Module 2a:
Benefit Incidence Analysis

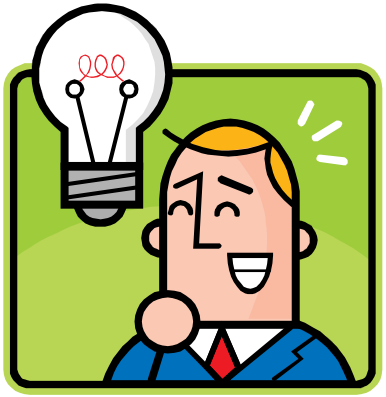
This presentation was prepared by Adam Wagstaff and Caryn Bredenkamp

ADePT

BIA in ADePT in a nutshell

- BIA asks whether the poor or better off (disproportionately) benefit from GHE
- It calls for
  - HH data on utilization of different provider types, and
  - NHA data on unit subsidies for the same provider types
- ADePT shows
  - how much each income/wealth/consumption quintile benefits from GHE, and
  - how pro-poor or pro-rich GHE is overall

The basic idea



ADePT

The basic idea

- Governments seem to want subsidies to the health sector (i.e. government health spending (GHE)) to disproportionately benefit the poor—or at least not disproportionately benefit the better off
- Benefit-incidence analysis (BIA) tries to allocate GHE across households to see whether it's the poor or better off who benefit disproportionately

ADePT

The idea of BIA

Ministry of Health

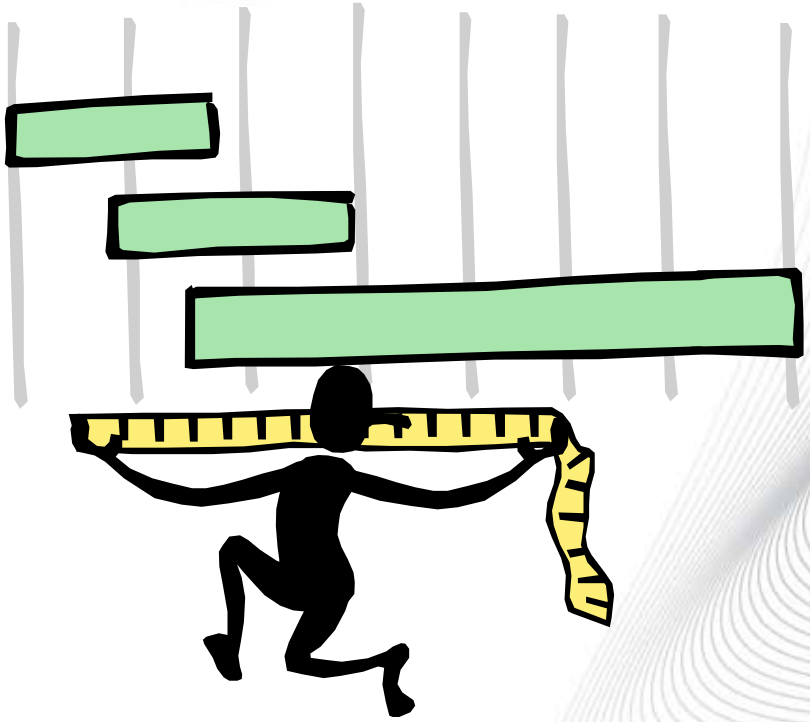
$

$$

$$$$

ADePT

Let’s get measuring!



ADePT

The challenge

- Household surveys don't record GHE at the household level. A BIA has to impute subsidies using observed data on:
  - utilization (and, under some assumptions, fees too) at the household level, and
  - GHE at the aggregate level
- Different assumptions require different data

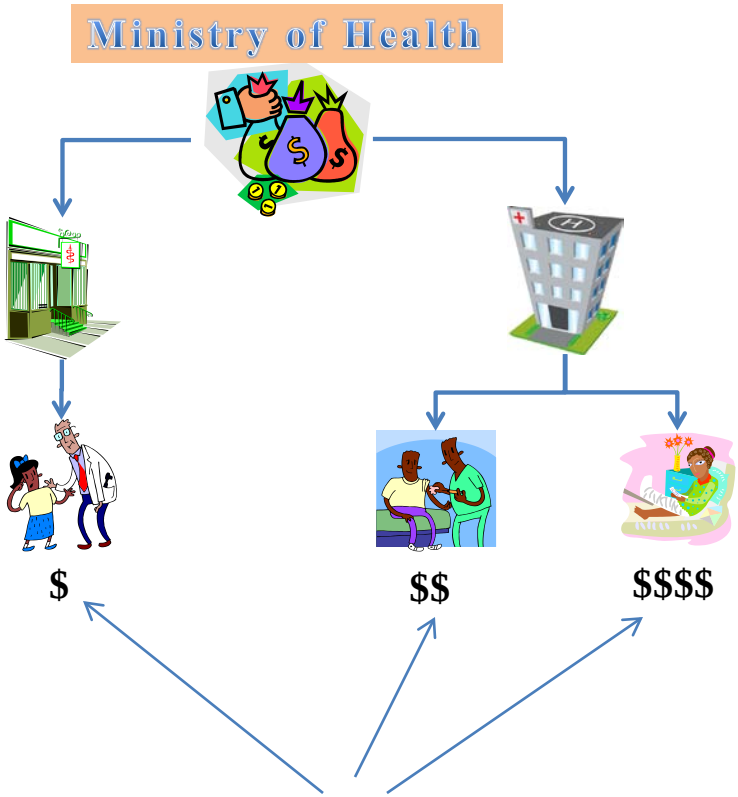
The constant unit subsidy (CUS) assumption

- The simplest assumption is that the subsidy per unit of utilization is constant:
  - E.g. the subsidy for each outpatient visit at a health center is $10
  - E.g. the subsidy for each inpatient admission is $500
- This means that the subsidies a person gets from e.g. inpatient admissions = 500 x # IP admissions

ADePT

Data for BIA

These data come from household survey



These data come from the NHA

Quintile	HH #	PHC visit	Hospital OP visit	IP admission
	1	2	1	0
	2	0	0	0
Poorest 20%	3	1	0	1
	...	...	...	...
	1500	3	2	0
	1501	1	1	1
	1502	0	1	0
2nd poorest	1503	0	0	1
	...	...	...	...
	3000	3	0	1
	3001	2	1	0
	3002	0	1	0
Middle 20%	3003	2	0	2
	...	...	...	...
	4500	0	0	2
	4501	1	1	0
	4502	0	0	0
2nd richest	4503	1	0	0
	...	...	...	...
	6000	0	2	1
	6001	1	3	1
	6002	0	2	0
Richest 20%	6003	2	2	0
	...	...	...	...
	7500	4	2	0

ADePT

Inequality under the constant unit subsidy assumption

- Under CUS, inequality in subsidies for IP admissions = inequality in IP admissions
  - i.e. CI for subsidies for IP admissions = CI for IP admissions
- Reason is that
  - $\text{subsidies}_i = (\text{unit subsidy}) \times \text{utilization}_i$
- Inequality in subsidies is same as inequality in utilization
  - just like income inequality stays the same if we multiply everyone's income by the same amount

ADePT

Assessing inequality in total subsidies

- Whatever assumption we make in BIA, we'll want to get the CI for total subsidies, i.e. subsidies across all provider types (i.e. GHE!)
- This is easily calculated as a weighted average of the CI's of the individual subsectors, where the weights are the shares of total subsidies going to each provider type
- E.g. with just two provider types (HC = health center visit; IP = inpatient admission), the CI for subsidies equals:

$$CI_{SUBS} = s_{HC}\, CI_{HC} + s_{IP}\, CI_{IP}$$

ADePT

How to do it in ADePT?

ADePT

What ADePT does

- ADePT produces tables showing the distribution across living-standards groups (e.g. quintiles of per capita consumption) of:
  - Utilization (by subsector), and
  - Subsidies (by provider type and in total)
- ADePT also computes the concentration indices for subsidies for each provider type, and for total subsidies
- Finally ADePT generates charts showing the concentration curves for subsidies for each provider type, and for total subsidies

ADePT

What ADePT asks for

- If we assume constant unit subsidies, ADePT asks only for:
  - Household survey data on:
    - Utilization by subsector for each household member (or a representative household member)
    - Living standards for each household (we need only a ranking variable)
  - Total govt. expenditure on health (i.e. subsidies), broken down by provider type (you can get these from the NHA)
- Assumptions other than the constant unit subsidy assumption call for household data on fees paid to public providers

ADePT

Vietnam as an example

- We have 4 subsectors:
  - 3 outpatient (commune health center, polyclinic, and general hospital), and 1 inpatient (general hospital)
- Vietnam's NHA contains GHE by inpatient vs. outpatient, and by type of provider in the case of outpatients
- For the household data, we use data from the 2006 Vietnam household survey—a multipurpose household survey
  - Each household member was asked:
  - the # of outpatient visits in the last 12 months broken down by provider type, and
  - the # of inpatient admissions

ADePT

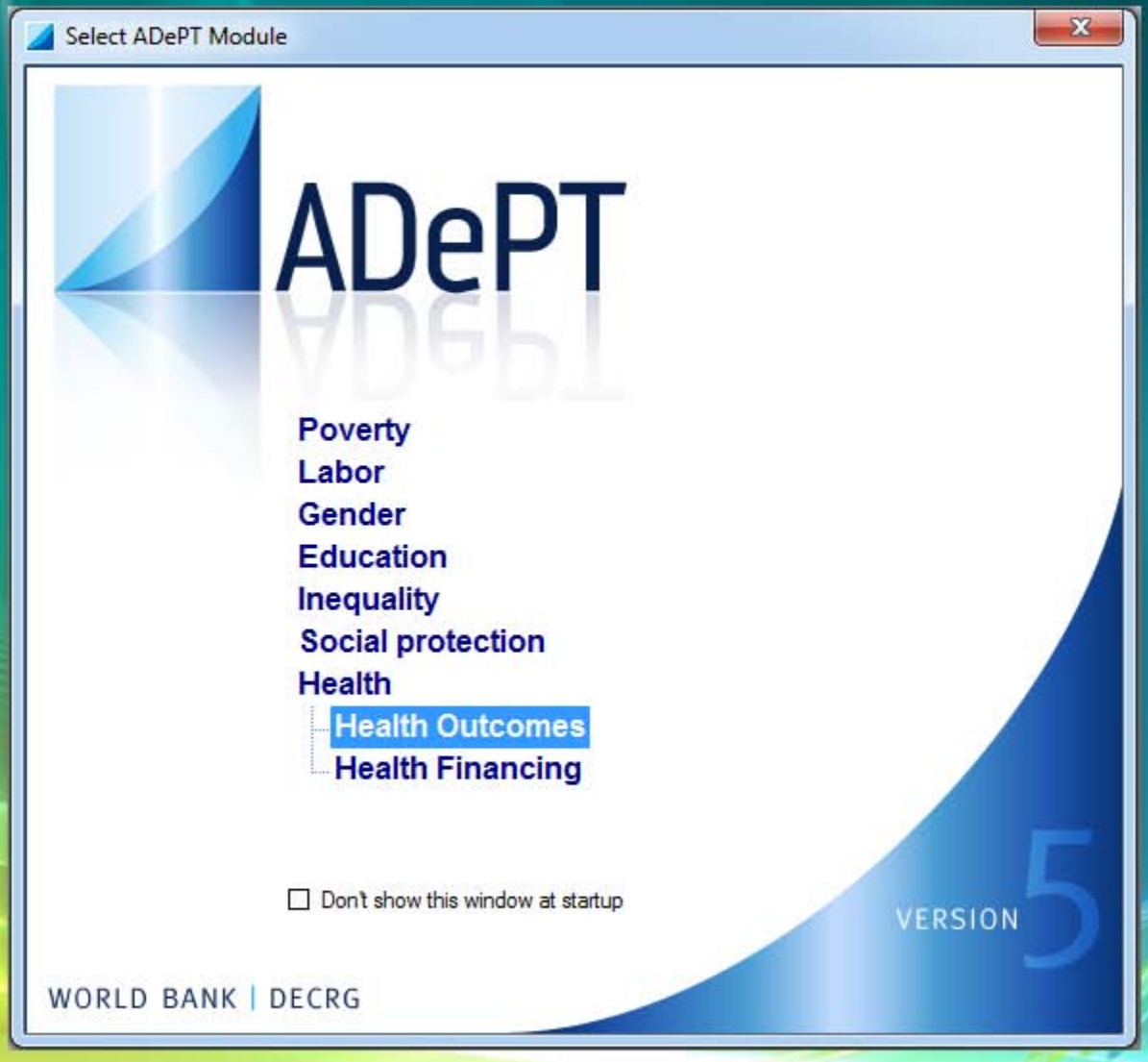
Before opening ADePT

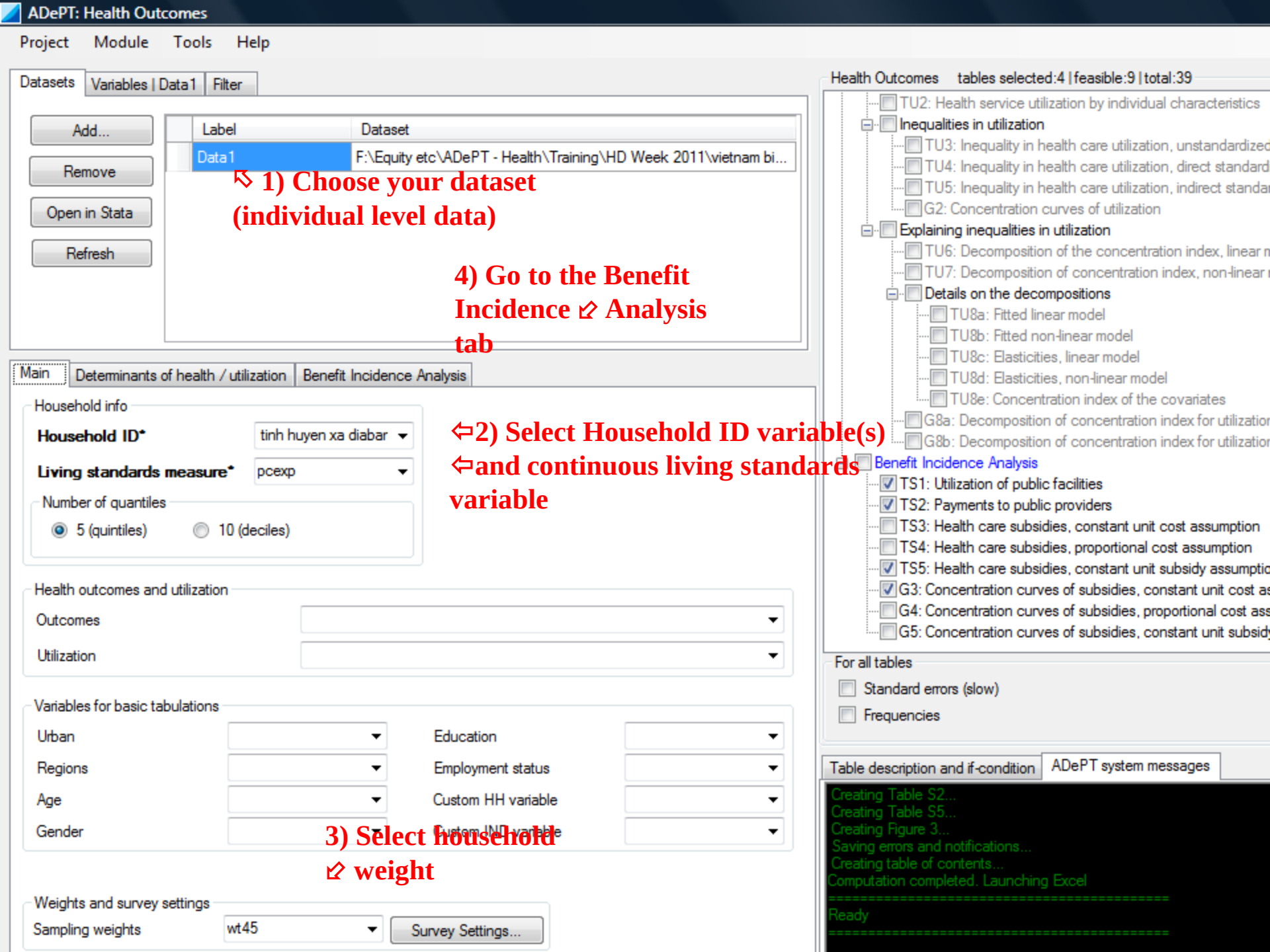
Go to the NHA and obtain GHE by subsector

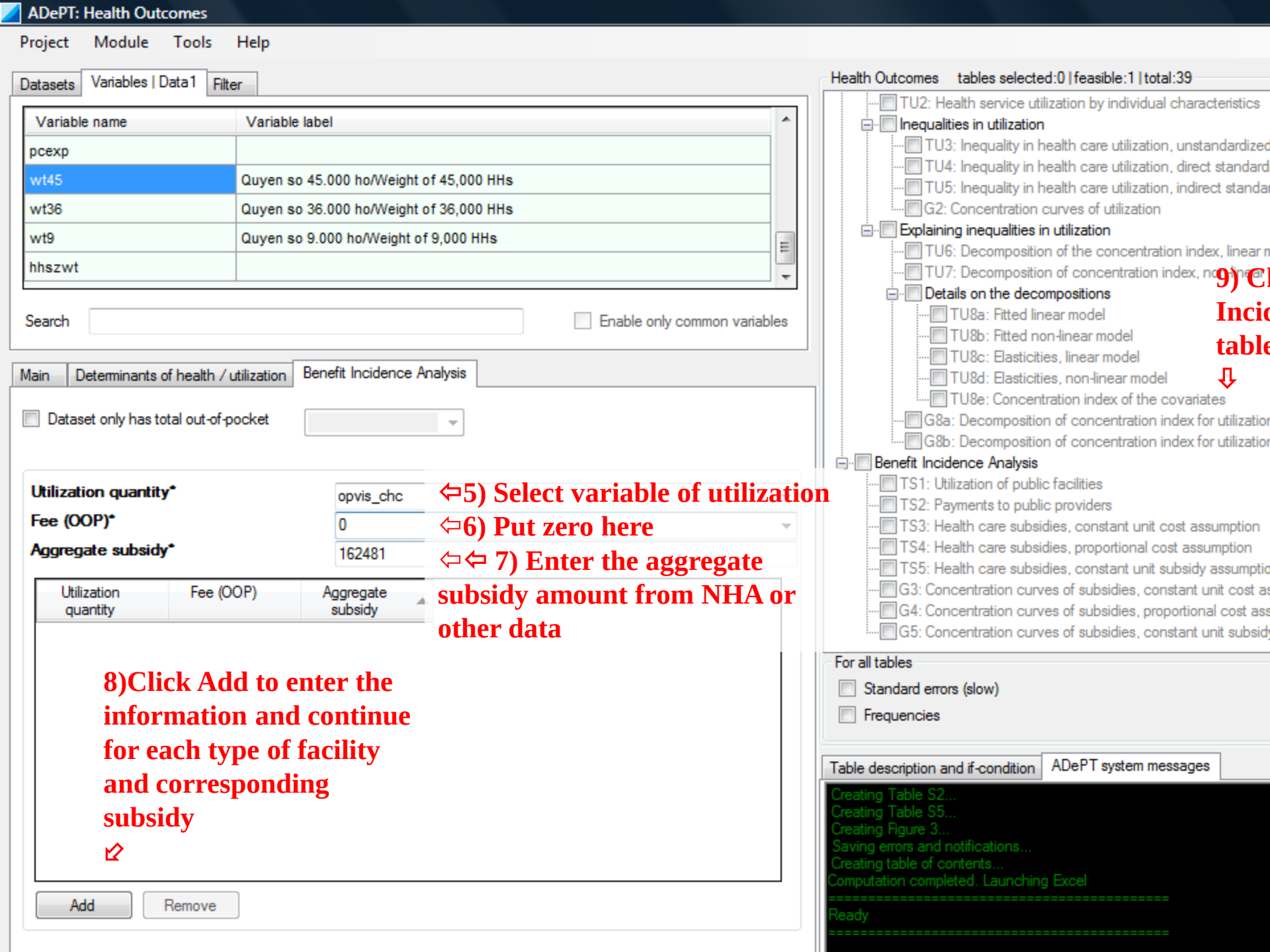
Vietnam example

Subsector	GHE (millions of Dong)
Outpatient (commune)	162,481
Outpatient (polyclinic)	21,898
Outpatient (hospital)	3,971,381
Inpatient (hospital)	3,276,459

ADePT


Select ADePT Module
ADePT
Poverty
Labor
Gender
Education
Inequality
Social protection
Health
Health Outcomes
Health Financing
Don't show this window at startup
VERSION 5
WORLD BANK | DECRG


ADePT: Health Outcomes
Project
Module
Tools
Help
Datasets
Variables | Data1
Filter
Add...
Remove
Open in Stata
Refresh
Label
Dataset
Data1
F:\Equity etc\ADePT - Health\Training\HD Week 2011\vietnam bi...
1) Choose your dataset (individual level data)
4) Go to the Benefit Incidence Analysis tab
Main
Determinants of health / utilization
Benefit Incidence Analysis
Household info
Household ID*
tinh huyen xa diabar
Living standards measure*
pcexp
Number of quantiles
5 (quintiles)
10 (deciles)
2) Select Household ID variable(s) and continuous living standards variable
Health outcomes and utilization
Outcomes
Utilization
Variables for basic tabulations
Urban
Regions
Age
Gender
Education
Employment status
Custom HH variable
Custom IND variable
3) Select household weight
Weights and survey settings
Sampling weights
wt45
Survey Settings...
Health Outcomes
tables selected:4 | feasible:9 | total:39
TU2: Health service utilization by individual characteristics
Inequalities in utilization
TU3: Inequality in health care utilization, unstandardized
TU4: Inequality in health care utilization, direct standard
TU5: Inequality in health care utilization, indirect standar
G2: Concentration curves of utilization
Explaining inequalities in utilization
TU6: Decomposition of the concentration index, linear
TU7: Decomposition of concentration index, non-linear
Details on the decompositions
TU8a: Fitted linear model
TU8b: Fitted non-linear model
TU8c: Elasticities, linear model
TU8d: Elasticities, non-linear model
TU8e: Concentration index of the covariates
G8a: Decomposition of concentration index for utilizatio
G8b: Decomposition of concentration index for utilizatio
Benefit Incidence Analysis
TS1: Utilization of public facilities
TS2: Payments to public providers
TS3: Health care subsidies, constant unit cost assumption
TS4: Health care subsidies, proportional cost assumption
TS5: Health care subsidies, constant unit subsidy assumptio
G3: Concentration curves of subsidies, constant unit cost as
G4: Concentration curves of subsidies, proportional cost ass
G5: Concentration curves of subsidies, constant unit subsid
For all tables
Standard errors (slow)
Frequencies
Table description and if-condition
ADePT system messages
Creating Table S2...
Creating Table S5...
Creating Figure 3...
Saving errors and notifications...
Creating table of contents...
Computation completed. Launching Excel
Ready


ADePT: Health Outcomes
Project
Module
Tools
Help
Datasets
Variables | Data1
Filter
Variable name
Variable label
pcexp
wt45
Quyen so 45.000 ho/Weight of 45,000 HHs
wt36
Quyen so 36.000 ho/Weight of 36,000 HHs
wt9
Quyen so 9.000 ho/Weight of 9,000 HHs
hhszwt
Search
Enable only common variables
Main
Determinants of health / utilization
Benefit Incidence Analysis
Dataset only has total out-of-pocket
Utilization quantity*
opvis_chc
Fee (OOP)*
0
Aggregate subsidy*
162481
Utilization quantity
Fee (OOP)
Aggregate subsidy
Add
Remove
⇦5) Select variable of utilization
⇦6) Put zero here
⇦⇦ 7) Enter the aggregate subsidy amount from NHA or other data
8)Click Add to enter the information and continue for each type of facility and corresponding subsidy
Health Outcomes
tables selected:0 | feasible:1 | total:39
TU2: Health service utilization by individual characteristics
Inequalities in utilization
TU3: Inequality in health care utilization, unstandardized
TU4: Inequality in health care utilization, direct standard
TU5: Inequality in health care utilization, indirect standar
G2: Concentration curves of utilization
Explaining inequalities in utilization
TU6: Decomposition of the concentration index, linear
TU7: Decomposition of concentration index,
Details on the decompositions
TU8a: Fitted linear model
TU8b: Fitted non-linear model
TU8c: Elasticities, linear model
TU8d: Elasticities, non-linear model
TU8e: Concentration index of the covariates
G8a: Decomposition of concentration index for utilizatio
G8b: Decomposition of concentration index for utilizatio
Benefit Incidence Analysis
TS1: Utilization of public facilities
TS2: Payments to public providers
TS3: Health care subsidies, constant unit cost assumption
TS4: Health care subsidies, proportional cost assumption
TS5: Health care subsidies, constant unit subsidy assumptio
G3: Concentration curves of subsidies, constant unit cost as
G4: Concentration curves of subsidies, proportional cost ass
G5: Concentration curves of subsidies, constant unit subsid
9) C
Incid
table
⇩
For all tables
Standard errors (slow)
Frequencies
Table description and if-condition
ADePT system messages
Creating Table S2...
Creating Table S5...
Creating Figure 3...
Saving errors and notifications...
Creating table of contents...
Computation completed. Launching Excel
Ready

Check your data

Original Data Report

	N	mean	min	max	p1	p50	p99	N_uniq
Data1								
tinh (Household ID)	**39,071**	**460.0**	**101.0**	**823.0**	**101.0**	**411.0**	**823.0**	**64**
huyen (Household ID)	**39,071**	**10.7**	**1.0**	**53.0**	**1.0**	**9.0**	**43.0**	**35.0**
xa (Household ID)	**39,071**	**18.2**	**1.0**	**95.0**	**1.0**	**15.0**	**63.0**	**57**
diaban (Household ID)	**39,071**	**10.1**	**1.0**	**105.0**	**1.0**	**8.0**	**42.0**	**59.0**
hoso (Household ID)	**39,071**	**14.6**	**13.0**	**25.0**	**13.0**	**14.0**	**20.0**	**10**
pcexp (Welfare aggregate)	**39,071**	**5,481.1**	**554.7**	**153,995.6**	**1,076.9**	**4,369.3**	**21,180.4**	**9,185.0**
wt45 (Household weights)	**39,071**	**422.2**	**93.4**	**927.5**	**115.4**	**401.2**	**870.7**	**2,079**
opvis_chc (Custom category 1)	**39,071**	**0.3**	**0.0**	**80.0**	**0.0**	**0.0**	**6.0**	**30.0**
opvis_poly (Custom category 2)	**39,071**	**0.0**	**0.0**	**40.0**	**0.0**	**0.0**	**1.0**	**19**
opvis_ghosp (Custom category	**39,071**	**0.4**	**0.0**	**52.0**	**0.0**	**0.0**	**6.0**	**32.0**
ipadm_ghosp (Custom category	**39,071**	**0.1**	**0.0**	**13.0**	**0.0**	**0.0**	**2.0**	**12**
generated (Household size)	**39,071**	**4.9**	**1.0**	**17.0**	**2.0**	**5.0**	**10.0**	**16.0**

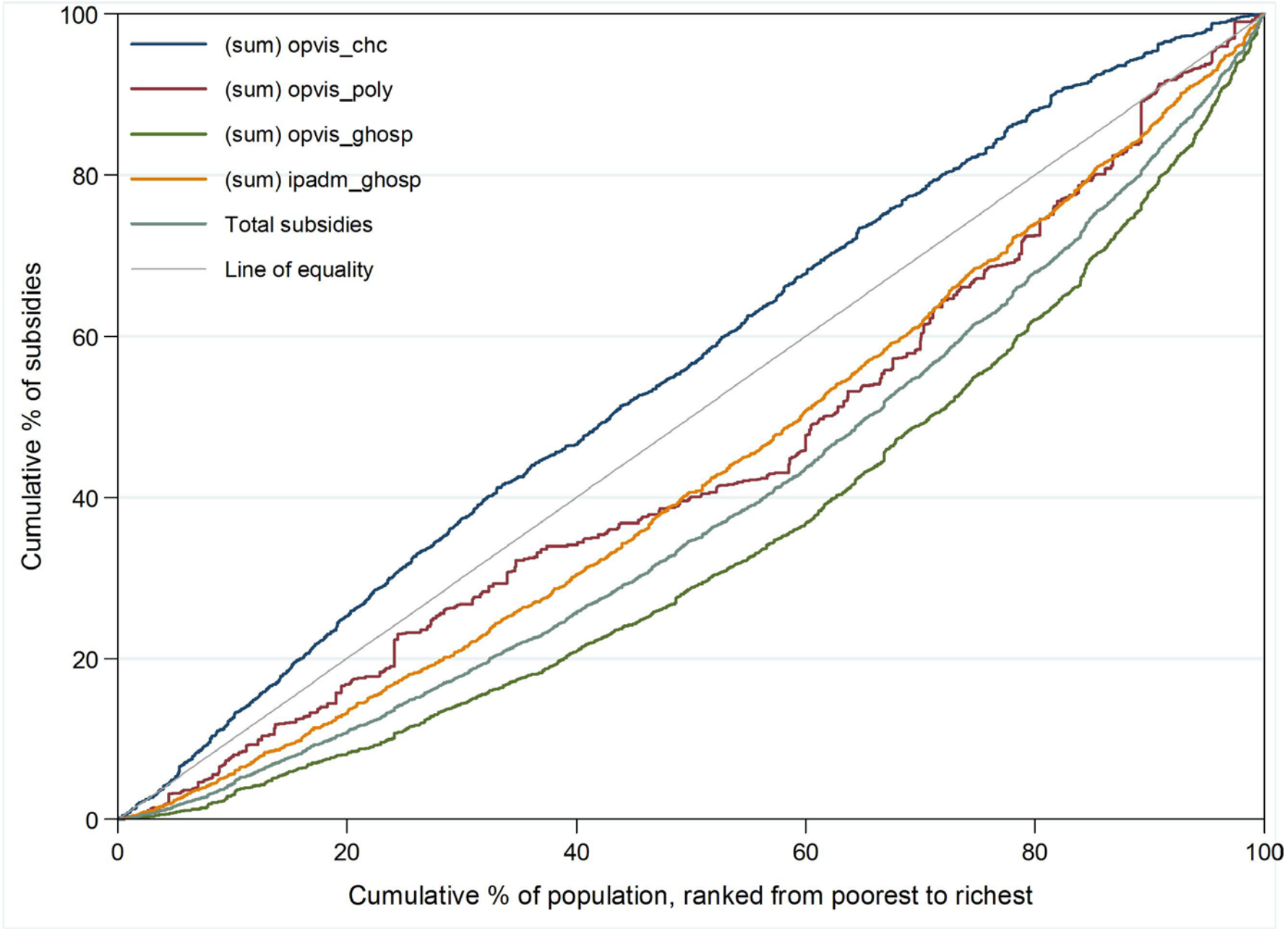
ADePT

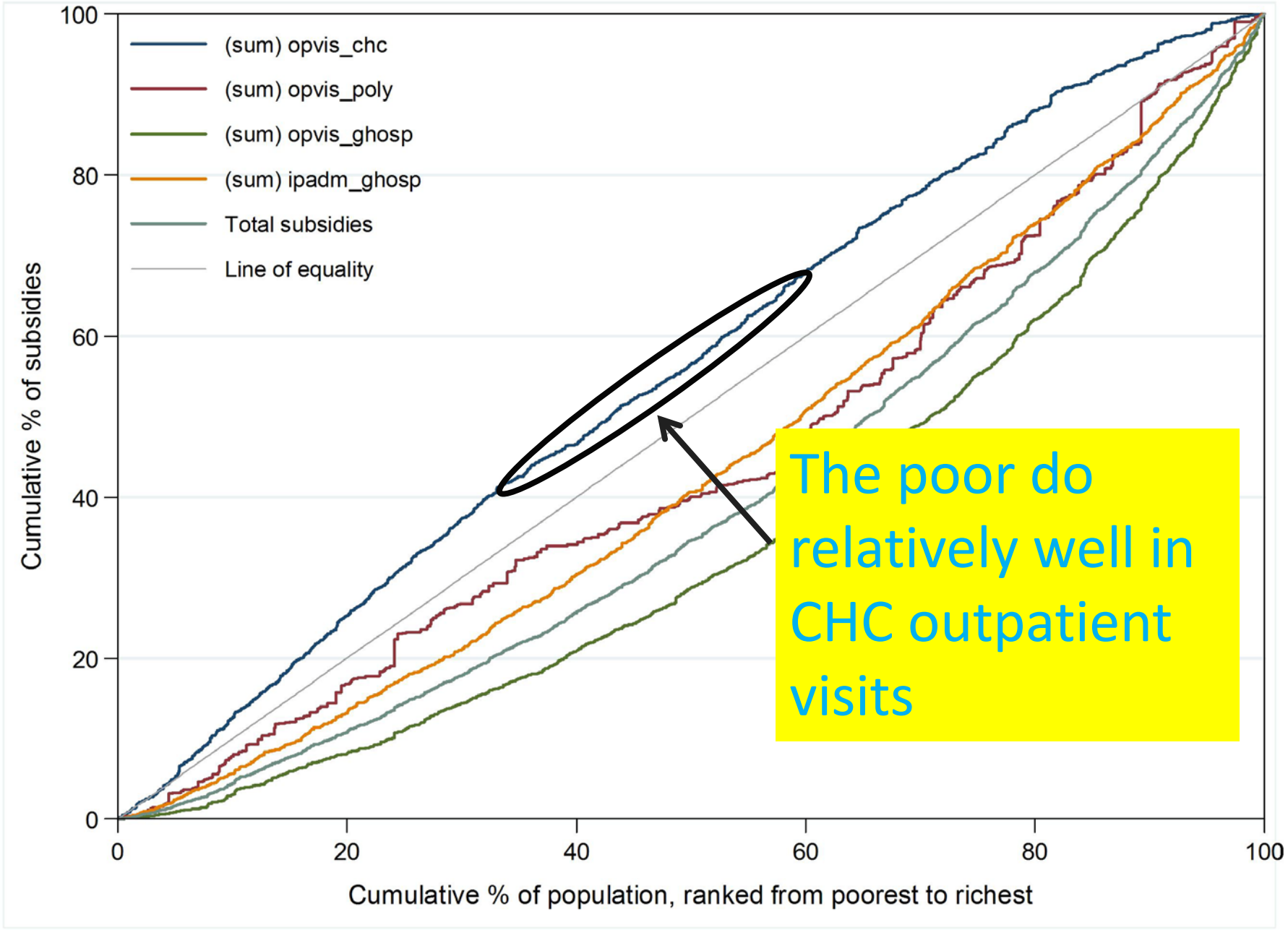
Table S1: Utilization of public facilities

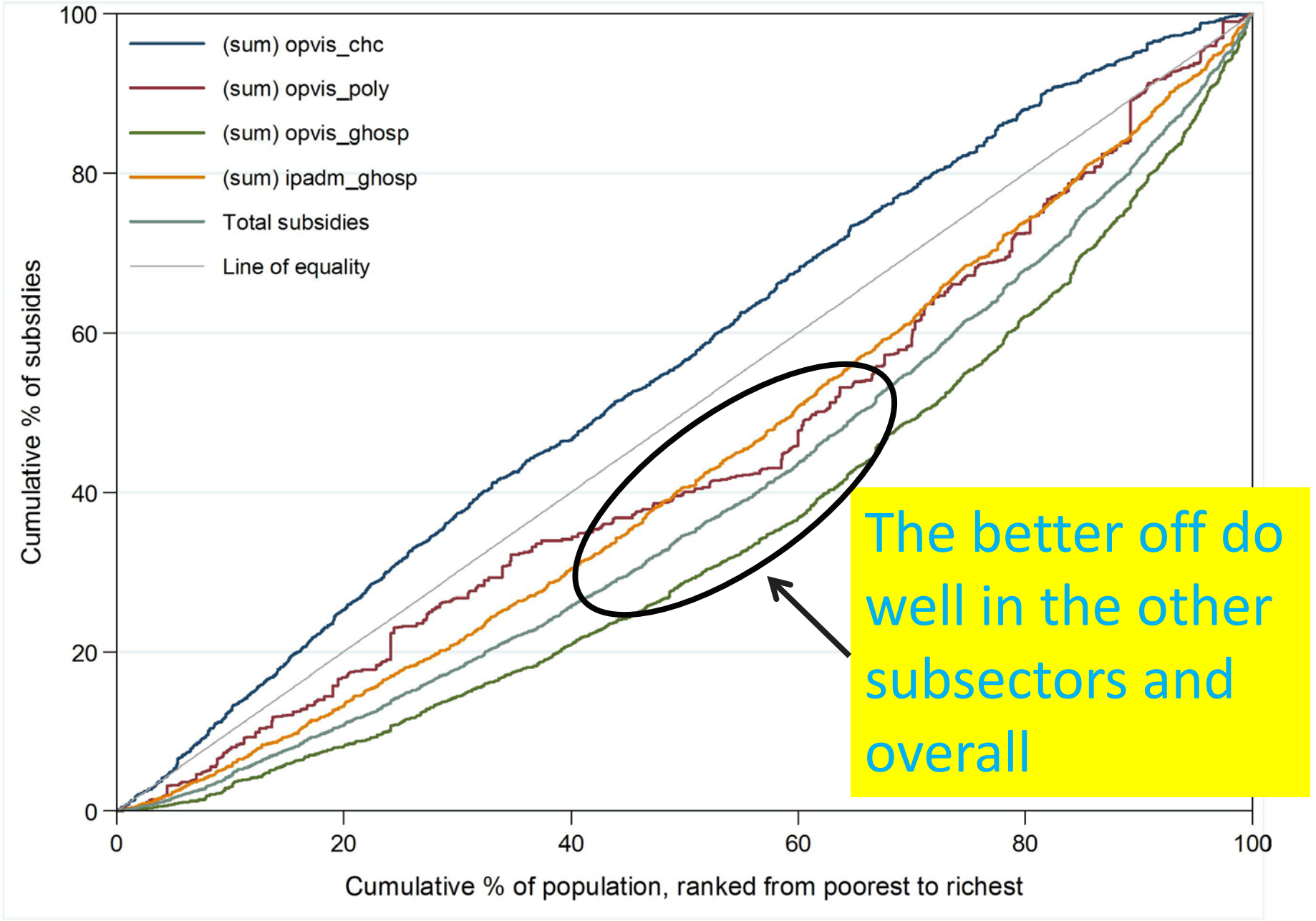
	(sum) opvis_chc	(sum) opvis_poly	(sum) opvis_ghosp	(sum) ipadm_ghosp
Means				
Lowest quintile	0.383	0.034	0.158	0.049
2	0.321	0.035	0.245	0.064
3	0.321	0.028	0.305	0.076
4	0.306	0.050	0.486	0.086
Highest quintile	0.180	0.056	0.730	0.096
Total	0.302	0.041	0.385	0.074
Shares				
Lowest quintile	25.3	16.8	8.2	13.2
2	21.3	17.3	12.7	17.1
3	21.2	13.6	15.9	20.4
4	20.3	24.7	25.3	23.3
Highest quintile	11.9	27.5	37.9	26.0
Total	100.0	100.0	100.0	100.0
Concentration index	-0.1167	0.1153	0.3050	0.1351

Table S5: Health care subsidies, constant unit subsidy assumption

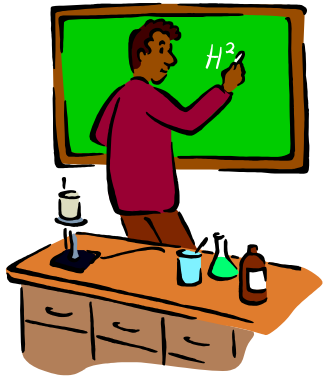
	(sum) opvis_chc	(sum) opvis_poly	(sum) opvis_ghosp	(sum) ipadm_ghosp	Total subsidies
Mean subsidy					
Lowest quintile	0.01	0.00	0.10	0.13	0.24
2	0.01	0.00	0.15	0.17	0.33
3	0.01	0.00	0.19	0.20	0.41
4	0.01	0.00	0.30	0.23	0.55
Highest quintile	0.01	0.00	0.46	0.26	0.72
Total	0.01	0.00	0.24	0.20	0.45
Shares					
Lowest quintile	25.3	16.8	8.2	13.2	10.8
2	21.3	17.3	12.7	17.1	14.9
3	21.2	13.6	15.9	20.4	18.0
4	20.3	24.7	25.3	23.3	24.3
Highest quintile	11.9	27.5	37.9	26.0	32.1
Total	100.0	100.0	100.0	100.0	100.0
Share in the total subsidy	2.2	0.3	53.4	44.1	100.0
Concentration index	-0.1167	0.1153	0.3050	0.1351	0.2204


(sum) opvis_chc
(sum) opvis_poly
(sum) opvis_ghosp
(sum) ipadm_ghosp
Total subsidies
Line of equality
Cumulative % of subsidies
0
20
40
60
80
100
Cumulative % of population, ranked from poorest to richest

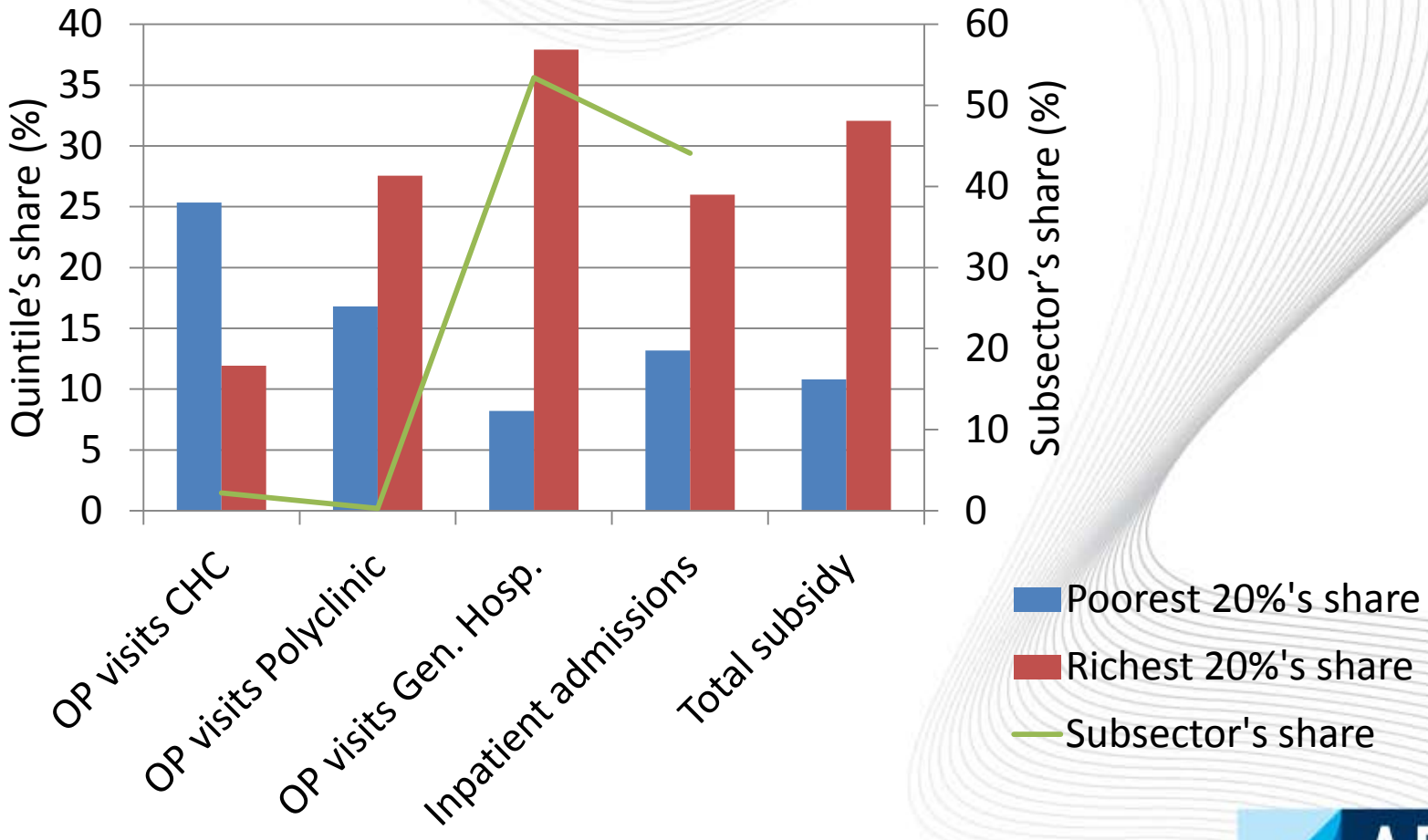

(sum) opvis_chc
(sum) opvis_poly
(sum) opvis_ghosp
(sum) ipadm_ghosp
Total subsidies
Line of equality
Cumulative % of subsidies
0
20
40
60
80
100
Cumulative % of population, ranked from poorest to richest
The poor do relatively well in CHC outpatient visits


(sum) opvis_chc
(sum) opvis_poly
(sum) opvis_ghosp
(sum) ipadm_ghosp
Total subsidies
Line of equality
Cumulative % of subsidies
0
20
40
60
80
100
Cumulative % of population, ranked from poorest to richest
The better off do well in the other subsectors and overall

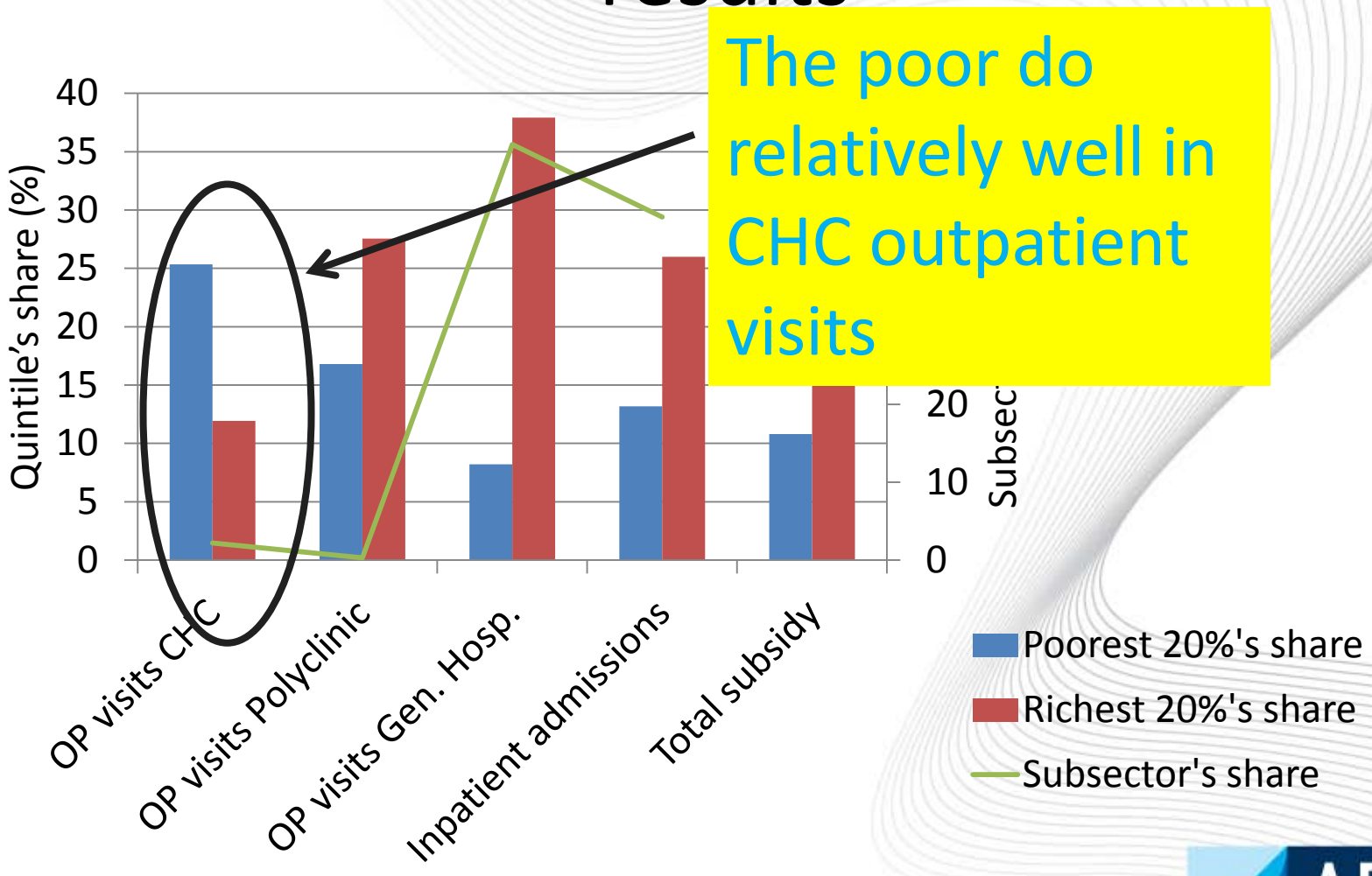
Presenting your results to policymakers



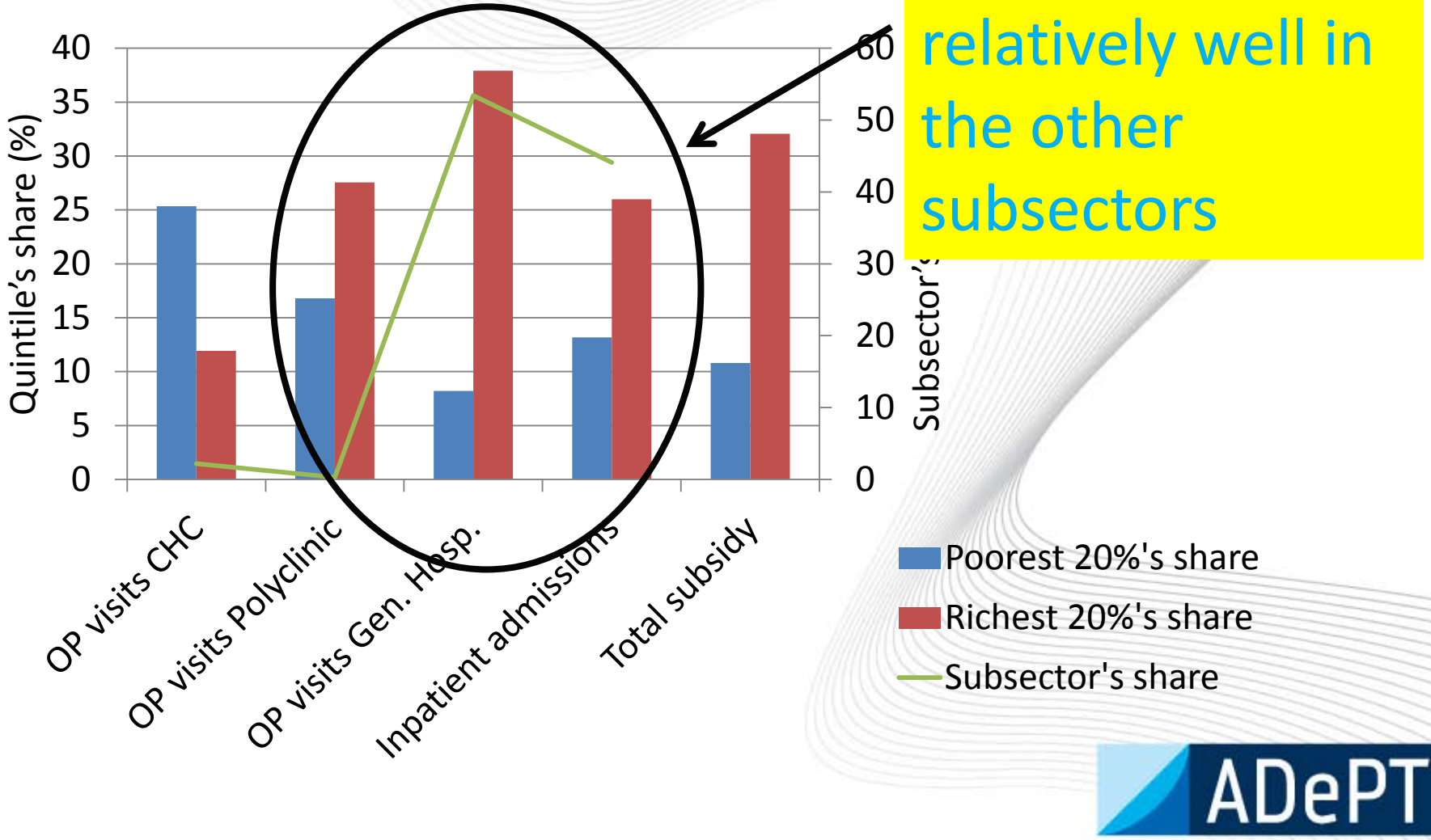
Charting and explaining your BIA results



Charting and explaining your BIA results



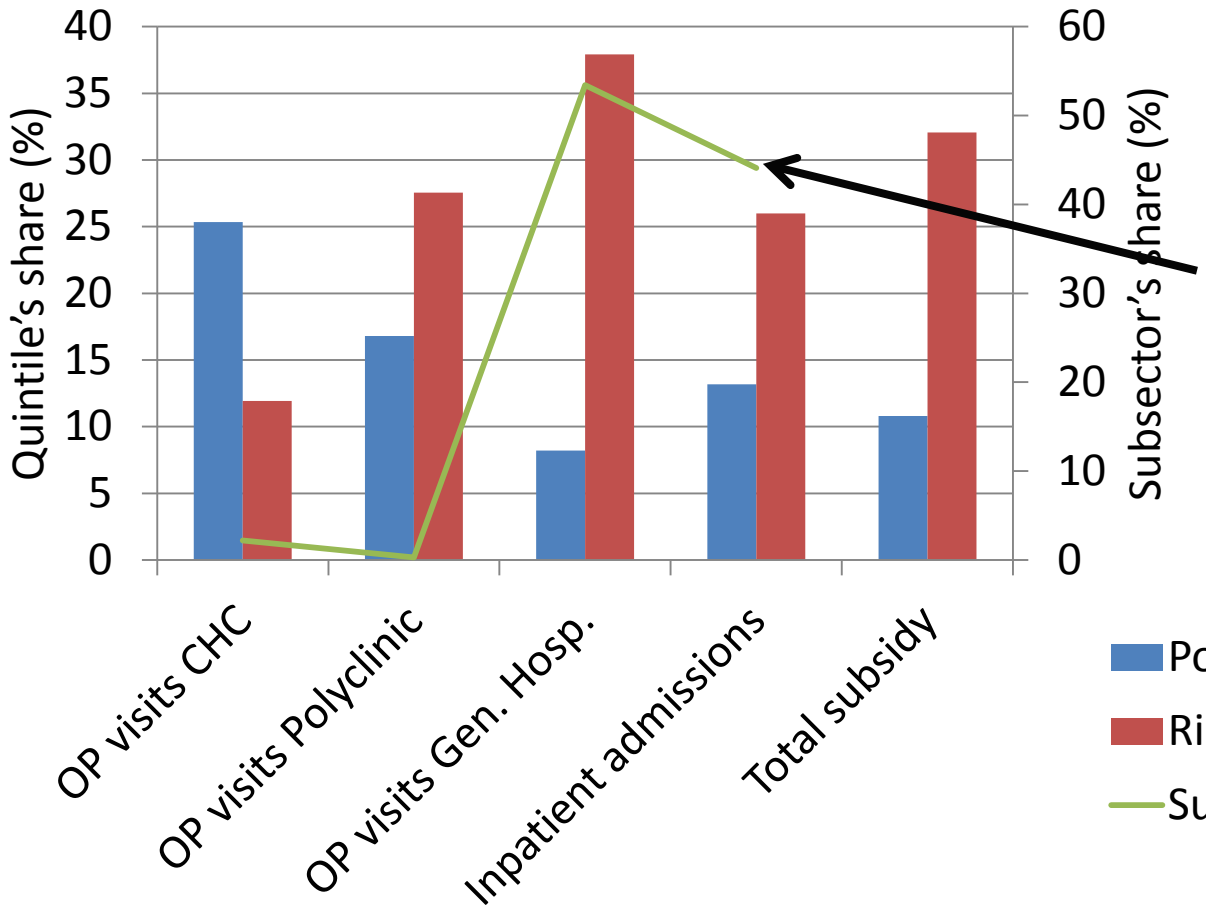
Charting and explaining your BIA results



The rich do relatively well in the other subsectors

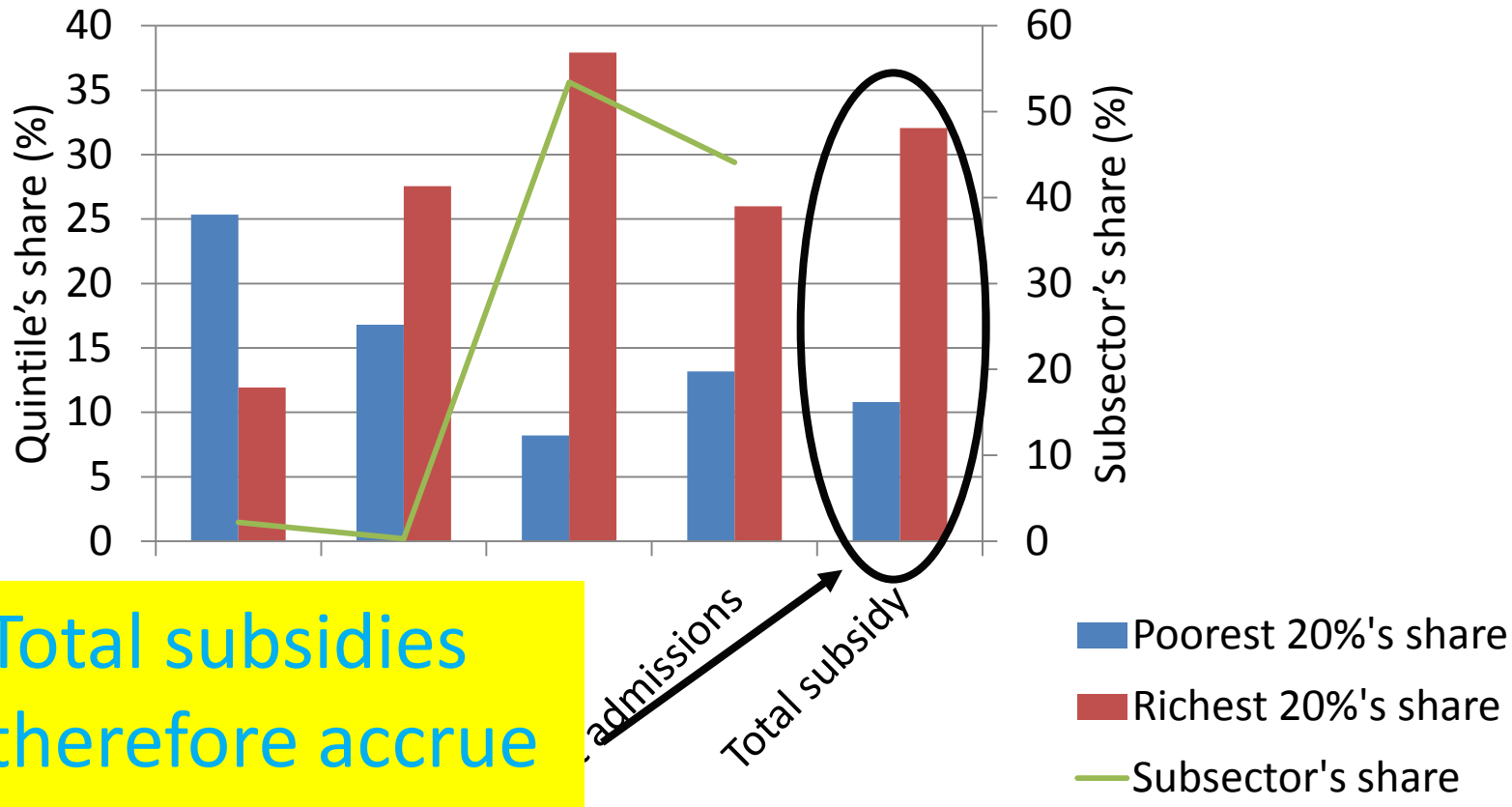
ADePT

Charting and explaining your BIA results



The bulk of GHE goes on hospitals—outpatients and inpatients

Charting and explaining your BIA results



Total subsidies therefore accrue disproportionally to the better off

Policy levers-i

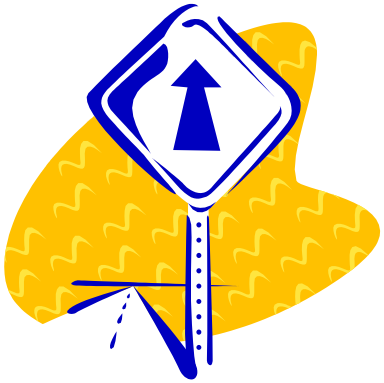
- BIA points to two types of policy lever:
  1. Making subsectors more pro-poor or less pro-rich, e.g. via demand-side programs (insurance, CCT's) that disproportionately raise health or utilization levels among the poor
  2. Shifting GHE to subsectors that are more pro-poor
- BIA results give a sense of how the pro-poorness of GHE would change following each type of intervention
  - You can do some rough simulations in the ADePT output, changing the CI's for different subsectors, or changing the shares of total subsidies going to different subsectors

ADePT

Policy levers-ii

- Examples of programs making subsectors more pro-poor:
  - Brazil's Family Health program takes health care to poor communities through aggressive outreach, reducing inequalities in distance to provider
  - Cambodia HEFs and Vietnam's Health Care for the Poor scheme eliminate user fees for the poor (but make sure providers still get paid!), making income matter less
- Examples of a program that shifts GHE to subsectors that are more pro-poor
  - Multiple examples of infrastructure and HR investments focusing specifically on rural areas
- Example of a program that does both:
  - Several central and eastern European countries introduced gatekeeper systems, reducing self-referral by the better off, and also strengthening primary care

Where to go from here?



ADePT

Data sources for BIA

- For household data:
  - Multipurpose household surveys (e.g. LSMS), or health interview surveys, that capture:
    - Utilization by entire population, for all types of care, and of all types of facilities (DHS is too partial)
    - Quantity of utilization (allowing for multiple visits and admissions) not just whether utilization occurred (WHS is too limiting)
    - Household living standards, ideally with a detailed consumption module. A wealth measure would be ok too
- For GHE data:
  - NHA containing GHE by subsector (WHO NHA's do not contain this information)

ADePT

Know your data

- It is important to ensure that all utilization variables cover the same reference period. E.g. if outpatient visits have a 4-week reference period, and inpatient admissions have a 12-month reference period, you will need to adjust one of them so they cover the same period of time

ADePT

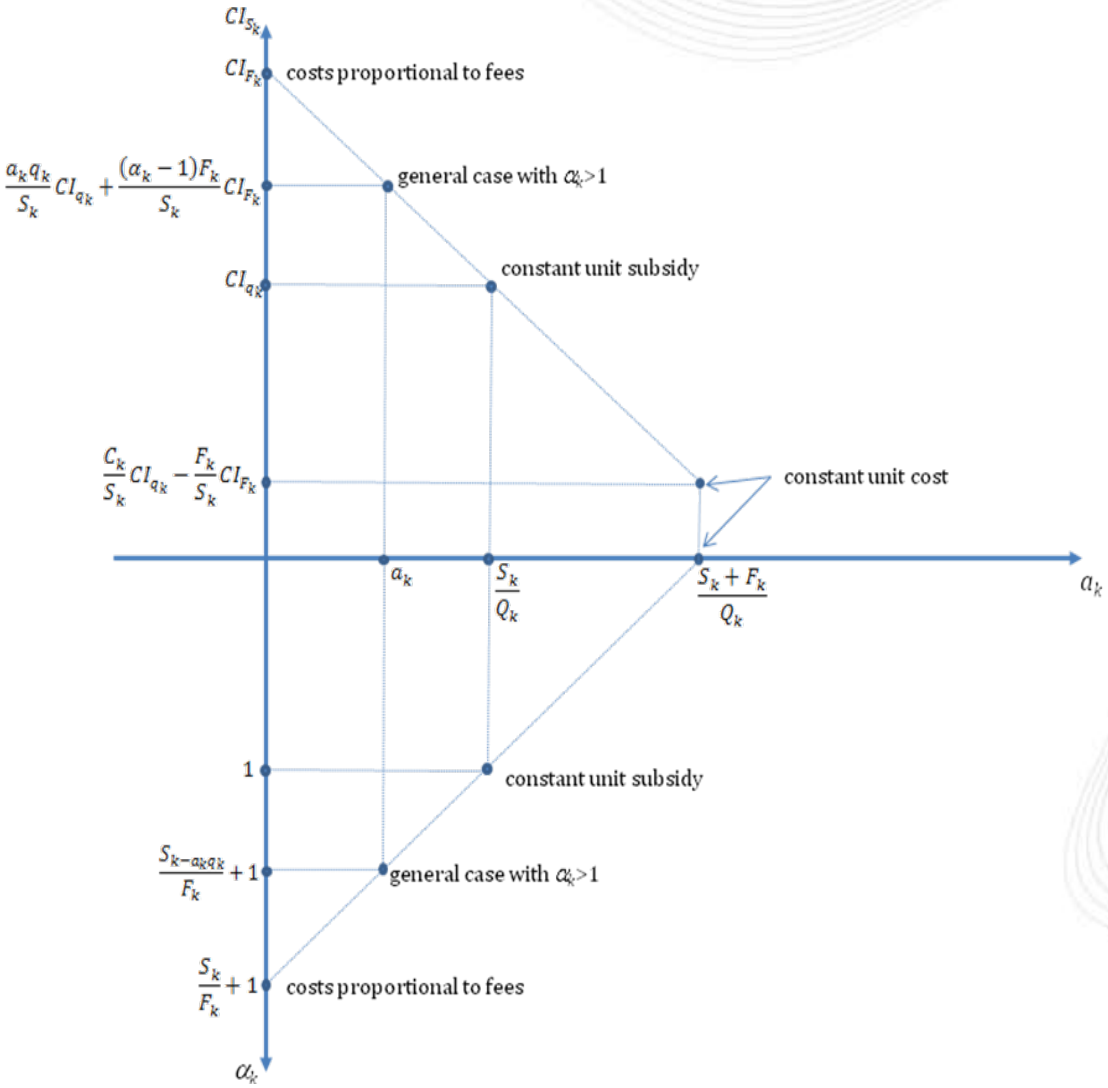
Alternative BIA assumptions

- We have:

  $S_{ki} = C_{ki} - F_{ki} = q_{ki}(c_{ki}-f_{ki}) = s_{ki}q_{ki}$
- Four different assumptions
  1. Constant unit subsidy: $s_{ki} = s_k$
  2. Constant unit cost: $c_{ki} = c_k$
  3. Fees are proportional to costs: $c_{ki} = \alpha_k f_{ki}$
  4. Fees are a linear function of costs: $c_{ki} = a_k + \alpha_k f_{ki}$
- Assumptions #3 and #4 get at the idea that higher fees (may) reflect more costly care
- The linear case (#4) nests the other three as special cases
- ADePT implements all 4 assumptions

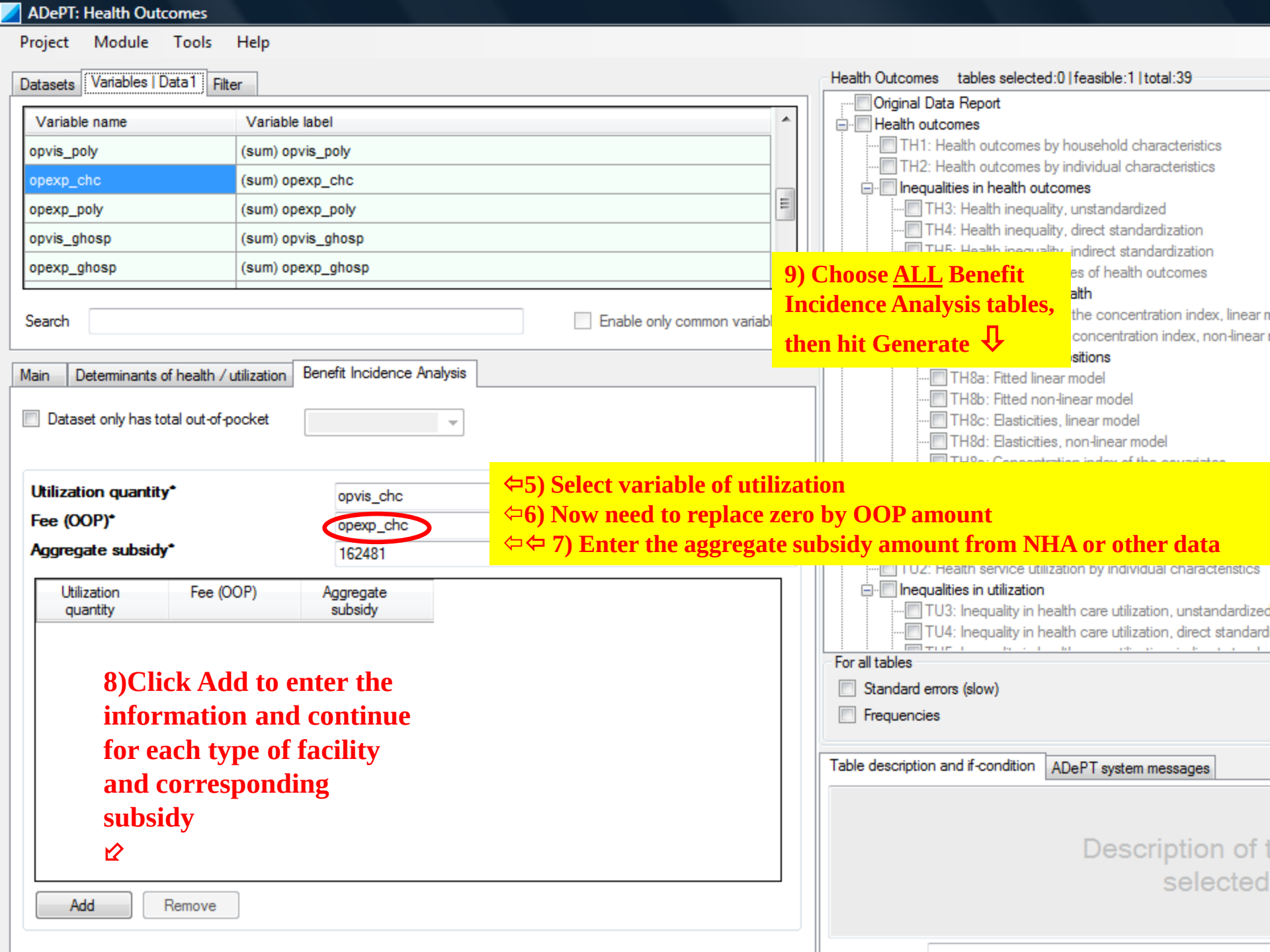
ADePT

Some assumptions make GHE look more pro-poor than others



NB: we need household data on out-of-pocket spending (F) for all cases except the constant unit subsidy assumption

ADePT


ADePT: Health Outcomes
Project
Module
Tools
Help
Datasets
Variables | Data1
Filter
Variable name
Variable label
opvis_poly
(sum) opvis_poly
opexp_chc
(sum) opexp_chc
opexp_poly
(sum) opexp_poly
opvis_ghosp
(sum) opvis_ghosp
opexp_ghosp
(sum) opexp_ghosp
Search
Enable only common variab
Health Outcomes
tables selected:0 | feasible:1 | total:39
Original Data Report
Health outcomes
TH1: Health outcomes by household characteristics
TH2: Health outcomes by individual characteristics
Inequalities in health outcomes
TH3: Health inequality, unstandardized
TH4: Health inequality, direct standardization
indirect standardization
es of health outcomes
alth
the concentration index, linear
concentration index, non-linear
sitions
TH8a: Fitted linear model
TH8b: Fitted non-linear model
TH8c: Elasticities, linear model
TH8d: Elasticities, non-linear model
9) Choose ALL Benefit Incidence Analysis tables, then hit Generate ⇩
Main
Determinants of health / utilization
Benefit Incidence Analysis
Dataset only has total out-of-pocket
Utilization quantity*
opvis_chc
Fee (OOP)*
opexp_chc
Aggregate subsidy*
162481
⇦5) Select variable of utilization
⇦6) Now need to replace zero by OOP amount
⇦⇦ 7) Enter the aggregate subsidy amount from NHA or other data
Utilization quantity
Fee (OOP)
Aggregate subsidy
8)Click Add to enter the information and continue for each type of facility and corresponding subsidy
Add
Remove
TU2: Health service utilization by individual characteristics
Inequalities in utilization
TU3: Inequality in health care utilization, unstandardized
TU4: Inequality in health care utilization, direct standard
For all tables
Standard errors (slow)
Frequencies
Table description and if-condition
ADePT system messages
Description of t
selected

Topics in BIA not covered today

- What to do with demand-side subsidies, e.g. payroll contributions and general-revenue subsidies to social health insurance programs
- For suggested methods, see A. Wagstaff (2011) “Benefit-incidence analysis: Are government health expenditures more pro-rich than we think?”, *Health Economics*

Related materials

- Guide to methods: Analyzing Health Equity Using Household Survey Data
- ADePT – Health Manual: Health Equity and Financial Protection
- Online video tutorials
- Health Equity and Financial Protection reports (ongoing)
- Health Equity and Financial Protection datasheets (ongoing)
- Book Attacking Inequality in the Health Sector
- Training events
- www.worldbank.org/povertyandhealth and www.worldbank.org/adept