

Indoor Air Pollution in Rural China – A Systems Perspective

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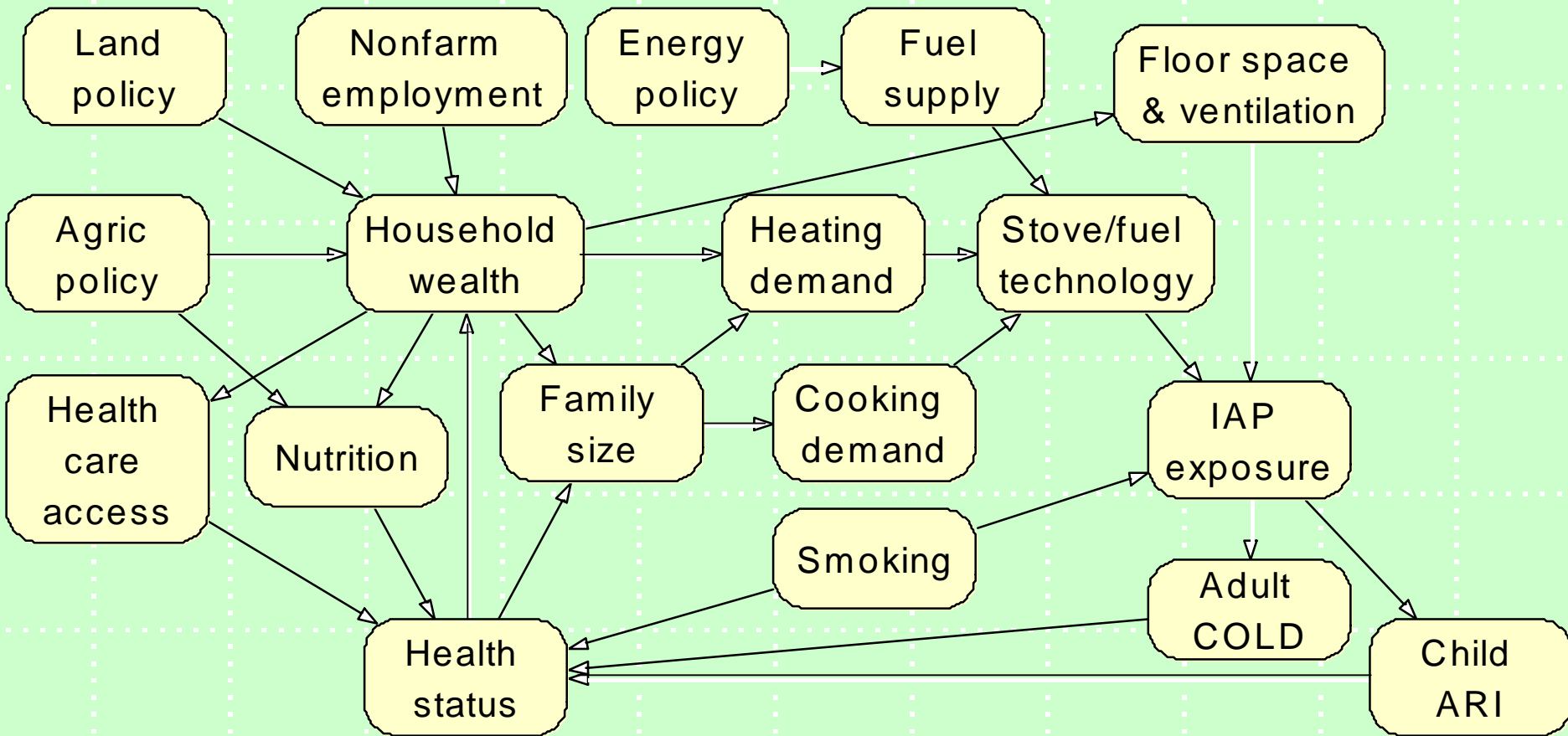
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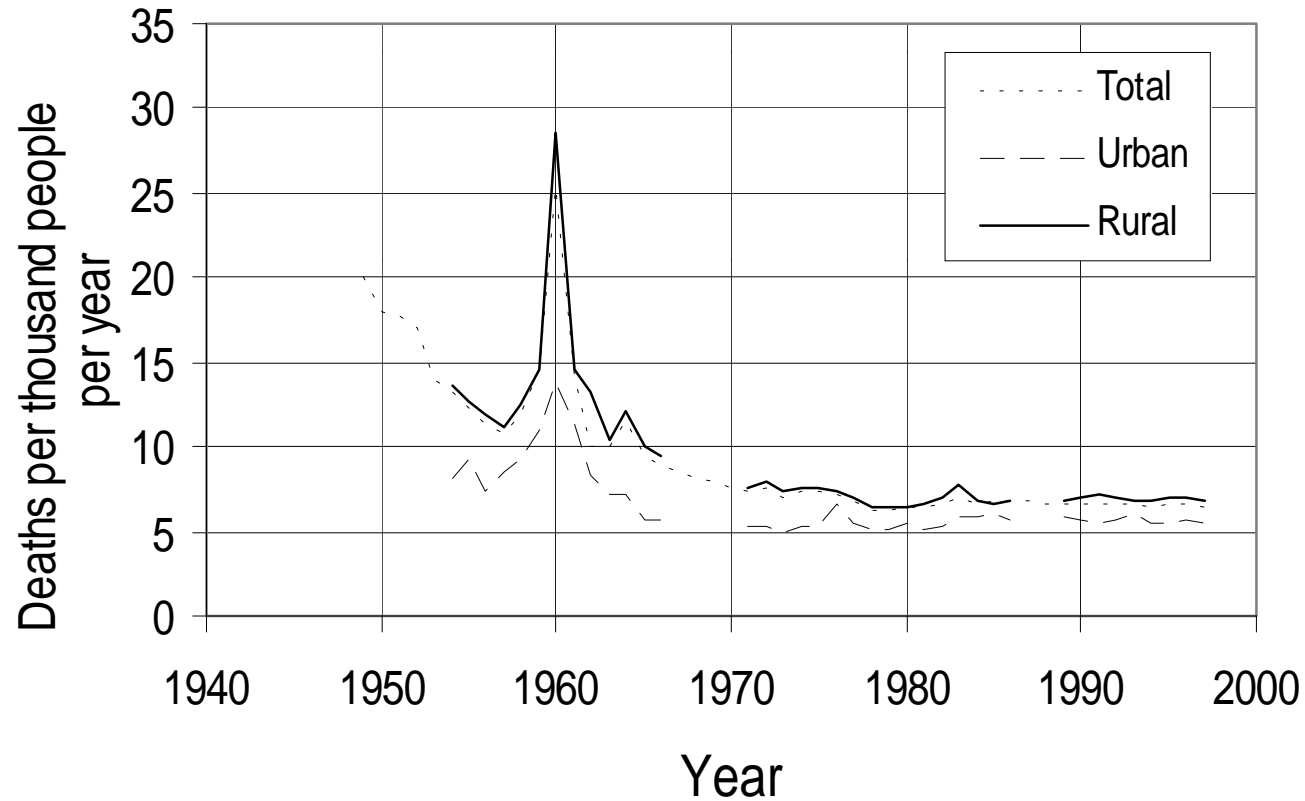
IAP in systems perspective



Health and Wealth

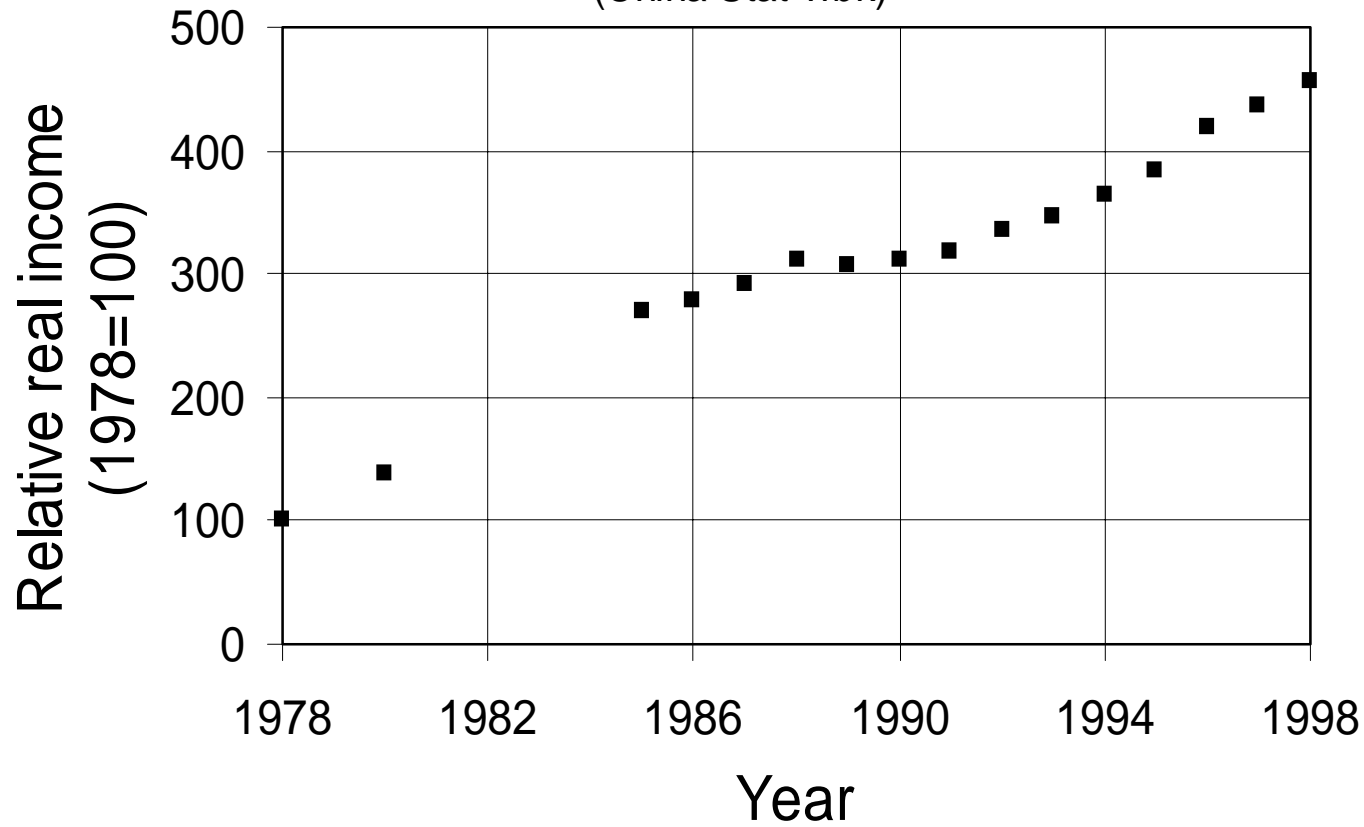
China's risk transition

Crude death rate in China, 1949-1997



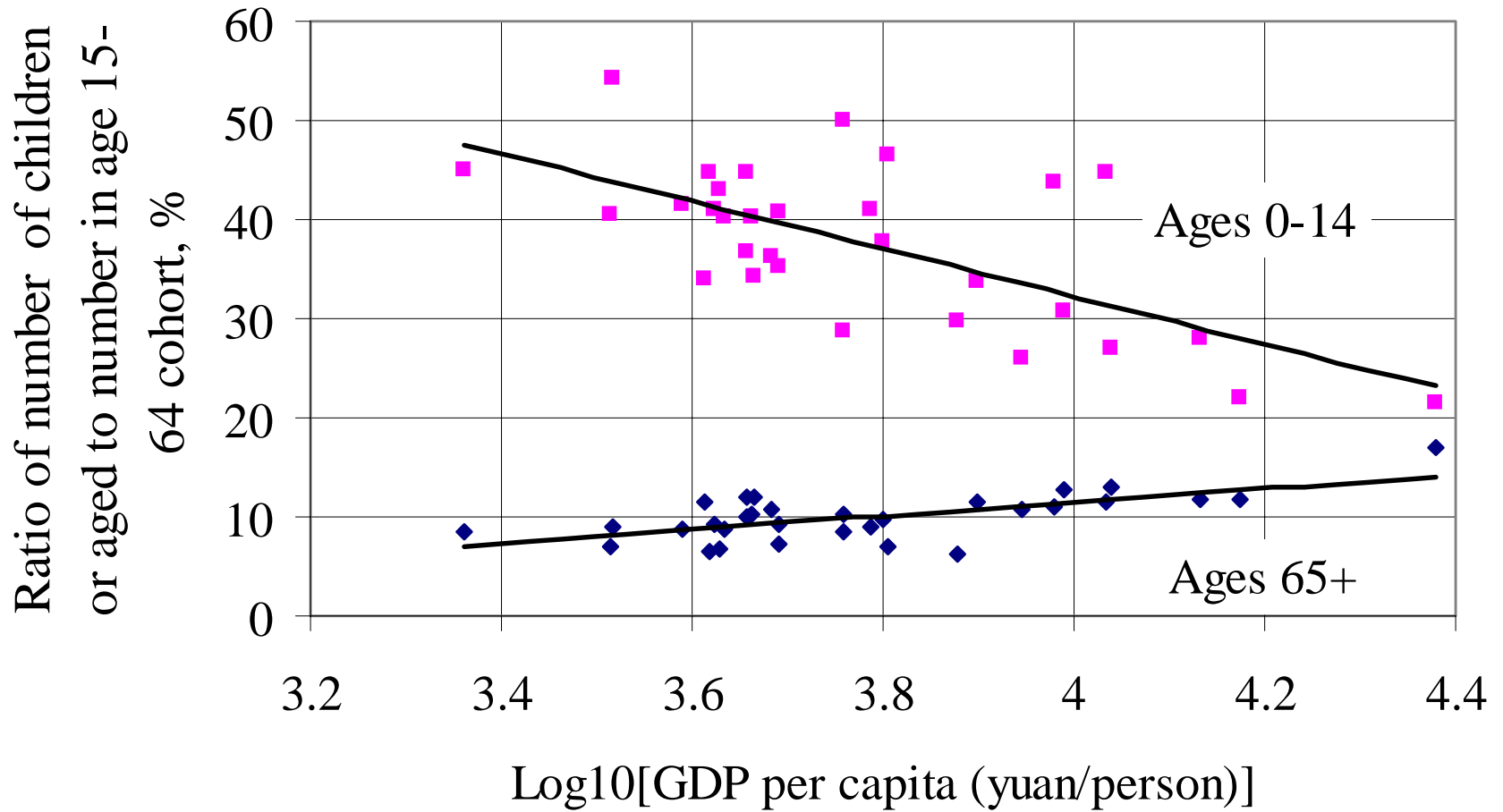
Per capita rural income vs. time

(China Stat Yrbk)



Demographic changes

Children and aged dependency ratios vs. GDP per capita by province, 1997 (from *Zhongguo Tongji Nianjian*)



Economic Forces

Rural economic setting

- Responsibility system replaced communes in 1978-80.
- Diversification. Full-time farmers comprised 91% of rural workforce in 1978, 63% in 1995.
- Growth in township & village enterprises (100 million new rural jobs from 1978-95). TVEs greatly increase rural demand for coal and electricity.
- Land rights policies fragment plots and introduce uncertainty, limiting agricultural productivity

Health care access

Health care dimensions

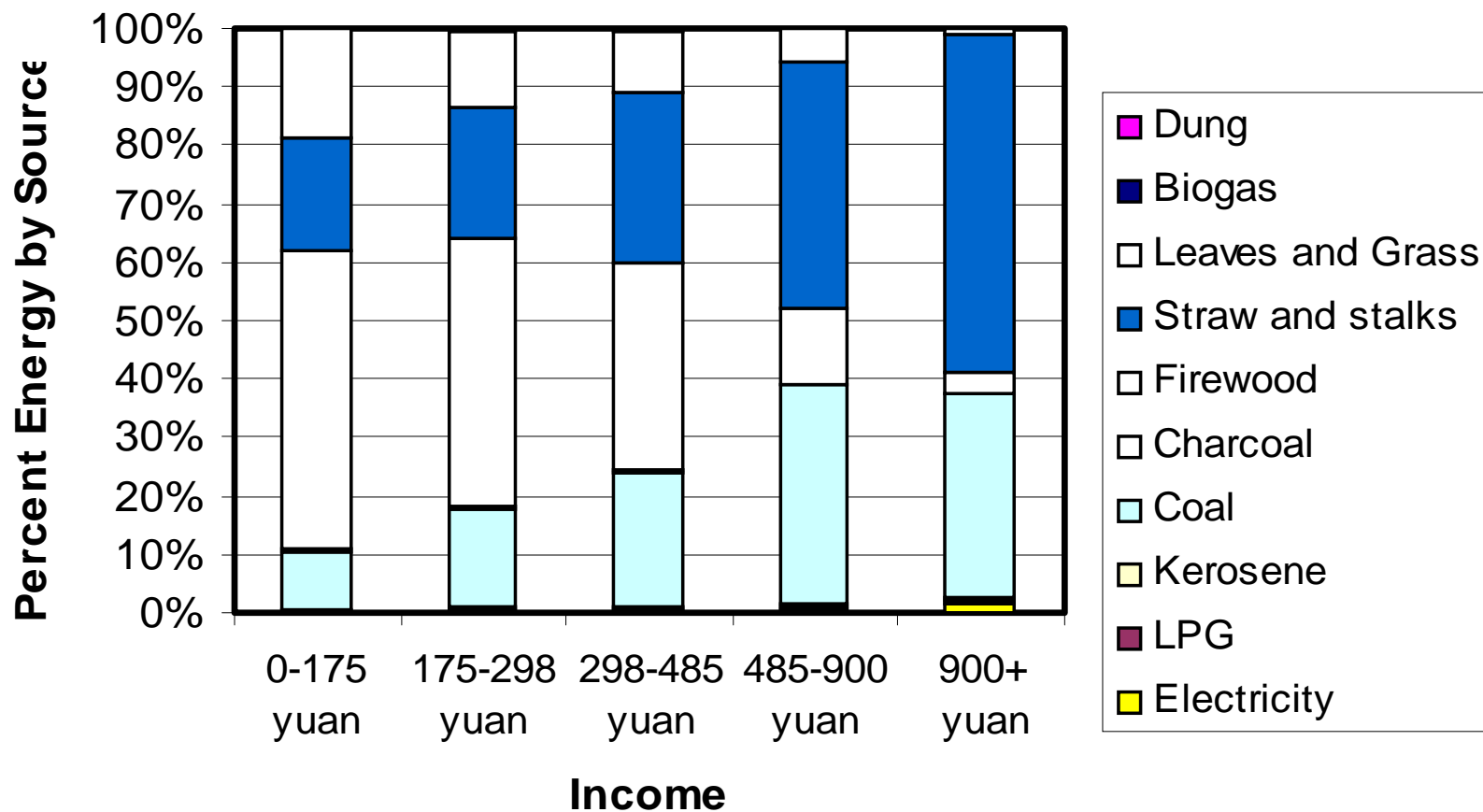
- Commune system is gone. Current system is fee for service.
- People delay seeking treatment.
- Some evidence that infant mortality has been affected.
- Higher health care costs leave less money for improvements in living conditions.
- Reducing IAP health effects will ease burden of medical costs, especially for poorest.

Rural Energy

Residential Sector Fuels

Fuel	Urban, %	Rural, %
Crop residues	0	42
Coal	80	29
Firewood	0	29
Gas	20	0

Rural Energy Consumption by Income Class and Source



(Adapted from Worldbank Energy Sector Management Assistance Program Report 183/96, "Energy for Rural Development in China: An Assessment Based on a Joint Chinese/ESMAP Study in Six Counties")

Substitutes for solid fuels

- Chinese oil and gas industry state-owned, limiting power of market forces to diffuse O&G technologies.
- Electricity reaches 90% of rural households, but electricity is currently used only for lighting and TV/radio.

Indoor Air Pollution

China's Improved Stove Program

(Smith et al., *World Dev*, 21(6), 1993; China SPC, *Xin Nengyuan*, 4/97)

- 175 million units from 1982-2000, all with chimneys
- > 90% of rural households
- > 85% of costs paid by households
- Diffusion enhanced by rural energy and service companies as well as incentives for government officials who meet targets.
- Improved stoves supplemented by unvented coal stoves, counteracting stove program benefits

Smoking in China

- Current smokers, ages 15-69, 63% men, 4% women.
- Rural rates slightly higher than urban among men, but urban higher than rural among older women.
- Education gradient: 72% primary, 54% college men.
- Overall prevalence increased 3.4% from 1984-96, with largest increases among young.

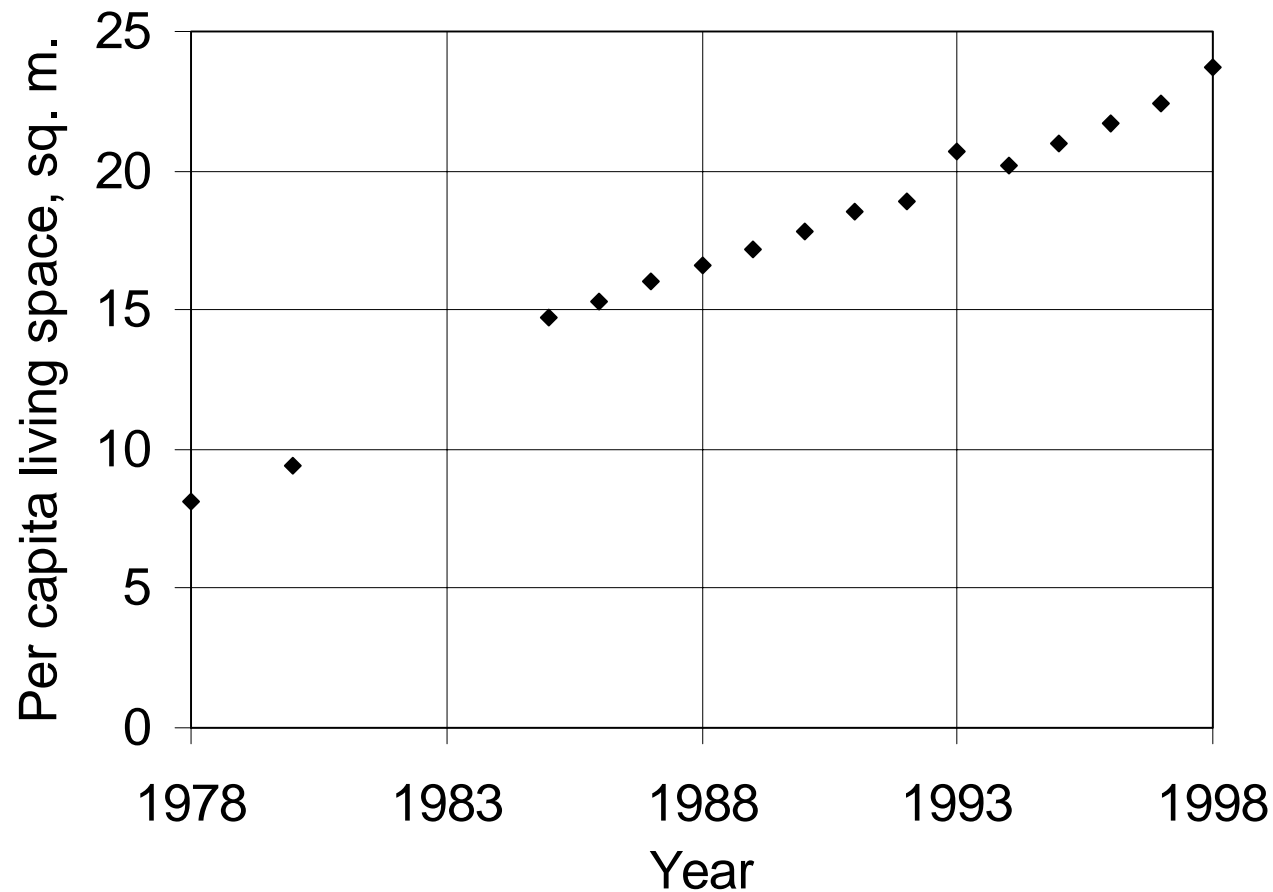
Source: Yang et al., JAMA 282(13):1247-1253, 1999.

Chinese-style cooking

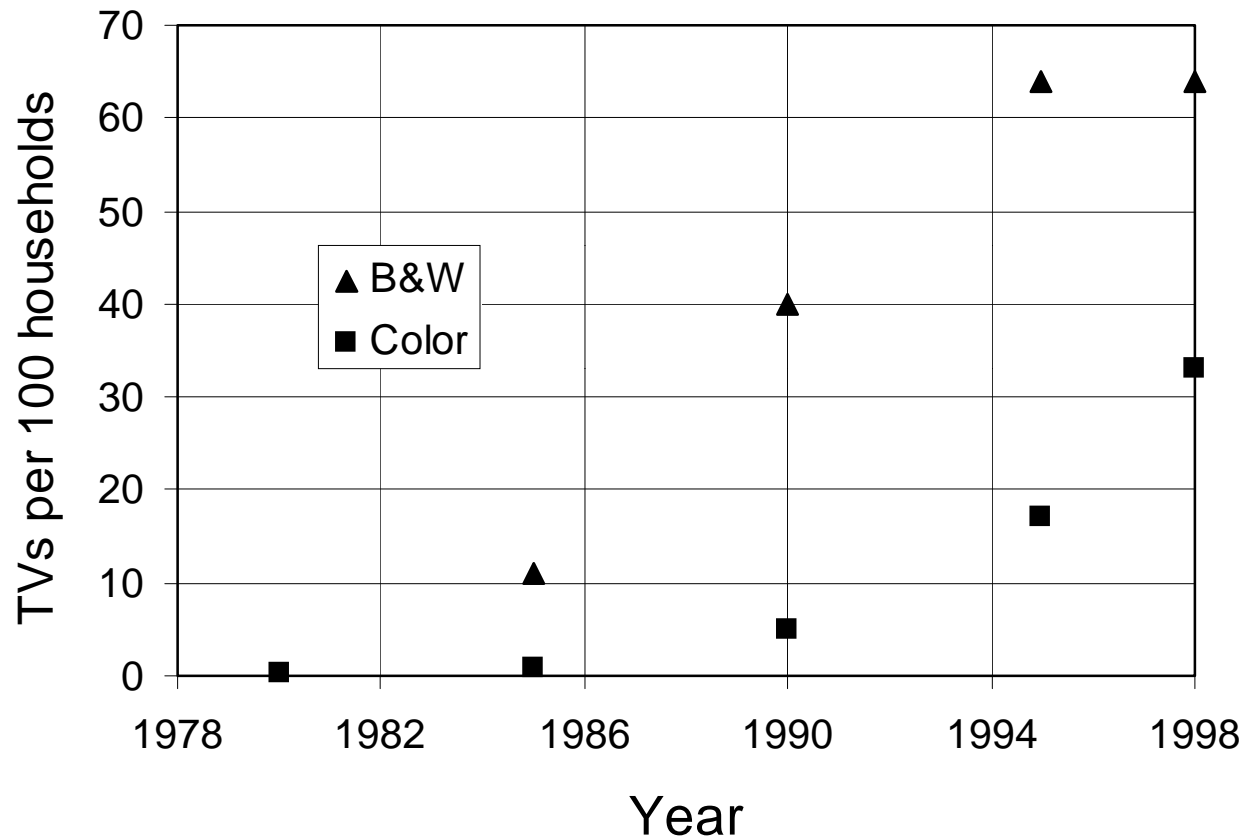
- Frying in hot oil is associated with 1.6-fold increase in lung cancer risk among Chinese women (Zhong et al., 1999).
- Highest risks associated with use of rapeseed oil and high temperatures

Per capita living space in rural China

(from China Stat Yrbk)



More time indoors? TV ownership in rural households



IAP and Macroeconomic Policy

Long-term macro policies that will reduce IAP

- Rural property rights reform to improve agricultural efficiency & rural wealth
- Electrification promoting more rural industry (and rural wealth)
- Privatization of oil and gas markets. Relaxation of import quotas.
- Urban housing development, replacing coal stoves with central heating.