Assessing inequalities in health outcomes in Sri Lanka:

Asset indices vs. household consumption and income

Forum 9
Global Forum for Health Research
Mumbai, India
14 September 2005

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Assessing Inequalities in Health Outcomes in Sri Lanka: Asset Indices vs. Household Consumption and Income

IHP

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Presented at the 9th Global Forum
Mumbai, India, 12 - 16 September 2005

Objectives

(1) Compile asset indices and consumption measures where relevant in a number of Sri Lanka surveys in order to compare the sensitivity and robustness of different measures of SES (income, consumption and asset indices) with one another.

(2) Use asset indices to examine trends in inequalities in maternal and child health outcomes in Sri Lanka, based on the analysis of the 1987, 1993 and 2000 DHS datasets.

Abstract

Given difficulties in the measurement of socioeconomic status (SES) in household surveys, methods have been developed to enable the use of asset indices or summary measures of household asset wealth as an alternative to income or consumption. They have the advantage that they can be applied in many surveys where no income or consumption data were originally collected, but questions remain about the validity of asset indices as proxies for consumption. The World Bank has applied the technique to analysis of Demographic and Health Surveys (DHS) world wide, including in Sri Lanka. The objectives of this study are to construct a set of asset indices, which can then be used to examine trends in inequalities in maternal and child health outcomes in Sri Lanka. Results show that the asset index method performs well with Sri Lankan data, showing good correlation with consumption measures constructed from similar surveys, and performs as well as household consumption in assessing inequalities in health care delivery and outcomes. The analyses of DHS data reveal that extreme disparities in maternal and child health care found in other parts of South Asia in work by Gwatkin et al. are not present in Sri Lanka, and in the case of Sri Lanka there are no purposive demonstrations of access to certain types of reproductive health services. This shows that the global situation is not as dismal as are most diverse than normally presumed. Moreover, these inequalities have narrowed over time.

Method

Household socioeconomic status can be measured using a composite index of household assets and living conditions. The asset index, versus household consumption per capita and annual income per capita were estimated using the Sri Lanka Central Bank Consumer Finance Survey. The asset index for Sri Lanka consisted of the following elements:

Using principal component analysis, the asset index for an individual i is defined as follows:

$$\beta_i = \sum_{n} f_n \frac{(a_{ni} - \bar{a}_n)}{s_n}$$

where a_{ni} is the value of asset n for household i, $\bar{a}_n$ is the sample mean and s_n is the sample standard deviation. Having assessed the reliability and sensitivity of the asset index against other measures of SES, the same set of assets were used to construct an asset index using Demographic and Health Survey (DHS) data for Sri Lanka.

Results (I): Asset index vs. other measures of SES

(1) How well do the asset indices distinguish between the asset rich and asset poor households?

The asset index does produce clear separations between the poor and the asset rich households. The index produces sharp differences across groups in asset ownership. 54% of the poorest quintile live in dwellings coded as poor quality materials, but only 0% of the middle quintile and 0% of the richest quintile do so; 4.3% of the poorest quintile own a TV while 50% of the middle quintile and 96% of the richest quintile do so. The distinction between the poor and rich quintiles is not so clear in some asset variables, particularly when subgroups are considered. For instance, in the urban population all groups except the poorest quintile have access to electricity.

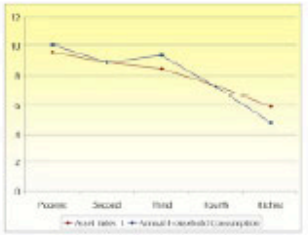
(2) How do asset index based classifications compare other measures of SES?

Households were assigned to three groups (bottom 40%, middle 40% and top 20%) based on annual consumption and on asset indices. Table 9 compares the two classifications for the whole population:

		Groups based on consumption by spending unit		
		Bottom 40%	Middle 40%	Top 20%
Groups based on asset index	Bottom 40%	62%	33%	4%
	Middle 40%	34%	51%	16%
	Top 20%	5%	16%	54%
	Total	100%	100%	100%

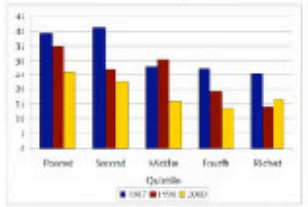
(3) Does choice of SES matter?

Probability of seeking care at a public provider by type of SES measure

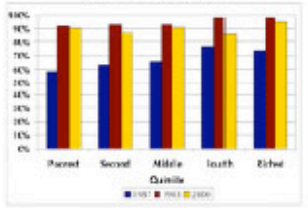


Results (II): Trends in maternal and child health outcomes in Sri Lanka, 1987-2000

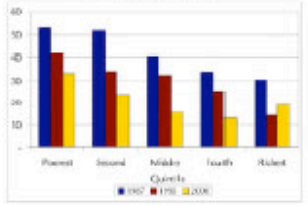
Infant mortality rate



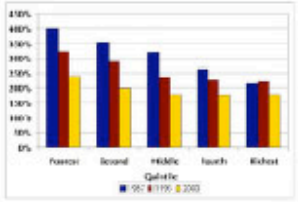
Measles vaccination rates



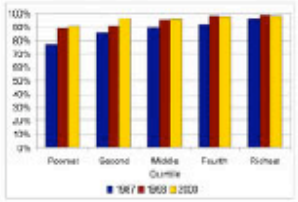
Under-5 mortality rate



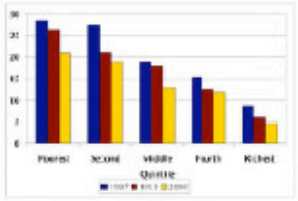
Total fertility rate



Professional attendance at delivery

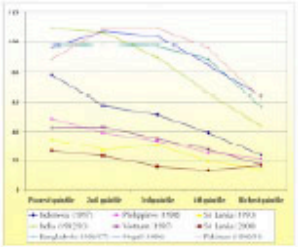


% severely underweight children



Comparison with other Asian countries

Infant mortality rates in 8 Asian countries



Funded by EU INCO-DEV
Grant No ICA4-CT-2001-10015, and product of the Equitap Project (www.equitap.org)

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Outline

- Problem
- Asset Indices
- Sri Lankan validation
- Sri Lanka findings using asset indices

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A Common Problem: Measuring socioeconomic status

- Critical need in equity research is a measure of household socioeconomic status/income to identify poor & rich
- Ideal survey measures combine detailed consumption (and wealth) instruments
  - Consumption is the ideal measure
- Not practical in many surveys
  - Costly to include questions
  - May want to analyze existing survey data
  - Many health surveys lack consumption measures, or the income variable is unreliable

CONFIDENTIAL

Schd	Round	Block	Household	Spending Unit	Inv.
41	ROUND	BLOCK	HHNO	SUNO	

SCHEDULE IV- Food and Drink Daily Expenditure for 7 days **Commencing Date :(7 days) From..... To .....**

(Separate schedule for each spending units)

Commencing Day (7 days) From.....To.....

(1)

Food Items *Discript*	Unit	1st Day			2nd Day			3rd Day			4th Day			5th Day			6th Day			7th Day			Total for 7 days			Item no.
		Qty	Value Rs	Value Cts	Qty	Value Rs	Value Cts	Qty	Value Rs	Value Cts	Qty	Value Rs	Value Cts	Qty	Value Rs	Value Cts	Qty	Value Rs	Value Cts	Qty	Value Rs	Value Cts	Qty	Value Rs	Value Cts	
1 Rice																							QUANTITY	VALUE		Item
1.1 Rice - Own Production																										
1.1.1 Samba	Grams																									01011
1.1.2 Ordinary Par Boiled	,,																									01012
1.1.3 Raw Kekulu Both Red & White	,,																									01013
1.2 Rice - Bought																										
1.2.1 Samba	Grams																									01021
1.2.2 Ordinary Par Boiled	,,																									01022
1.2.3 Raw Kekulu Both Red & White	,,																									01023
2. Flour																										
2.1 Wheat Flour	,,																									02010
2.2 Rice Flour	,,																									02020
2.3 Kurakkan Flour	,,																									02030
2.4 Ulundu Flour	,,																									02040
	,,																									
3. Bread	,,																									03000
4. Other Cereals																										
4.1 Kurakkan	,,																									04010
4.2 Maize	,,																									04020
4.3 Sorghum	,,																									04030
4.4 Barley	,,																									04040
4.5 Processed Cereals																										
4.5.1 Papadam	,,																									04051
4.5.2 Noodles	,,																									04052
4.5.3 Sago	,,																									04053
4.6 Other	X	X			X			X			X			X			X			X			X			04060

Potential Solutions

- Use non-economic measures of status, e.g., education of mother (standard in DHS reports)
- Use information on assets owned by household and apply weights
  - E.g., motor car, electricity, cows
  - Practical problem is how to compute the weights and which assets to use

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Asset Indices

- Filmer D, Pritchett L. Estimating wealth effects without income data or expenditure data - or tears: Educational enrollment in India. *Demography* 2001;**38**(1).
- Use principle components analysis to assign weights
  - Computes weights based on variance in ownership variables
  - Identifies variables with best linear combination in terms of variation that match the common variation
  - Assumption is that variation in ownership is linked to underlying income and wealth

Application of Asset Indices

- Applied to most recent rounds of Demographic & Health Surveys (DHS) through contract to Macro from World Bank
- Gwatkin DR, Rutstein S, Johnson K, Pande R, Wagstaff A. Socio-economic Differences in Health, Nutrition, and Population. Washington, D.C., USA: World Bank, HPN/Poverty Thematic Group, 2000
- Increasingly used with other surveys
- Some validation in some countries where surveys combine information on assets with income/consumption

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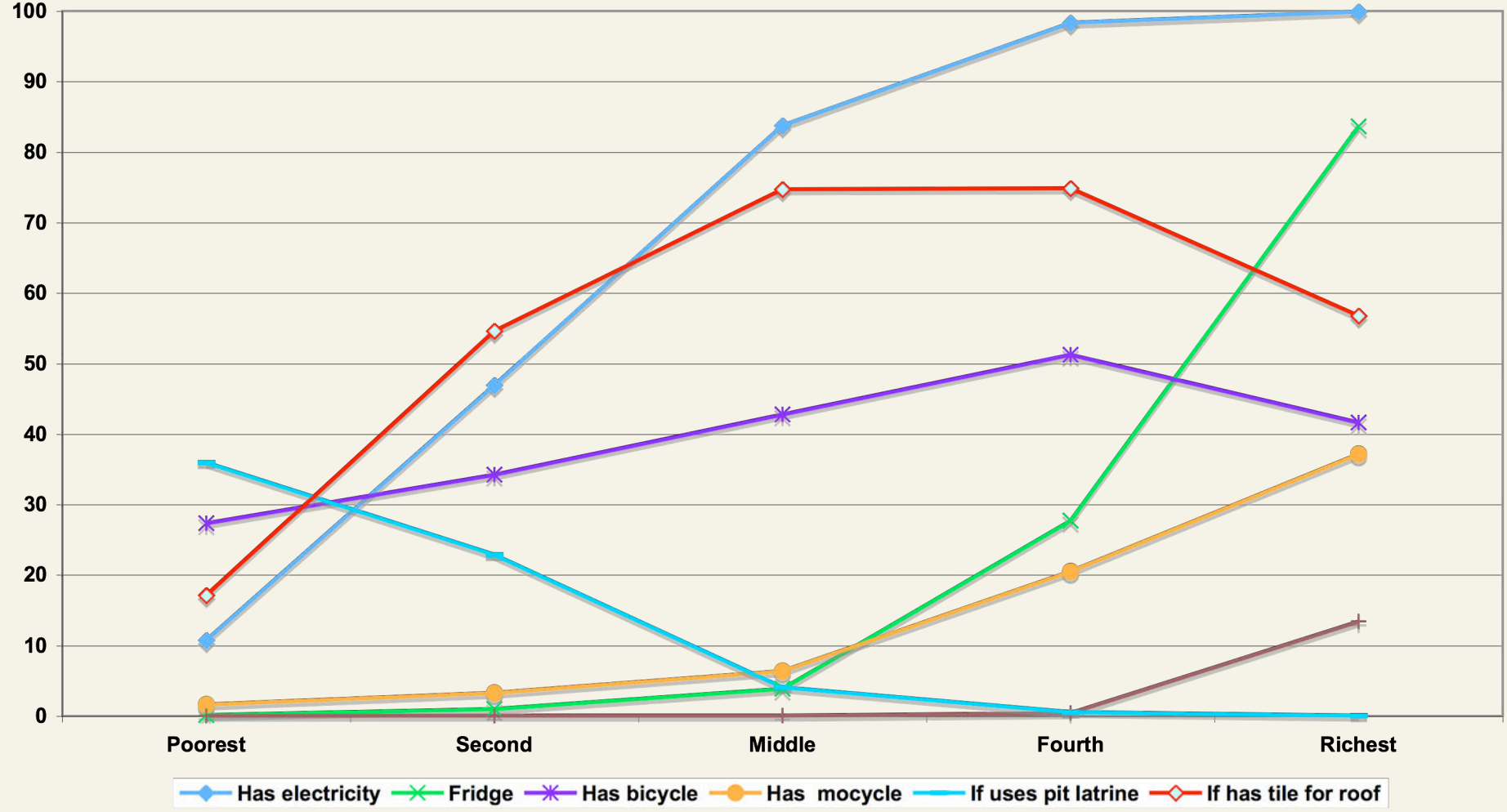
Sri Lankan Experience

- Continuous DHS series in Sri Lanka, but not included in WB/Macro analysis, as not funded by USAID
- Education of mother poor stratification index in Sri Lankan context
- Same survey organization that conducts Sri Lanka DHS also conducts detailed consumption surveys
  - Need to adapt asset indices for use in SL
  - Potential for validation of method

Sri Lanka validation

- DHS surveys - assets, but no income
  - 1987, 1993, 2000 (2005...)
- Consumption surveys - Central Bank Consumer Finance Surveys 1996/97
  - Assets, income, consumption but no detailed health data
- Method
  - Estimated asset indices applying WB method using (I) all assets available in CFS, (ii) only assets common to DHS
  - Compared predictive value with the full consumption measure

Ownership of selected assets by income quintile, Sri Lanka 1997



Comparison of measures (1)

Table 1: Asset index versus consumption ranking (national population)

		Groups based on consumption by spending unit		
		Bottom 40%	Middle 40%	Top 20%
Group based on asset index 1	Bottom 40%	62	33	8
	Middle 40%	30	51	38
	Top 20%	8	16	54
	Total	100	100	100

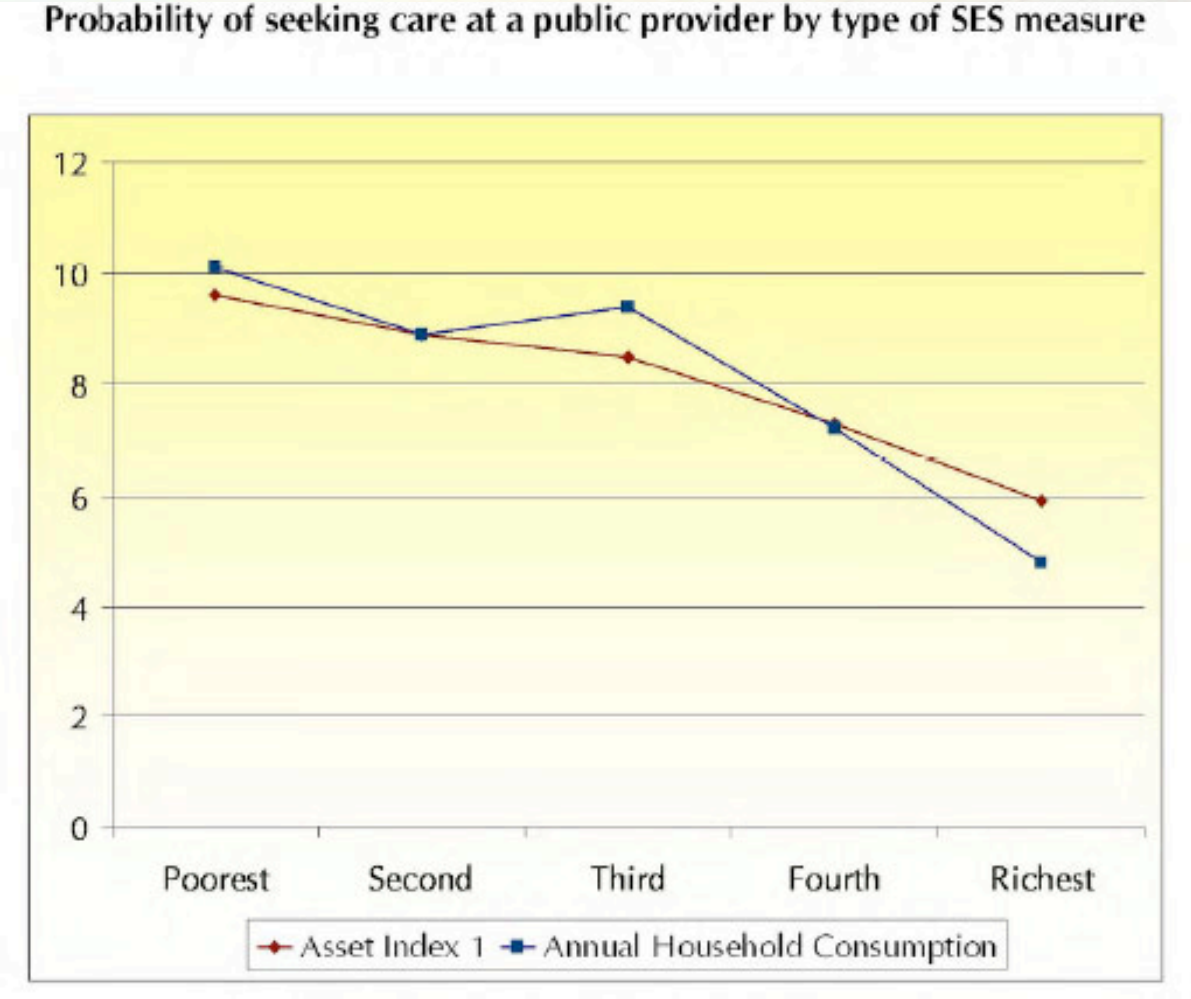
Table 2: Asset index versus consumption ranking (urban)

		Groups based on consumption by spending unit		
		Bottom 40%	Middle 40%	Top 20%
Group based on asset index 1	Bottom 40%	60	34	12
	Middle 40%	28	51	43
	Top 20%	12	15	45
	Total	100	100	100

Table 2: Asset index versus consumption ranking (rural)

		Groups based on consumption by spending unit		
		Bottom 40%	Middle 40%	Top 20%
Group based on asset index 1	Bottom 40%	61	32	9
	Middle 40%	32	53	42
	Top 20%	7	14	49
	Total	100	100	100

Comparison of measures (2)



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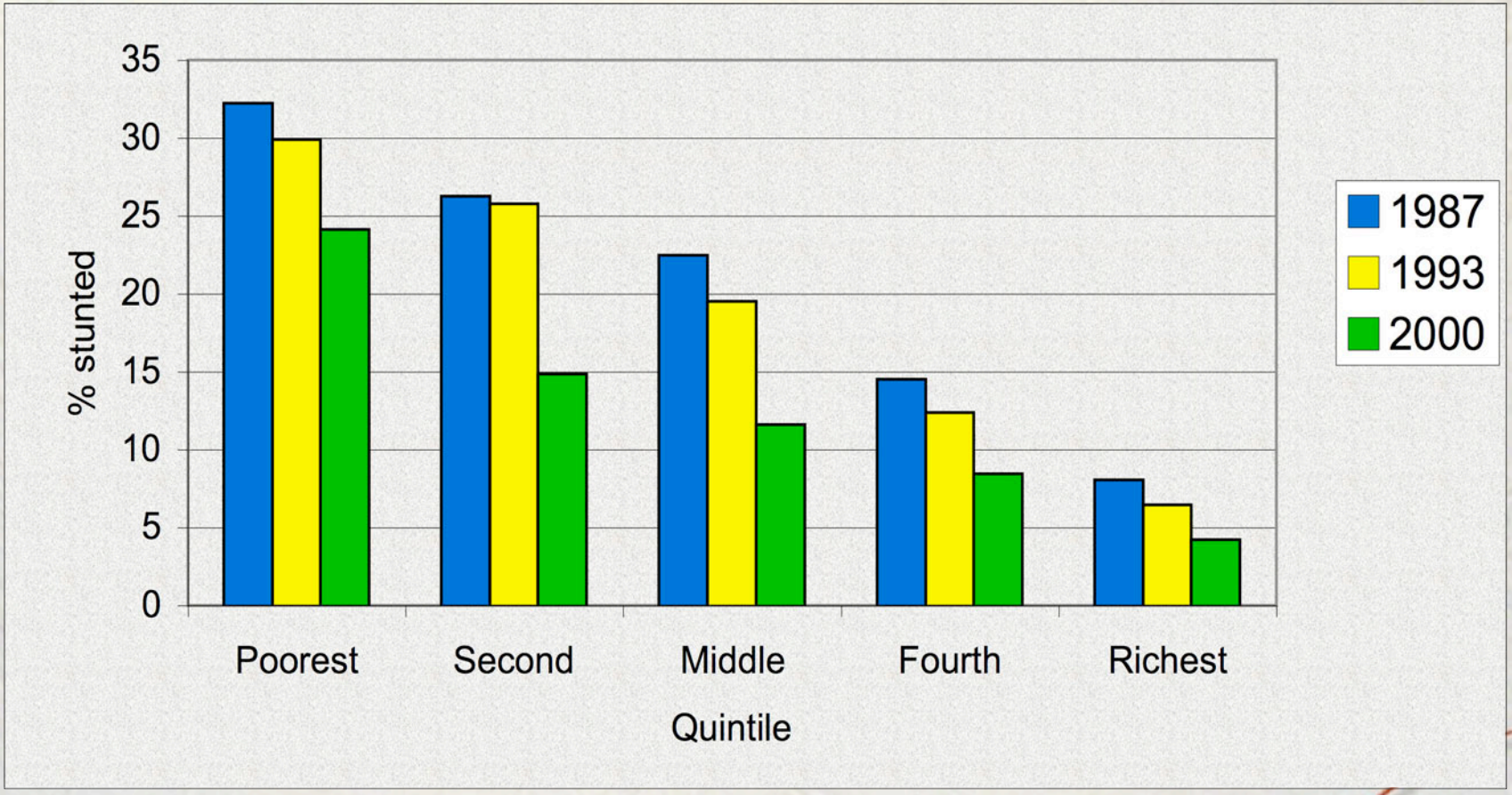
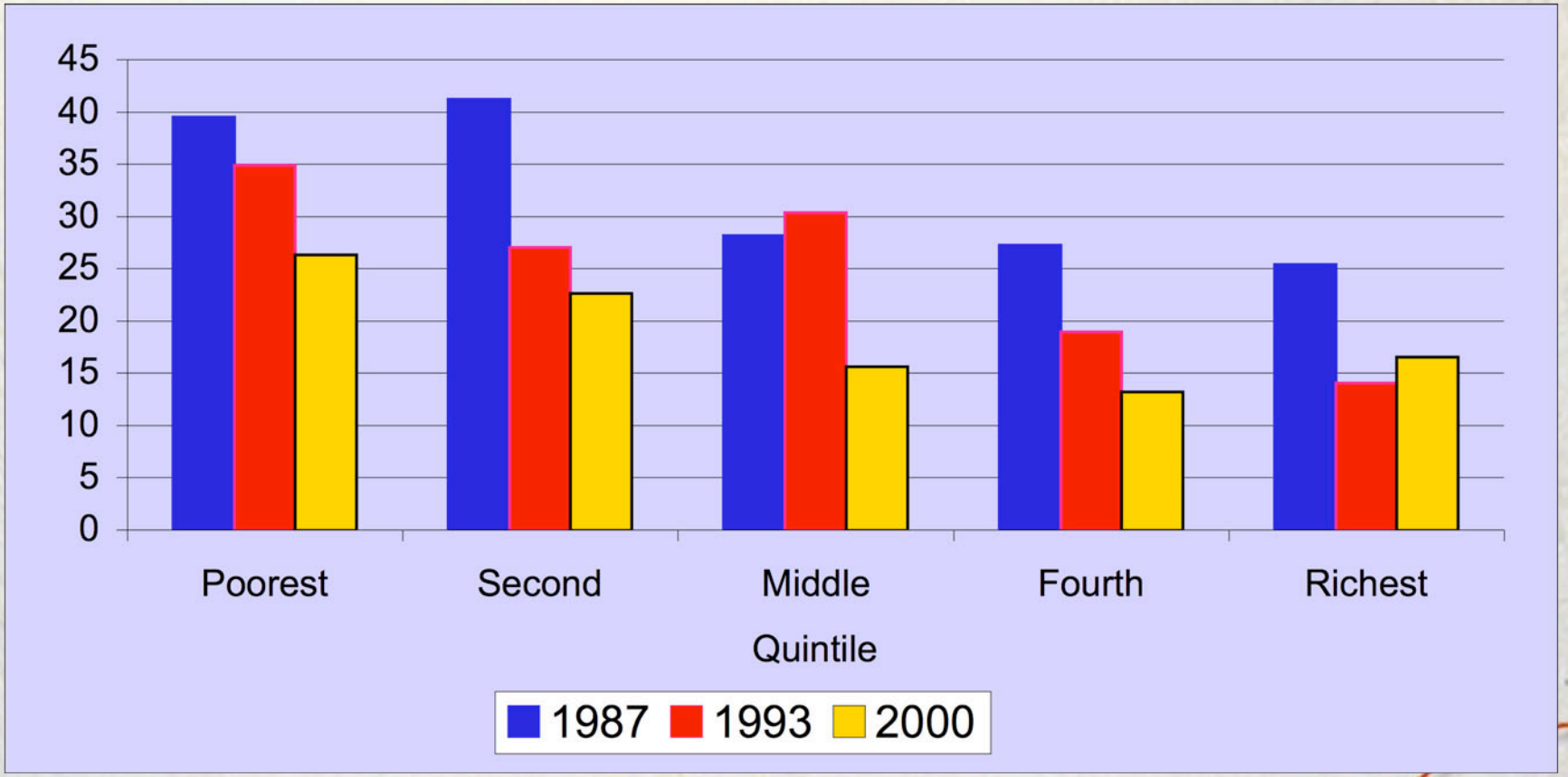
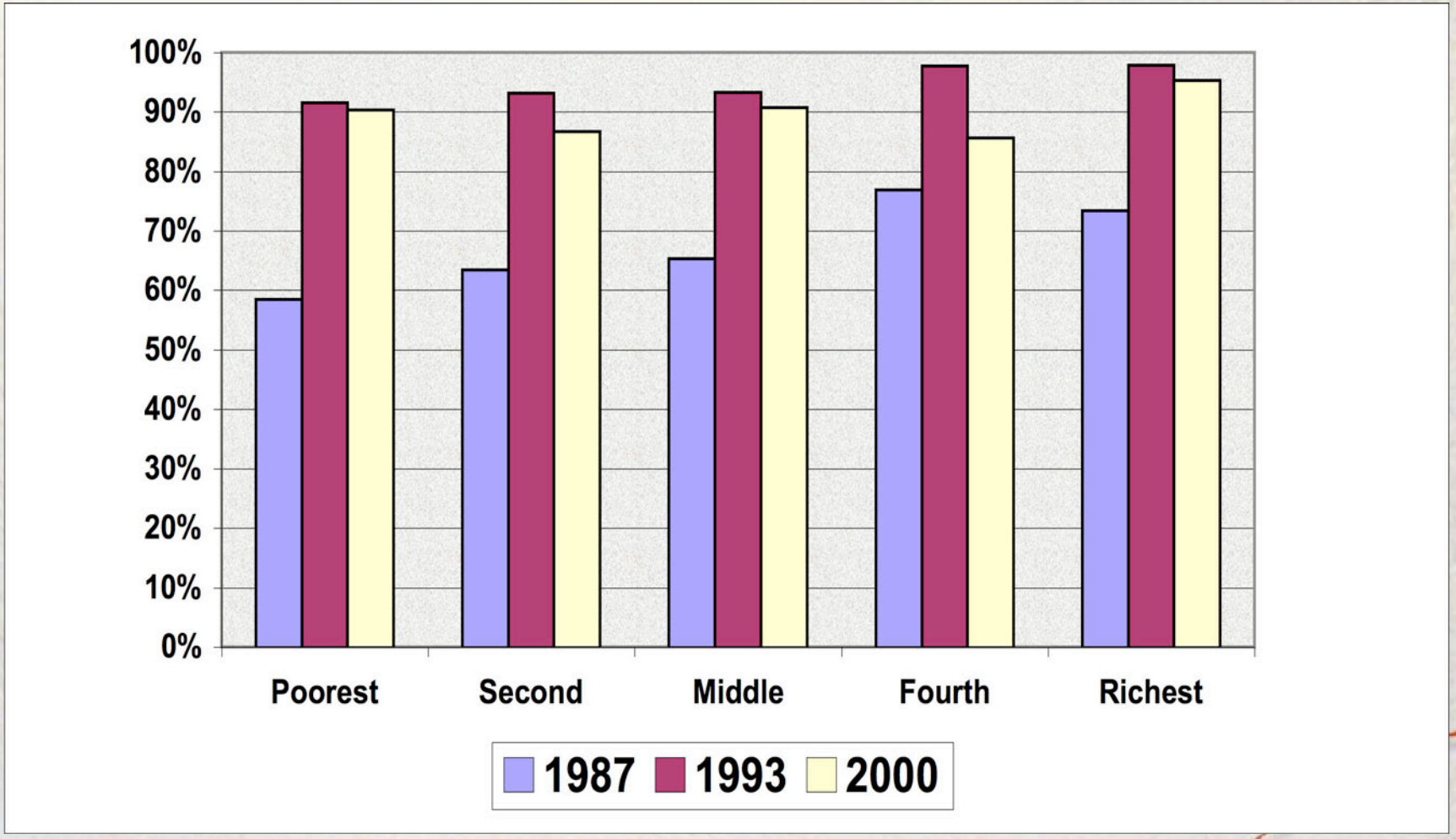
Stunting in children, Sri Lanka 1987-2000



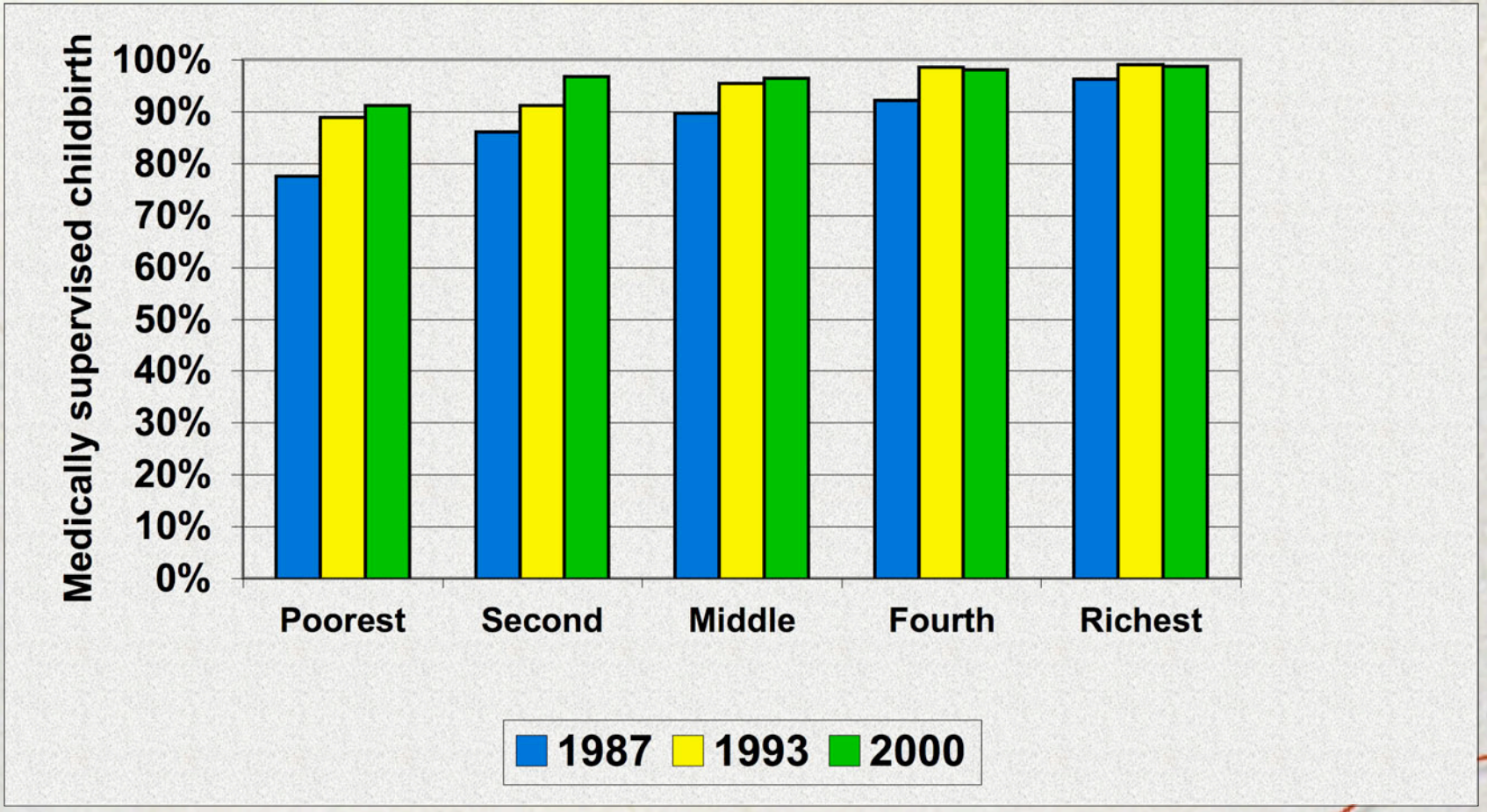
IMR by quintile, Sri Lanka 1987-2000



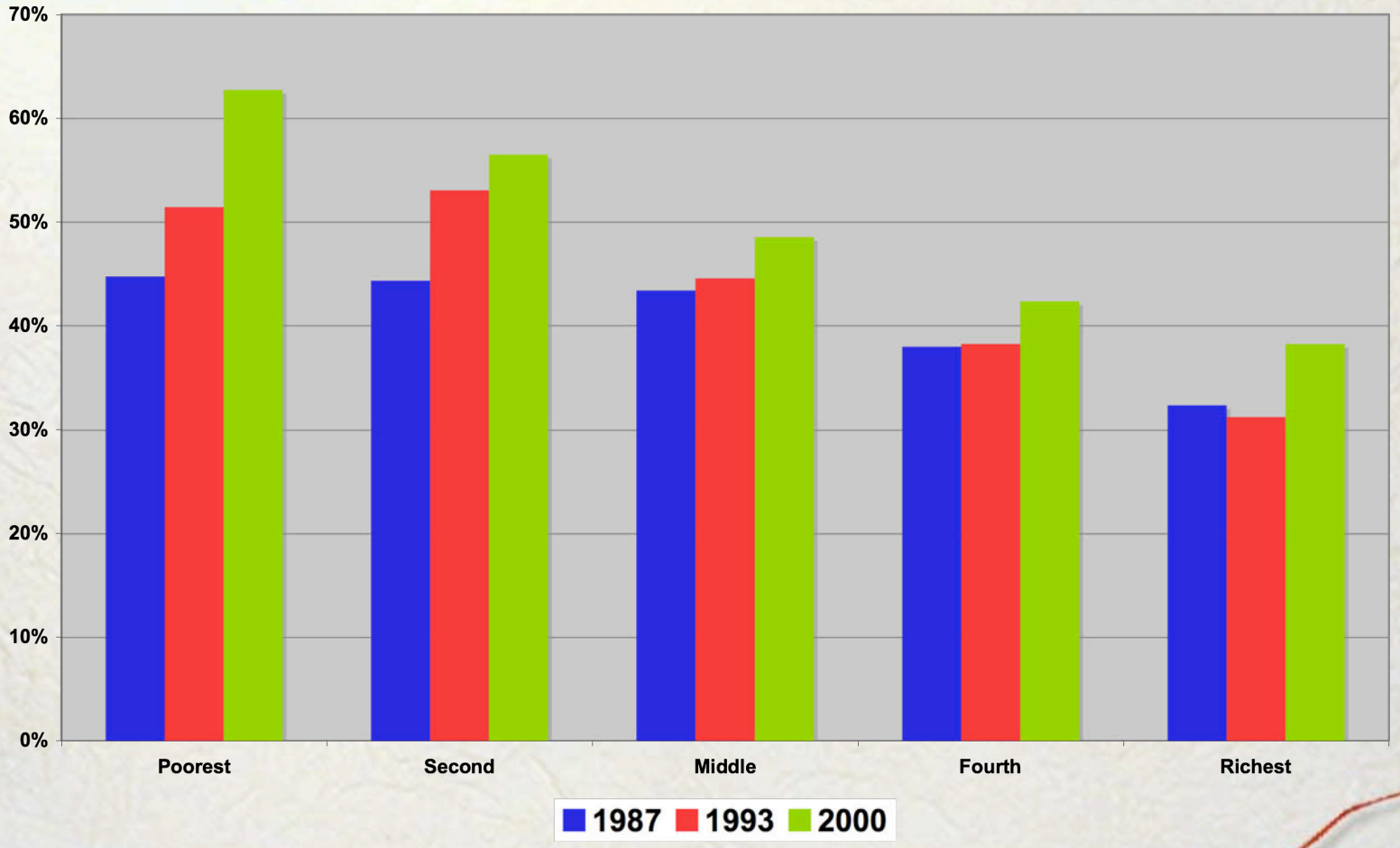
Measles vaccination, Sri Lanka 1987-2000



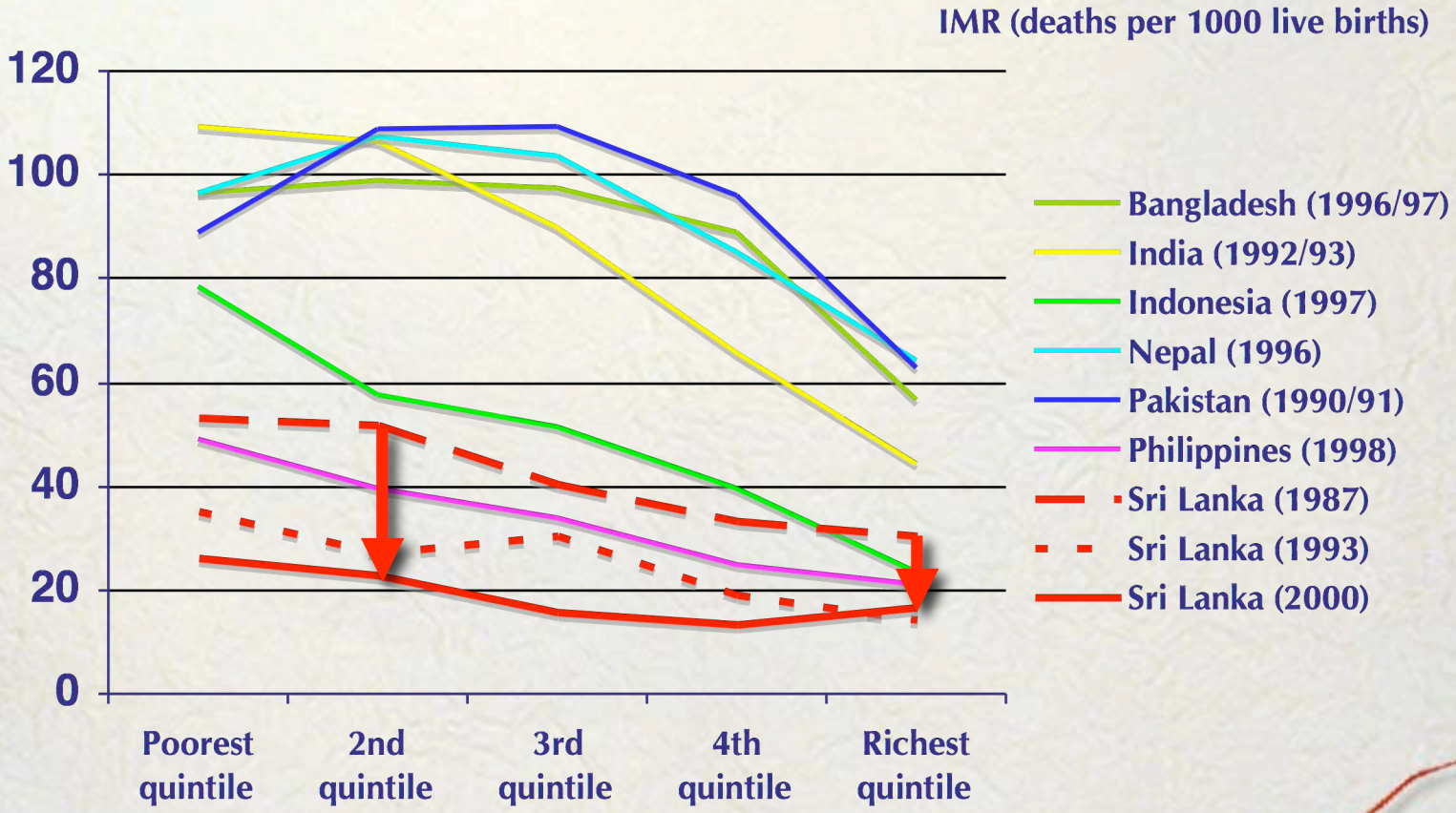
Medically-supervised childbirth, Sri Lanka 1987-2000



Modern contraceptive use, Sri Lanka 1987-2000



Health trajectories by income



Future Agenda

- Incorporate asset index-based measure in all survey data analyses
- Experiment with asset indices in patient surveys to obtain socioeconomic ranking
- Develop short-form inventory for such purposes, with weights linked to most recent household consumption survey