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INSTITUTO DE SAÚDE COLETIVA
UNIVERSIDADE FEDERAL DA BAHIA



The two-tier Brazilian health system: implications for equity

Edson C. Araujo

PhD Student

Institute for International Health and Development



Queen Margaret University
EDINBURGH

www.qmu.ac.uk

Overview

1. Introduction/background

- *The two-tier health systems and the demand for PHI*
- *Objectives*

2. The two-tier Brazilian Health System

- *Brief description*
- *The demand for private health insurance*

3. DCE analysis

- *Definition of attributes and attributes levels*
- *Design of the experiment*
- *Some preliminaries results*

4. Conclusions/Developments

PHI and public coverage 1

- **Some argue that a greater role for PHI will ‘crowd out’ the public health services and alleviate financial pressures on public system (Emery & Gerrits, 2005; Vaithianathan, 2002)**
- **PHI would be more responsive to consumers’ preferences than the public health services (Cyrenne, 1988)**
 - *access high quantity and quality of care for those with higher willing-to-pay for it*
- **PHI can results in a cross-subsidization between privately insured and public users (Harper, 2003)**
 - *High income individuals pay twice for coverage (taxes and PHI premium), subsidizing the public users*
- **Others point out the negative consequences of a ‘two-tier’ style of health care, such as:**
 - *little fiscal relief for public system (Hurley et al., 2002)*
 - *equity issues arising from the reduction of political pressure to improve the quality of public services when removing the higher demand individuals to PHI (Shiell & Seymour, 2002)*

PHI and public coverage 2

- The existence of PHI in presence of compulsory public health insurance depends on the extent the parallel systems are two-tier systems
 - *providing the same services at different levels of quality and price*
- There is evidence that the demand for PHI is highly influenced by the perceived quality differentials between public and private services (Vera-Hernandez, 1999; Besley et al., 1999; Costa, & Garcia, 2003)
- Costa and Garcia (2003), e.g.:
 - *analysing the demand for PHI in Spain, found that an increase in the quality gap between public and private financed services will result in a larger probability of purchasing PHI*
 - *they estimate that “a 10% increase in quality of private health care, holding NHS quality constant, will result in a 8.43% increase in the numbers of individuals purchasing PHI”*

3.1 – Models of demand for PHI

- There are two main types of models that explain the demand for health insurance Kondo (2006):

a) *The first type models the consumer's choice for coverage for risky events (illness) applying the expected utility maximization model*

b) *The second type develops statistical models for empirical analysis of demand for health insurance*

- **Example from Costa & Garcia, 2003:**

- *Individuals are expected to maximize their utilities*

- $V_{PHI} = \mu U(Q_1, y - \pi) + (1 - \mu)U(y - \pi)$ ----- Expected utility PHI

- $V_{NHS} = \mu U(Q_0, y) + (1 - \mu)U(y)$ ----- Expected utility NHS

- $V_{OOP} = \mu U(Q_1, y - p) + (1 - \mu)U(y)$ ----- Expected utility OOP

- *Buy PHI if the expected utility gain is:*

$$\mathbf{EUG = V_{PHI} - \max(V_{NHS}, V_{OOP}) > 0}$$

Importance of the “quality gap”

- Previous studies on demand of PHI in Brazil and elsewhere have been focusing on the influence of socio-economic variables as income, education, social class, occupation and risk of illness
- Despite the role played by perceived quality on the consumers' choice for coverage, the link between the quality of public health services (or the quality gap) and the demand for PHI is still unclear, especially in low and middle income context
- Important to examine how the incentives to purchase PHI varies with the probability of illness and income given the **perceived quality differential between public and private services** (and individuals characteristics)

Objectives

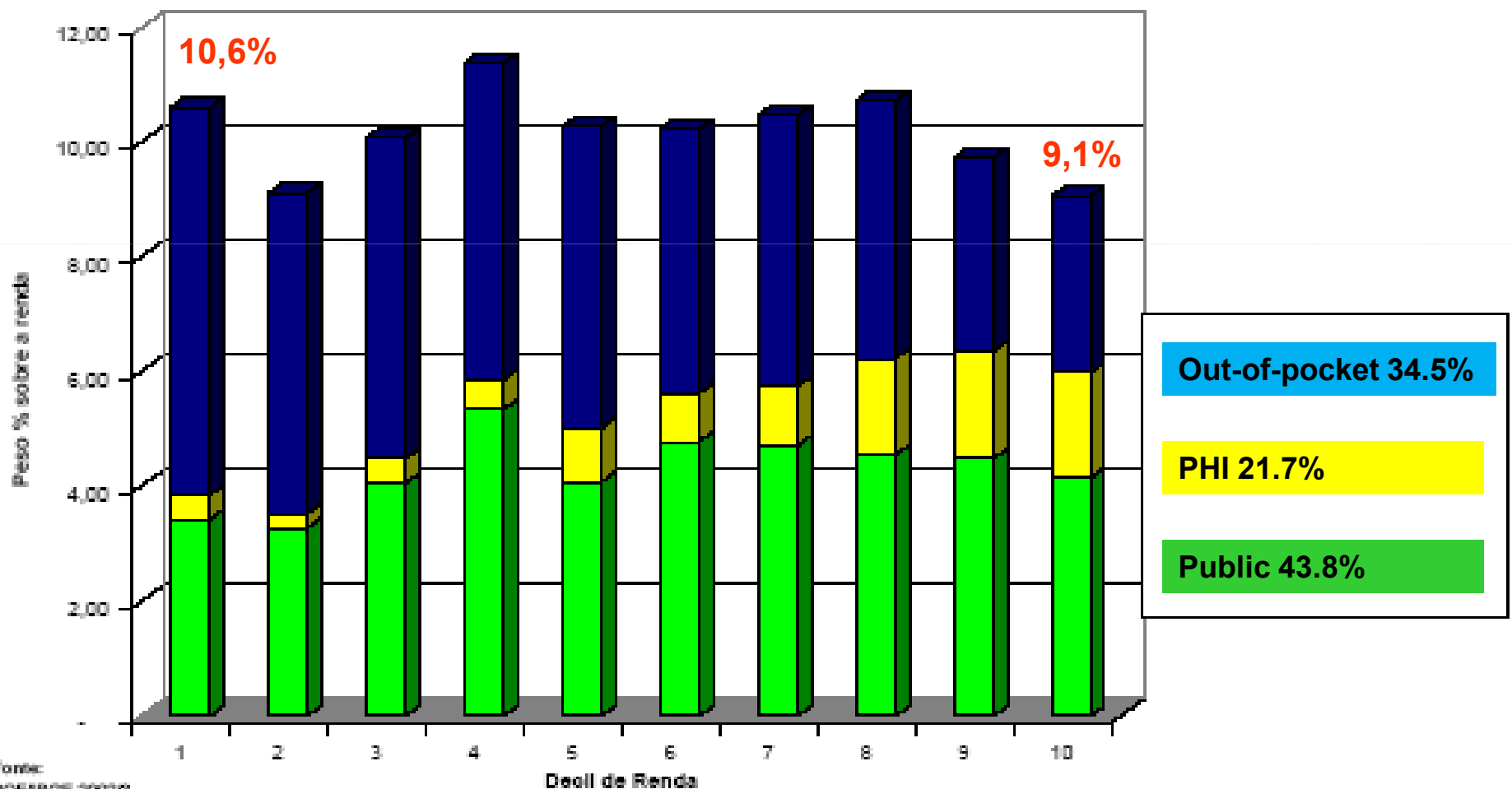
- This study explores the effects of perceived quality differentials between public and private health services on households' choice for health coverage
- And how these effects vary across different households (in terms of income, education, risks of illness, insurance premium, cost of treatment)
- The main objective is to identify the quality attributes of health care coverage that influence on the individual's decision to purchase or not private health insurance

2. The two-tier Brazilian Health System

- In Brazil, as in many developing and developed countries, private sector plays an important role in the provision and financing of health care services
- **75% of the population relies on public health system (or out-of-pocket payments)**
 - *43,8% of total health expenditure*
 - *expenditure per capita = R\$ 264 (£63.61)*
- **25% of the population has private health insurance (PHI)**
 - *21.7% of total health expenditure*
 - *Expenditure per capita = R\$ 819 (£197.35)*
- “Those with sufficient means, or whose employers provide health coverage, have access to a private system of healthcare that provides quality treatment on demand” (Alves & Timmins, 2003)

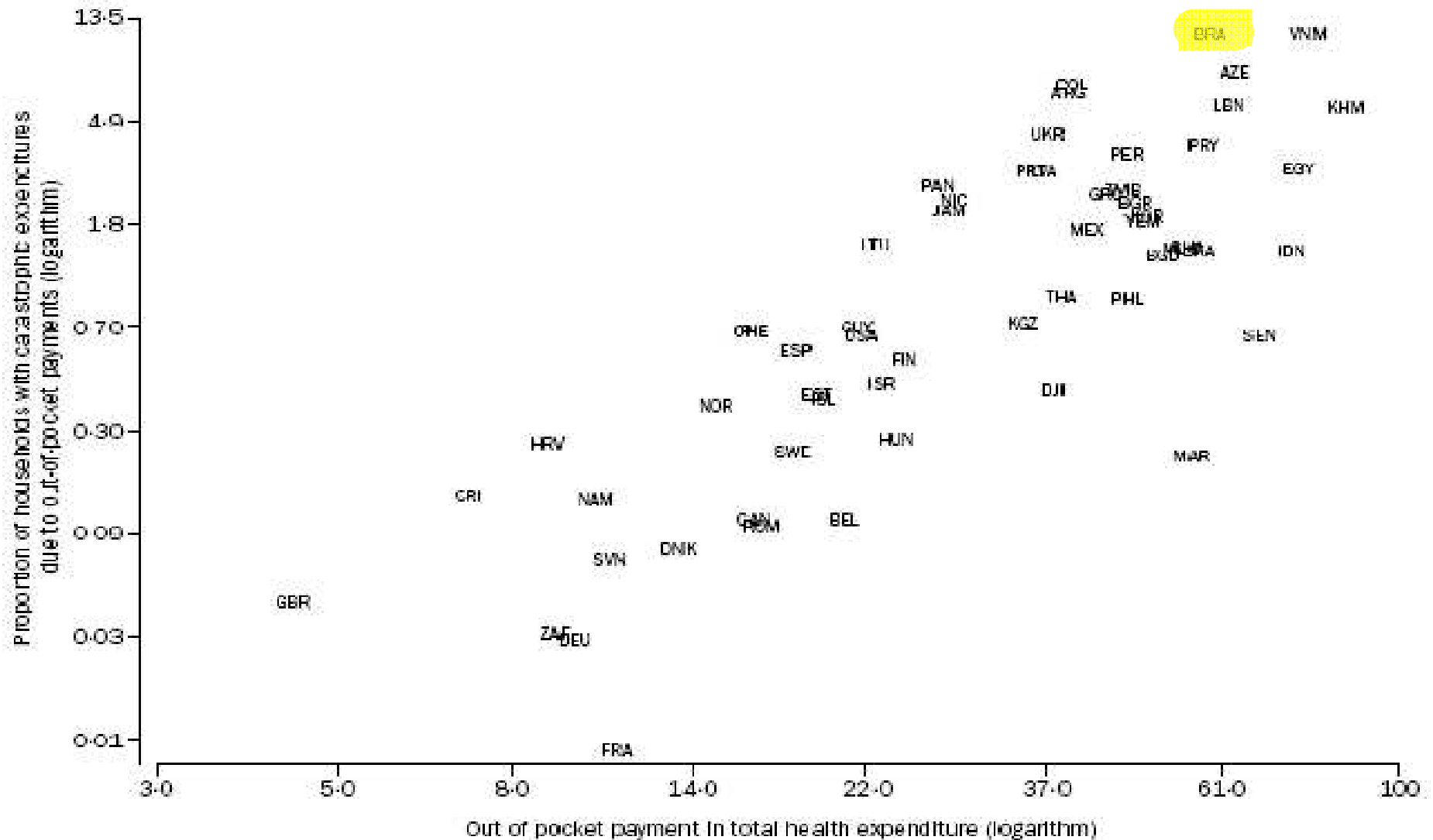
Health care spending across income groups Equity in financing of health expenditures in Brazil (UGÁ & SANTOS, 2007)

Peso do Financiamento do Setor Saúde sobre a Renda familiar per capita, segundo tipo de gasto, por Decil de Renda familiar per capita - Brasil, 2002



Fonte:
IPQ/IBGE 2002/3
SIOPS/MS

Ke Xu; Evans; Kawabata; Zeramdini; Klavus and Murray "Household catastrophic health expenditure: a multicountry analysis". THE LANCET (2003)



Proportion of households with catastrophic expenditures vs share of out-of-pocket payment in total health expenditures
 Log-log plot is used because the relation not linear. See table 1 for definitions of country codes.

PHI choice, Andrade & Maia (2005)

	ESCOLHA POR PLANO DE SAÚDE		ESCOLHA POR PLANO DE SAÚDE INDIVIDUAL	
	1998	2003	1998	2003
Variáveis independentes	Odds-Ratio. (P valor)	Odds-Ratio. (P valor)	Odds-Ratio. (P valor)	Odds-Ratio. (P valor)
Idade entre 18 e 29 anos	0,744 (0,000)	0,775 (0,000)	0,702 (0,000)	0,706 (0,000)
Idade entre 30 e 39 anos	0,918 (0,000)	0,876 (0,000)	0,891 (0,000)	0,810 (0,000)
Idade entre 40 e 49 anos	0,948 (0,001)	0,898 (0,000)	0,981 (0,418)	0,844 (0,000)
Idade entre 50 e 59 anos	1,137 (0,000)	1,068 (0,001)	1,396 (0,000)	1,152 (0,000)
Idade entre 60 e 69 anos	1,238 (0,000)	1,151 (0,000)	1,448 (0,000)	1,215 (0,000)
Mais de 70 anos	1,086 (0,028)	1,206 (0,000)	1,206 (0,000)	1,292 (0,000)
Presença de criança na família	1,275 (0,000)	1,330 (0,000)	1,296 (0,000)	1,404 (0,000)
Presença de idosos na família	0,849 (0,000)	0,919 (0,007)	0,885 (0,018)	0,956 (0,312)
Presença de mulher em idade fértil na família	1,401 (0,000)	1,422 (0,000)	1,588 (0,000)	1,546 (0,000)
1°. Decil de renda	0,025 (0,000)	0,025 (0,000)	0,028 (0,000)	0,027 (0,000)
2°. Decil de renda	0,033 (0,000)	0,026 (0,000)	0,021 (0,000)	0,020 (0,000)
3°. Decil de renda	0,051 (0,000)	0,043 (0,000)	0,035 (0,000)	0,036 (0,000)
4°. Decil de renda	0,066 (0,000)	0,066 (0,000)	0,043 (0,000)	0,061 (0,000)
5°. Decil de renda	0,102 (0,000)	0,090 (0,000)	0,072 (0,000)	0,077 (0,000)
6°. Decil de renda	0,129 (0,000)	0,126 (0,000)	0,096 (0,000)	0,101 (0,000)
7°. Decil de renda	0,191 (0,000)	0,189 (0,000)	0,154 (0,000)	0,159 (0,000)
8°. Decil de renda	0,276 (0,000)	0,268 (0,000)	0,236 (0,000)	0,233 (0,000)
9°. Decil de renda	0,460 (0,000)	0,439 (0,000)	0,418 (0,000)	0,415 (0,000)
Sem Carteira	0,314 (0,000)	0,379 (0,000)	0,728 (0,000)	0,794 (0,000)
Doméstico	0,315 (0,000)	0,330 (0,000)	0,764 (0,026)	0,677 (0,000)

3. DCE analysis

Identifying attributes
and levels



Experimental
design



Establishing
preferences



Statistical analysis

- **Determine decision frame, attributes, and levels**
 - *Attribute and level selection*
- **Definition of choice sets**
- **Sampling and data collection**
- **Estimation procedures: WTP estimative, interactions, etc**

Definition of attributes and attributes levels

- **Qualitative work was conducted to define attribute and attribute levels for health care coverage**
 - *FGD (6 with 6 participants each)*
 - *Individuals interviews (20)*
- **Individuals were asked to describe the characteristics of services provided in the public and PHI systems**
- **Also were asked to identify the positive and negative aspects of the services provided in each the system**

Some remarks from the qualitative work

- **The main issues reported were:**
 - *The waiting time is the greatest barrier to access the public services*
 - *Most people reported dissatisfaction with staff's attitude in the public services (in terms of time of consultation, courtesy and explanation regarding procedures and diagnostics)*
- **The general impression that the doctors are the same in PUB and PHI facilities (same capability)**
 - *However, the working conditions and salary at private facilities result in better incentives to provide better service (so they are more friendly and give more attention for the insured in private providers)*

Attributes and attributes levels for health care coverage - 1

Categories	Attributes	Levels
Access	<i>Likelihood of receive care when needed</i>	<i>Likely to be subject to queues and availability of doctors and beds</i>
		<i>Likely to have doctors and and beds available</i>
	<i>Waiting times for a GP appointment</i>	<i>On average 30 days (one month)</i>
		<i>On average 1 week (07 days)</i>
	<i>Waiting times for a specialist appointment</i>	<i>On average two months (60 days)</i>
		<i>On average 15 days</i>
	<i>Waiting time for exams and tests</i>	<i>On average one month (30 days)</i>
		<i>On average 15 days</i>
<i>Waiting times in the health centre/hospital</i>	<i>On average have to wait for 3 hours</i>	
	<i>On average have to wait for 30 minutes</i>	
Quality of care (interpersonal quality)	<i>Doctor's attitude and time of the appointment</i>	<i>Appointment usually takes 10 min and It is likely the examination will be superficial, doctors usually are not friendly and usually don't explain tests and procedures</i>
		<i>Appointment usually takes 30 min and it is likely the examination will be thorough, doctors are friendly, and explain tests and procedures</i>

Attributes and attributes levels for health care coverage - 2

Categories	Attributes	Levels
Infrastructure	Cleanliness, infrastructure and maintenance of waiting areas and consultation areas	<i>Infrastructure not good, equipments not well maintained and in general areas cleaned rarely and not comfortable waiting areas</i>
		<i>Good infrastructure, equipments well maintained and areas cleaned very often and comfortable waiting areas</i>
Financing scheme	Monthly payment	<i>Zero (Nothing)</i>
		<i>R\$100</i>
		<i>R\$200</i>
		<i>R\$300</i>
Public Health Services	Likelihood that public health interventions will be proposed (like vaccinations for children/cervical smears for women)	<i>Likely to be offered spontaneously</i>
		<i>Will only be offered in response to a request</i>

Choice set 1 (1)	1	2
Likelihood of receive care when needed	<i>Likely to have doctors and and beds available</i>	<i>Likely to be subject to queues and availability of doctors and beds</i>
Waiting times for a GP appointment	<i>On average 1 week (07 days)</i>	<i>On average 30 days (one month)</i>
Waiting times for a specialist appointment	<i>On average 15 days</i>	<i>On average two months (60 days)</i>
Waiting time for exams and tests	<i>On average one month (30 days)</i>	<i>On average 15 days</i>
Waiting times in the health centre/hospital	<i>On average have to wait for 3 hours</i>	<i>On average have to wait for 30 minutes</i>
Doctor's attitude and time of the appointment	<i>Appointment usually takes 30 min and it is likely the examination will be thorough, doctors are friendly, and explain tests and procedures</i>	<i>Appointment usually takes 10 min and It is likely the examination will be superficial, doctors usually are not friendly and usually don't explain tests and procedures</i>
Cleanliness, infrastructure and maintenance of waiting areas and consultation areas	<i>Infrastructure not good, equipments not well maintained and in general areas cleaned rarely and not comfortable waitng areas</i>	<i>Appointment usually takes 10 min and It is likely the examination will be superficial, doctors usually are not friendly and usually don't explain tests and procedures</i>
Monthly payment	<i>Do not offer</i>	<i>Likely to be offered spontaneously</i>
Likelihood that public health interventions will be proposed (like vaccinations for children/cervical smears for women)	<i>R\$100</i>	<i>R\$200</i>
Choice		

Individuals' attributes evaluation

Whar are the most importante attributes for health coverage?	Choice %
Staff's attitude	27
Cleanliness	22.9
Do not have to pay monthly	10.5
Likelihood of receive care when needed	10.3
Waiting times for a GP appoint	9.7
Waiting times in the facility	9
Waiting times for a specialist appoint	5.0
Waiting time for exams and tests	2.8
Likelihood that public health intervent	2.8
	100

Attributes evaluation by SES

Attributes	High	Medium	Low	Total
Staff's attitude	26.6	28.0	26.7	27.0
Cleanliness	27.6	21.0	23.0	22.9
Do not have to pay	5.4	10.3	11.2	10.5
Likelihood of receive care	11.8	15.0	8.4	10.3
Waiting times for a GP	11.3	8.8	9.8	9.7
Waiting times in the facility	3.9	8.1	10.0	9.0
Waiting times for a Espec	1.5	6.2	4.9	5.0
Waiting time for exams	9.9	1.5	2.4	2.8
Public Services	2.0	1.2	3.6	2.8
Total	100	100	100	100

The construction of the choice scenarios

- From the full factorial design of 1024 profiles ($2^8 \cdot 4^1$) was obtained a orthogonal fractional factorial design with **16 profiles** using a fold-over method
- Unlabelled main effects only design (no interactions)
- The generated design fulfil the desirable properties
 - *Orthogonality*
 - *Level balance*
 - *Minimum overlap*
- * *Not optimality (however, it is claimed orthogonal designs work well to estimate part-worth utilities – importance of attributes)*
- *A block design (4 levels) was used to reduce the number of choice sets for each respondent*
- *Each respondent evaluated 4 choice scenarios*

Data Collection

- Data collection conducted in the City of Salvador/Bahia (Northeast of Brazil)
- 604 face-to-face interviews – 06/2009!

Charcteristics		%
Sex	Female	58.28
Race	White	14.24
	Black	33.44
	Mixed	51.99
	Others	0.33
Income	< 1 mw	13.25
	1-3 mw	52.32
	3-6 mw	23.34
	6-10 mw	5.79
	>10 mw	5.3
Employ	Employed1	31.13
	Employed2	22.35
	Unemployed	15.23
	Housewife	9.44
	Retired	17.72
	Student	4.13
Schoolling	Illiterate	5.51
	Basic	7.35
	College	33.89
	Graduated	7.85
	Post-grad	3.51

Charcteristics	%
Self-Health	60.6
Chronic disease	35.88
Private Insurance	33.14
Has ever used NHS	86.36
Trust NHS services	56.57
Impaired last 30days	12.46
Seek care last 30days	32.56
Attended NHS facility	54.4

Regression analysis 1 – initial

Random-effects probit regression
Group variable: id

Number of obs = 2416
Number of groups = 604

Random effects u_i ~ Gaussian

Obs per group: min = 4
avg = 4.0
max = 4

Log likelihood = -811.66987

wald chi2(9) = 938.83
Prob > chi2 = 0.0000

answer	Coef.	Std. Err.	z	P> z	[95% Conf. Interva]	
dlike	.4673513	.0359873	12.99	0.000	.3968174	.5378852
dwaitgp	-.0144248	.0016303	-8.85	0.000	-.0176201	-.0112295
dwaitesp	-.0116245	.0008064	-14.42	0.000	-.0132049	-.0100441
dwaitexam	-.0155683	.0024038	-6.48	0.000	-.0202796	-.0108571
dwaitfac	-.0029961	.0002474	-12.11	0.000	-.003481	-.0025112
dstaff	.6183279	.0373262	16.57	0.000	.5451698	.691486
dtean	.3018212	.0374629	10.46	0.000	.3183953	.4652472
dpubserv	-.4753941	.0359337	-13.23	0.000	-.5458228	-.4049653
dcost	-.001753	.0002267	-7.73	0.000	-.0021974	-.0013086
_cons	-.3905326	.035923	-10.87	0.000	-.4609405	-.3201248
/lnsig2u	-14.02402	19.32018			-51.89087	23.84284
sigma_u	.000901	.0087037			5.40e-12	150454.8
rho	8.12e-07	.0000157			2.91e-23	1

Likelihood-ratio test of rho=0: chibar2(01) = 0.00 Prob >= chibar2 = 1.000

WTP estimative 1

Attribute	Coeff.	WTP
Likely to receive care	0.4674	266.60
Wait GP	-0.1442	(82.29)
Wait Specialist	-0.1162	(66.31)
Wait Exam	-0.0156	(8.88)
Wait Facility	-0.0030	(1.71)
Staff Attitude	0.6183	352.73
Cleanliness	0.3192	182.08
Pub Health	-0.4754	(271.19)

- *WTP is given by the ration of each attribute coefficient by the cost coefficient*
- *The highest WTP is for the staff attitude attribute (R\$352,73) – Individuals are willing to pay for better “interpersonal quality”*
- *Individuals are willing to pay R\$266,60 to be sure that they will receive care when needed (avoiding queues and lack of resources in public facilities)*
- *Individuals are willing to pay R\$82,29 to wait 8 fewer days for a GP consultation*

Interactions: SESxCost and SESxStaff

Random-effects probit regression
 Group variable: **id**

Random effects u_i ~ Gaussian

Log likelihood = **-804.08294**

Number of obs = 2416
 Number of groups = 604

Obs per group: min = 4
 avg = 4.0
 max = 4

wald chi2(13) = 935.50
 Prob > chi2 = 0.0000

answer	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
dlike	.468304	.036314	12.90	0.000	.3971299	.5394781
dwaitgp	-.0144617	.0016372	-8.83	0.000	-.0176705	-.0112529
dwaitesp	-.0117667	.0008127	-14.48	0.000	-.0133596	-.0101737
dwaitexam	-.0154891	.0024202	-6.40	0.000	-.0202326	-.0107455
dwaitfac	-.0030199	.0002496	-12.10	0.000	-.0035091	-.0025306
dstaff	.3948631	.1191259	3.31	0.001	.1613807	.6283454
_Ic1axdsta~2	.2300905	.1264243	1.82	0.069	-.0177162	.4778972
_Ic1axdsta~3	.2979099	.1362458	2.19	0.029	.030873	.5649468
dclean	.3922053	.0377035	10.40	0.000	.3183079	.4661027
dpubserv	-.4839954	.0363379	-13.32	0.000	-.5552164	-.4127745
dcost	-.0013945	.0007355	-1.90	0.058	-.002836	.000047
_Ic1axdcos~2	-.0008668	.0007811	-1.11	0.267	-.0023978	.0006642
_Ic1axdcos~3	.000772	.0008485	0.91	0.363	-.000891	.002435
_cons	-.3887019	.0361218	-10.76	0.000	-.4594994	-.3179044
/lnsig2u	-14.03143	19.37349			-52.00278	23.93991
sigma_u	.0008977	.0086954			5.10e-12	157937.3
rho	8.06e-07	.0000156			2.60e-23	1

Likelihood-ratio test of rho=0: chibar2(01) = 0.00 Prob >= chibar2 = 1.000

WTP estimative 1

Attribute	Coeff.	WTP
Likely to receive care	0.4680	360.00
Wait GP	-0.0144	(11.08)
Wait Specialist	-0.0110	(8.46)
Wait Exam	-0.0154	(11.85)
Wait Facility	-0.0030	(2.31)
Staff Attitude	0.3948	303.69
StaffxSES Low	0.2300	176.92
StaffxSES Medium	0.2970	228.46
Cleanliness	0.3922	301.69
Pub Health	-0.4830	(371.54)

Developments

- Explore the possibility of DCE data in measuring the effect on the demand for PHI due to changes in the levels of attributes

E.g.: What is the effect of a decrease in the waiting times in the NHS on the demand for phi?

- *labeled experiment?*

- Explore further regressions models/specifications

- *Test for interactions (SES X Quality and cost aspects) – allow to observe how the preferences changes across SES groups*

- Incorporate more levels for attributes (particularly waiting times for different providers/procedures)

- Optimal designs vs. orthogonal designs

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Thank you!

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