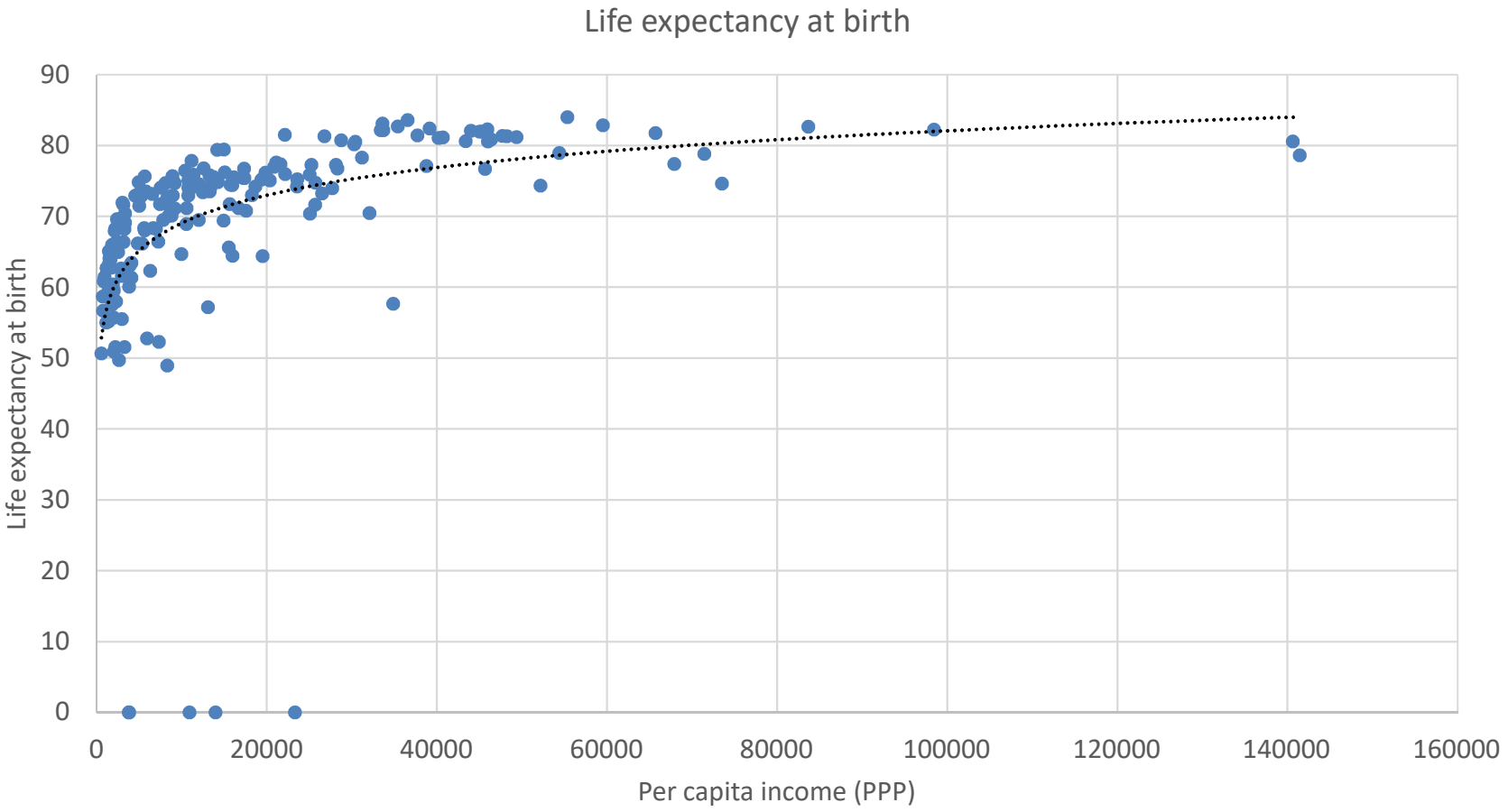
Encouraging service delivery to the hard-to-serve: Healthcare professionals, pecuniary incentives, and pro-poor motivation

Sheheryar Banuri (UEA and CBESS)

Prepared for Measuring the tricky things workshop

Oxford, October 2018

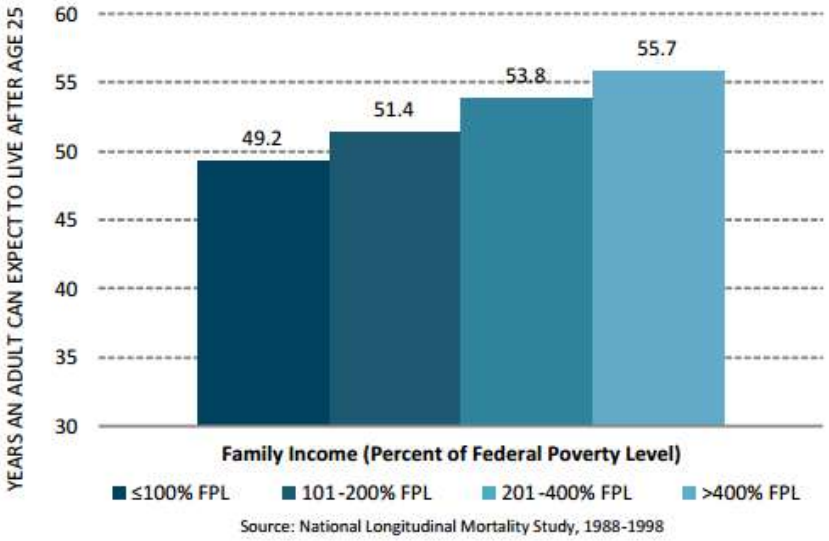
A not-very-controversial statement: Health outcomes of the poor are substantially lower overall



Health outcomes are worse for lower income families in developed countries…

Figure 1. Self-Report of Fair or Poor Health, by Income, 2011

Source: Schiller, J. S., J. W. Lucas, and J. A. Peregoy. 2012. "Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2011." Vital and Health Statistics 10 (256): Table 21. http://www.cdc.gov/nchs/data/series/sr_10/sr10_256.pdf

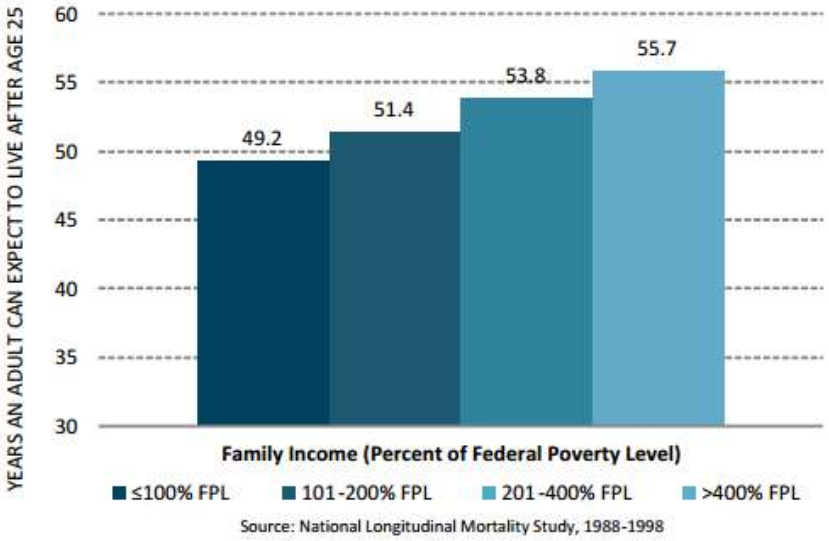


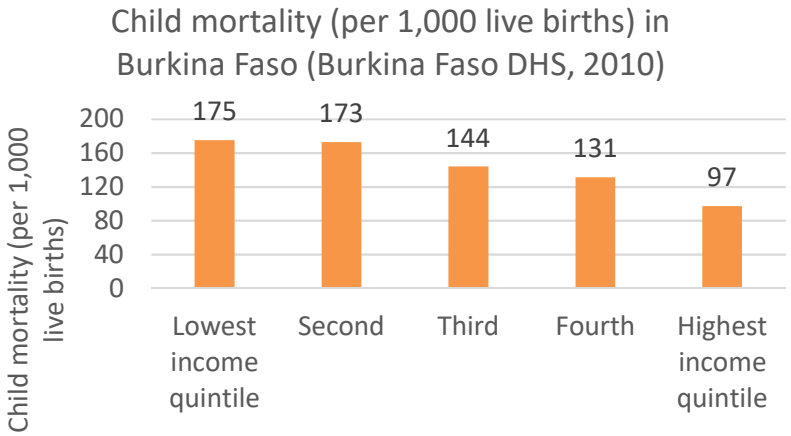
Source: National Longitudinal Mortality Study, 1988-1998

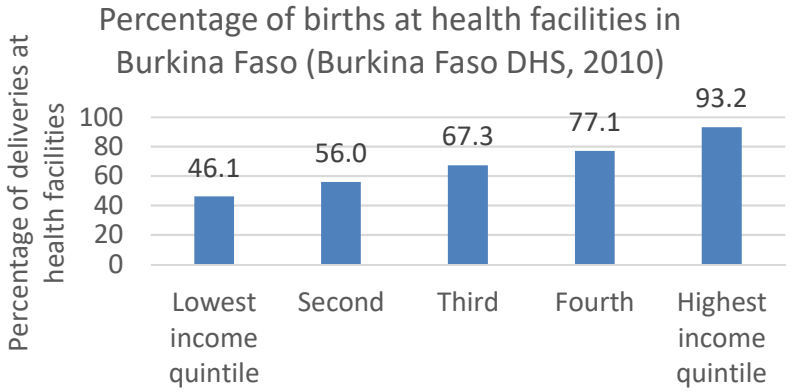
And in developed countries…

Figure 1. Self-Report of Fair or Poor Health, by Income, 2011

Source: Schiller, J. S., J. W. Lucas, and J. A. Peregoy. 2012. "Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2011." Vital and Health Statistics 10 (256): Table 21. http://www.cdc.gov/nchs/data/series/sr_10/sr10_256.pdf







Typical reasons for low health outcomes among low income populations

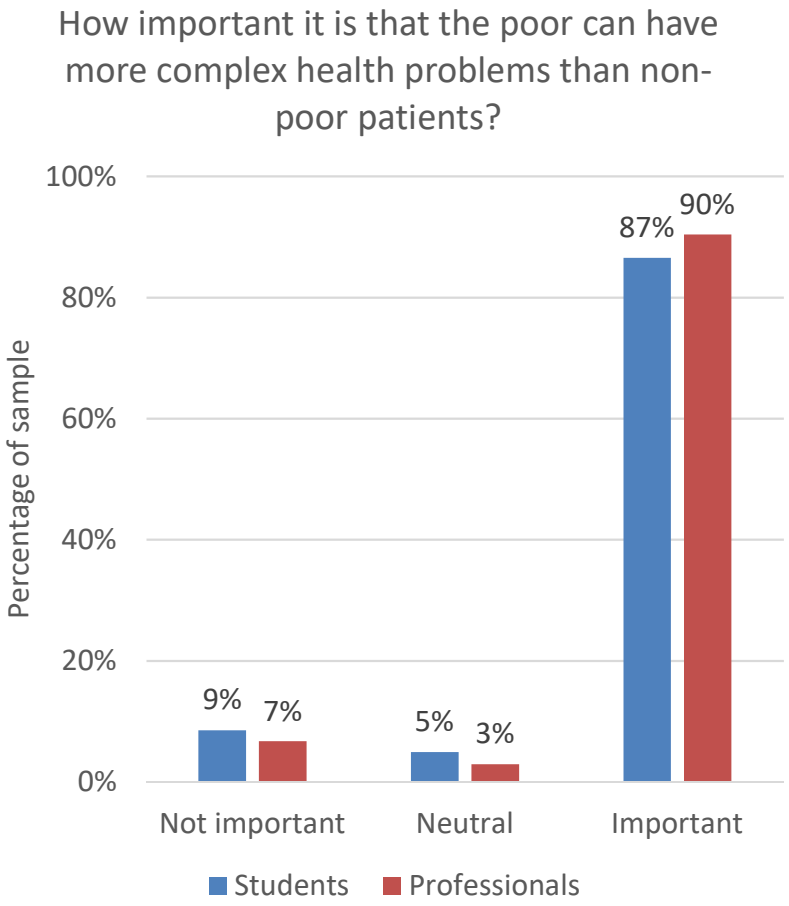
- Affordability of healthcare
- Worse environment and housing
- Worse transportation
- Low education
- Other psycho-social factors…
- But what about differences in access to health services (beyond affordability)?

Literature

- Health outcomes worse for poor:
  - Peters et al. (2008); Bindman et al. (1995); Ensor and Sam (1996); Haelterman et al. (2003); Joseph and Philips (1984); Ku and Matani (2017); Sudore et al. (2006); Raso et al. (2005); Weissman et al. (1991); among plenty others
- Improving health and education for the poor requires greater resources
  - Ingersoll, 2004; Peters et al., 2008; Wagstaff, Bredenkamp and Buisman, 2014; Loignon et al. 2015; Willems et al. 2005; Street, 1992

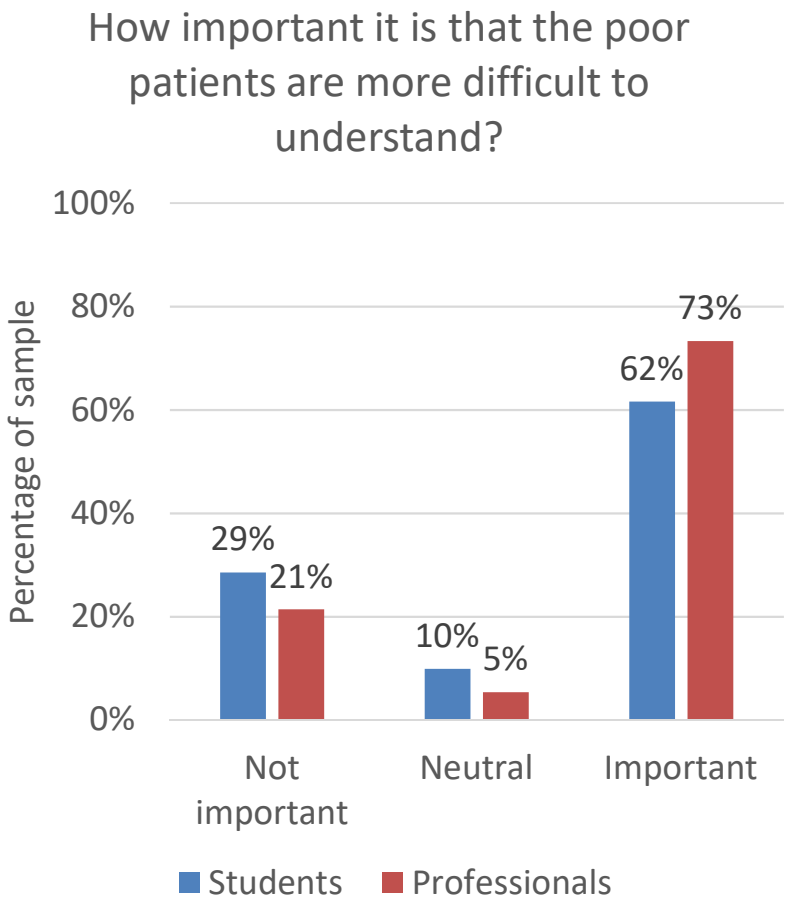
Why are the poor underserved (Burkina)?

- Complexity
  - Have more symptoms, making diagnosis harder (Wagstaff, Bredenkamp and Buisman, 2014; Peters et al., 2008; among others)



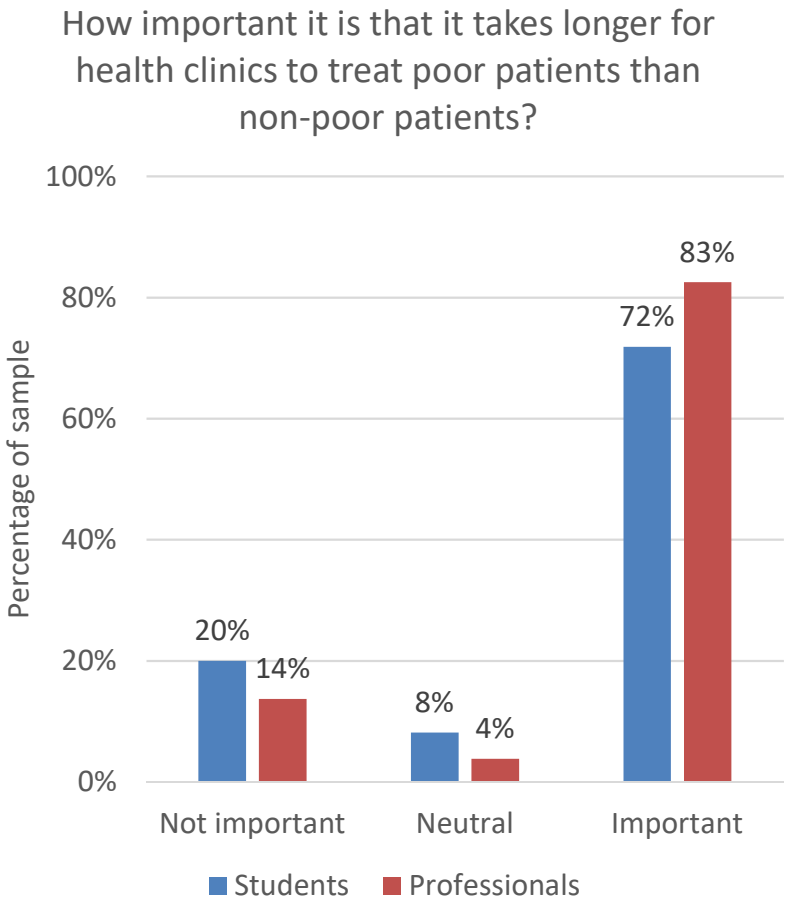
Why are the poor underserved (Burkina)?

- Communication
  - Communication is more difficult (Loignon et al. 2015; Willems et al. 2005; Street, 1992)



Why are the poor underserved (Burkina)?

- Time
  - Due to the difficulties with communication and complexity, require greater time to resolve poor cases (Loignon, 2015)



Motivation

- Experiment to test the impact of subsidies (bonuses) on the willingness of health professionals to serve the poor
  - "Poor bonus"
- (Non-random) Sample of health professionals (doctors, nurses, and midwives) randomly assigned to different pay schemes (treatments)
- Lab-in-the-field experiments measure:
  - Pro-poor motivation
  - Ability (medical knowledge)
  - Allocation of effort for the poor

Burkina Faso – Field sites

Lab-in-the-field: Recruitment

- Recruitment: health professionals attending training sessions for PBF were invited to take part in the lab activity (nearly all invitees participated)
  - Training sessions for PBF were conducted by the Ministry of Health, and provided details of the new payment structure
  - The lab experiments were conducted with health professionals that had not undergone training as of February 2014
- Each health facility in the region was expected to send at least one representative from the facility to attend the training sessions

Experiment details (I)

- 1,029 health professionals from health facilities in five regions (Gourcy, Kaya, Koudougou, Nouna, and Ouahigouya) in Northern Burkina Faso
  - Nurses – 552
  - Midwives – 124
  - Doctors and other - 353
- Subjects participated in activity for 90 minutes on average, and were paid in cash towards the end of the activity
  - All activities were conducted in French
  - Average earnings: 6,000 CFA ($12)
- Average age: 36 years old
- Gender: 59% female
- Average salary: 139,332 CFA per month (Approx. $280)

Experiment details (II)

- The following variables are measured during the course of the experiment:
  - Pro-poor motivation
  - Ability (medical knowledge)
  - Allocation of effort for the poor

Measuring allocation of effort: A medical "real-effort" task (I)

- Problem: Need a task which requires effort and knowledge in a medical context
  - Which can be incentivized to test bonus structure
- "Standard" approaches to measuring medical knowledge use survey vignettes, providing subjects with symptoms, and asking them to provide a diagnosis
- We take a similar approach, with cases (videos) presenting a patient with maternal/early childhood symptoms visiting the clinic
  - Simulate a clinic
  - Subjects view the video and are asked to select the correct (1) diagnosis, (2) treatment, (3) follow up schedule, and (4) alternate treatment from a list of 5 options

A medical “real-effort” task (II)

- The cases were created by Dr. Maurice Ye of the Medical Research Center in Nouna, with the guidance of the research team
  - Created a pool of 20 cases
- Focus on maternal and early childhood care
- Developed and tested with nurses at a nursing school in Ouagadougou
- Cases with adequate variation in responses were kept while others were replaced with new cases
- Multiple choice answers: each answer set had one correct response, two nearly correct responses, and two wholly incorrect responses, yielding additional variation

A medical “real-effort” task (III)

- Each case consisted of a video lasting between 60-100 seconds
  - Two types of cases:
    - simple; video is 60 seconds
    - Complex; video is 100 seconds
  - Length of videos consistent across cases
  - Same actress and the same set
  - Shot and edited by renowned director Boubakar Diallo
  - Selected an actress of neutral appearance in terms of ethnicity

Measuring effort for the poor (I)

- Problem: How do we measure effort exerted for the poor?
  - Little guidance in the literature, most studies focus on general effort
- Address this by developing two types of cases:
  - "non-poor" – videos are shorter and simpler
  - "poor" – videos are longer, have more complexity and difficult to understand
    - Each case has a "non-poor" and "poor" patient version

English transcript of a non-poor case

“Hello Doctor. My husband and I come from a village far from here. We had to walk for more than two hours in order to get your help for our child. He is 6 months old, and does not feel well at all. He has been coughing for more than 5 days. He has a runny nose and his body is very hot. When he coughs, we can hear from a distance whistling sounds. My child is very tired and he is not breastfeeding as usual. Last night I did not sleep at all, because his breathing was heavy and fast. This morning, my baby seems a bit agitated; he cries incessantly, and his face is paler than usual.”

Case questions

1) What is the most probable diagnosis?		
A	Ruptured uterus	Incorrect
B	Premature membranes ruptured	Almost
C	Eclampsia	Incorrect
D	Preterm labour	**Correct**
E	Vaginal candidiasis	Almost

2) What is the most appropriate treatment?		
A	Magnesium sulphate IV	Incorrect
B	Tocolysis with Salbutamol IV	**Correct**
C	Nystatine tablets	Almost
D	Amoxicillin tablets	Almost
E	Caesarean-section	Incorrect

3) When should you see the patient for a follow-up after the completion of the initial treatment?		
A	4 days	Incorrect
B	7 days	**Correct**
C	10 days	Incorrect
D	30 days	Incorrect
E	A follow-up visit is not necessary	Incorrect

4) What is likely to be the best alternative treatment for the patient (for example, if the patient's condition does not improve)?		
A	Refer to emergency unit	Incorrect
B	Deliver the woman	**Correct**
C	Amphotericin B tablets	Almost
D	Blood transfusion	Incorrect
E	Close surveillance	Almost

“Non-poor” vs. “Poor” patients

- There are a number of differences between non-poor and poor patients designed to mimic reality
  - Poor patients are dressed poorly (next slide)
  - Poor patients have more symptoms (case complexity)
  - Poor patients take longer to serve (time)
  - Poor patients are less articulate (communication)

“Non-poor” vs. “Poor” patients

Non-poor patient

Poor patient

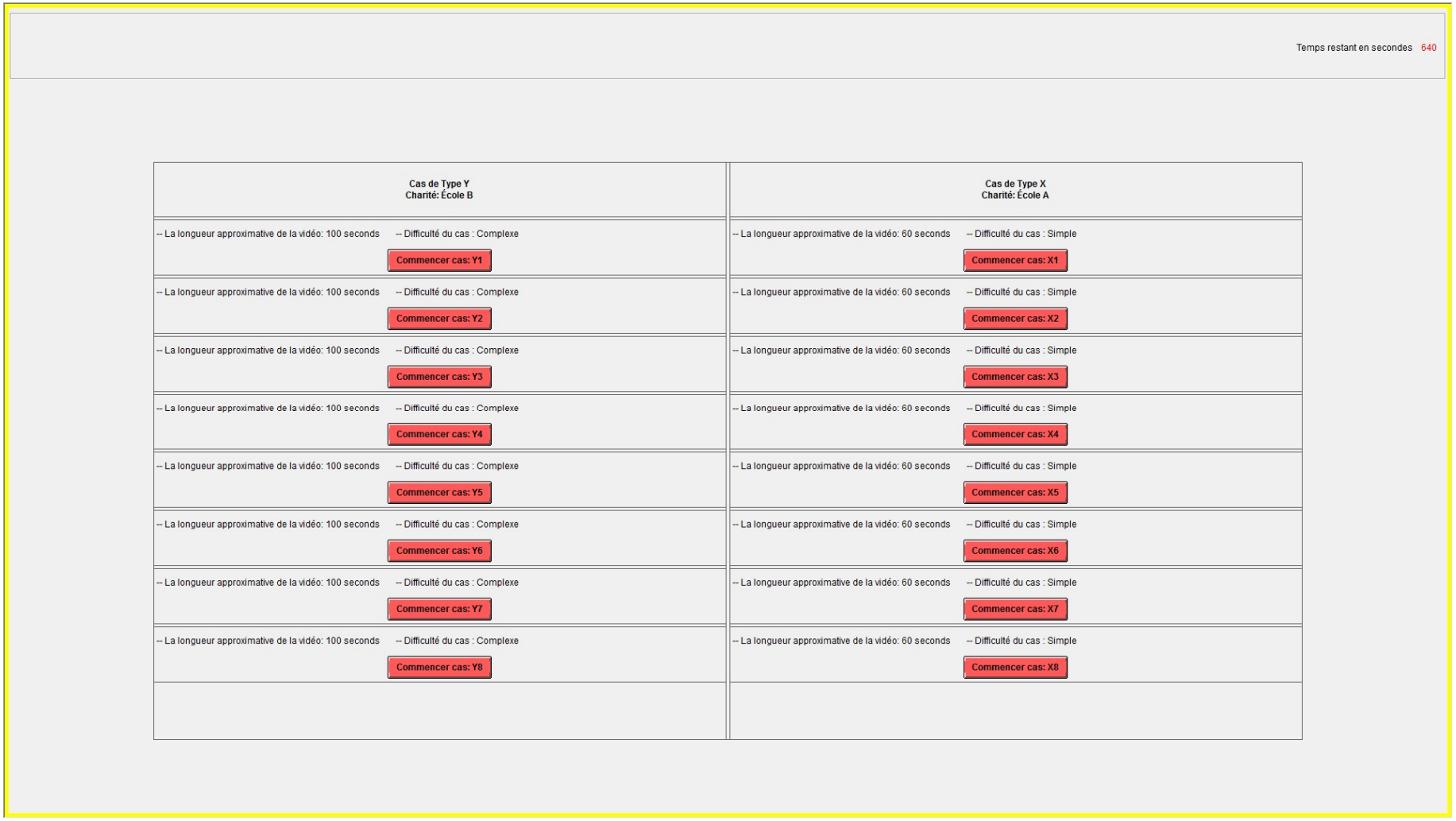
English transcript of (poor) case

"Hello Doctor. My husband and I come from a village far from here. It is beyond the hill, just after the area with the thorny bushes. We had to walk for more than two hours in order to get your help for our child. He is 6 months old, and does not feel well at all. He has been coughing for more than 5 days. He has a runny nose and his body is very hot. My poor child, we can feel that he is suffering a lot. When he coughs, we can hear from a distance whistling sounds. My child is very tired and he is not breastfeeding as usual. Last night I did not sleep at all, because his breathing was heavy and fast. But it didn't stop my husband from snoring as usual. *This morning, my baby seems a bit agitated; he cries incessantly, and his face is paler than usual. Help us Doctor. Save our child."*

Simulating the clinic…

- At the beginning of the task, health workers are informed about the task particulars, including how they will be paid
- Informed that they will have a finite amount of time (11 minutes) to diagnose and treat as many cases as they want
- Can choose any case from the case menu, which contains two types of cases:
  - Type X Cases (corresponding to non-poor patients)
  - Type Y Cases (corresponding to poor patients)

Case menu


Temps restant en secondes 640
Cas de Type Y
Charité: École B
-- La longueur approximative de la vidéo: 100 seconds -- Difficulté du cas : Complexe
Commencer cas: Y1
-- La longueur approximative de la vidéo: 100 seconds -- Difficulté du cas : Complexe
Commencer cas: Y2
-- La longueur approximative de la vidéo: 100 seconds -- Difficulté du cas : Complexe
Commencer cas: Y3
-- La longueur approximative de la vidéo: 100 seconds -- Difficulté du cas : Complexe
Commencer cas: Y4
-- La longueur approximative de la vidéo: 100 seconds -- Difficulté du cas : Complexe
Commencer cas: Y5
-- La longueur approximative de la vidéo: 100 seconds -- Difficulté du cas : Complexe
Commencer cas: Y6
-- La longueur approximative de la vidéo: 100 seconds -- Difficulté du cas : Complexe
Commencer cas: Y7
-- La longueur approximative de la vidéo: 100 seconds -- Difficulté du cas : Complexe
Commencer cas: Y8
Cas de Type X
Charité: École A
-- La longueur approximative de la vidéo: 60 seconds -- Difficulté du cas : Simple
Commencer cas: X1
-- La longueur approximative de la vidéo: 60 seconds -- Difficulté du cas : Simple
Commencer cas: X2
-- La longueur approximative de la vidéo: 60 seconds -- Difficulté du cas : Simple
Commencer cas: X3
-- La longueur approximative de la vidéo: 60 seconds -- Difficulté du cas : Simple
Commencer cas: X4
-- La longueur approximative de la vidéo: 60 seconds -- Difficulté du cas : Simple
Commencer cas: X5
-- La longueur approximative de la vidéo: 60 seconds -- Difficulté du cas : Simple
Commencer cas: X6
-- La longueur approximative de la vidéo: 60 seconds -- Difficulté du cas : Simple
Commencer cas: X7
-- La longueur approximative de la vidéo: 60 seconds -- Difficulté du cas : Simple
Commencer cas: X8

“Non-poor” vs. “Poor” patients

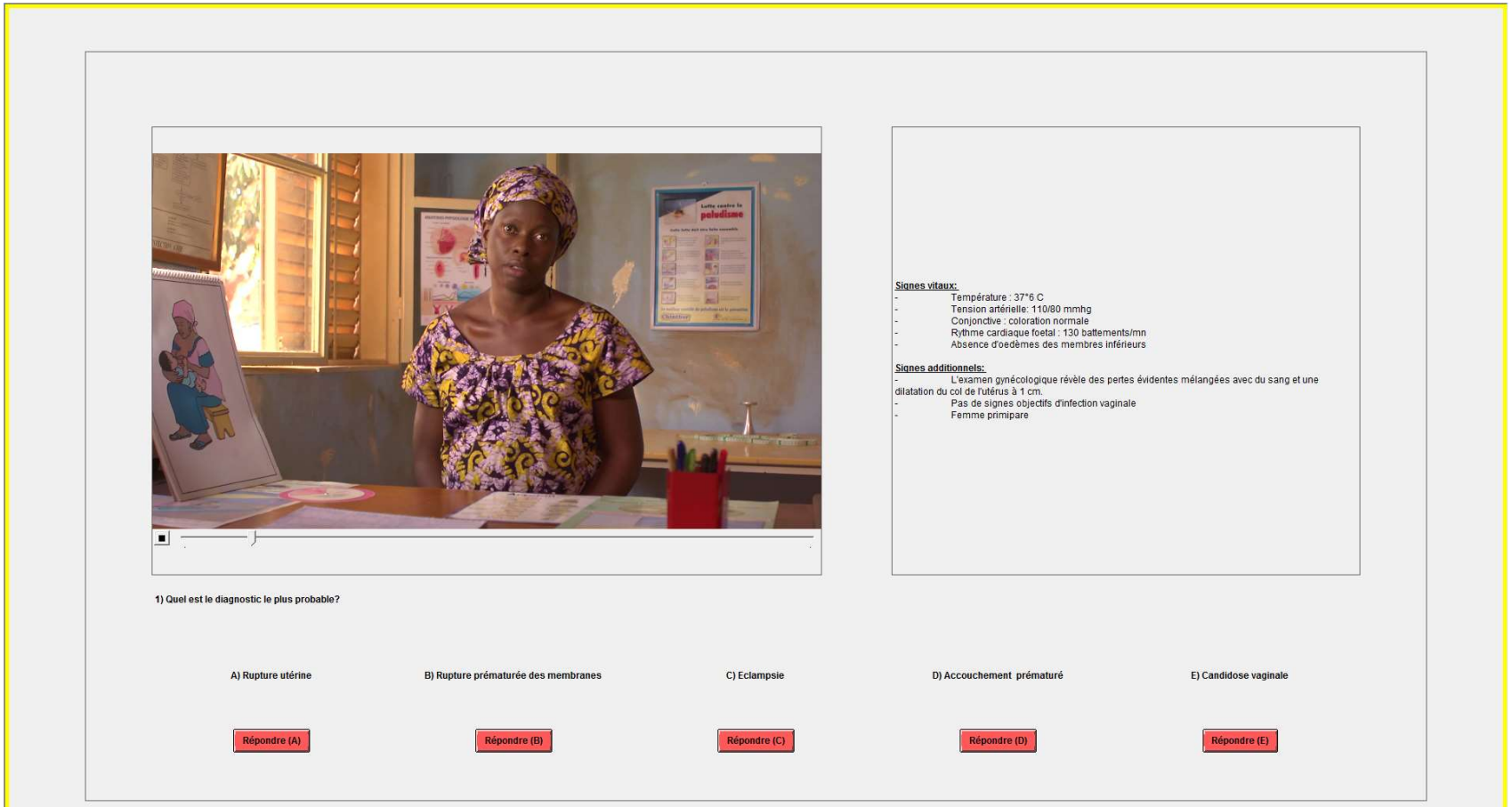
- Health workers are informed that type Y cases have longer videos, and are more complex
- Diagnosing and treating the patient matters: for each correct response, the schools earn 100 CFA ($0.20)
  - Correct responses for Type X cases yield donations to a wealthy school (Le Creuset Plus)
  - Correct responses for Type Y cases yield donations to a poor school (Gampela 3)
    - This payment to the school is separate from the earnings of the health workers

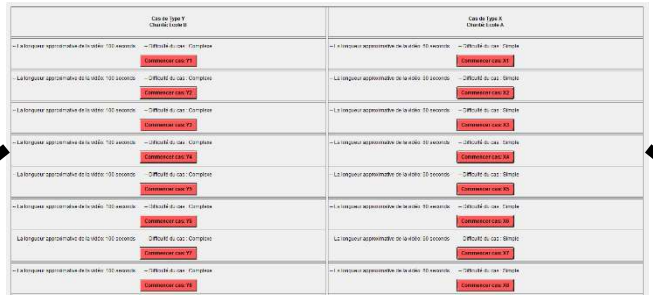
“Non-poor” vs. “Poor” case selection matters

Non-poor School *(Le Creuset Plus)*

Poor School *(Gampela 3)*

Sample case screenshot

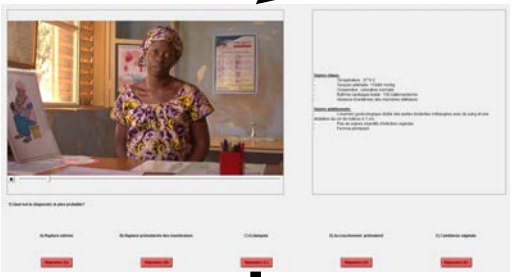


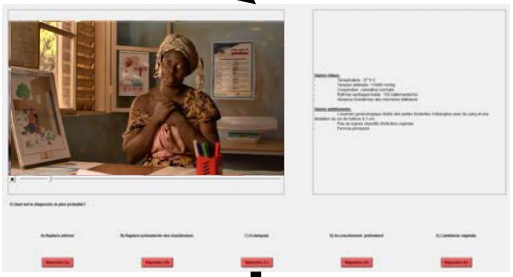


11 minutes total (1 “day”)

Choose non-poor case

Choose poor case





Poor cases are different:

- Take longer (time disincentive)
- Have more symptoms (complexity disincentive)
- More difficult to understand (communication disincentive)

- But: Benefit poor populations (larger prosocial incentive)

Effort generates benefits for non-poor

Effort generates benefits for poor

Measuring motivation (I)

- Problem: How do we measure motivation for serving the poor?
- Standard dictator game: measures pro-social preferences (e.g. altruism)
  - Subjects given a fixed sum and are asked whether they would like to donate some of the money to *an anonymous partner or charitable organization*
- Modified dictator game: measures preferences for serving the poor
  - Subjects given a fixed sum (2500 CFA: $5) and are asked whether they would like to donate some of the money to *a wealthy school and/or a poor school*
  - Since the only difference between the two schools is wealth levels of the students (no other information is provided to the subjects), preferences for serving the poor is defined as the difference in giving between the rich and the poor school

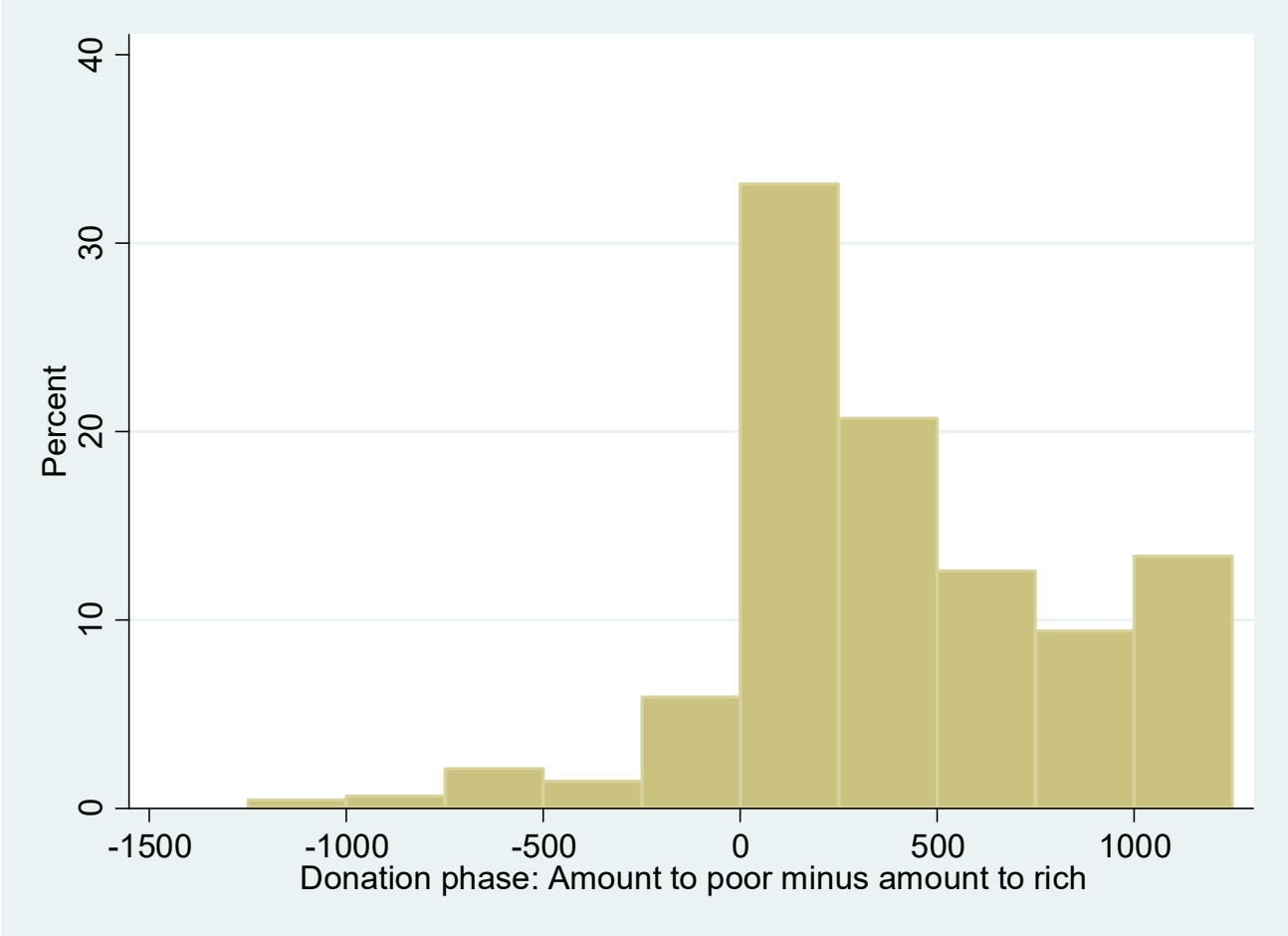
Measuring Motivation (II)

Wealthy School *(Le Creuset Plus)*

Poor School *(Gampela 3)*

Distribution of giving to poor school *less* giving to rich school

* 68% of the sample gave more to the poor school



Measuring motivation (III)

- Dictator games measure general levels of pro-social preferences through donations
  - In this case, however, pro-social preferences have both education and poverty components
  - The game distinguishes between preferences for the poor, and preferences for education by allowing different donations to the two schools, which differ in income levels

Measuring ability (I)

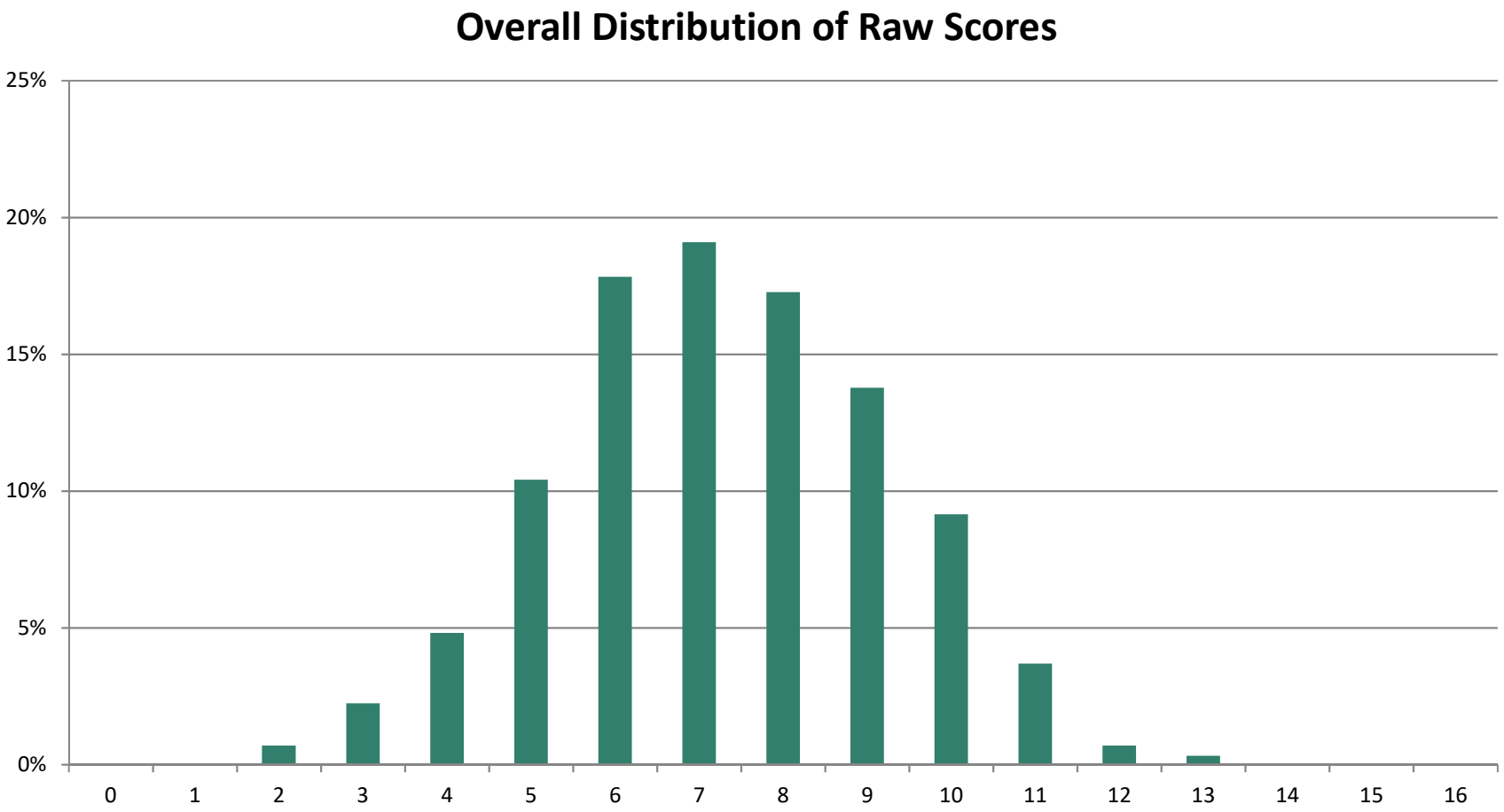
- Problem: How do we measure ability levels of health professionals?
- “Standard” effort tasks: measure ability levels in a given task by providing a piece rate that is a direct function of output
  - We take the same approach, providing health workers with a piece rate of 100 CFA ($0.20) for each correct response

Measuring ability (II)

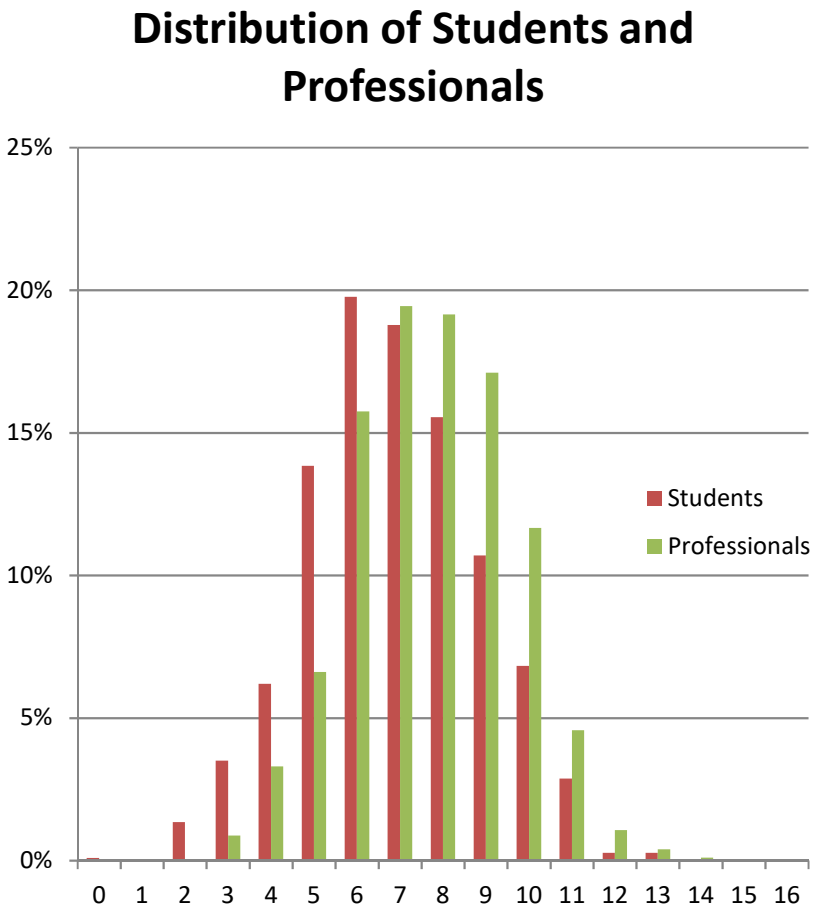
- Health workers given 4 cases in the same sequence to diagnose and treat
- … could take as long as they like to respond to the questions
- … were asked to provide responses to the following questions for each case:
  - What is the most likely diagnosis?
  - What is the most appropriate treatment?
  - When would you prefer to see the patient again after the initial treatment?
  - What is the best alternative treatment for the patient (if, for example, the patients condition does not improve)?
- Each correct response earns 100 CFA ($0.20) for the subject

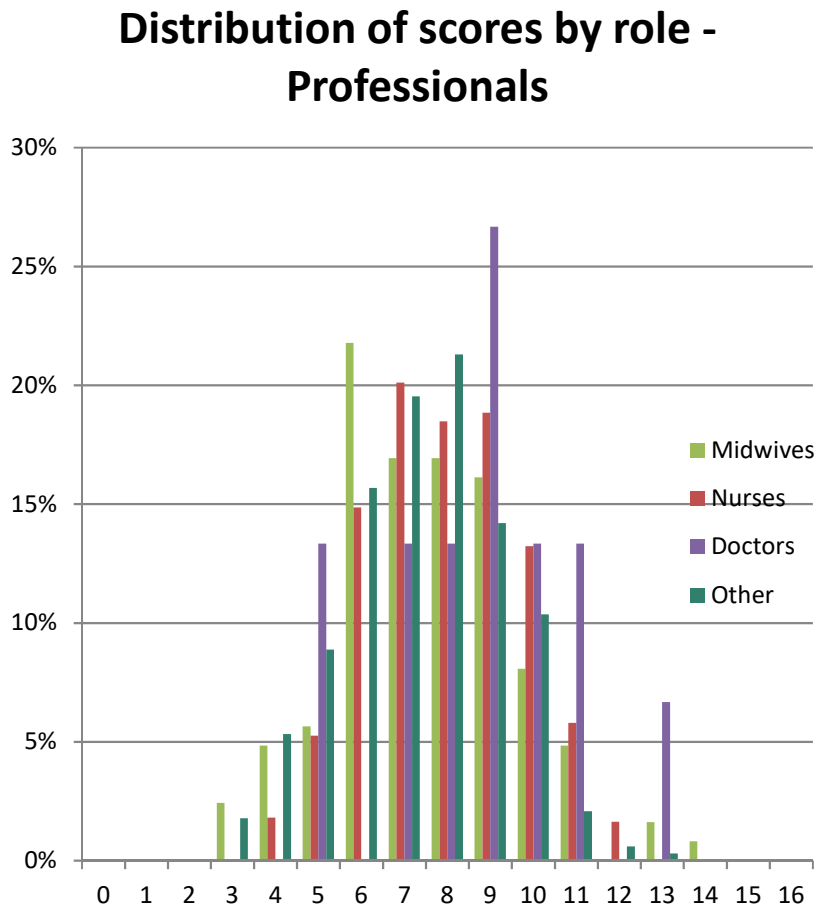
Distribution of ability measurement scores

(maximum score = 4 question X 4 cases = 16) 4 cases = 16)



Distribution of ability measurement scores





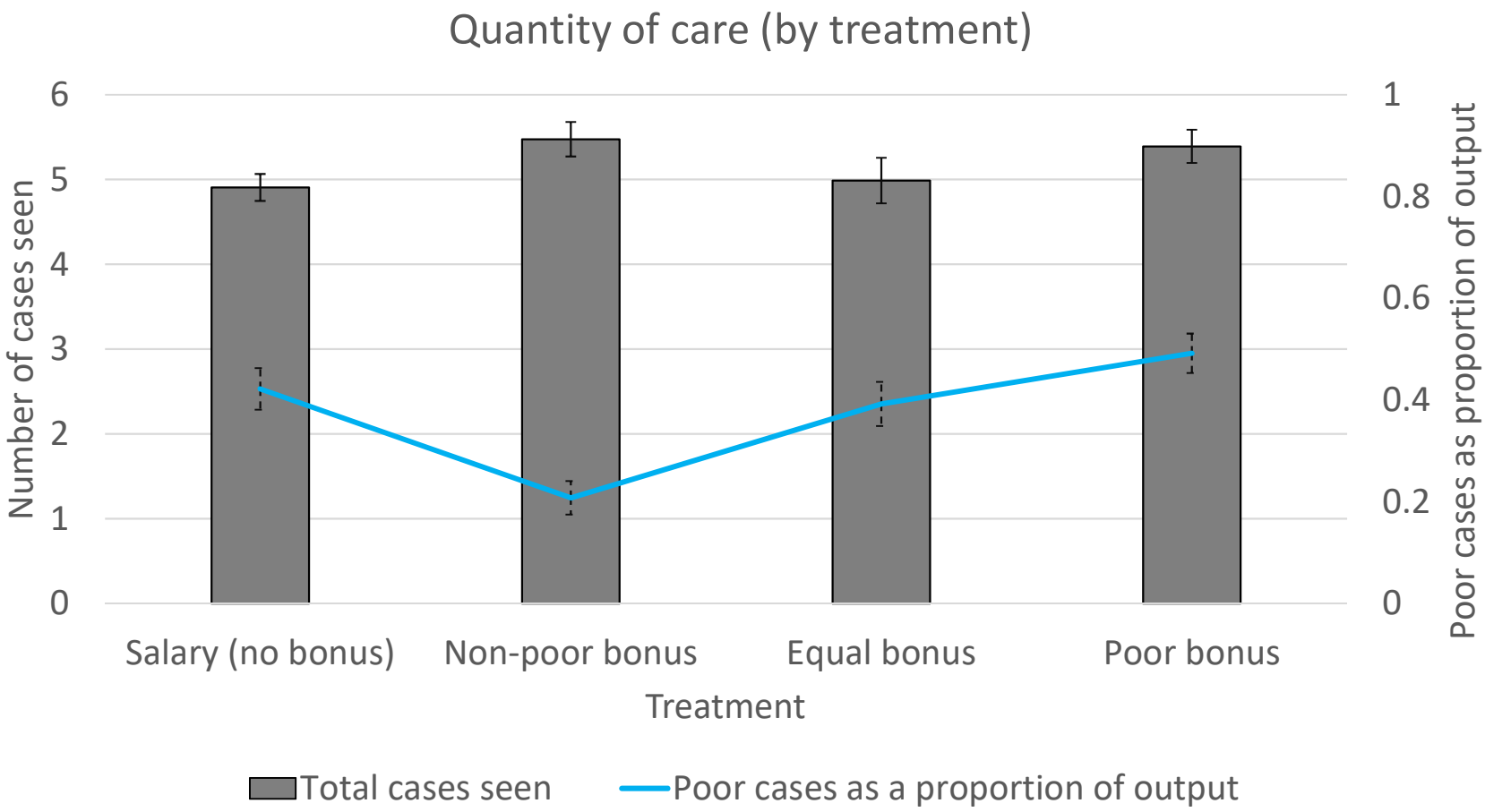
Treatments (I)

- Salary: Health workers paid 4000 CFA ($8)
- Non-poor bonus: Health workers paid salary plus 100 CFA ($0.20) per *non-poor* case seen
- Equal bonus: Health workers paid salary plus 100 CFA ($0.20) per (any) case seen
- Poor bonus: Health workers paid salary plus 100 CFA ($0.20) per case seen plus 100 CFA ($0.20) per *poor* case seen

Summary

- Medical real-effort task mimics a health facility
  - Health professionals have a limited amount of time (11 minutes = 1 day) to see as many patients as they can
  - “Waiting room” has 16 patients, 8 non-poor, and 8 poor
  - Workers can see whichever patients they wish, in whichever sequence they choose
  - Correct responses generate donations to the charity (schools)
- Treatments vary incentive structure

Results


Quantity of care (by treatment)
Number of cases seen
Poor cases as proportion of output
0
1
2
3
4
5
6
0
0.2
0.4
0.6
0.8
1
Salary (no bonus)
Non-poor bonus
Equal bonus
Poor bonus
Treatment
Total cases seen
Poor cases as a proportion of output

Pro-poor workers have stronger response to incentives

Dependent variable: Poor cases as a proportion of ~~output~~total cases					
	I	II	III	IV	V
Treatment: Non-poor bonus	-0.214***	-0.210***	0.286	0.294*	0.314
	(0.05)	(0.05)	(0.17)	(0.16)	(0.19)
Treatment: Equal bonus	-0.030	-0.025	0.300*	0.281*	0.280
	(0.07)	(0.07)	(0.17)	(0.16)	(0.16)
Treatment: Poor bonus	0.070	0.068	0.203	0.198	0.236
	(0.06)	(0.05)	(0.18)	(0.19)	(0.21)
Pro-poor preference		**0.189***	**0.584*****	**0.587*****	**0.619*****
Poor school / total donation		**(0.09)**	**(0.16)**	**(0.15)**	**(0.17)**
Interaction: Non-poor bonus X			-0.775***	-0.804***	-0.833***
Pro-poor preferences			(0.25)	(0.23)	(0.27)
Interaction: Equal bonus X			-0.505**	-0.486**	-0.488**
Pro-poor preferences			(0.23)	(0.22)	(0.22)
Interaction: Poor Bonus X			-0.210	-0.206	-0.274
Pro-poor preferences			(0.26)	(0.27)	(0.30)
Effort cost ratio (ability round)				0.245**	0.256**
Score with poor cases / Total score				(0.10)	(0.11)
Pseudo R2	0.076	0.086	0.110	0.123	0.130
Log Likelihood	-167.7	-165.7	-160.5	-157.7	-156.2
P	0.000	0.000	0.000	0.000	.
Observations	379	379	379	379	379

Conclusion

- We find that when the poor cannot afford services, they are underserved, as workers increase their efforts towards non-poor patients
- Poor bonus is effective in increasing equity
- Important for results-based financing programs: "equal" bonuses (systems like Medicaid) reduces inequity but may not go far enough
- Need to compensate workers for the disincentives involved in serving the poor

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