



# Comparative study of medical management of diabetes in Pacific-Rim cities

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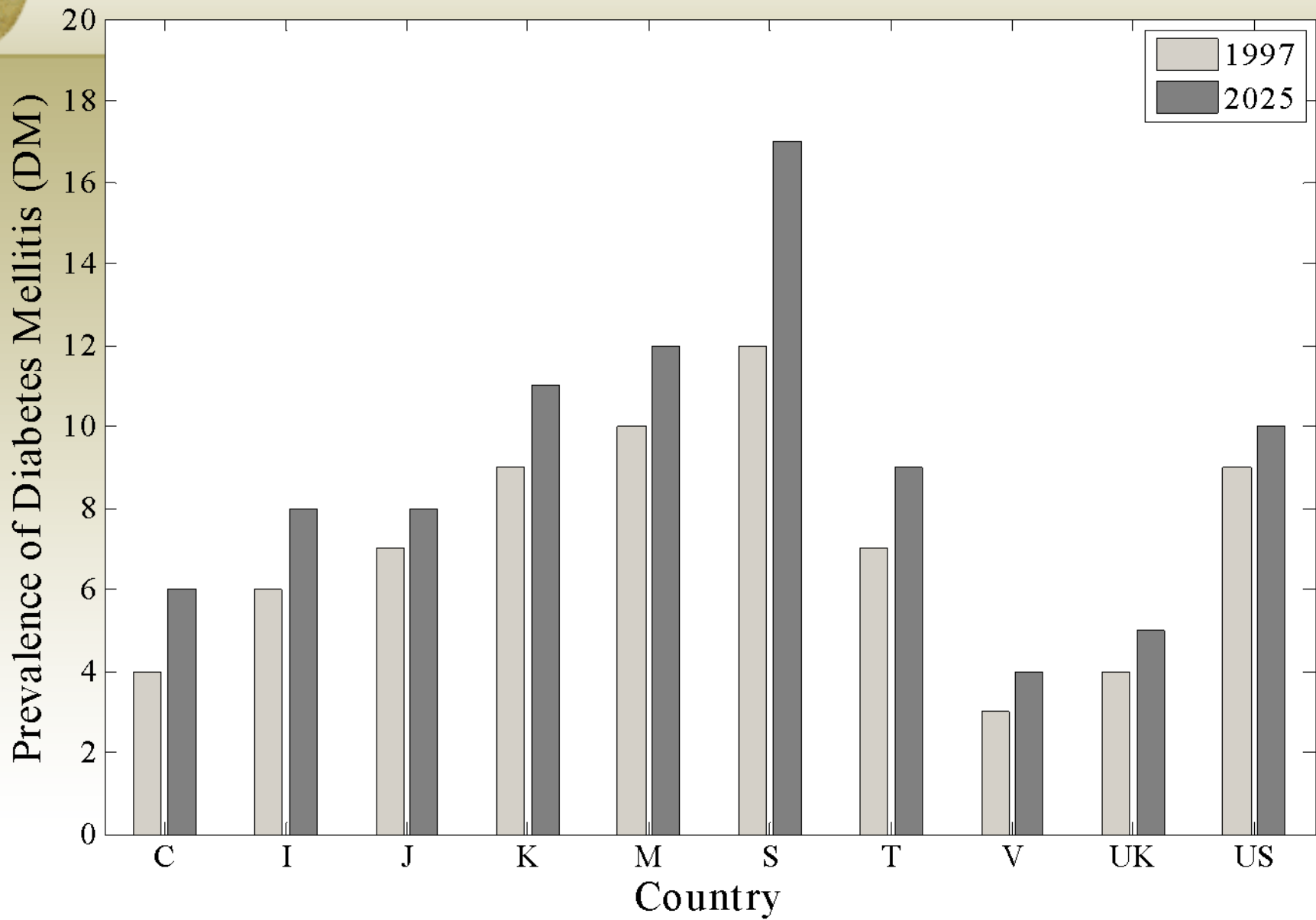
# Diabetes as window onto health systems

Diabetes, especially type 2 DM, increasingly prevalent around the Pacific Rim

Challenges:

Education and motivation for healthier lifestyles;  
and

Providing access to timely, effective, and  
affordable care





# Two initial research goals

- (1) Assess “value for money” (productivity) of health promotion and chronic disease management; and
- (2) Give evidence-based policy advice to help prepare health systems for aging populations and greater NCD burden.



# Why economic studies?

- \* quantify the return to investment in prevention
  - \* reduced morbidity and mortality
  - quality of life, at-work productivity
  - \* avoided treatment spending
  
- \* elucidate how policymakers can enhance “value for money” in caring for the growing number of patients with diabetes

# Applying method of assessing “net value”

## Example: “The Net Value of Health Care for Patients with Type 2 Diabetes, 1997 to 2005,” *Annals of Internal Medicine* 151(6): 386-393.

Karen Eggleston, Nilay D. Shah, Steven A. Smith, Amy E. Wagie, Kirsten H. Long, Arthur R. Williams, Ernst R. Berndt, Jerome H. Grossman, and Joseph P. Newhouse (the Mayo/Harvard/MIT Collaborative Study Group), 2009.

### ARTICLE

Annals of Internal Medicine

## The Net Value of Health Care for Patients With Type 2 Diabetes, 1997 to 2005

Karen N. Eggleston, PhD; Nilay D. Shah, PhD; Steven A. Smith, MD; Amy E. Wagie, BA; Arthur R. Williams, PhD; Jerome H. Grossman, MD; Ernst R. Berndt, PhD; Kirsten Hall Long, PhD; Ritesh Banerjee, PhD; and Joseph P. Newhouse, PhD

**Background:** The net economic value of increased health care spending remains unclear, especially for chronic diseases.

**Objective:** To assess the net value of health care for patients with type 2 diabetes.

**Design:** Economic analysis of observational cohort data.

**Setting:** Mayo Clinic, Rochester, Minnesota, a not-for-profit integrated health care delivery system.

**Patients:** 613 patients with type 2 diabetes.

**Measurements:** Changes in inflation-adjusted annual health care spending and in health status between 1997 and 2005 (with health status defined as 10-year cardiovascular risk), holding age and diabetes duration constant across the observation period (“modifiable risk”), and simulated outcomes for all diabetes complications based on the UKPDS (United Kingdom Prospective Diabetes Study) Outcomes Model. Net value was estimated as the present discounted monetary value of improved survival and avoided treatment spending for coronary heart disease minus the increase in annual spending per patient.

**Results:** Assuming that 1 life-year is worth \$200 000 and accounting for changes in modifiable cardiovascular risk, the net value of

changes in health care for patients with type 2 diabetes was \$10 911 per patient (95% CI, –\$8480 to \$23 422) between 1997 and 2005, a positive dollar value that suggests the value of health care has improved despite increased spending. A second approach based on diabetes complications yielded a net value of \$6931 per patient (CI, –\$186 901 to \$211 980).

**Limitation:** The patient population was homogeneous and small, and the wide CIs of the estimates are compatible with a decrease as well as an increase in value.

**Conclusion:** The economic value of improvements in health status for patients with type 2 diabetes seems to exceed or equal increases in health care spending, suggesting that those increases were worth the extra cost. However, the possibility that society is getting less value for its money could not be statistically excluded, and there is opportunity to improve the value of diabetes-related health care.

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*Ann Intern Med.* 2009;151:386-393.

For author affiliations, see end of text.  
† Decreased.

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Health care spending has increased rapidly in the United States and other countries, but so have longevity and quality of life. Do the improved outcomes justify the increased costs? Studies of several acute conditions and surgical procedures have suggested an increase in the net value of health care spending (1–3), which counters the widespread impression that increased spending has not resulted in commensurate increases in health benefits. If the value of health care spending increased, the component of a “cost-of-living” index associated with health care decreased over time (4–6), meaning a price index for health care decreased. Official price indices, such as the Consumer Price Index, do not adjust for improvements in quality of care and thus overstate medical inflation.

Chronic diseases account for a growing share of morbidity, mortality, and total health care spending in both developed and developing countries (7–9) and warrant similar economic analyses. Although some studies have analyzed the economics of diabetes (10–15), none has assessed the value of increased medical care spending by using a “cost-of-living” approach, which measures how the quality- or value-adjusted cost of goods or services has changed over time. We assessed whether the value of changes in health care for patients with type 2 diabetes, defined as the prevention of future mortality and morbidity, exceeds the increase in costs of that management.

### METHODS

Using data from the Diabetes Electronic Management System at the Mayo Clinic, Rochester, Minnesota (16, 17), we identified 912 patients in whom diabetes was diagnosed before 1 January 2003 who were continuous Mayo employees or dependents of employees from 1999 to their deaths or to 2005 and had elected to obtain their primary health insurance benefits through a Mayo Clinic self-insured plan. The sample included patients who became employees (and their dependents) as early as 1997 and otherwise met inclusion criteria, which were developed as a

### See also:

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Appendix Tables	
Conversion of graphics into slides	



# Quantitative and qualitative research

- An overview of trends in DM-related burden of disease in Asia, complemented by
- descriptive “patient journeys” for patients with DM in India, China, Vietnam, Thailand, Malaysia, and Korea to illustrate the institutional context of care-seeking and the opportunities for policy improvements.

Chapter in **Aging Asia: Economic and Social Implications of Rapid Demographic Change in China, Japan, and Korea**, forthcoming from Stanford’s series with Brookings Institution Press, 2010

# Inpatient treatment of diabetic patients in Asia: Evidence from India, China, Thailand, and Malaysia



Forthcoming in *Diabetic Medicine*

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# Variations in hospitalization spending

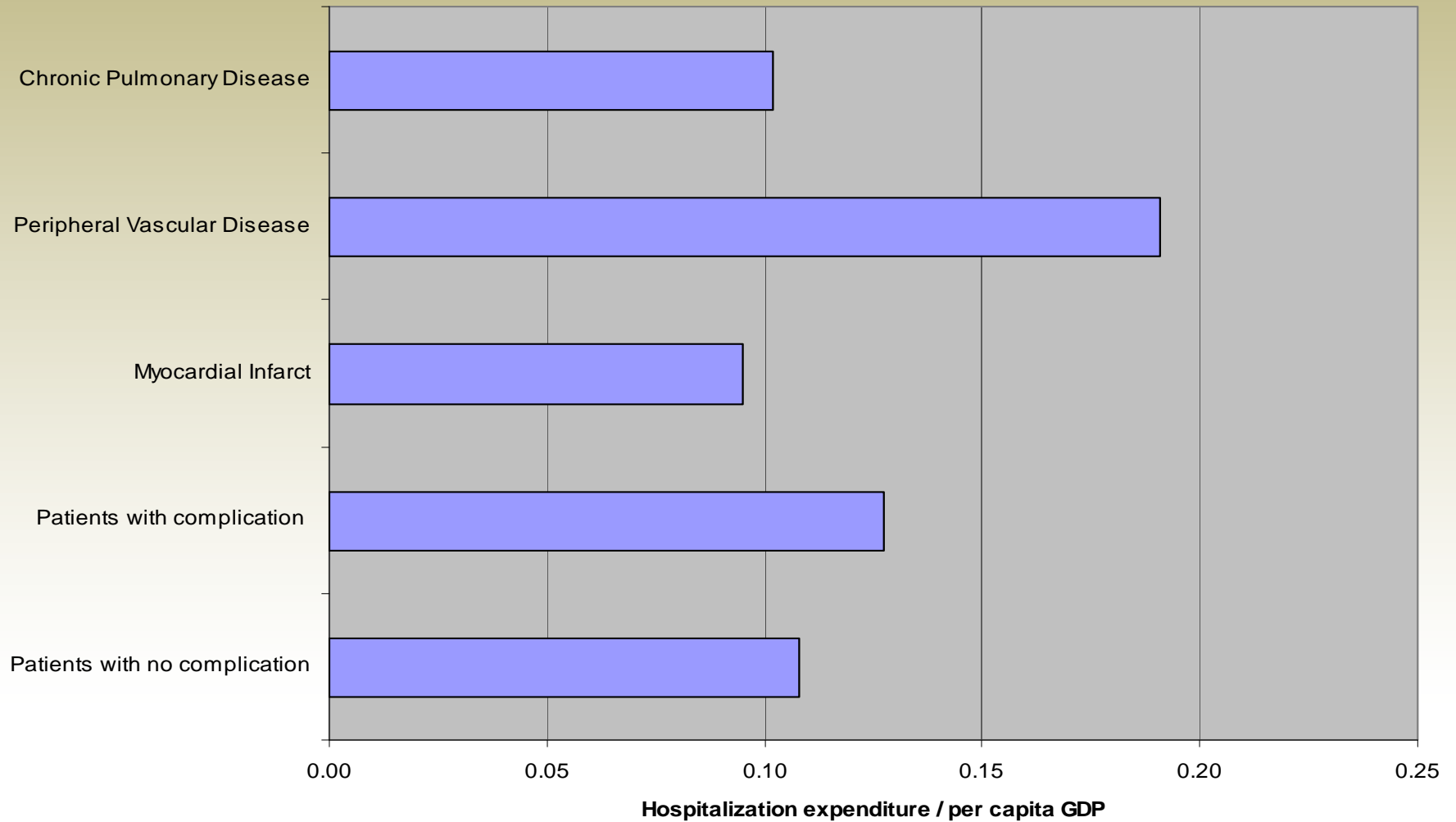
- Spending for one hospitalization for a diabetic patient with no complications ranged from 11% to 84% of annual per capita income.
- Spending for a patient with a complication was from 18% to over 350% more than spending for a patient without a complication treated at the same hospital.
- Significant gaps in resource use between insured and uninsured patients
  - Largest in countries with high out-of-pocket financing like India and China





# Malaysia: UKM

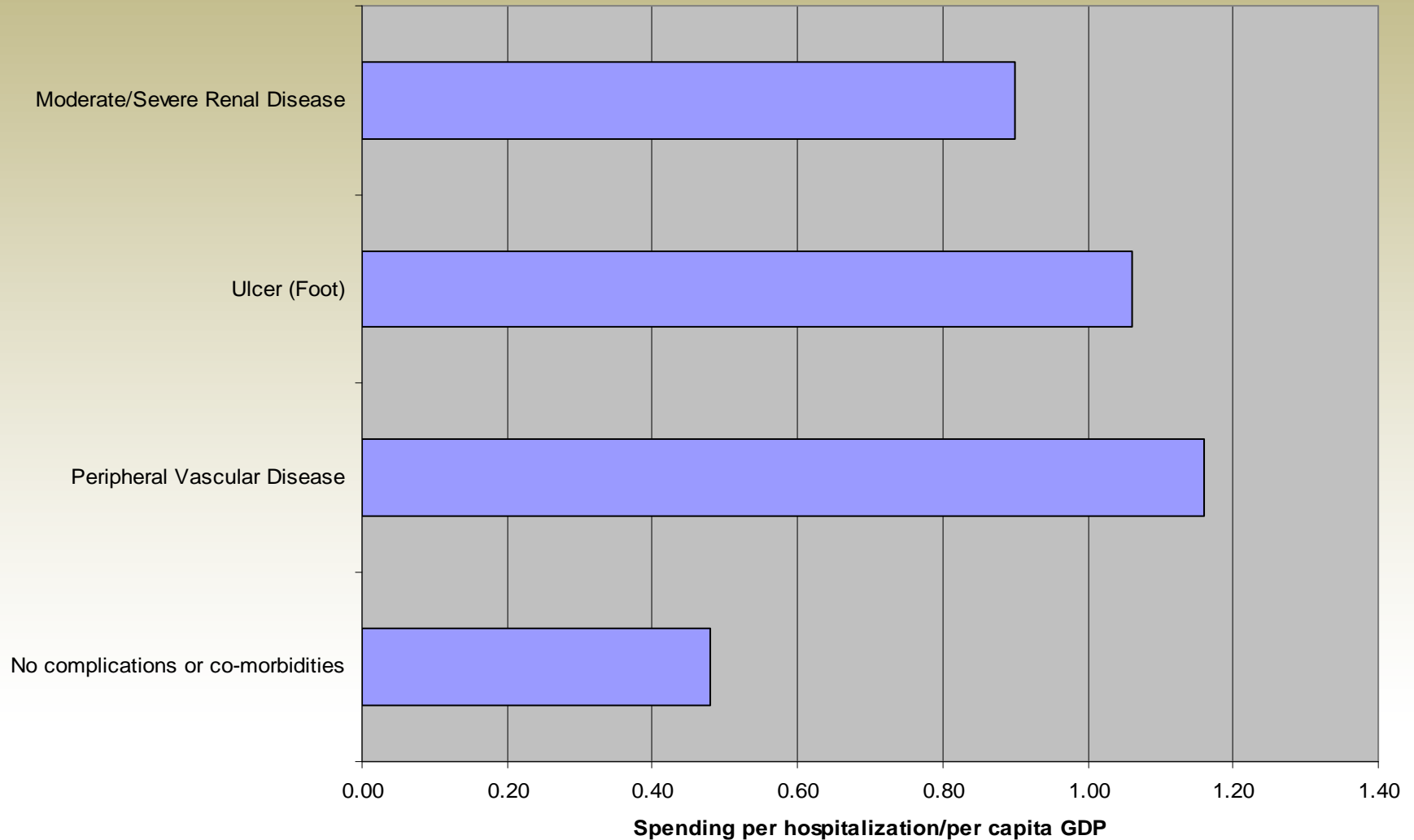
Malaysia: UKM





# Thailand: Bangkok

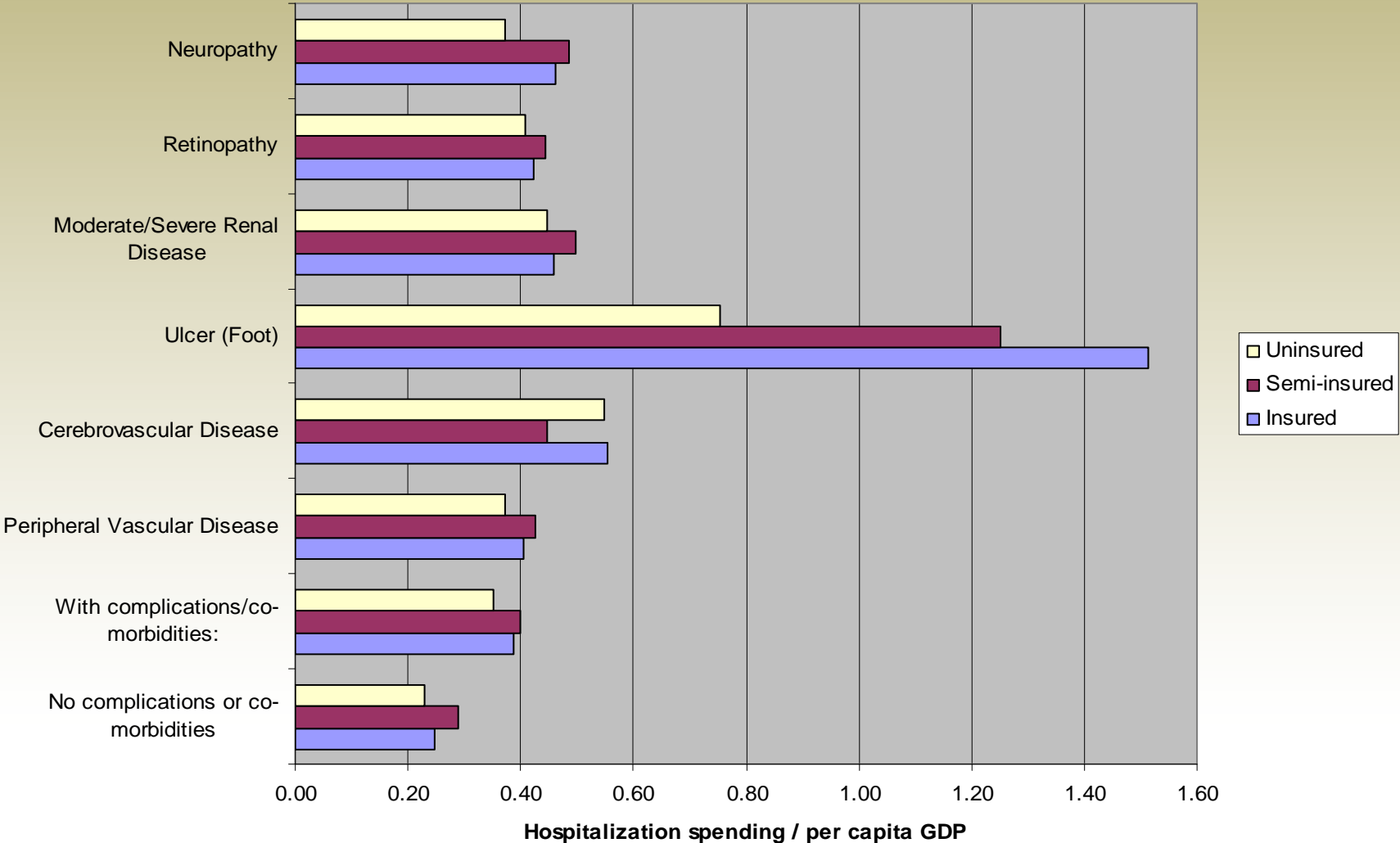
Thailand: Bangkok





# China: Hangzhou

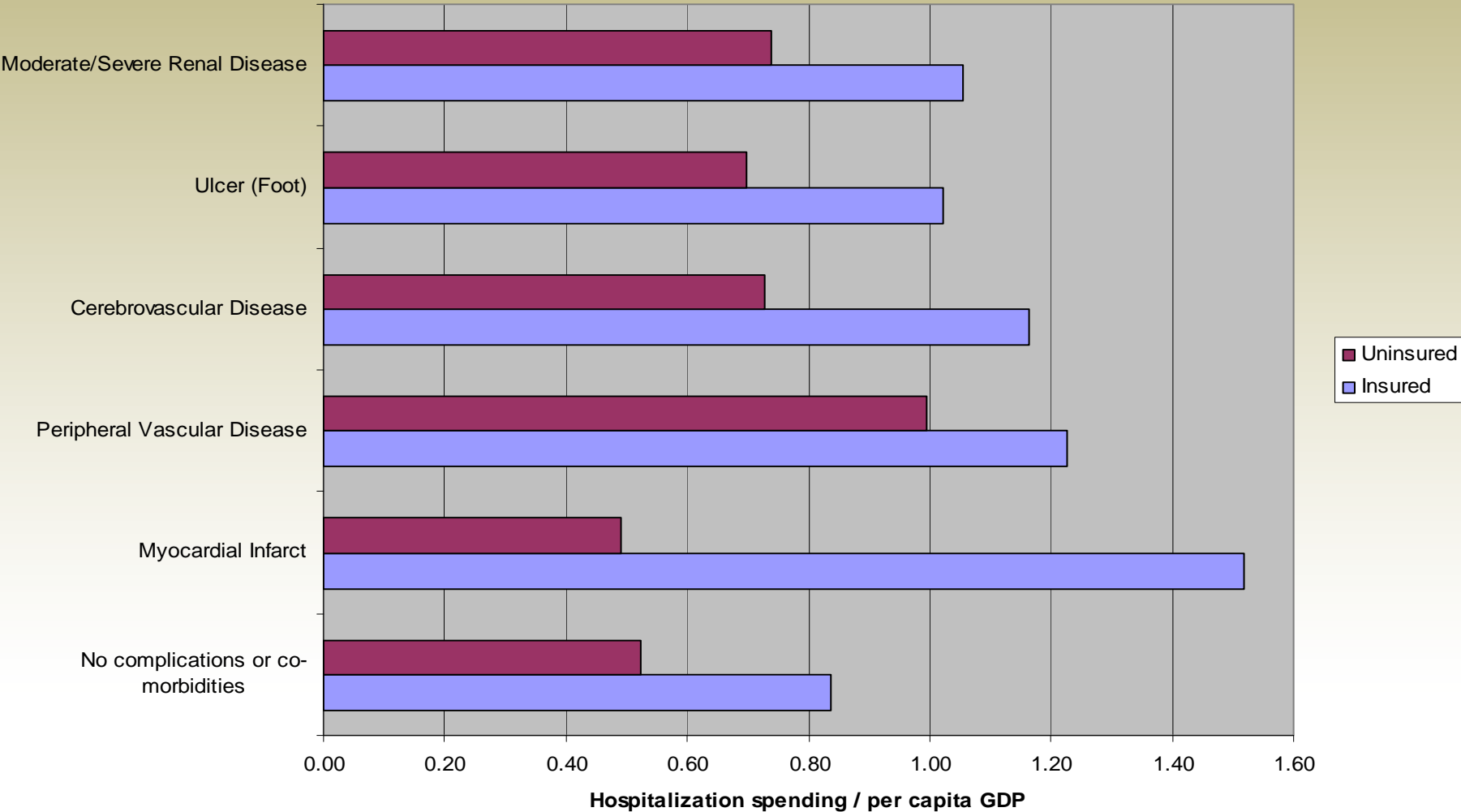
China: Hangzhou





# China: Shandong

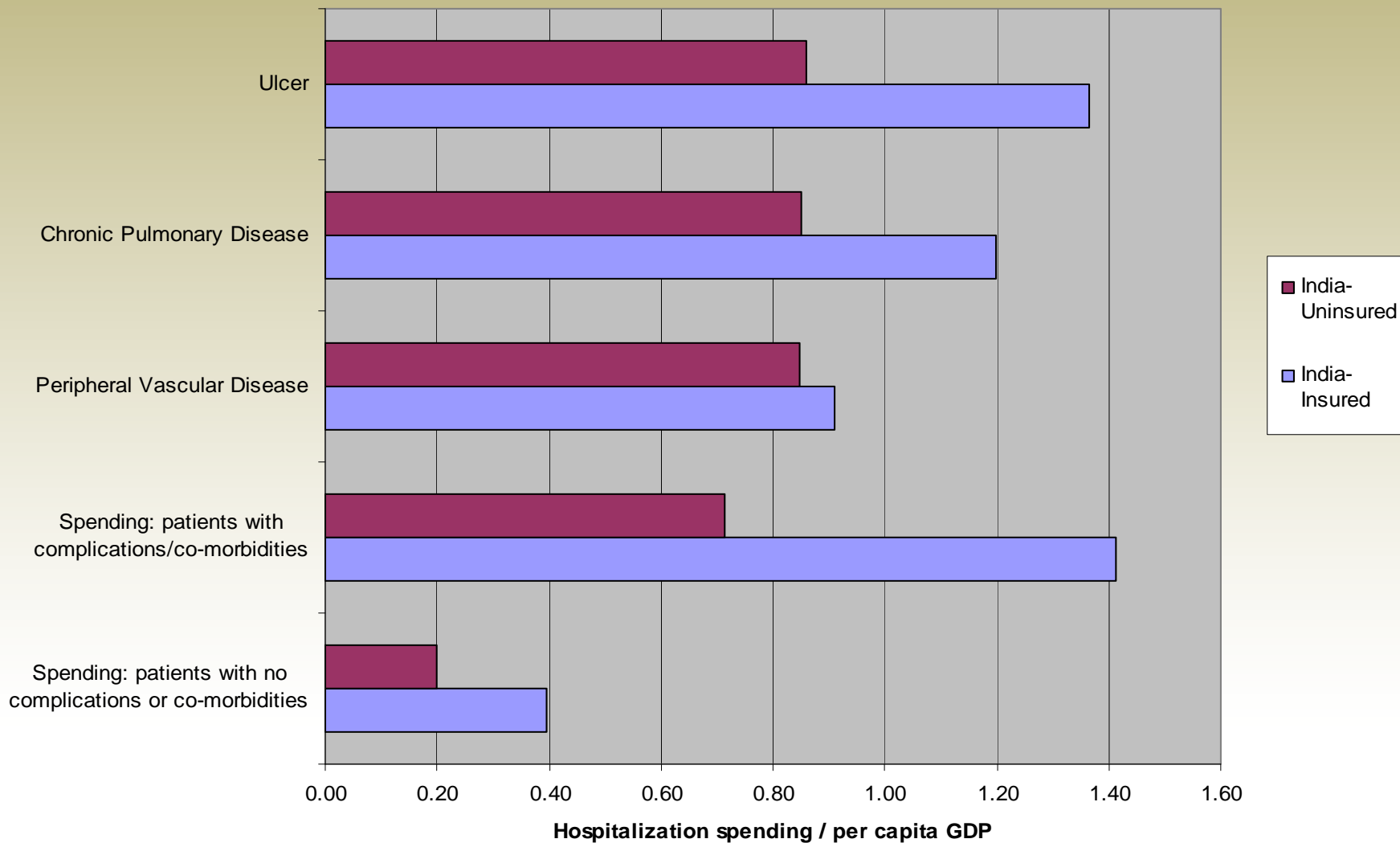
China: Shandong





# India: Kasturba

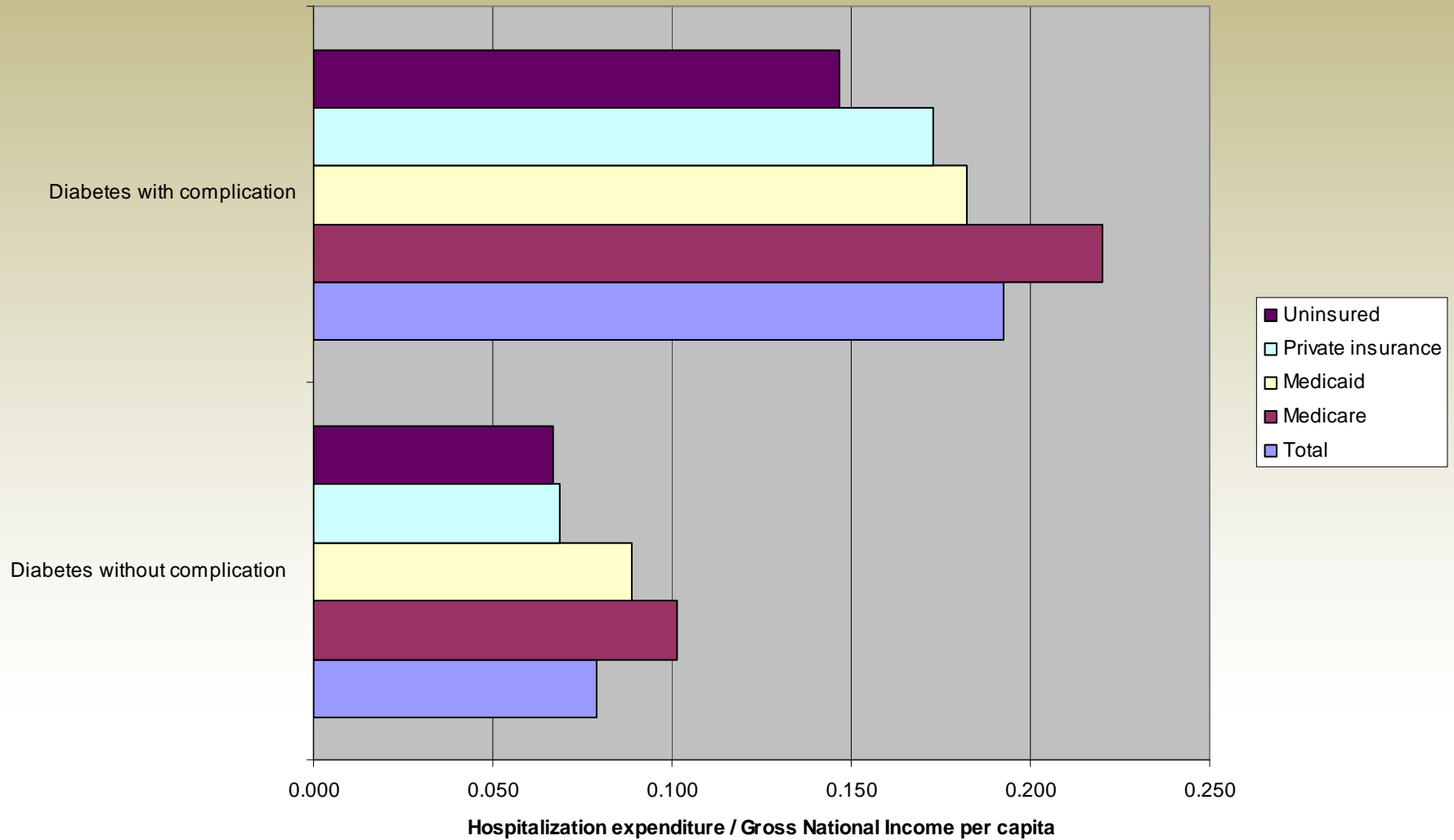
India: Kasturba





# United States

US (National Inpatient Sample 2006)





# Implications



- Large economic burden for households and health systems
- Return to investment in preventing diabetic complications
- Gaps in resource use likely reflect both
  - under-use by the uninsured, and
  - over-use by the insured



# Future research directions

- **Comparative study of primary care for NCD control**
- Other possibilities being explored:
  - SES gradient in self-management
  - Worksite-based health promotion and chronic disease management -- impact on health, absenteeism, at-work productivity
  - Organization and payment of providers
    - Primary care and referral system
    - Cost-effective human resources for chronic disease management (physicians, nurses, pharmacists, etc) in different settings
    - Public and private sector
  - Differences in patient burden (travel costs, co-payments)
    - Impact on access, adherence, health outcomes
    - Implications for how economic downturns shape health