

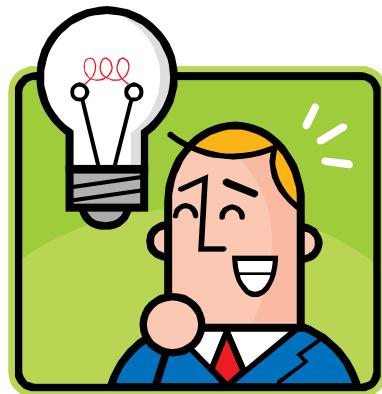
Module 1b:

Inequalities and inequities in health and health care utilization

Decomposition, standardization, and
inequity

This presentation was prepared by Adam Wagstaff, Caryn Bredenkamp and Sarah Bales

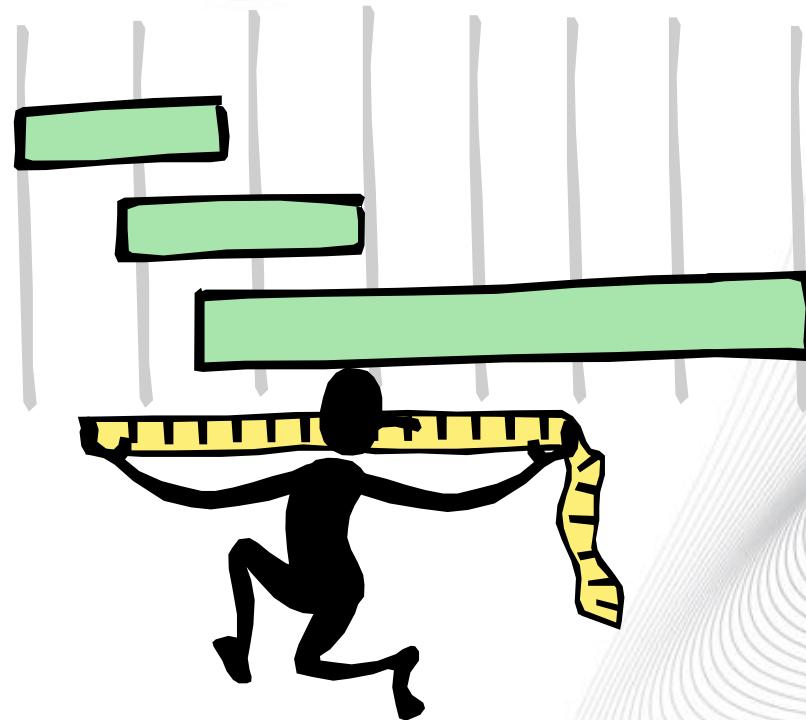
The basic idea



The basic idea

- Inequalities in outcomes (i.e. health or utilization) reflect inequalities in the determinants of outcomes
- This key point allows us to think about two (related) things:
 - How far inequalities are justifiable or unjustifiable (i.e. inequitable); and
 - The relative importance of (inequalities in) different determinants in explaining outcome inequities

Let's get measuring!

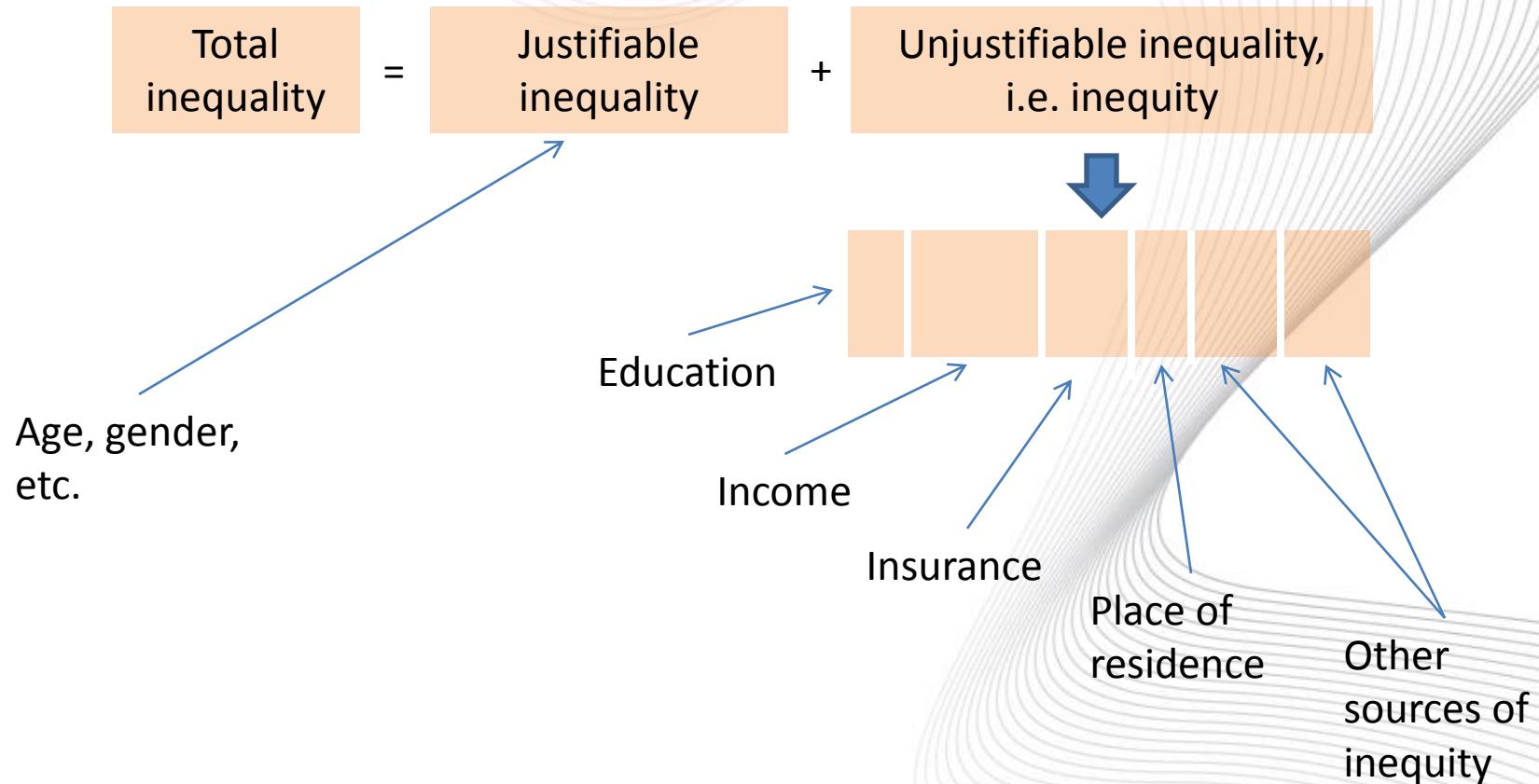


Distinguishing between justifiable and unjustifiable determinants

	Health outcomes	Utilization
Justifiable determinants ('standardizing' variables)—the X's	Age, gender	Need for health care, age, gender
Unjustifiable determinants—the Z's	Income, health insurance status, place of residence	Income, health insurance status, place of residence

You might be unsure whether a variable is an X (justified) or a Z (unjustified). Don't worry! ADePT makes it easy to see how your conclusions change depending which way you jump!

Decomposing inequalities—what we'd like to do



How to do it—in words

- We measure inequality via the concentration index (CI). (Remember this is negative when the outcome is more concentrated among the poor.)
- We assume the outcome (y) is linked to the X 's and the Z 's by a linear regression
- We can then show that the CI for y is linearly related to the CI's of the X 's and Z 's, where the “coefficients” on the CI's are the elasticities of y with respect to the X 's and Z 's

How to do it—in symbols

- For any linear model:

$$y_i = \alpha + \sum_j \beta_j x_{ji} + \sum_k \gamma_k z_{ki} + \varepsilon_i$$

x's are justifiable determinants or 'standardizing' variables
z's are unjustifiable determinants

- the concentration index for y can be written as:

$$C = \underbrace{\sum_j (\beta_j \bar{x}_j / \mu) C_j}_{\text{Justifiable inequality}} + \underbrace{\sum_k (\gamma_k \bar{z}_k / \mu) C_k}_{\text{Unjustifiable inequality, i.e. inequity}} + GC_\varepsilon / \mu$$

Total inequality = Justifiable inequality + Unjustifiable inequality, i.e. inequity

Some key points

- The terms in parentheses ($\beta\bar{x} / \mu$) can be thought of as elasticities, indicating the responsiveness of y to changes in the x or z
- The contribution to inequality of x 's and z 's (individually and collectively) depends on:
 1. The elasticity of the outcome with respect to the x or z ; and
 2. The degree of inequality in the x and z (measured by their concentration indexes C_x and C_z)
- So, an x or z that's highly unequal, and has a large elasticity, will be a big part of the explanation of inequality

$$C = \sum_j (\beta_j \bar{x}_j / \mu) C_j + \sum_k (\gamma_k \bar{z}_k / \mu) C_k + GC_\varepsilon / \mu$$



A tricky (but important) point

- Remember that a positive CI means that the variable is more concentrated among the better off, while a negative CI means it's more concentrated among the poor
- The elasticity can be positive or negative. So can the CI of the determinant
- So, a negative term in the decomposition could be because:
 - The elasticity is negative but the CI positive; or
 - The elasticity is positive but the CI is negative
- And a positive term in the decomposition could be because:
 - Both the elasticity and the CI are positive; or
 - Both the elasticity and the CI are negative
- Bottom line: *we need to know the elasticity and the CI of the determinant to make sense of the decomposition results*

$$C = \sum_j (\beta_j \bar{x}_j / \mu) C_j + \sum_k (\gamma_k \bar{z}_k / \mu) C_k + GC_\varepsilon / \mu$$

The link between decomposition and ‘standardization’

- Epidemiologists use ‘direct’ and ‘indirect’ standardization to adjust observed outcomes for differences between groups in standardizing variables
- What’s left after standardization we can think of as ‘inequity’
- We know that standardization can be done through regression
- A neat result: *If we do an indirect standardization, we get precisely the last term in the decomposition*

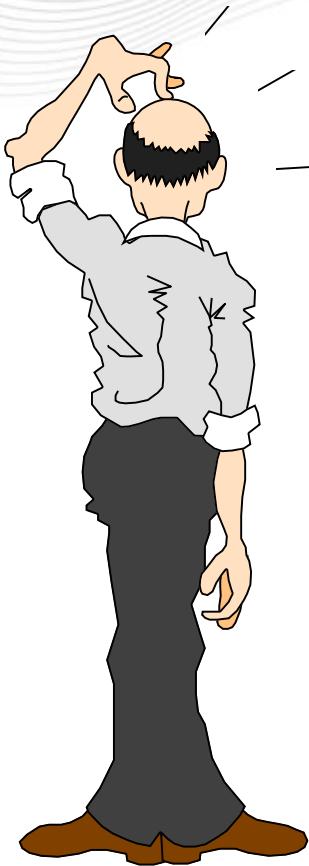
$$C = \sum_j (\beta_j \bar{x}_j / \mu) C_j + \sum_k (\gamma_k \bar{z}_k / \mu) C_k + GC_\varepsilon / \mu$$

Total
inequality

Justifiable
inequality

Unjustifiable inequality,
i.e. inequity

How to do it in ADePT?



What ADePT does

- ADePT produces the full decomposition results, allowing the user to:
 - Break down inequalities into justifiable inequalities and inequities
 - And decompose the causes of inequities so the contribution to inequality from each Z can be quantified
 - To facilitate interpretation, ADePT also outputs the elasticities for each X and Z (and their components) and the CI's of each X and Z
- Finally, ADePT produces a stacked bar chart showing the contribution to inequality from each X and Z

What ADePT asks for

- ADePT asks the user to indicate:
 - The outcome and/or utilization variables
 - The X's and the Z's
- You can play with the ADePT output, exploring the sensitivity of the inequity value to putting the variable(s) in the X rather than the Z

Select ADePT Module

ADePT

- Poverty
- Labor
- Gender
- Education
- Social protection
- Inequality
- Health
- Health Outcomes**
- Health Financing**

Don't show this window at startup

VERSION 4

INDIA (WHS)

Variable name	Variable label
hhid	Identification
pweight	sample weight
hhszie	number of household members
foodexp	food expenditures in last 4 weeks (Peso)
healthexp	health care expenditures in the last 4 weeks (Peso)

Search Enable only common variables

Main Determinants of health / utilization Benefit Incidence Analysis

Household info

Household ID*	<input type="text" value="hhid"/>
Living standards measure*	<input type="text" value="wealthscore"/>
Number of quantiles	<input checked="" type="radio"/> 5 (quintiles) <input type="radio"/> 10 (deciles)

Health outcomes and utilization

Outcomes	<input type="text" value="TB chest"/>
Utilization	<input type="text"/>

Variables for basic tabulations

Urban	<input type="text"/>	Education	<input type="text"/>
Regions	<input type="text"/>	Employment status	<input type="text"/>
Age	<input type="text"/>	Custom HH variable	<input type="text"/>
Gender	<input type="text"/>	Custom IND variable	<input type="text"/>

Weights and survey settings

Sampling weights Survey Settings...

Health Outcomes tables selected:0 | feasible:14 | 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
 - TH5: Health inequality, indirect standardization
 - G1: Concentration curves of health outcomes
- Explaining inequalities in health
 - TH6: Decomposition of the concentration index, linear model
 - TH7: Decomposition of concentration index, non-linear model
- Details on the decompositions
 - TH8a: Fitted linear model
 - TH8b: Fitted non-linear model
 - TH8c: Elasticities, linear model
 - TH8d: Elasticities, non-linear model
 - TH8e: Concentration index of the covariates
 - G7a: Decomposition of concentration index for health outcomes
 - G7b: Decomposition of concentration index for health services
- Health service utilization
 - TU1: Health service utilization by household characteristics
 - TU2: Health service utilization by individual characteristics
- Inequalities in utilization
 - TU3: Inequality in health care utilization, unstandardized
 - TU4: Inequality in health care utilization, direct standardization

For all tables

- Standard errors (slow)
- Frequencies

Table description and if-condition ADePT system messages

Description of the selected

Variable name	Variable label
hhid	Identification
pweight	sample weight
hhszie	number of household members
foodexp	food expenditures in last 4 weeks (Peso)
healthexp	health care expenditures in the last 4 weeks (Peso)

Search Enable only common variables

Main Determinants of health / utilization Benefit Incidence Analysis

Determinants of health

Standardizing (demographic) variables

(F3040 F4050 F5060 F60plus M1830 M3040 M4050 M5060 M60plus)

Control variables

i.education i.wealthquint insurone urban (employee selfem employer)

Determinants of utilization

Standardizing (need) variables

Control variables

Health Outcomes tables selected:5 | feasible:14 | total:39

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For all tables

Standard errors (slow)

Frequencies

Table description and if-condition ADePT system messages

Data Report presents information on variables selected for the analysis. It includes missing values, mean, minimum, maximum, percentiles, number of observations, and other statistics for each variable. The statistics are generated for variables in every dataset loaded.

Table H3: Health inequality, unstandardized

	symptoms of TB: coughing for more than two weeks & coughing blood		suffer from chest pain (1/0)
Quintiles of scores for asset index			
Lowest quintile	0.035	0.293	
2	0.030	0.253	
3	0.013	0.243	
4	0.017	0.225	
Highest quintile	0.008	0.176	
Total	0.021	0.238	
Standard concentration index	-0.278	-0.097	

Most of the inequality disfavoring the poor is not due to age and gender differences across wealth groups. Most of it's inequity

Table H5: Health inequality, indirect standardization

The totals (i.e. overall averages) differ because some cases have missing information in the X's or Z's

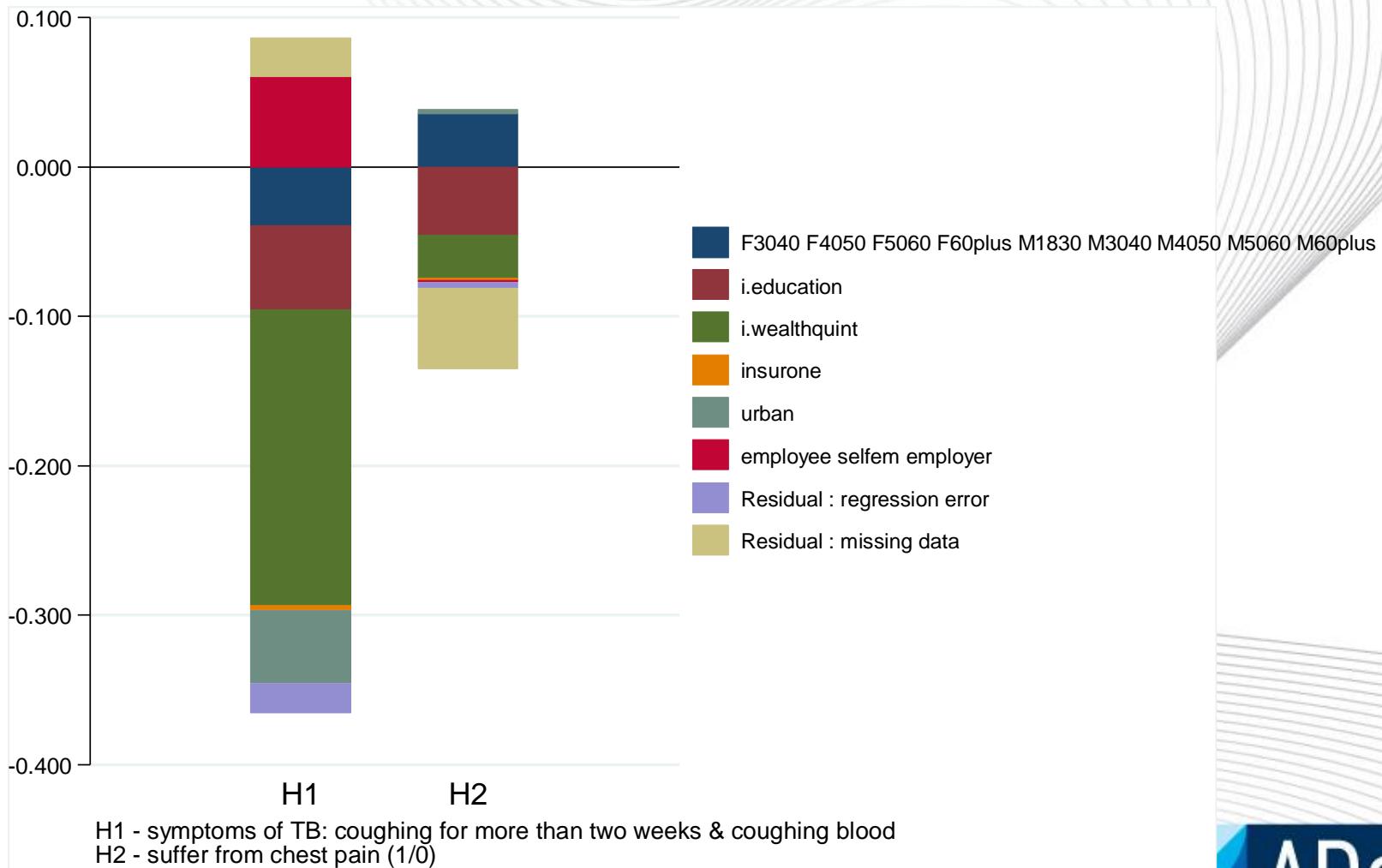
	symptoms of TB: coughing for more than two weeks & coughing blood	suffer from chest pain (1/0)
Quintiles of scores for asset index		
Lowest quintile	0.021	0.181
2	0.012	0.193
3	0.009	0.182
4	0.008	0.174
Highest quintile	0.006	0.136
Total	0.009	0.167
Standard concentration index	-0.264	-0.078

Inequalities in most Z's work to widen inequalities in health disfavoring the poor. The biggest contributors are inequalities in wealth and education

Table H6: Decomposition of the concentration index for health outcomes, linear model

	symptoms of TB: coughing for more than two weeks & coughing blood	suffer from chest pain (1/0)
Standardizing (demographic) variables		
F3040 F4050 F5060 F60plus M1830 M3040 M4050 M5060 M60plus	-0.039	0.036
Subtotal	-0.039	0.036
 Control variables		
i.education	-0.056	-0.046
i.wealthquint	-0.198	-0.029
insurone	-0.003	-0.001
urban	-0.049	0.003
employee selfem employer	0.060	-0.002
Subtotal	-0.246	-0.075
 Residual : regression error		
Residual : missing data	-0.019	-0.003
Inequality (total)	0.026	-0.054
 Inequity/Unjustified inequality	-0.278	-0.097
	-0.265	-0.078

Decomposing inequalities graphically



Probing to understand the decomposition results

Employment status and TB

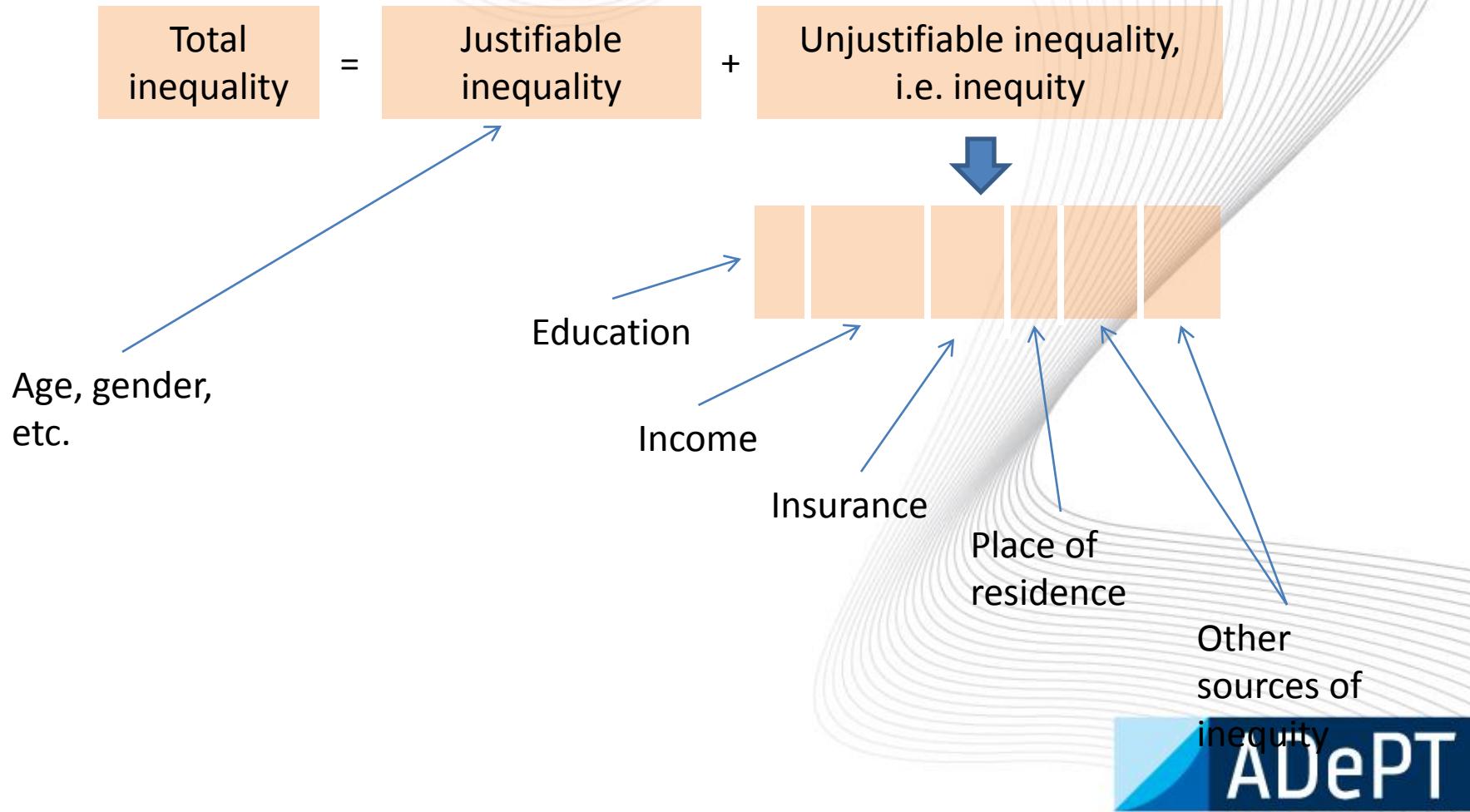
Employment category*	Elasticity	CI	Product
Respondent working as employee (1/0)	-0.278	0.159	-0.044
Respondent self-employed (1/0)	-0.801	-0.132	0.105
Respondent working as employer (1/0)	-0.028	0.000	0.000
Total			0.061

*Omitted category is person not working

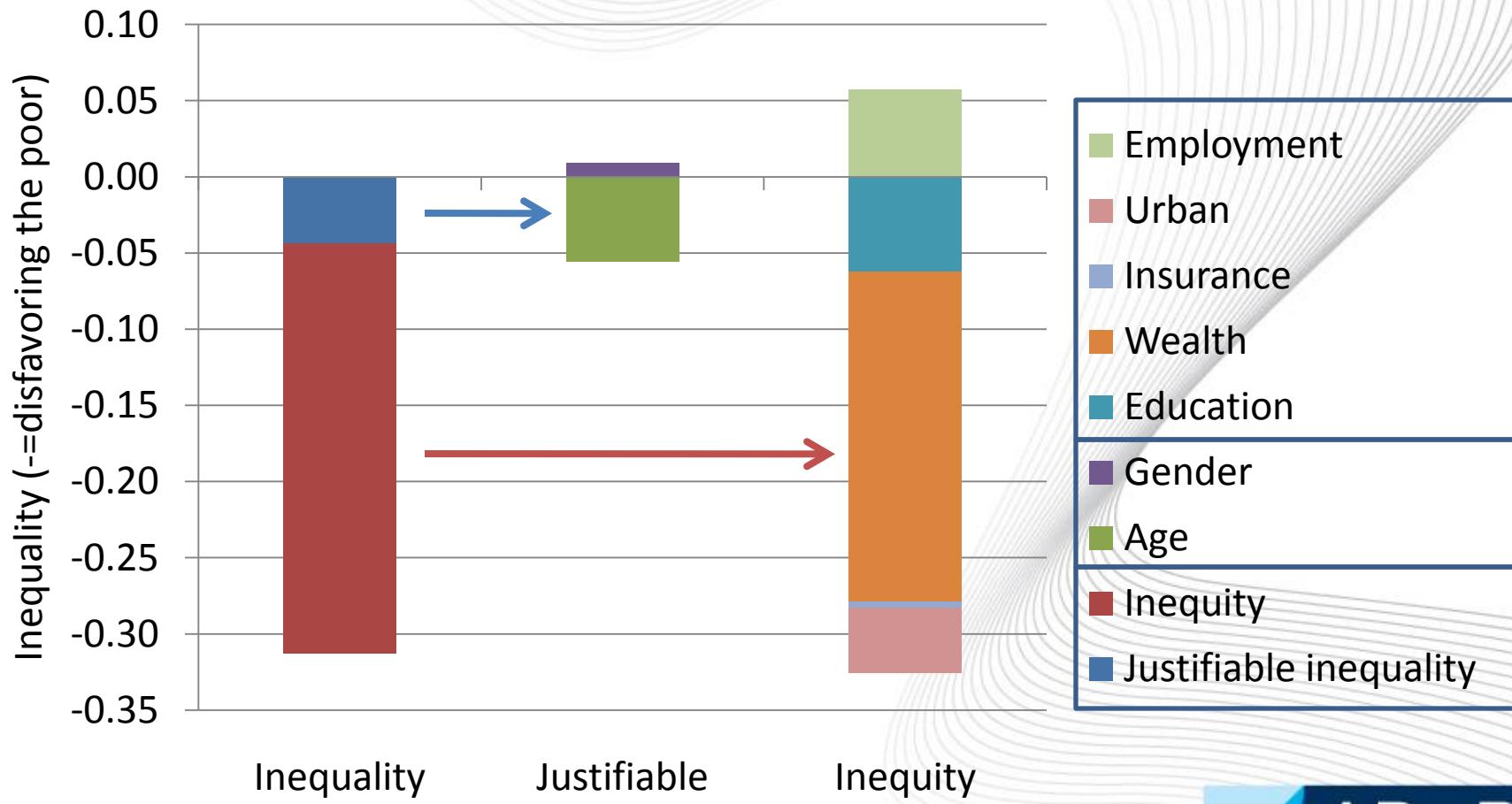
Presenting your results to policymakers



Explain the idea behind the decomposition



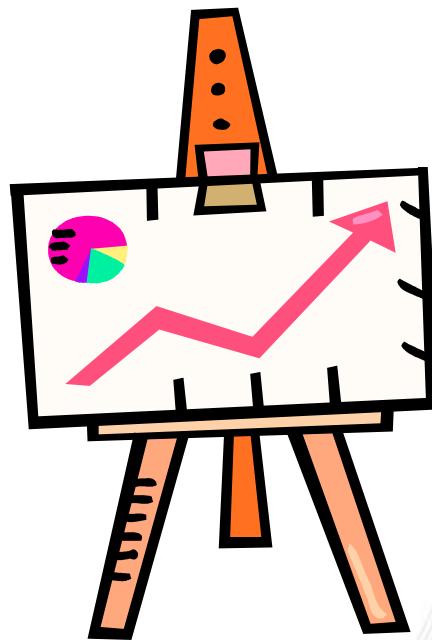
Show the sources of inequality graphically (e.g. TB)



Policy levers

- The decomposition points to two types of policy lever:
 1. Reducing inequalities in determinants (changing the CI's of the Z's), e.g. raising education levels among the poor
 2. Reducing the effects of determinants (changing the γ 's on the Z's), e.g. health education programs that make general education matter less
- Health ministries have greater scope to implement type-2 interventions (e.g. expanding health insurance). And they can lobby other ministries to implement type-1 interventions
- Decomposition results give a sense of how inequalities would change following each type of intervention
 - You can do some rough simulations in the ADePT output, changing the CI's or the γ 's of the Z's, and seeing how the CI of the outcome changes

Where to go from here?



Data sources for decomposing inequalities in health and utilization

- Health surveys like the DHS, WHS, MICS typically contain the needed information
- Multipurpose surveys are also useful

Topics in decomposition not covered in other modules but doable in ADePT

- Nonlinear decompositions for categorical and count data on health and utilization—some debate about just how useful these are
- ‘Direct’ standardization—doesn’t drop out of the decomposition, and not clear they are advantages over the ‘indirect’ standardization method which does link to the decomposition

Topics in decomposition not covered in other modules nor doable in ADePT

- Decompositions with distinct living-standards groups, e.g. poor vs. nonpoor
- Oaxaca and related decompositions. These are discussed in *Analyzing Health Equity Using Household Survey Data* and Stata code is available online for the chapter

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

