.820) |
| Provider education, upper secondary or higher | 5.069 | 0.451*** | 0.295** | 1.553 |
| | (3.371) | (0.109) | (0.129) | (4.675) |
| Practicing Physician Certificate | 12.294** | 0.433*** | 0.065 | 11.177 |
| | (5.483) | (0.168) | (0.225) | (11.930) |
| Has base salary (0/1) | 3.476 | -0.098 | 0.053 | -5.186 |
| | (3.821) | (0.106) | (0.153) | (3.735) |
| Value of medical instruments (10,000 yuan) | -0.316 | 0.107** | -0.044 | 0.097 |
| | (1.342) | (0.049) | (0.047) | (1.100) |
| Patient load | -0.967 | 0.024 | 0.132 | -1.437 |
| | (1.943) | (0.066) | (0.091) | (2.576) |
| Angina | -0.188 | -0.034 | 0.130 | 5.932 |
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# Correlates of Quality in Village Clinics

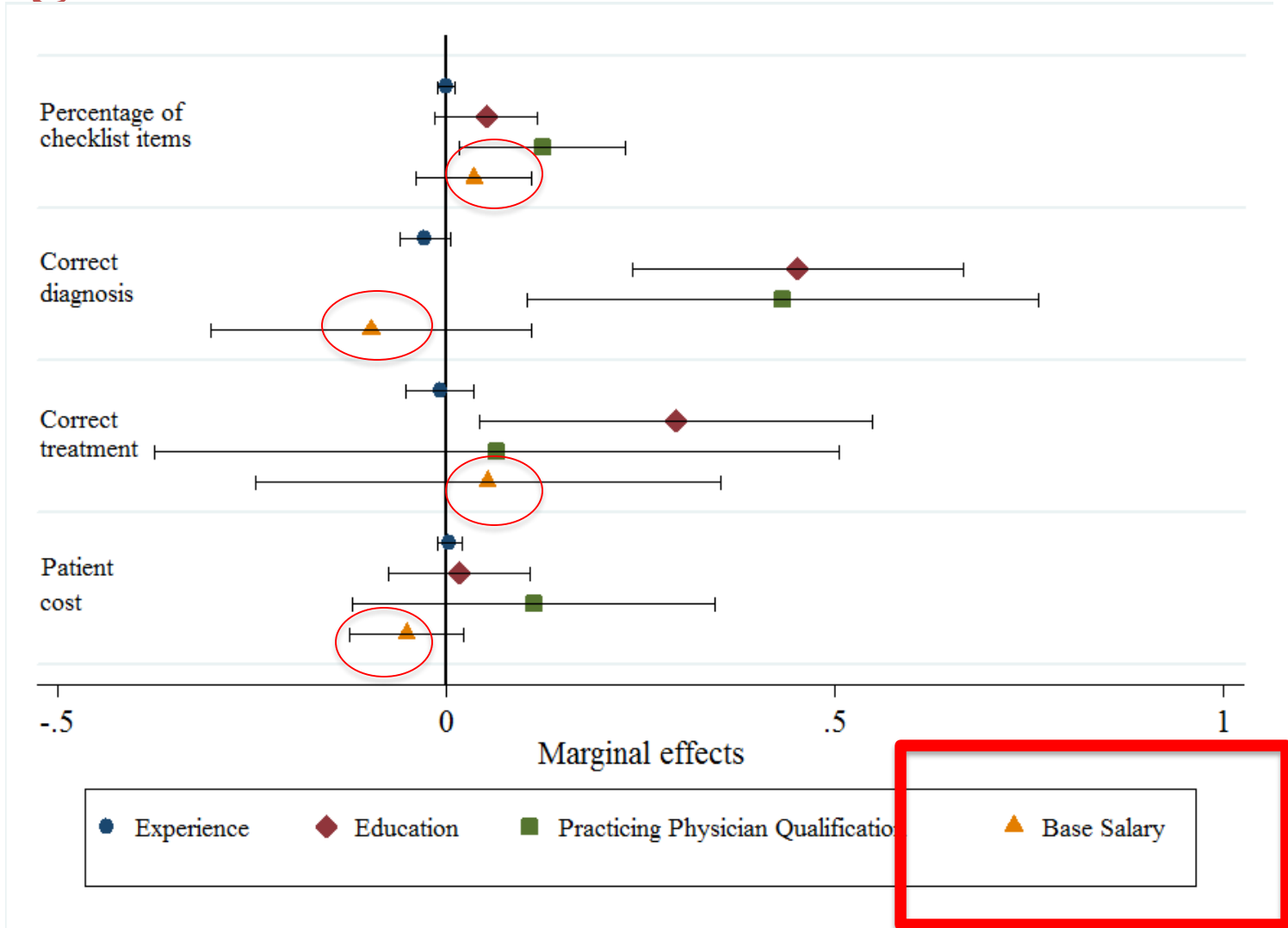| | Percent of Recommended Questions and Exams (%) | Diagnosis Correct (0/1) | Correct Treatment (0/1) | Total Fees Charged (yuan) |
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# Process Quality and Doctor Qualification in Village Clinics

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# Process Quality and Doctor Qualification in Village Clinics

# Summary: Correlates

- Clinician Competence/Knowledge

  – Better process quality and correct diagnoses strongly correlated with village doctor education and qualifications.

- Clinician Incentives/Effort

  – Suggestive evidence that having base pay reduces costs to patients (but effects on quality less clear).

- BUT

  – Sample is small (we don't have power to see relationships)

  – Clinician qualifications and pay correlated with many other factors that also influence quality and costs

# Going Forward

Improvements to study design
* Incorporate "lessons learned" from pilot study
* Panel of physicians to perfect/develop case scripts and analysis guidelines
* Measure knowledge AND quality by combining vignettes and Standardized Patients

Future Research
* Is this true throughout China's poor areas?
  – Improve power and representation
  – Improved ability to analyze factors correlated with quality
    (Representative Survey of Providers in the Northwest)
* FIND Solutions
  – Training for Rural Physicians
  – Checklists of recommended questions and exams for specific cases
  – Test effects of provider payment
  – Others
    (Randomized Trials to Test CAUSAL IMPACT of these interventions)

A new case: TB …

Thank you!