

**Crawford School, ANU**  
**June 5, 2013**

# **Two Decades of Poverty in Papua New Guinea**

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# Motivation

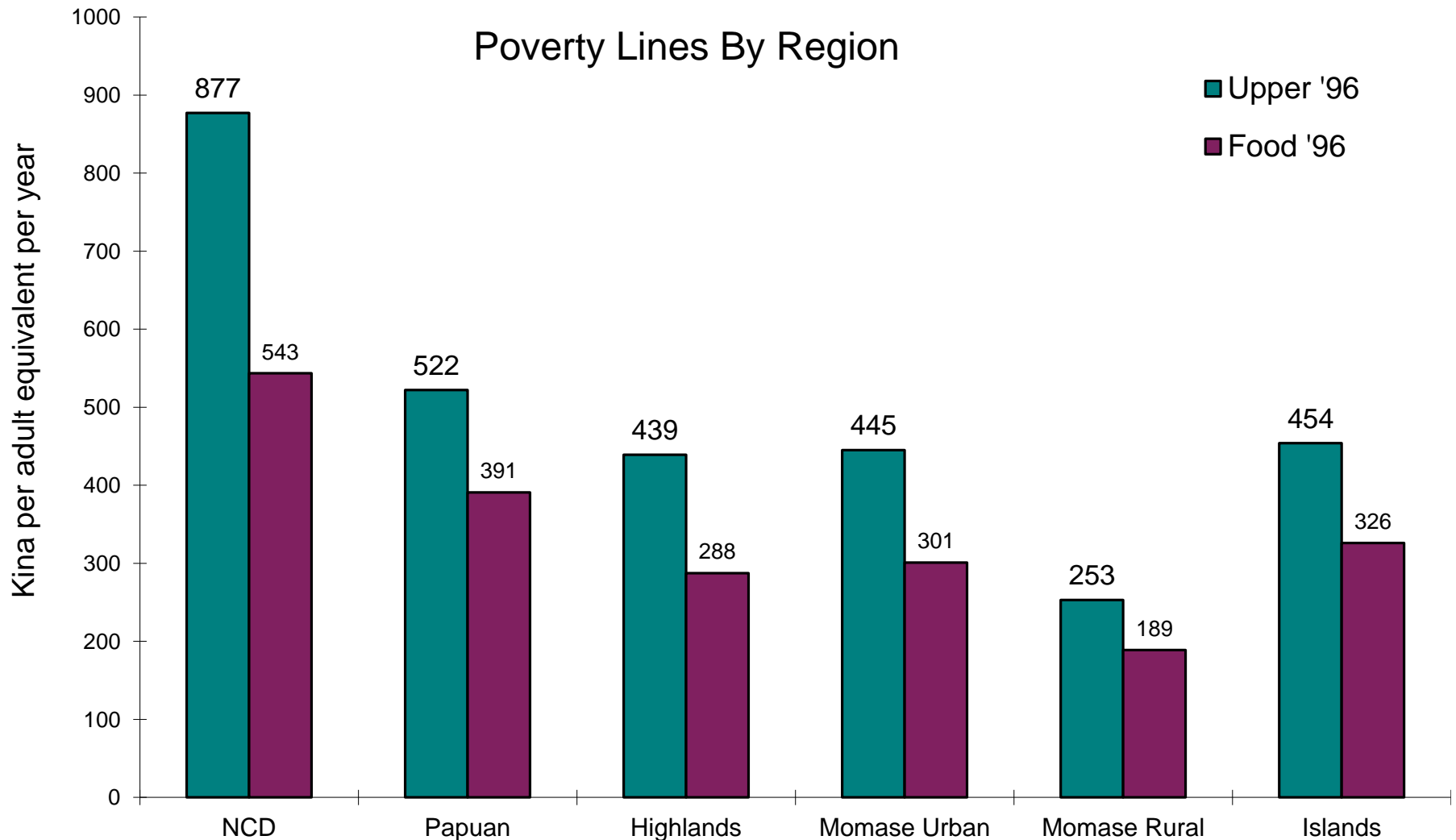
- Little is known about poverty trends in PNG
  - Despite priority placed on helping people overcome poverty by AusAID, who allocate second largest share of aid budget to PNG
- PNG is a laggard in household surveying
  - few countries remain with just two national household surveys that can be used for poverty measurement
  - 14 year gap between these surveys also reduces usefulness
  - Compare with biennial estimates in Vietnam, triennial estimates in Indonesia etc,
- Existing evidence already places PNG amongst the highest poverty rate countries in East Asia and the Pacific
  - Social indicators more similar to Africa than to the surrounding region
  - Limited domestic constituency for action on poverty and very weak statistical capability, along with indifference to statistics from policy makers

# Baseline: 1996 PNG Household Survey

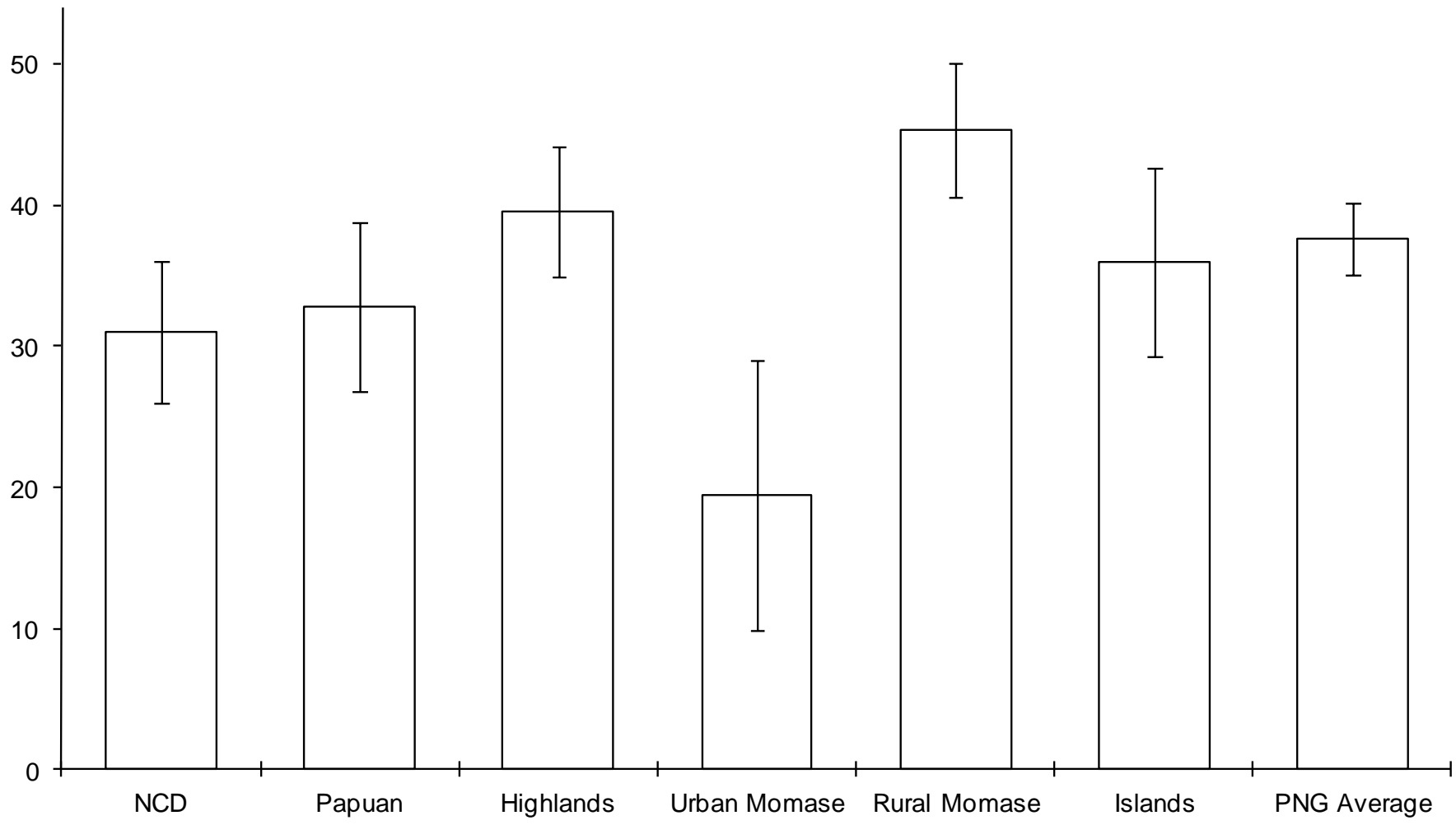
- Sample of 800 households in 73 rural Census Units, 240 households in NCD and 100 in other urban areas
  - Survey measured consumption, not cash incomes
    - Using 2-week closed interval recall
  - Consumption estimates include self-produced items, gifts, changes in food stocks, estimated value of services from durables
    - Adjust for household composition using adult-equivalent scale, 0-6 years = 0.5, else 1.0.
- Cost-of-Basic-Needs poverty line (cost of 2200 calories per adult equivalent per day) + non-food
  - National poverty rate of 37% (highest in rural Momase)

# 1996 Poverty Lines

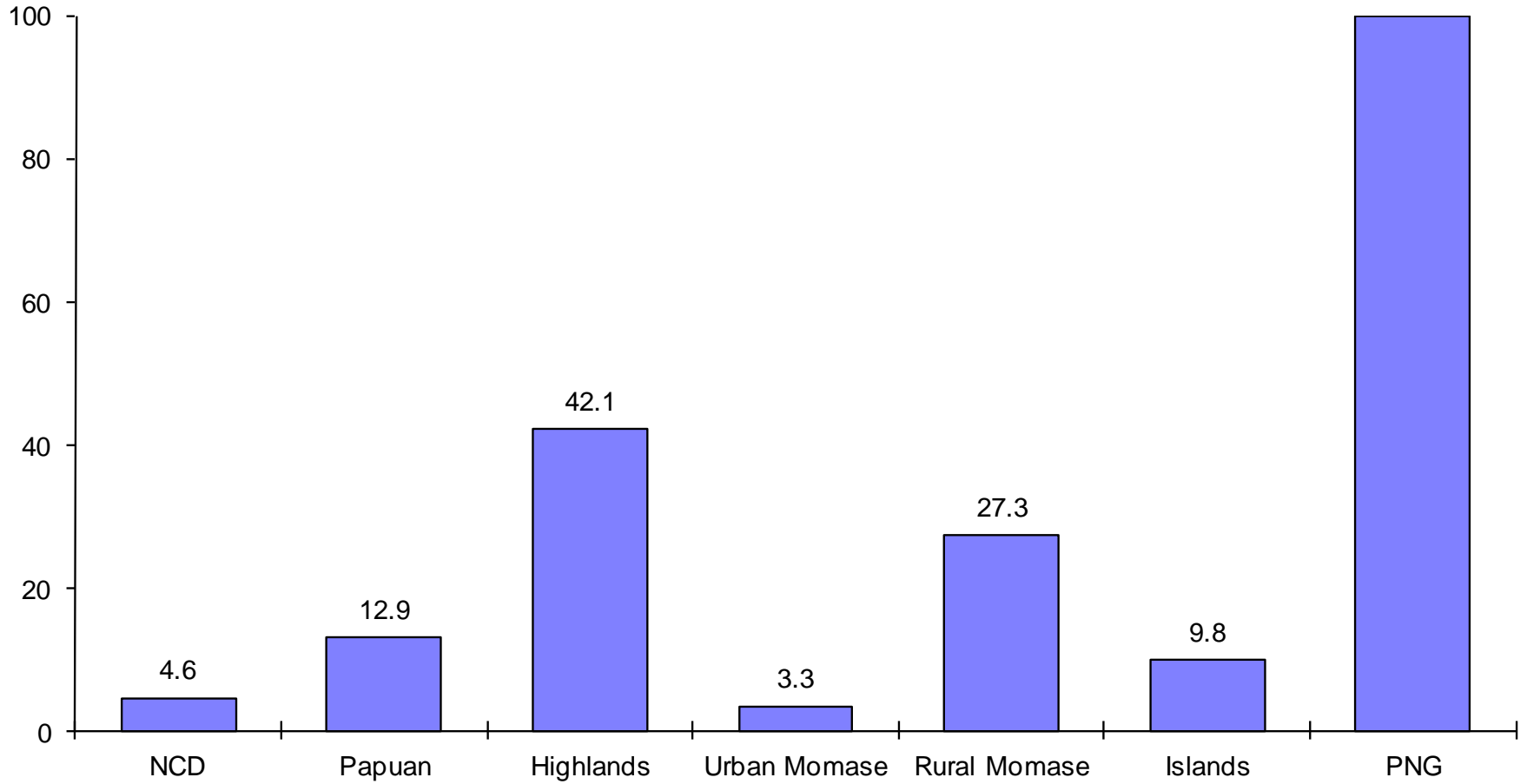
(upper line averaged USD \$350/adult equivalent)



### Percentage Living in Households Below Upper Poverty Line: 1996 Revised Data

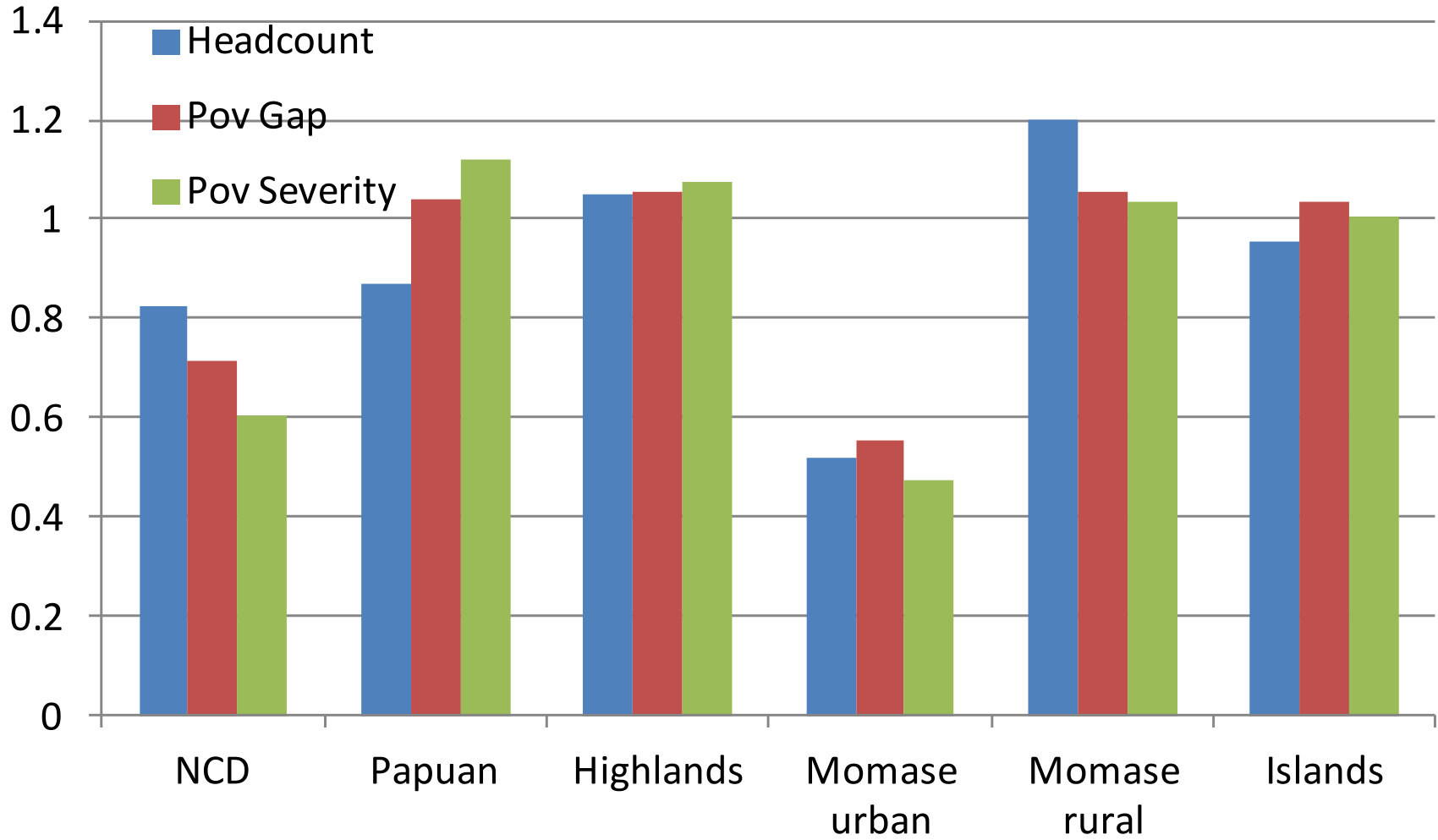


### Contribution to National Poverty (%)



# Relative Rates ('risk') in 1996

(adjusted to comparability with 2010)

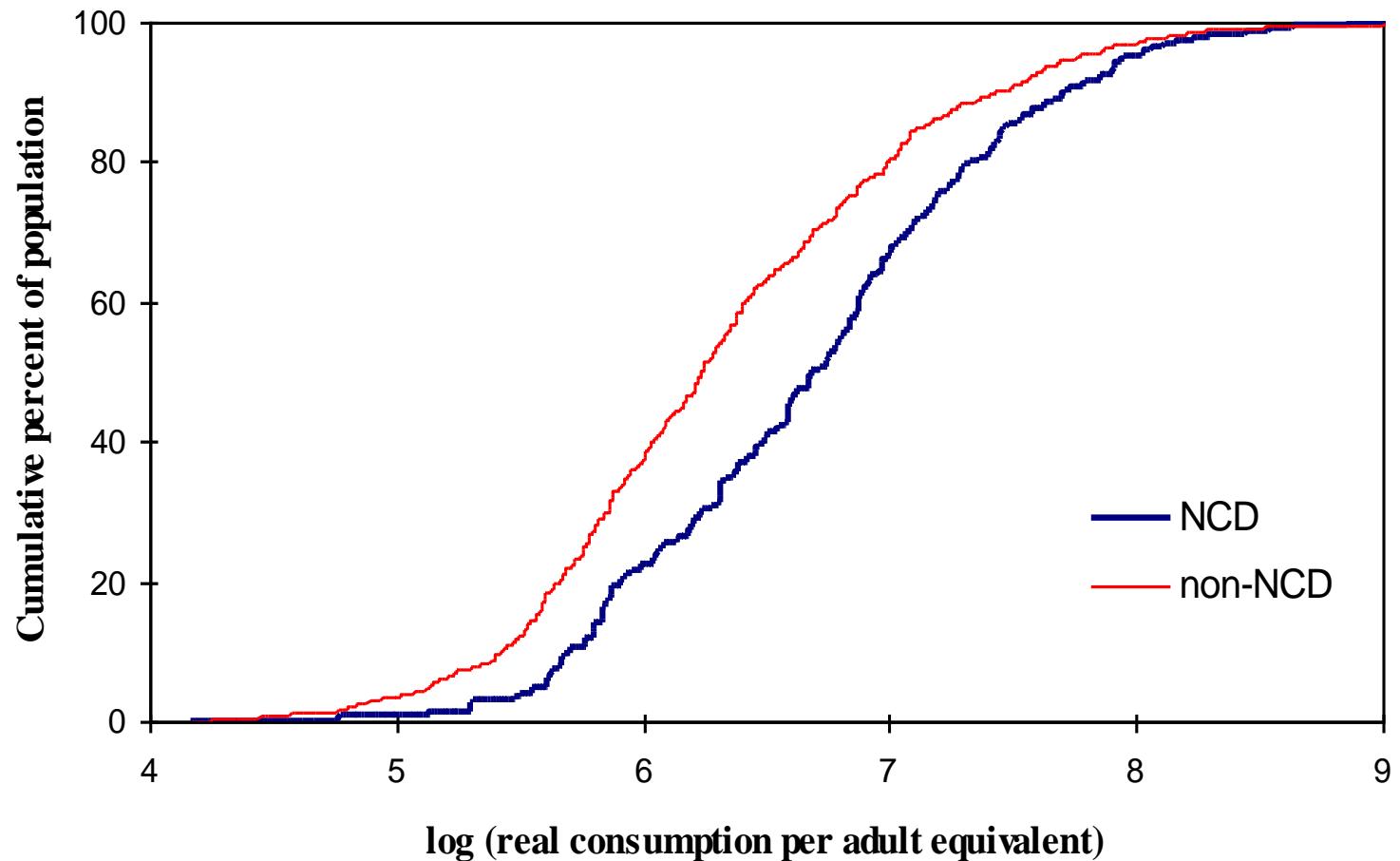


NCD: low risk, even lower as consider distribution-sensitive measures

Rural Momase: high risk of being poor, but depth/severity are average

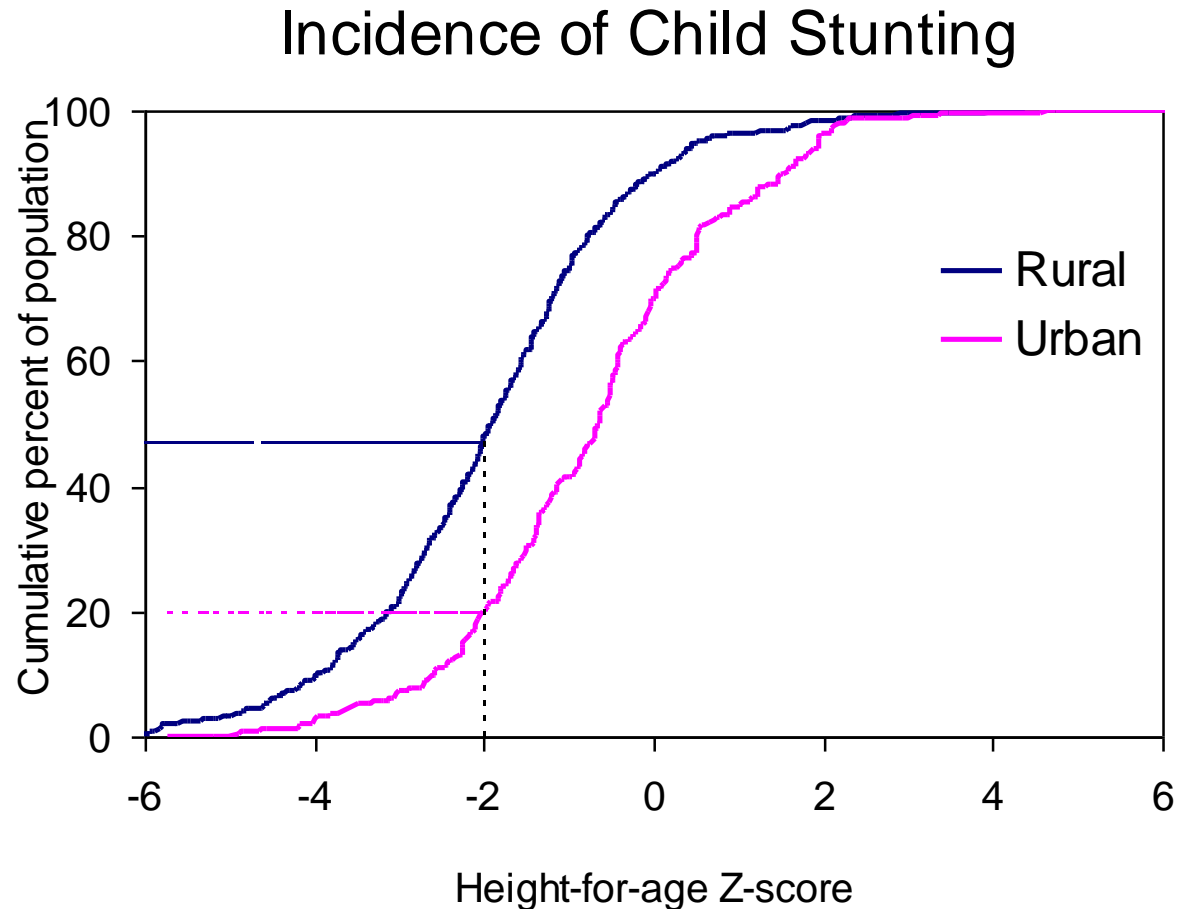
# Lower poverty rate in NCD was robust to choice of poverty line

Distribution of Consumption by Region



# Non-monetary indicators showed the same patterns

- E.g. incidence of stunting was much higher in rural areas, regardless of threshold used
- Why?
- Access to health, energy-dense diet, higher incomes and higher women's education



# 2009/10 Household Income and Expenditure Survey (HIES)

- Sampling differences

More than three times larger (n=4080)

- Almost half the sample in urban areas, since CPI updating was a major objective of the survey
- more heavily clustered (18 households per rural CU vs 12 in 1996) so sampling errors not 3 times smaller)
- Does allow disaggregation of urban and rural sectors for Momase
  - 600 urban households surveyed in Momase, similar to NCD, compared with only 200 urban households in each of Highlands, Islands and Southern Regions
  - This disaggregation was a sensitivity analysis in 1996 survey rather than part of main results

# The final HIES sample

Stratum	# PSUs	Pop Est HH	Sample HH	Weight
Pt Moresby	107	41546	622	66.79
Southern Urban	13	11833	232	51.00
Southern Rural	23	127416	399	319.34
Momase Metro	25	12322	173	71.23
Momase Urban	25	24762	425	58.26
Momase Rural	32	228613	565	404.62
Highlands Urban	12	15884	211	75.28
Highlands Rural	47	395482	841	470.25
Islands Urban	12	9775	210	46.55
Islands Rural	23	125685	403	311.87
TOTAL	319	993318	4081	

NB: Count of 4081 households is those with any part of the survey completed. Only 3,800 started an expenditure diary and only 3,660 have a complete diary

# The HIES Survey Instruments

- The household and individual surveys consisted of five forms:
  - Form A: Household Control
  - Form B: Household Schedule (also in the same booklet as Form A)
  - Form C: Personal Schedule (mostly income)
  - Form D: Personal Diary (expenditures/consumption)
  - Form E: Personal Notepad (unusual element)
- There was also a community questionnaire for each Census Unit
  - Service accessibility
  - No price survey

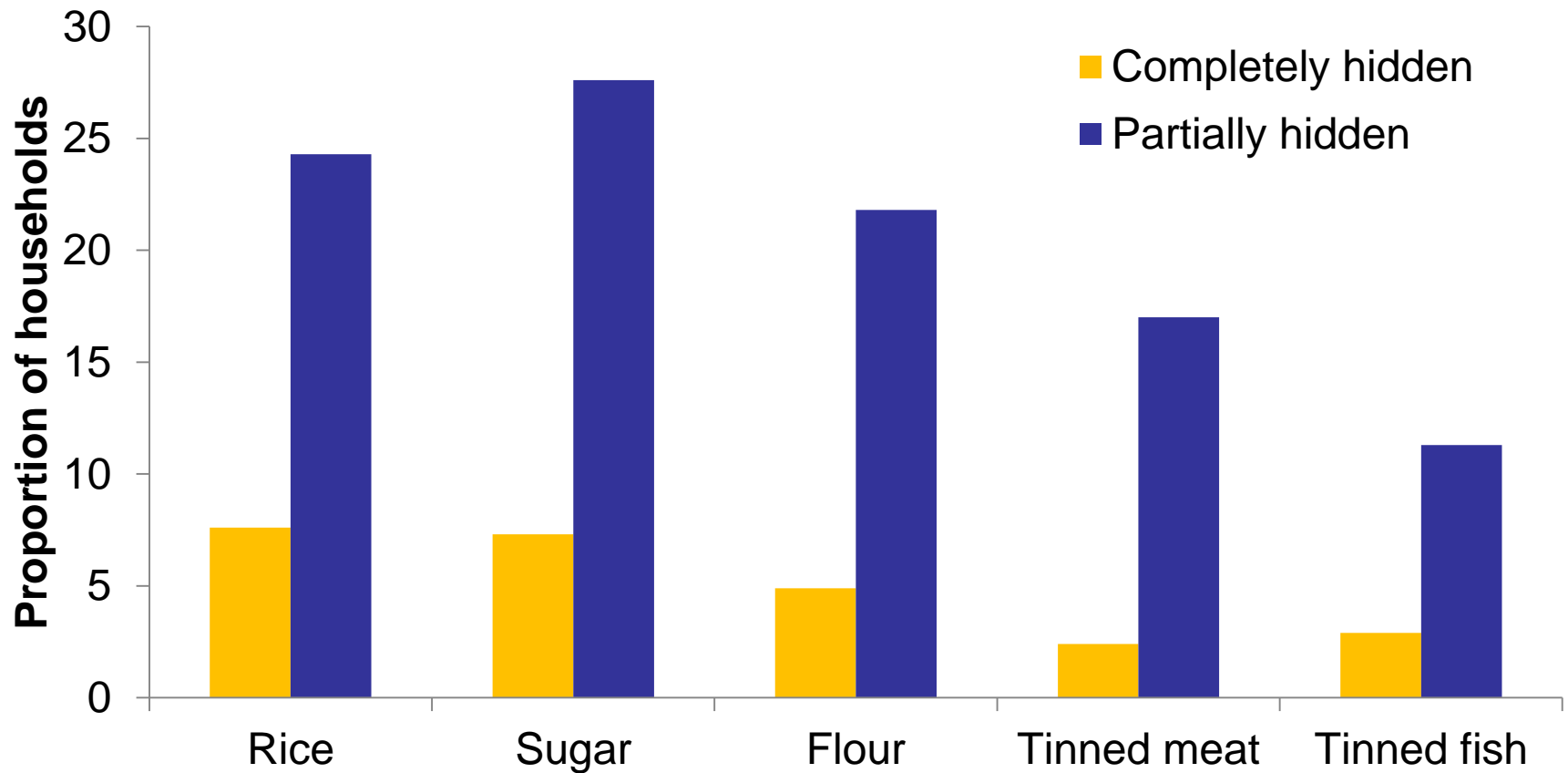
# Similar features of the two surveys

- Questionnaires organised by means of acquisition
  - Consumption is a residual
    - Purchases
    - + Own-production
    - + Gifts received
    - Sales
    - Gifts given
    - Stock increases
    - = Consumption.
- Attempt to measure starting and ending stocks of major foods to remove one wedge between expenditure and consumption
  - PNG is non-seasonal with storage for ca. 30 days
  - Gardens 1 hour away, markets 2 hours away
- Non-frequent items based on annual recall

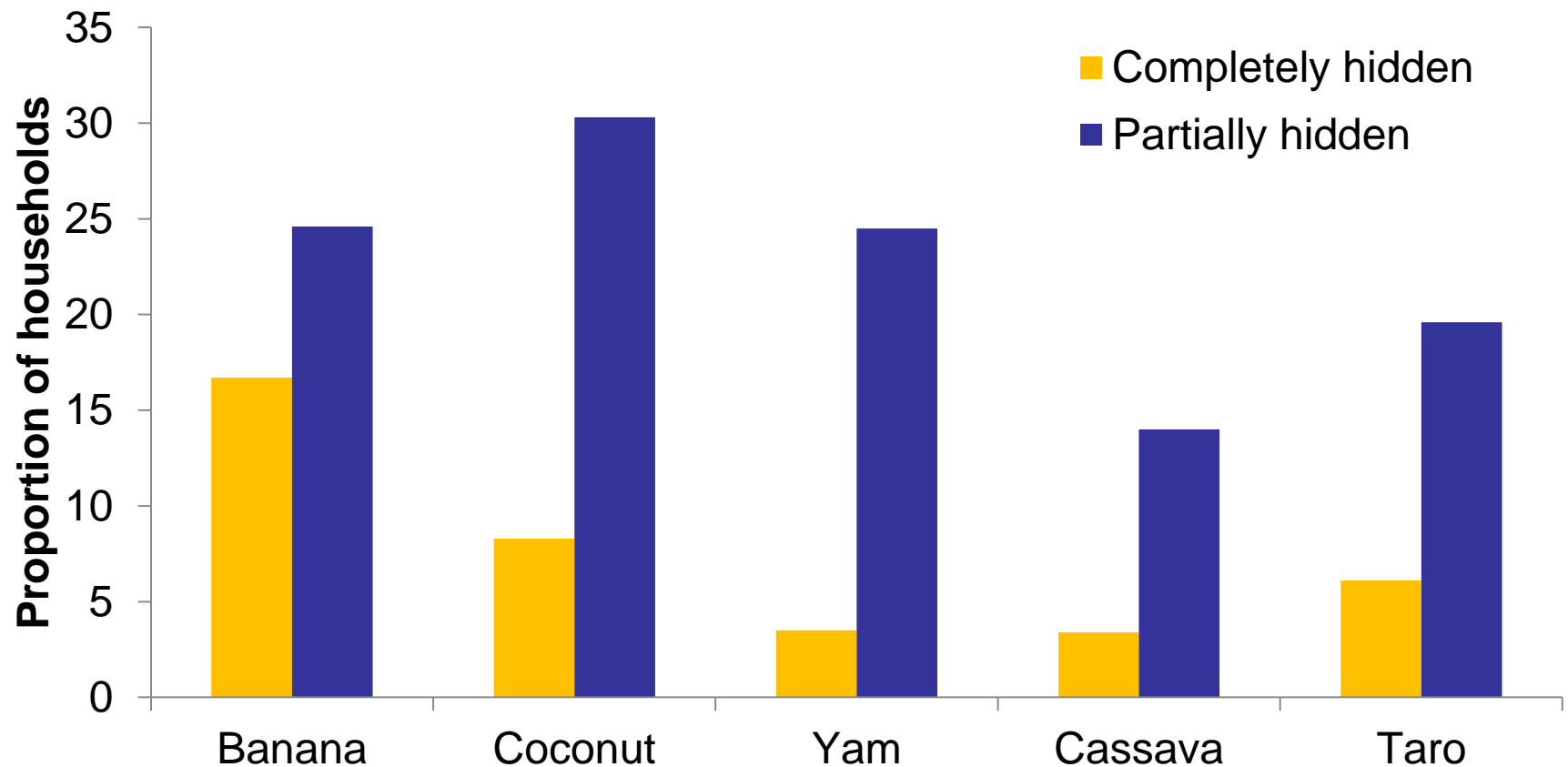
# Food stocks measurement

- closed interval (two-visit) consumption recall in 1996 enabled measuring start and end food stocks
    - Largest stocks for root crops and plantains
      - Average 9 kg amongst stockholders, maximum 90kg
        - Max could feed family for 20 days, so non-seasonal stocking
    - Rice had largest stocks of store-bought foods
      - Ignoring just rice destocking → error of 300 calories/person/day
    - No net destocking observed, given non-seasonal stocking
  - Daily visits for diary checking in HIES also allowed starting and ending food stocks to be measured, but extended to more foods in 2010 than in 1996
- non-compliance causes apparent destocking

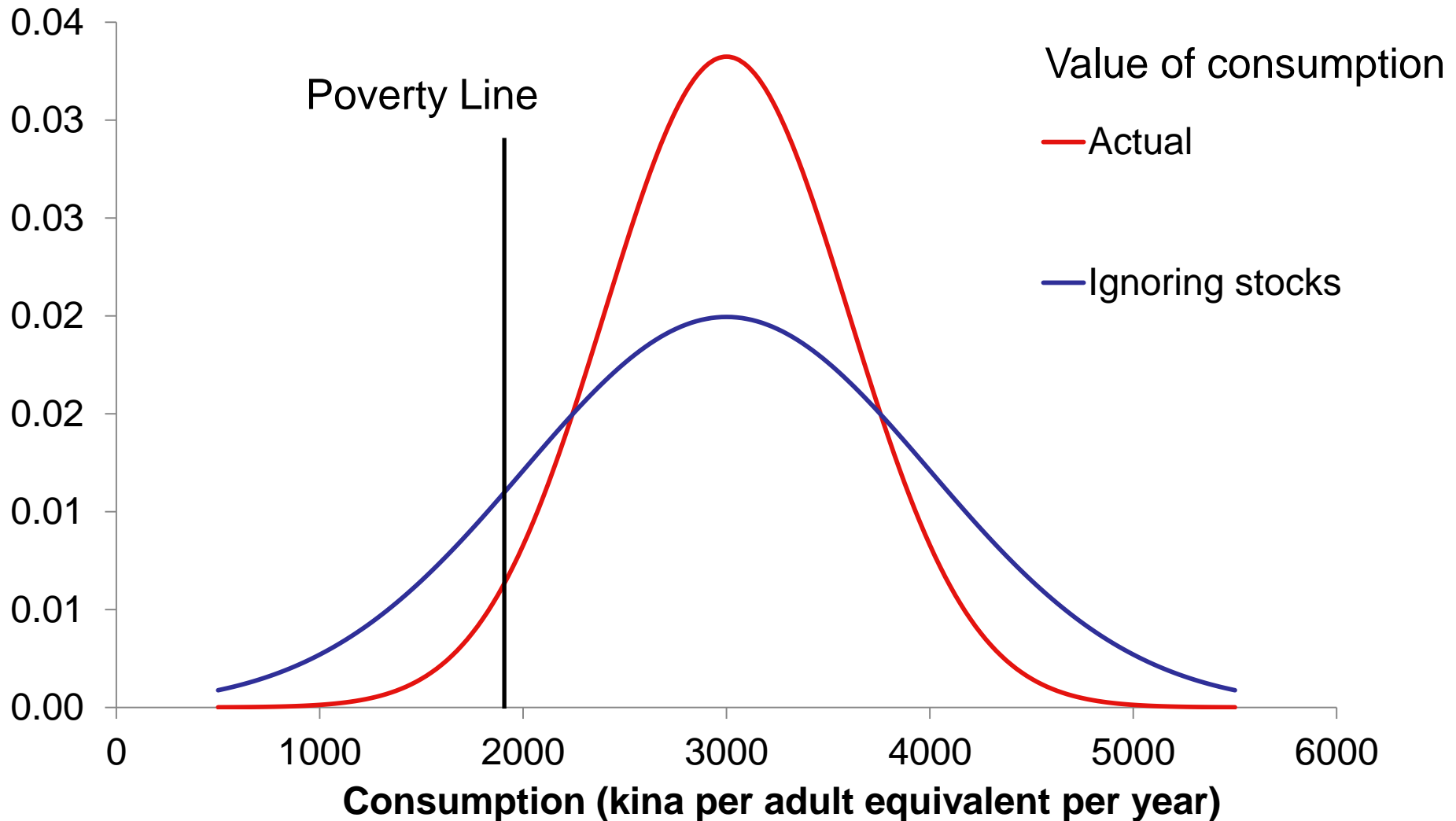
# Importance of consumption from food stocks: foods with no own-production in PNGHS



# Importance of consumption from food stocks: foods with possible own-production (PNGHS)



# Ignoring stocks gives variance error not mean error – poverty estimates will be affected

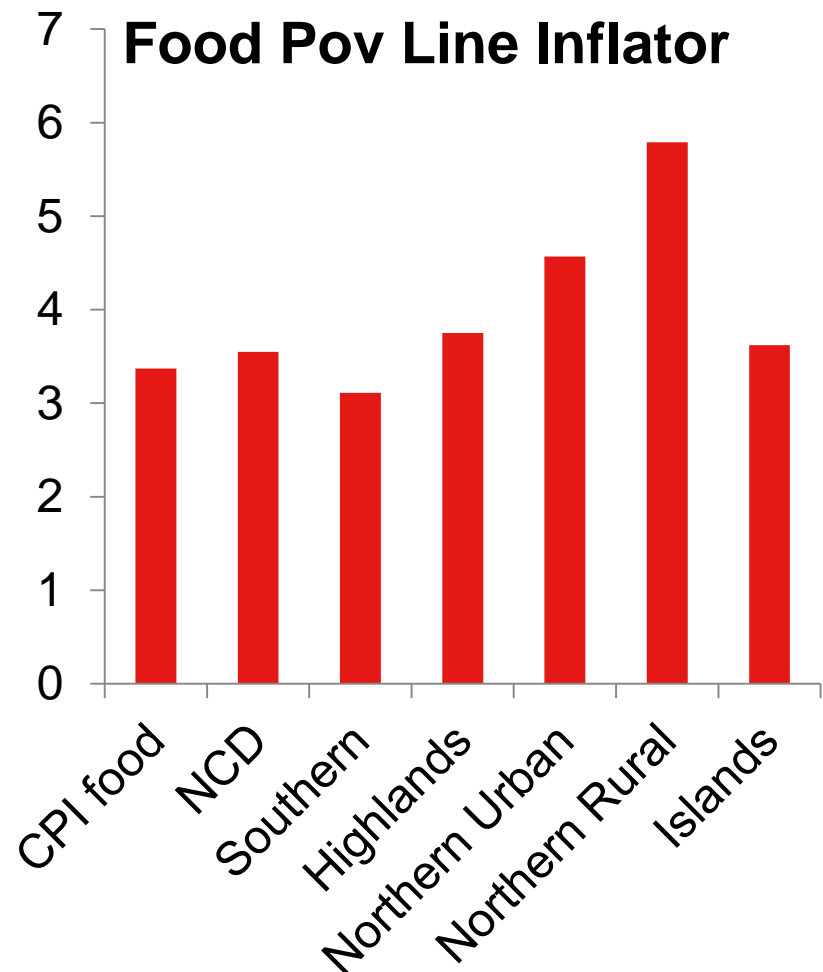


# First threat to comparability

- No community price survey in HIES
- PNG exactly type of environment where prices are unequal over space → nominal ≠ real living standards
  - Instead use transaction-level records from diaries (over 400,000 in total)
  - Restrict attention to specification used in 1996
    - E.g. 1 kg Trukai rather than 1 kg Roots
      - To use price of Roots would be a downgrade in the quality of the food poverty
    - Less easy for fresh produce, meats etc
      - Self-reported weights are not necessarily reliable for foods not sold by weight → unit prices are questionable
        - 5-fold higher unit price if use gram records vs kg ones

# Regional food poverty lines show uneven 'inflation'

- Item-specific prices from diaries v. 1996 price survey gives food poverty line inflator close to the movement in CPI for food, for NCD and Southern
- Much higher apparent inflation in northern region (Momase) especially rural
  - Previously the lowest poverty line and a high poverty rate
  - Evidence of further shift in poverty to this region depends on imperfect updating for prices



# Why Not Use the CPI?

- CPI uses a 36 year old urban basket, priced in just four towns not well integrated with rural economy
  - High import share so sensitive to fall in value of the kina
  - Specifications that are now rarely consumed
  - Doubtful that price movements are same as those experienced in rural areas and provides no way to measure regional shifts
- Questions posed by the changing value of the food poverty lines
  - Is local food production keeping up with demand pressure?
    - Since 1961/62 Survey of Indigenous Agriculture, food production stats for PNG broadly assume that growth in output  $\approx$  population growth
  - Is food market integration advancing, since regional variation in food poverty line has reduced
  - What has happened in rural Momase to raise prices?

# Second threat to comparability

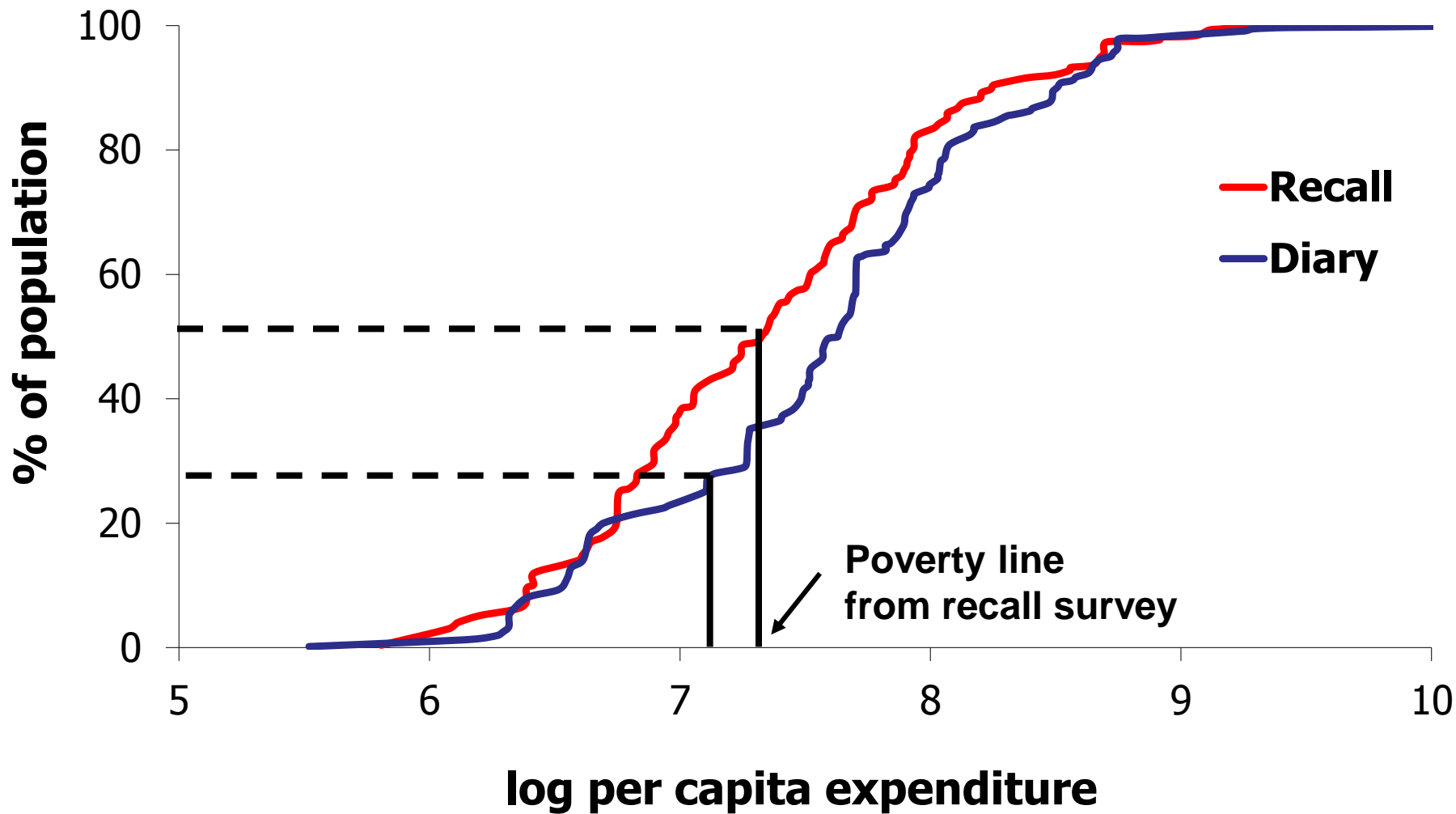
- Much more intensive surveying effort
  - Switch from a recall survey to an intensively supervised diary would normally be expected to raise measured consumption and lower estimated poverty
  - Surprisingly few controlled comparisons to confirm this
  - 1996 survey had a limited experiment in Port Moresby with diary vs recall
    - But reliance on the market and greater number of transactions may make diary-recall gap in urban area an overstatement of expected gap in rural areas
- non-compliance on diary-keeping and end stock recording introduces doubt into the direction of bias in the temporal comparison

# Resource requirements

- 1996 fieldwork cost  $\approx$  US\$0.5m (\$400/hh)
  - By 2010 the (urban) CPI 3X as high and the Kina half its US\$ value, so ca. US\$1m in 2010 prices
  - 2010 sample of 4,000 vs 1,300  $\rightarrow$  US\$3m
- 2010 HIES fieldwork (+ admin) cost US\$15m
  - Approx 5X cost that would be expected based on the “extensive” 1996 method
  - Fieldwork productivity
    - Do 3 EAs in 3 weeks with bounded recall v 1 EA with diary
    - Plus labour for coding diaries and extra data entry cost
  - Tanzania experiment the personal diary with visits every 1 (2) days was about 10 (6) times cost of the (unbounded) recall
- Resource intensity of 2010 survey ca. 4X that of 1996

# Diary vs recall in 1996 Port Moresby

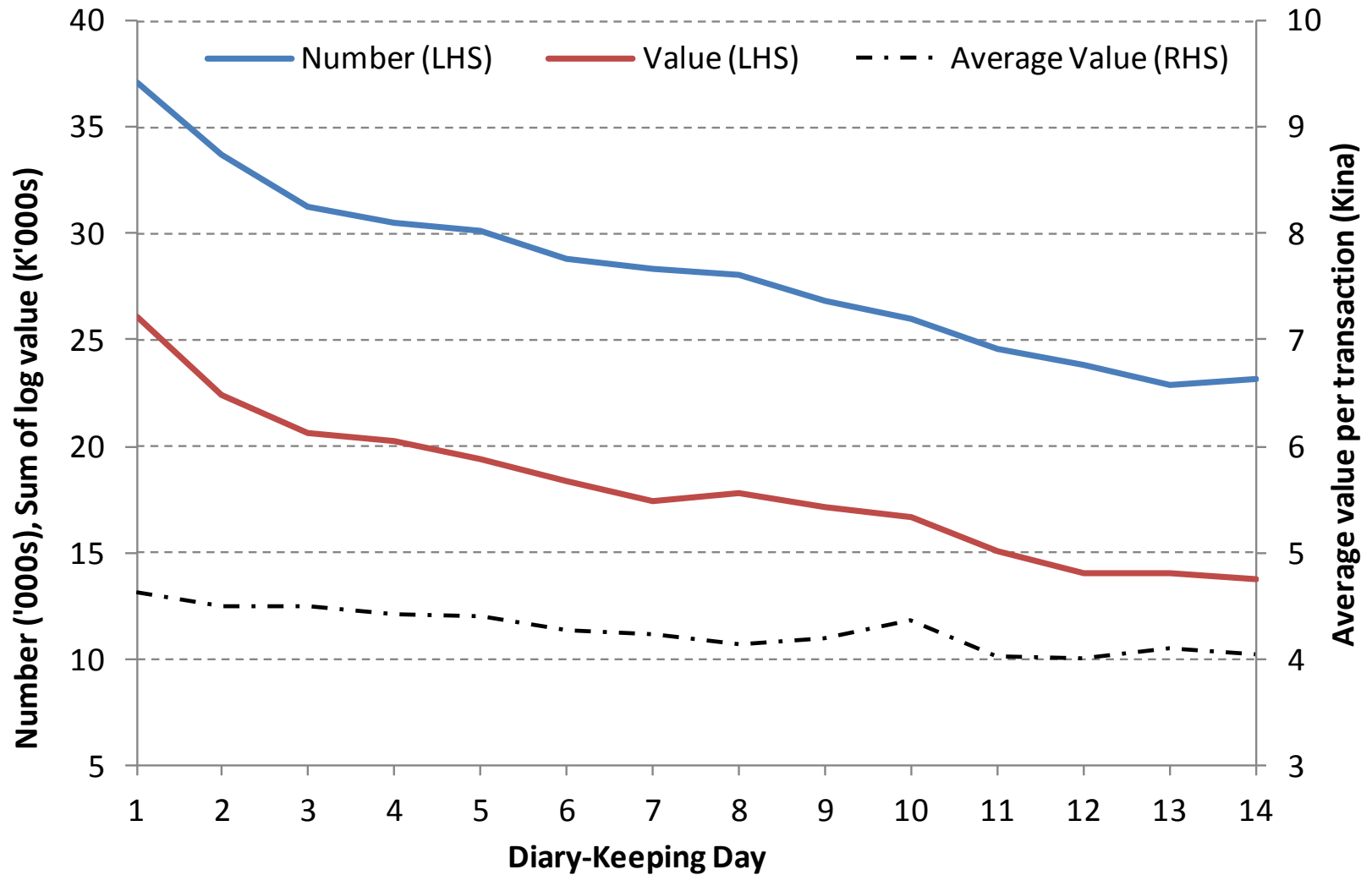
(only 106+106 HHs)



# Problems with the nominal data

- Contrary to expectations of diaries capturing higher recorded consumption
- Evidence of diary fatigue
  - Number of transactions declines by 3.4% per day
    - Not through aggregating into fewer, larger transactions
    - Average value of transaction falls slightly
  - Total value of consumption transactions declines by 4.4% per day of diary keeping period
- Non-fatigue causes?
  - Diaries started on any day of the week (slightly less on Sunday) so no timing cause for the decline
  - No break between one diary and another – continuous monitoring

# Diary Fatigue Evident

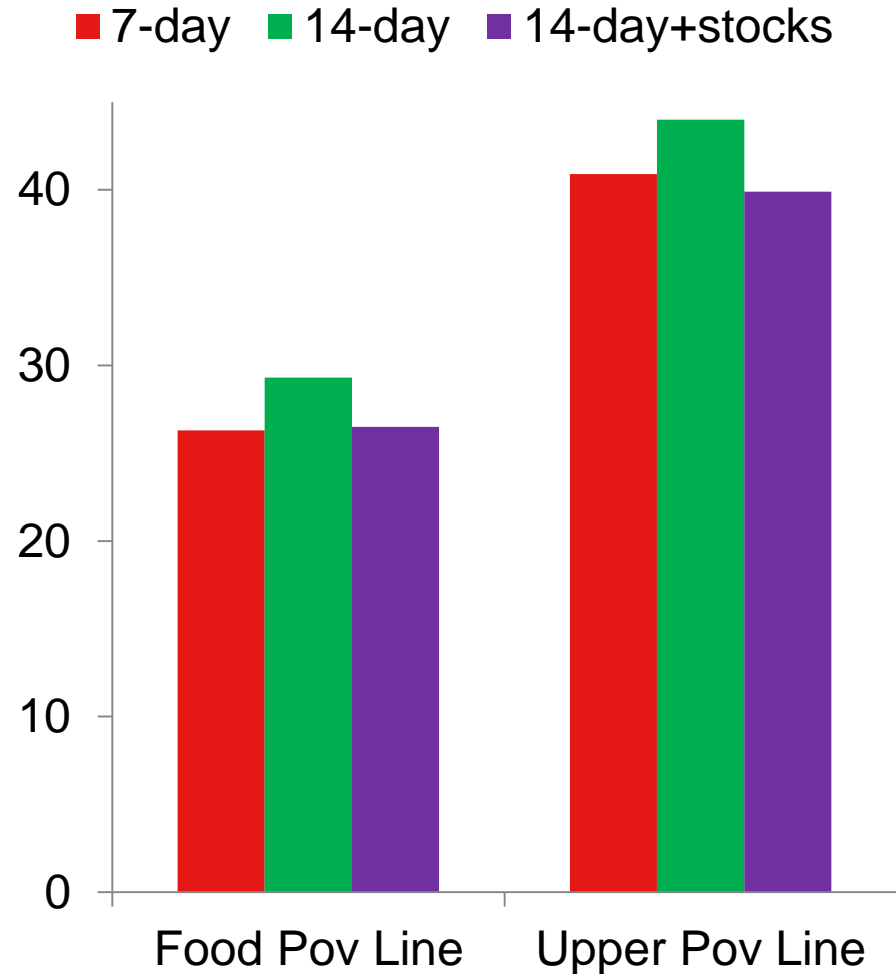


# Problems with the nominal data (2)

- Stock measurement also seems affected by fatigue
  - Reported ending food stocks much lower than starting stocks, contrary to what non-seasonal stocking would look like
  - Contrary to pattern in 1996 stocks data
    - 2009/10 measured stocks of over 100 food items versus 18 in 1996
  - Apparent destocking adds 6% to value of food consumption
- Created 3 aggregates to see if poverty measurements and profile robust to these problems
  - 7 day food and frequent ( $\times 52.14$ ) + infrequent
  - 14 day food and frequent ( $\times 26.07$ ) + infrequent
  - 14 day food + stock change and frequent ( $\times 26.07$ ) + infrequent

# Headcount poverty rates with three consumption aggregates

- 14-day rather than 7-day adds 3-4 percentage points to headcount rates
  - Adding the apparent destocking of food reduces headcount back to what it would be if using 7-day and no stock measurements
  - Two errors working to offset each other
- ➔ mainly used 14-day+stocks



# Summary comparison of the two surveys

## 1996 PNGHS

- Bounded recall (33 food, 28 freq non-food), average duration 13 days
- 12 HHs per rural EA, 6 per EA in capital city
  - Diaries for half capital city sample, or bounded recall
- Measuring device (empty 25 sack given for garden produce) used for 90% of root crops, 50% of others + weighing trials → kgs
  - Average 80 kgs root crops during obs period
- Market survey (2 visits)

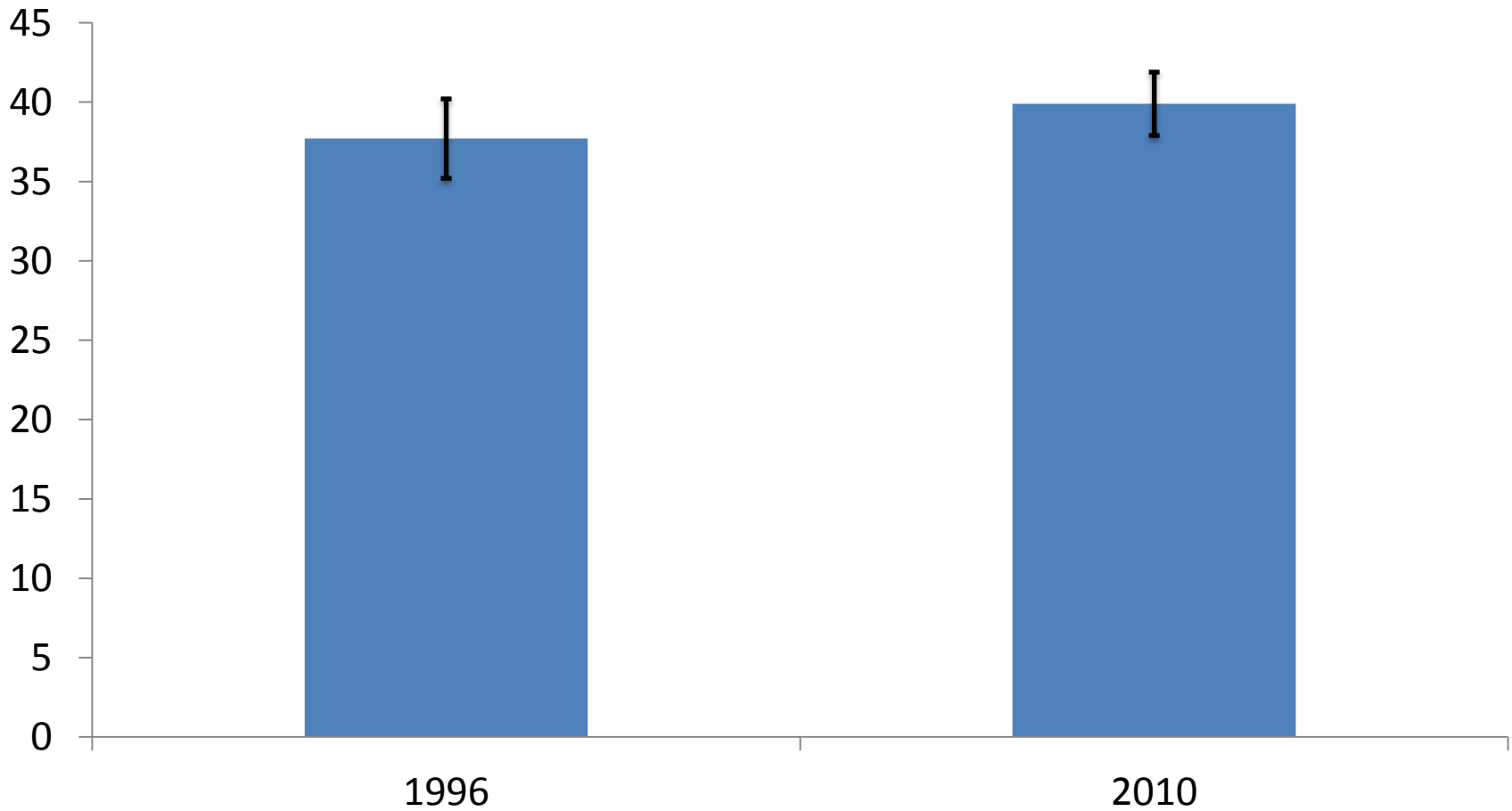
## 2009/10 HIES

- 14 day personal diary with daily or semi-daily checks by interviewers
  - Transaction level, with brand, unit size, price etc
  - 5-digit coding at head office
  - Personal notepad used in addition to the diary
- 18 HHs per rural EA, 6 in urban EA
- Self-reported kg or grams for own-production, gifts, purchases, no validation
- No market survey

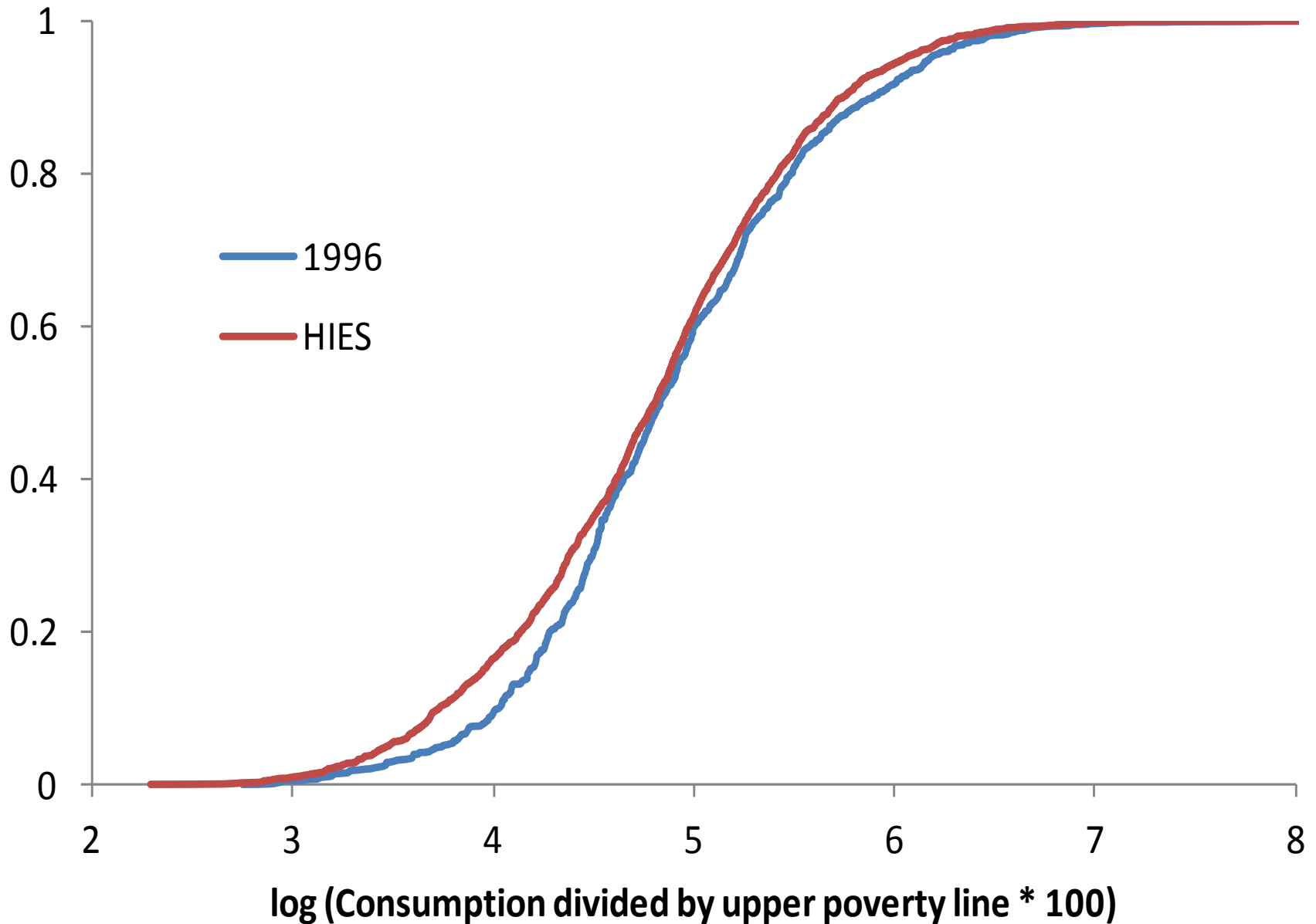
# What Do the Results Show?

- Notwithstanding all the caveats due to imperfect comparability...
- There is no evidence of any decline in poverty in PNG between 1996 and 2009/10
  - No progress at all towards the first of the MDGs
  - An outlier in the East Asia and Pacific region, which has seen historically unprecedented poverty reduction in the last two decades
    - See this week's *Economist*
- Poverty in Port Moresby risen to be similar to the national average rate
  - But still only home to 6% of the total poor, so 'urbanization of poverty' story should not be overstated

# PNG Headcount poverty rate, upper poverty line ( $p=0.493$ for null of no change)

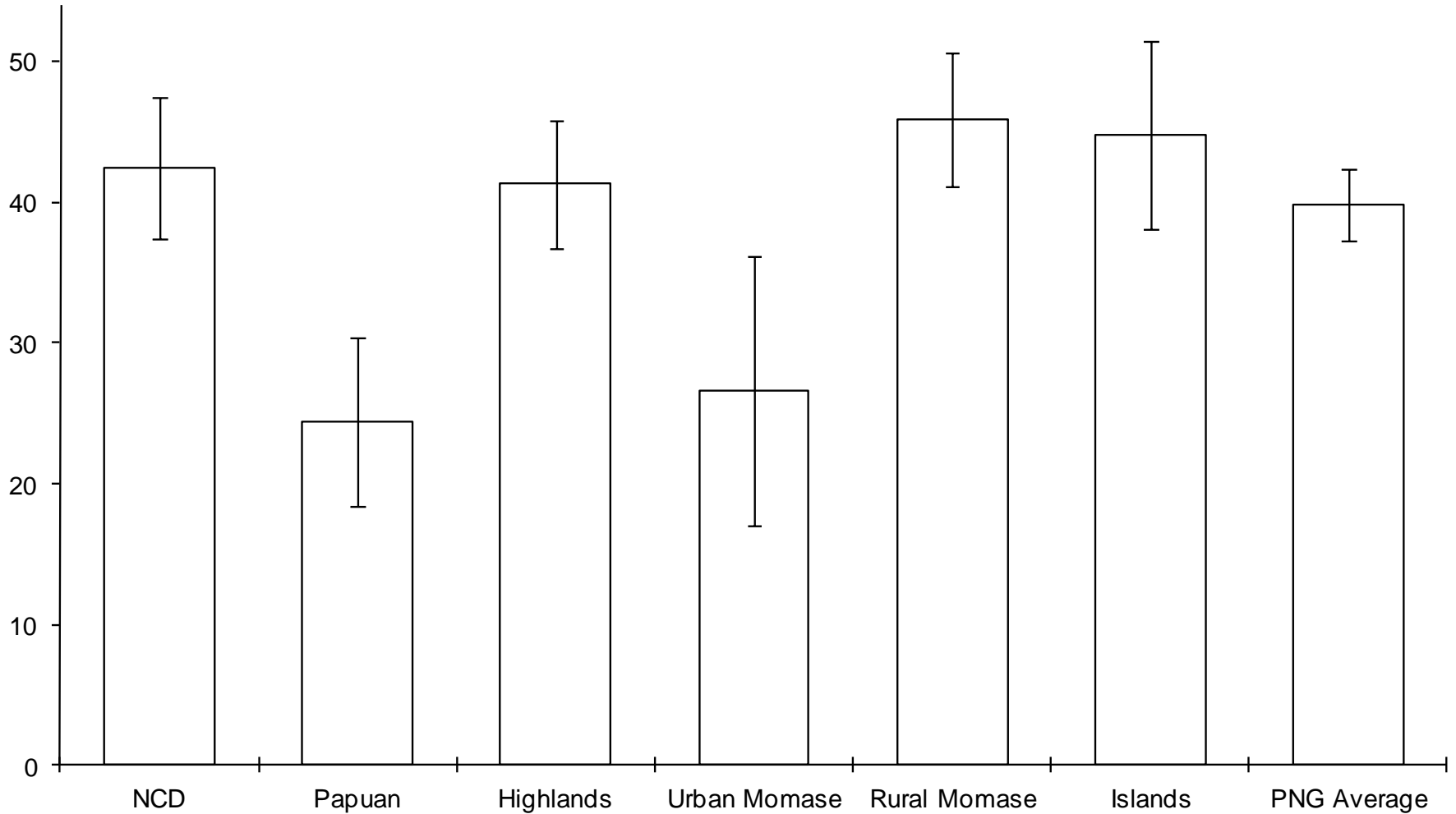


# No Stochastic Dominance (1<sup>st</sup>, 2<sup>nd</sup> or 3<sup>rd</sup> order)

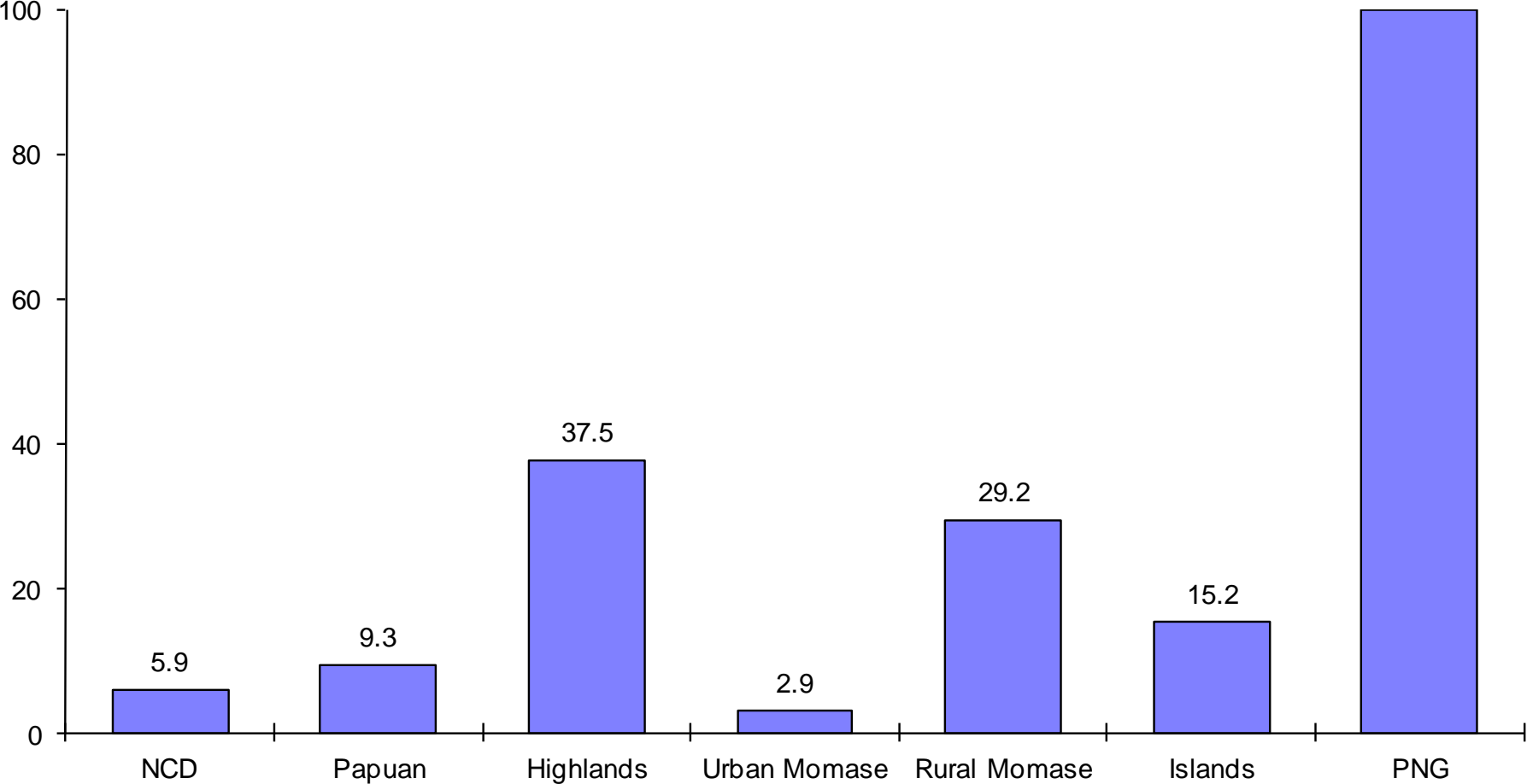


# Regional Poverty Profile

Percentage Living in Households Below Upper Poverty Line: HIES 14 day + stocks

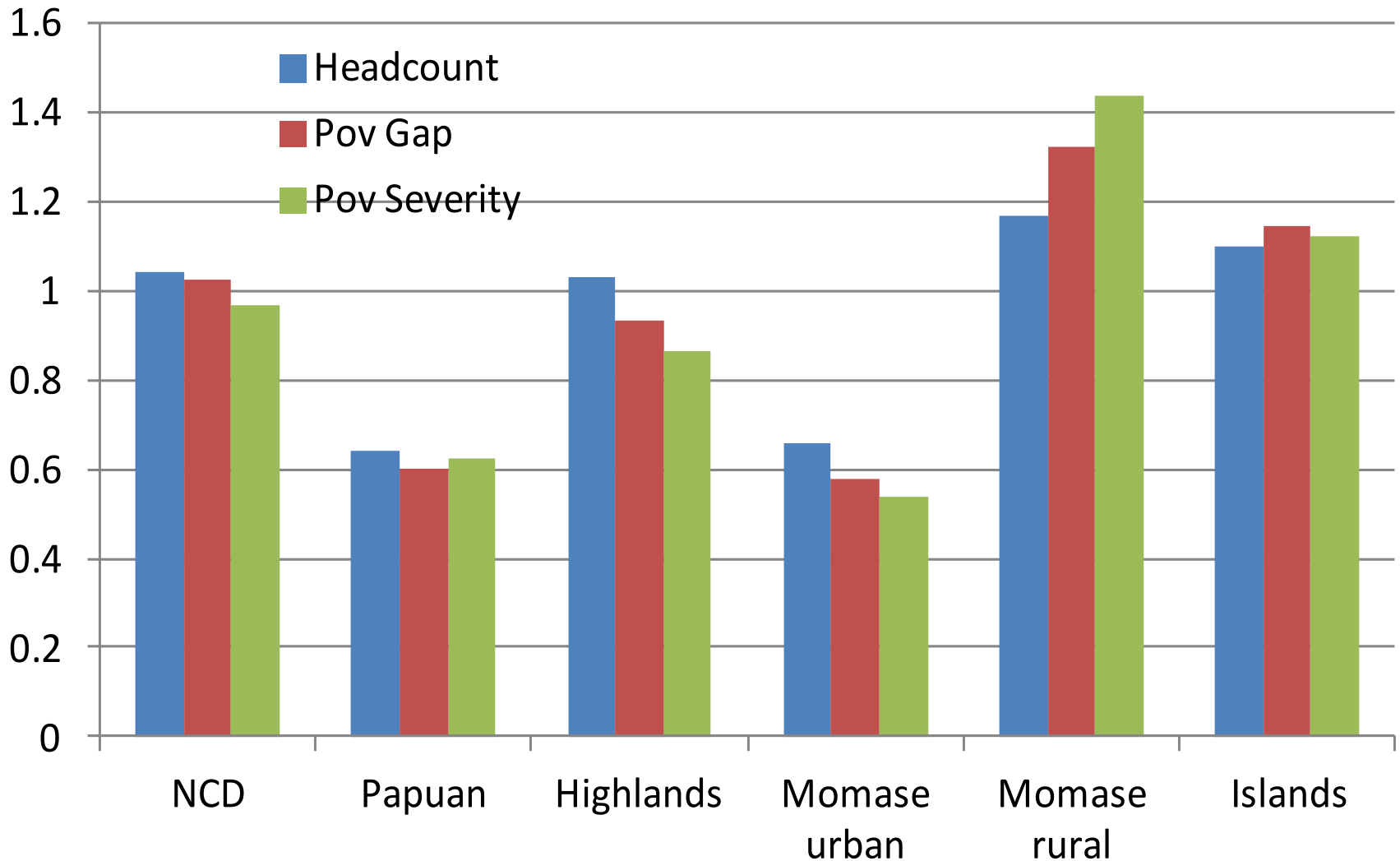


### Contribution to National Poverty (%)



# Relative Poverty Rates ('risk') in 2010

(Upper poverty line, 14 day diaries plus stock changes )



NCD: average risk, even as consider distribution-sensitive measures

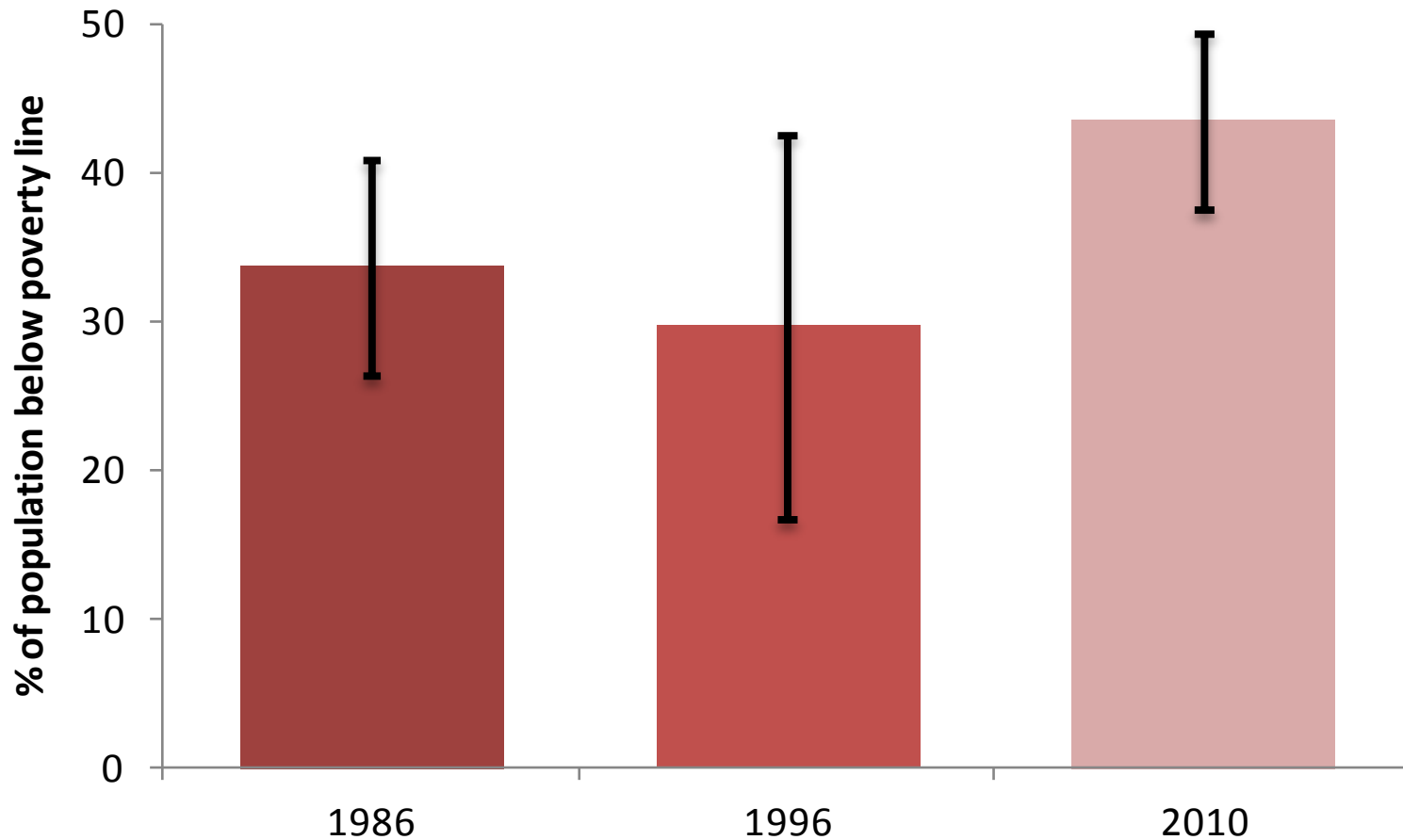
Rural Momase: high risk of being poor, rises for depth/severity measures

# Temporal Poverty Comparisons for Port Moresby

- 1986 Urban Household Survey (UHS), one-half of the Port Moresby sample in 1996 PNGHS and the 2009/10 HIES all use similar expenditure diaries
  - Fewer comparability issues than the PNG-wide temporal comparisons
  - CPI for Port Moresby available to update the Port Moresby-specific poverty line
    - K623 per adult equivalent in 1986
    - K1265 in 1996 and K3500 in 2009/10
- Increase in poverty between each survey, but of a different nature each time
  - Initial increase in severity of poverty (inequality amongst poor)
  - Then increase in the prevalence of poverty

# Changing Prevalence of Poverty

(Head Count Index for Port Moresby)

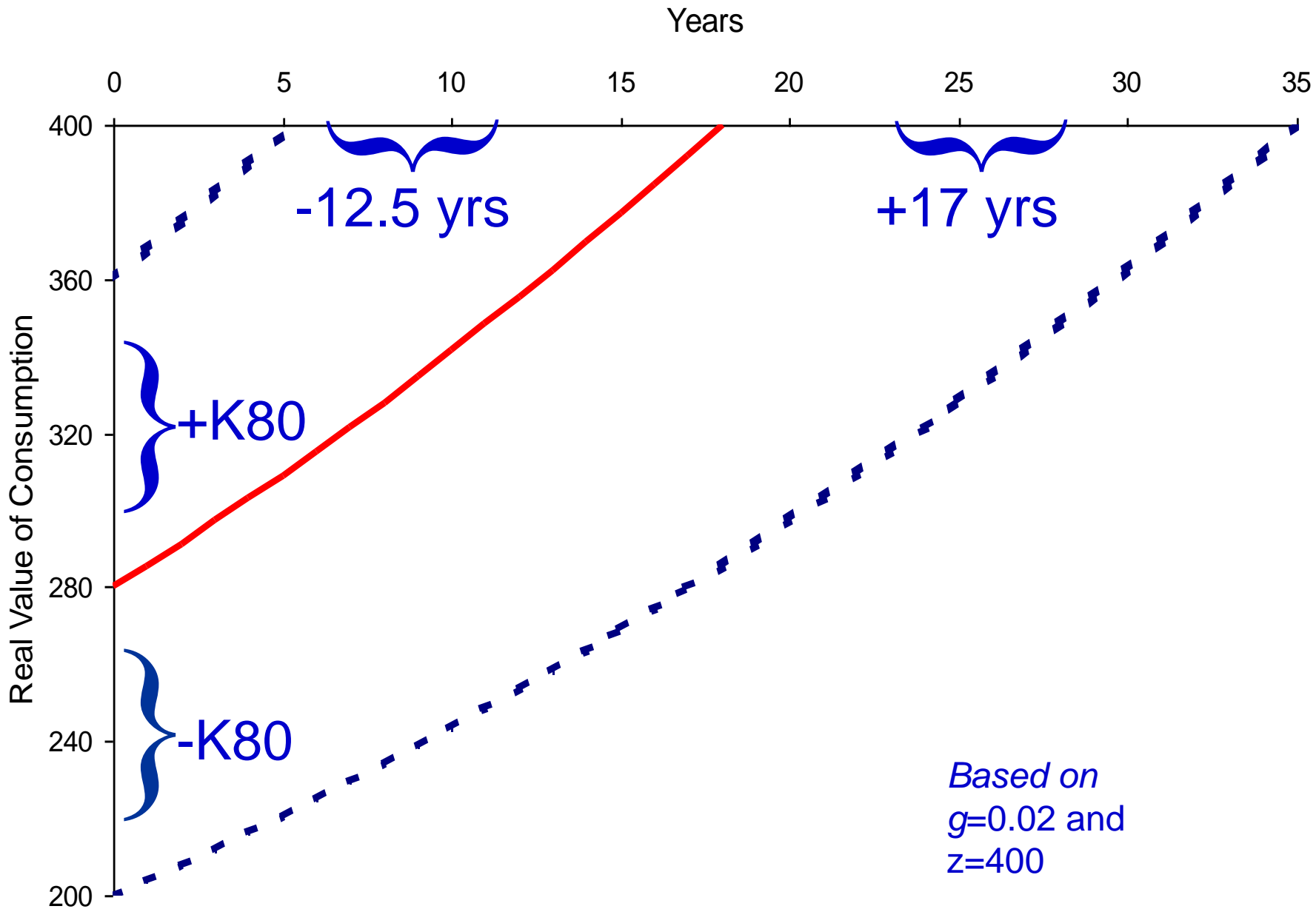


Statistically significant increase ( $p < 0.05$ ) from 1996 to 2010, no change from 1986 to 1996

# Poverty exit time

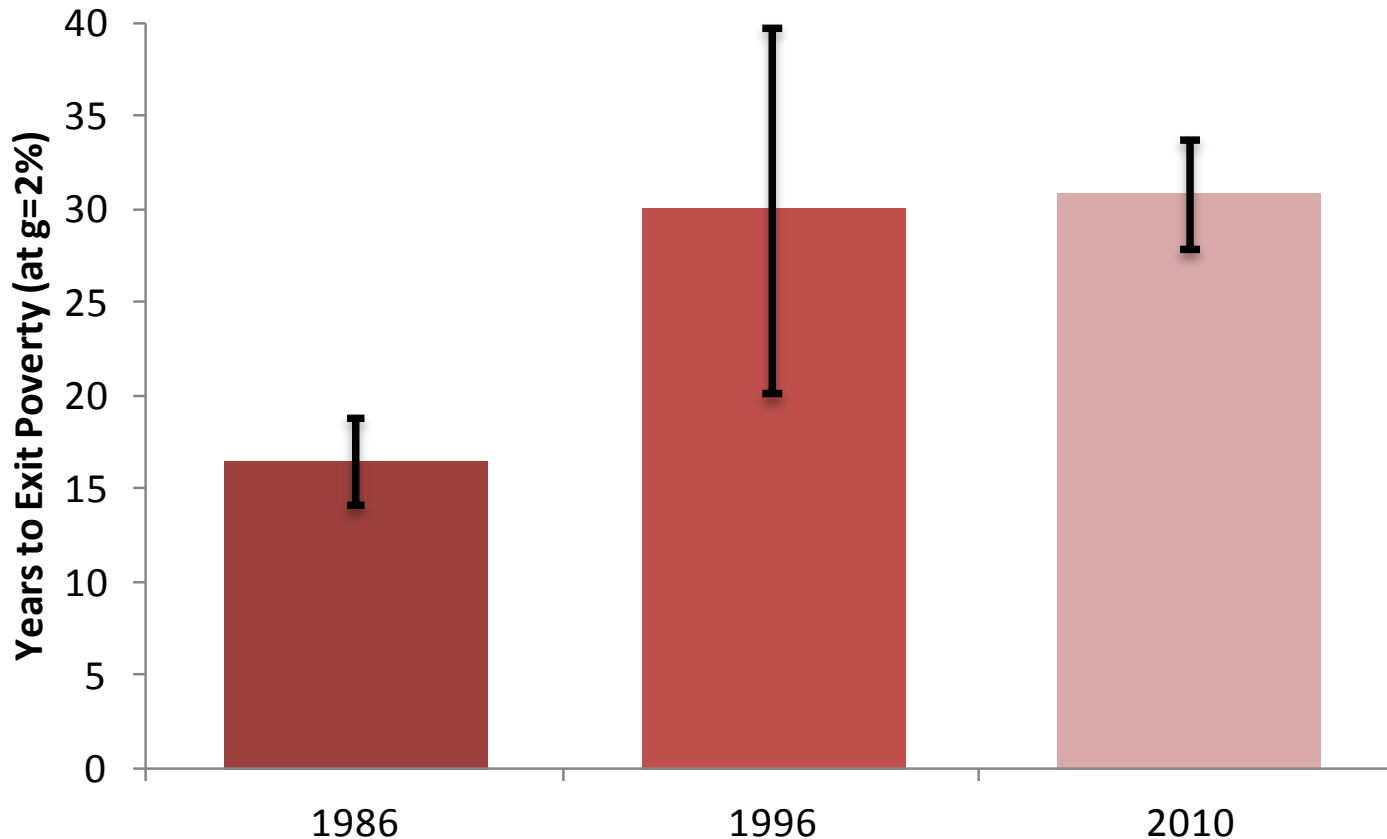
- Distribution-sensitive measure that is similar to the squared poverty gap ( $P^{\alpha=2}$ ) but with an intuitive interpretation
- expected time taken to exit poverty under ideal conditions of constant and uniform growth rate
- maps cross-sectional information on distribution of consumption distribution into time units
  - Require panel data to study actual exit time, which will always be higher due to volatile and unevenly distributed growth rate
- Sensitive to inequality amongst the poor, which increases the average exit time

# Example showing sensitivity to inequality of average exit time measure



# Changing Severity of Poverty

(Average Exit Time Amongst the Poor in Port Moresby)



Statistically significant increase ( $p < 0.05$ ) from 1986 to 1996, but no change from 1996 to 2010

# Changing patterns of urban poverty

- Poverty in Port Moresby initially worsened from 1986-1996 because the poor fell further behind
  - Decompositions show that it was due to rising inequality rather than failure of real growth as experienced at the mean
- Poverty in Port Moresby further worsened from 1996-2010 because a larger proportion joined the poor
  - Real incomes near the mean stagnating due to rapid rise in prices
- Change in the poverty profile also reflects this shift
  - In UHS risk of poverty was 1.8 for households whose head had no economic activity, and 0.9 for those with an employed head in either the formal or the informal sector (no informality penalty)
  - In HIES, risk of poverty is 1.3 for households with inactive head and households whose head is in the informal sector and 0.9 for households whose head has a formal sector wage job or business
  - ➔ Only formal sector employment provided protection against poverty by 2010 (buffering against price rises)

# Conclusions

- no evidence of any decline in poverty in PNG between 1996 and 2009/10
  - Evidence base for temporal poverty comparisons in PNG is weak
    - due especially to lack of price data for comparing cost of living over time and space
- Firmer (and longer term) evidence available for Port Moresby
  - Poverty has recently become more widespread, previously it became more severe
    - Rapidly rising costs of living are major contributor