

# *Estimating the impact of daycare on child development and women welfare*

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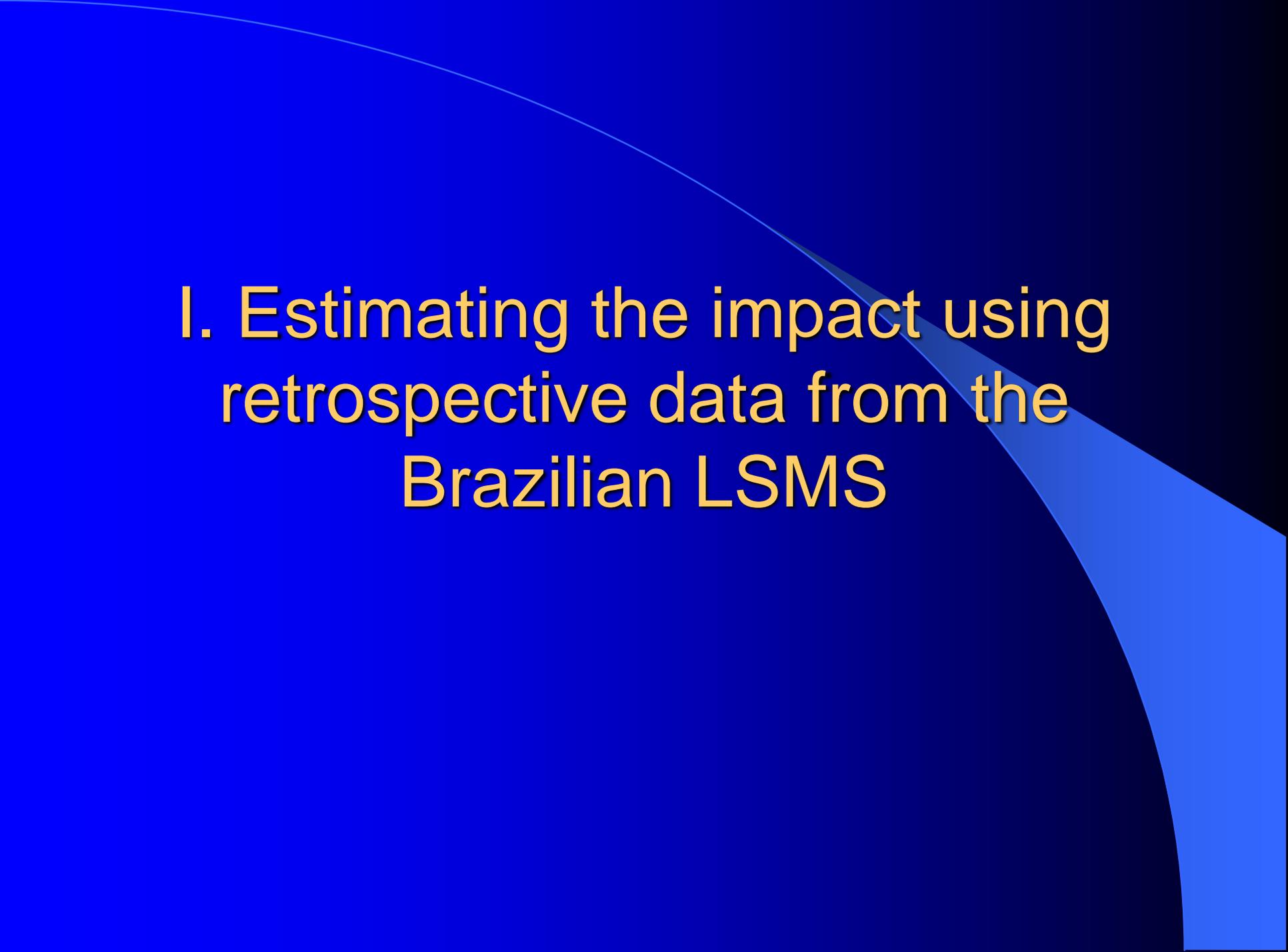
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Washington, April 2008



# I. Estimating the impact using retrospective data from the Brazilian LSMS

## Impact of an extra year of daycare and pre-school on educational performance, labor force participation and income

Outcome	Daycare		Pre-school	
	Coefficient	P-value(%)	Coefficient	P-value(%)
<b><i>The impact on educational performance</i></b>				
Finally achieved educational level	<b>-0.07</b>	<b>33</b>	<b>0.63</b>	<b>8</b>
Probability of completing 8th grade	<b>-0.14</b>	<b>63</b>	<b>0.27</b>	<b>0</b>
Probability of completing secondary education	<b>-0.05</b>	<b>85</b>	<b>0.18</b>	<b>1</b>
Probability of going to college	<b>-0.06</b>	<b>91</b>	<b>0.35</b>	<b>0</b>
Probability of having completed 4 <sup>th</sup> grade before age 14	<b>-9.47</b>	<b>34</b>	<b>0.65</b>	<b>2</b>
Probability of having completed 8 <sup>th</sup> grade before age 18	<b>7.65</b>	<b>97</b>	<b>0.41</b>	<b>23</b>
Probability of having completing secondary educational before age 25	<b>0.65</b>	<b>6</b>	<b>0.05</b>	<b>9</b>
Probability of entering college before age 25	<b>0.67</b>	<b>18</b>	<b>0.50</b>	<b>2</b>
Repetition rate (ratio between the number of years spent on school and the number of grades completed)	<b>-0.01</b>	<b>80</b>	<b>-0.05</b>	<b>0</b>
<b><i>The impact on labor market outcomes</i></b>				
Labor force participation rate (women 25 to 64 years old)	<b>0.67</b>	<b>54</b>	<b>-0.10</b>	<b>16</b>
Occupation rate (women 25 to 64 years old)	<b>0.78</b>	<b>53</b>	<b>-0.07</b>	<b>27</b>
Labor income (men 25 to 64 years old)	<b>-0.06</b>	<b>61</b>	<b>0.06</b>	<b>7</b>

Source: Barros, Ricardo and Mendonça, Rosane. Uma avaliação dos custos e benefícios da educação pré-escolar no Brasil, July, 1999, IPEA.

Note: This study was used as a background paper for: Young, Mary Eming. From Early Child Development to Human Development: Investing in Our Children's Future

# Four alternative interpretations

- Statistically non significant estimates result from the poor quality of the data
- Weak statistical results are caused by fragile identification strategy (problems with internal validity)
- Daycare really do not have important impacts on child development
- Small impact results from the low quality of daycare services in the past (problems with external validity)

II. Observational study with  
primary data collection in 100  
daycare centers and for 1000  
children

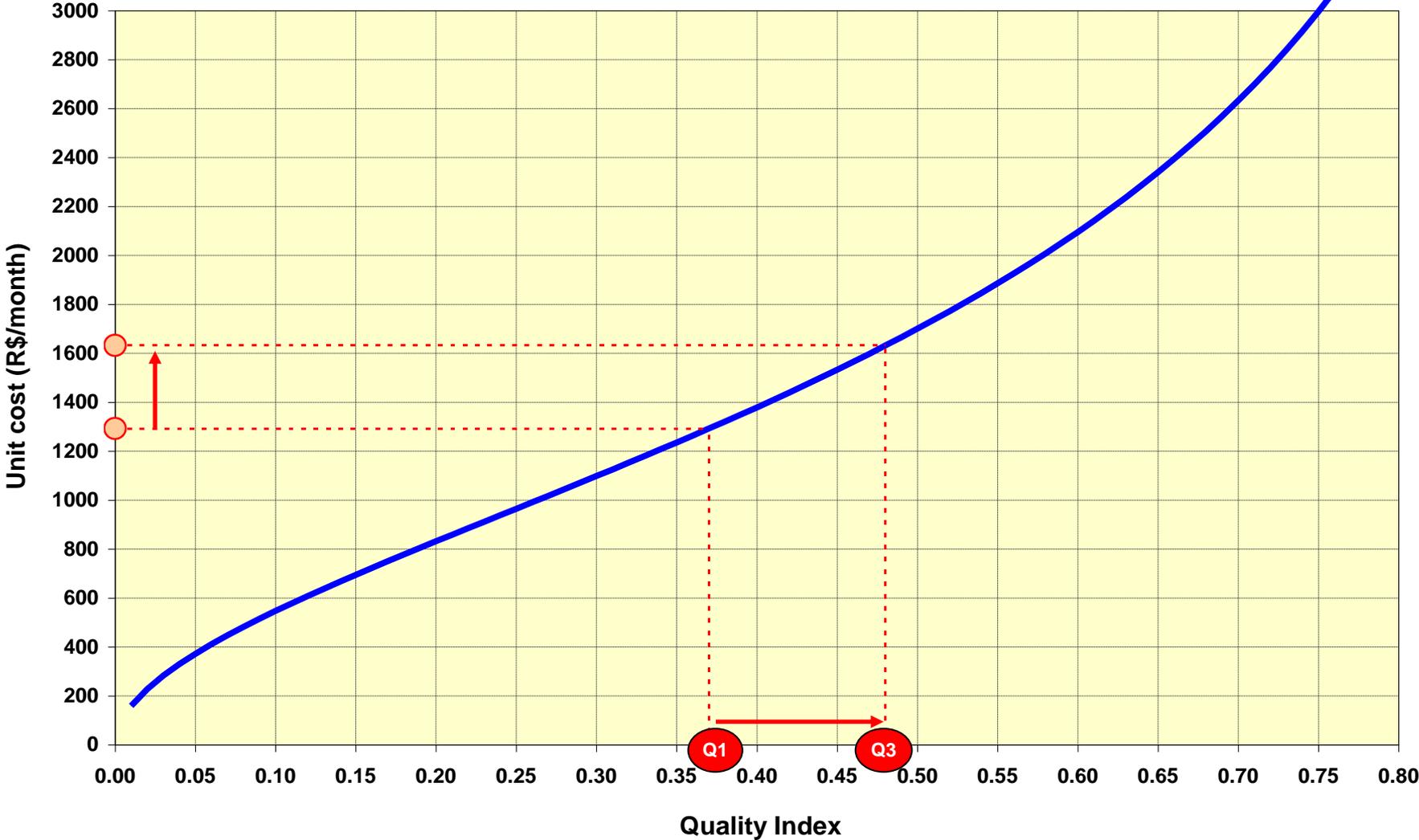
## Daycare centers in Rio de Janeiro municipality

<b>Indicator</b>	<b>value</b>
<i>Daycare centers</i>	<b>1,198</b>
<i>Municipal daycare centers</i>	<b>243</b>
<i>Children aged 0 to 3 years old (thousands)</i>	<b>276</b>
<i>Children aged 0 to 3 years old attending daycare centers (thousands)</i>	<b>68</b>
<i>Children aged 0 to 3 years old attending municipal daycare centers (thousands)</i>	<b>25</b>
<i>Proportion of children attending daycare centers (%)</i>	<b>25</b>
<i>Proportion of children attending daycare centers who attend municipal centers (%)</i>	<b>37</b>
<i>Proportion of poor children (bottom 50%) attending daycare centers who attend municipal centers (%)</i>	<b>50</b>

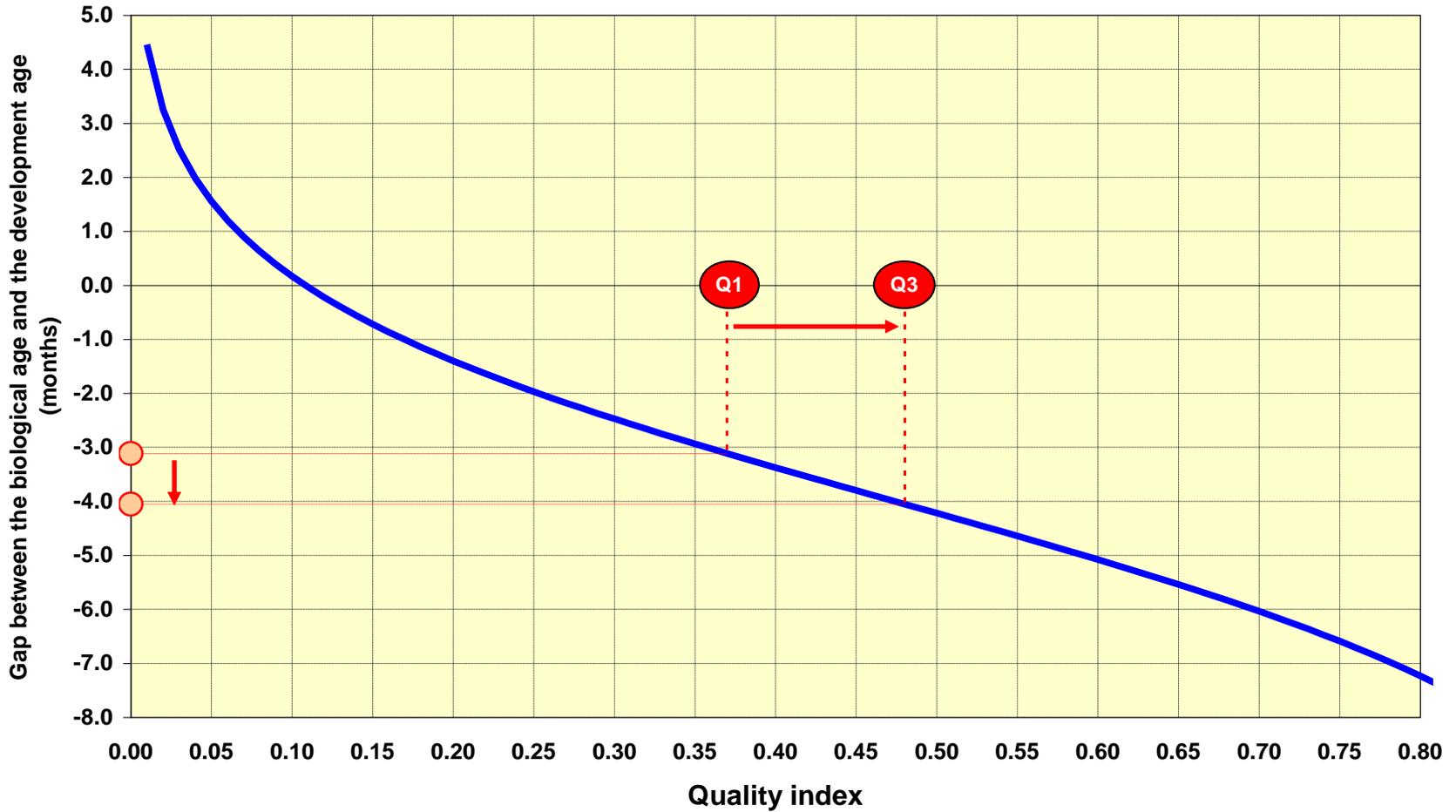
# Nature of data collection

- Evaluation of the economic cost of 100 daycare centers in Rio de Janeiro
- Objective evaluation of the quality of these 100 daycare centers (470 indicators, one week of continuous observation)
- Beneficiaries subjective perception of the service quality
- Evaluation of the development of a sample of 10 children per daycare center (total of 1000 children evaluated)
- Collection of information on family socio-economic conditions for each child in the study (household survey)

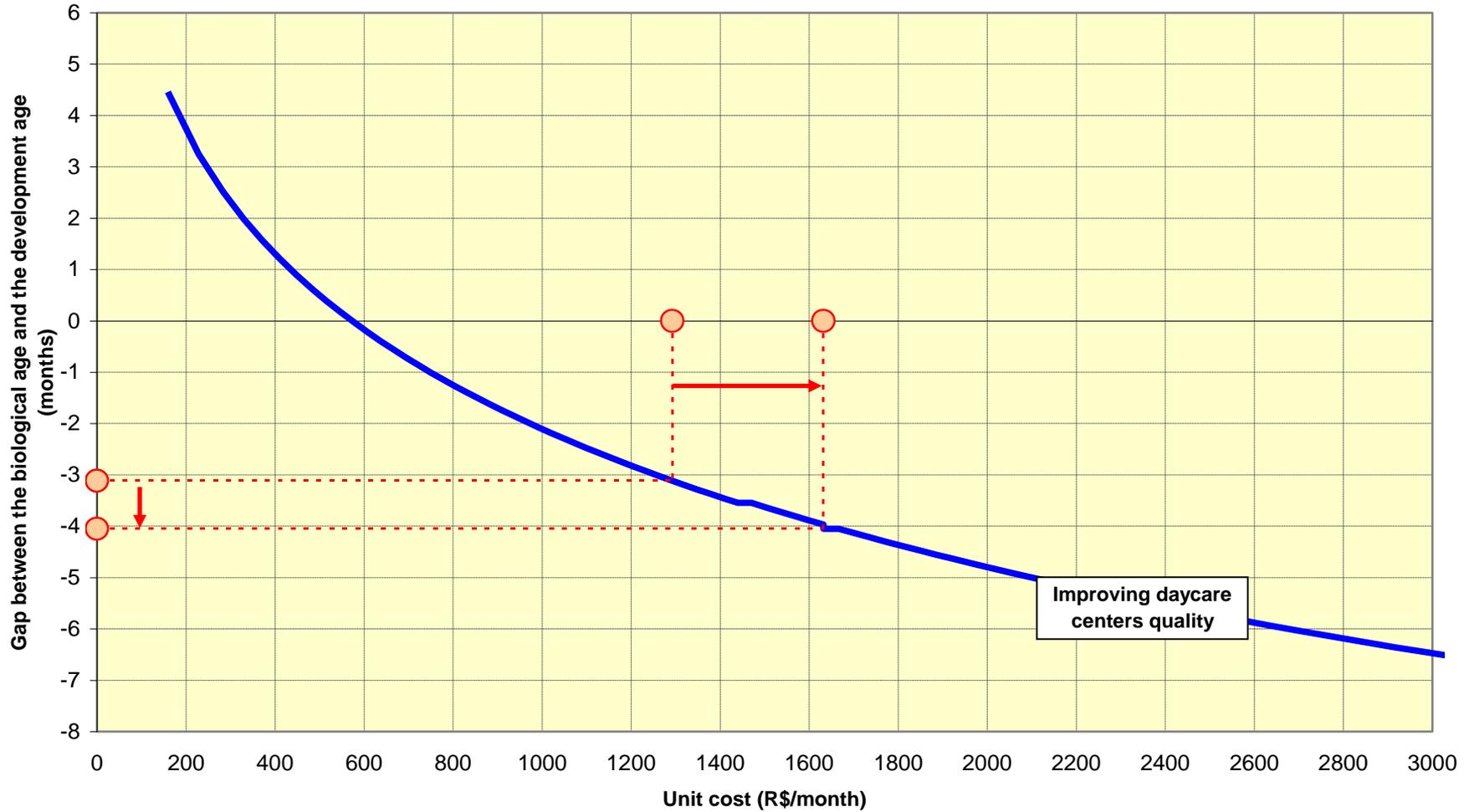
# Relationship between daycare centers cost and quality



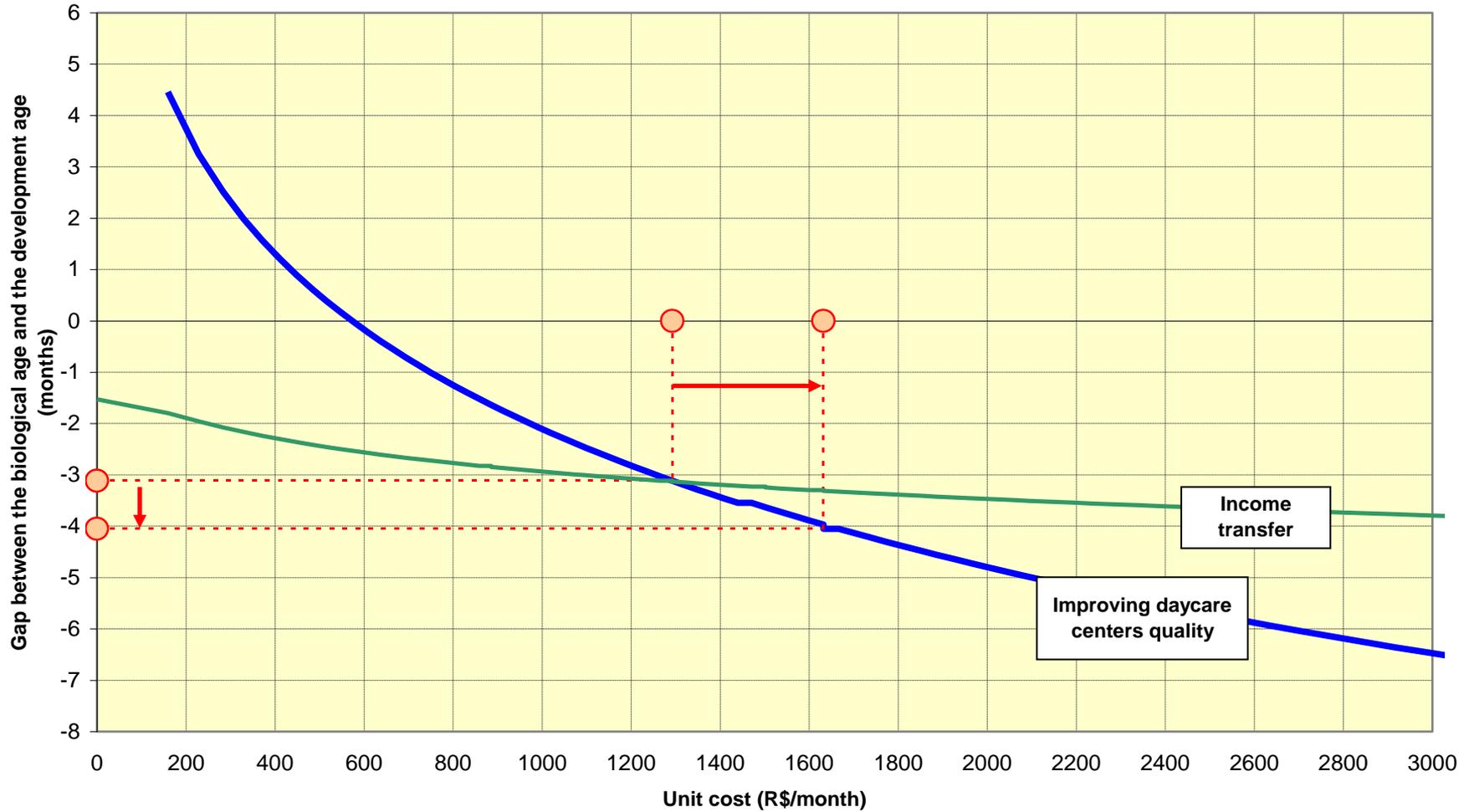
# Relationship between children development and the quality of daycare centers



# Relationship between children development and daycare expenditure

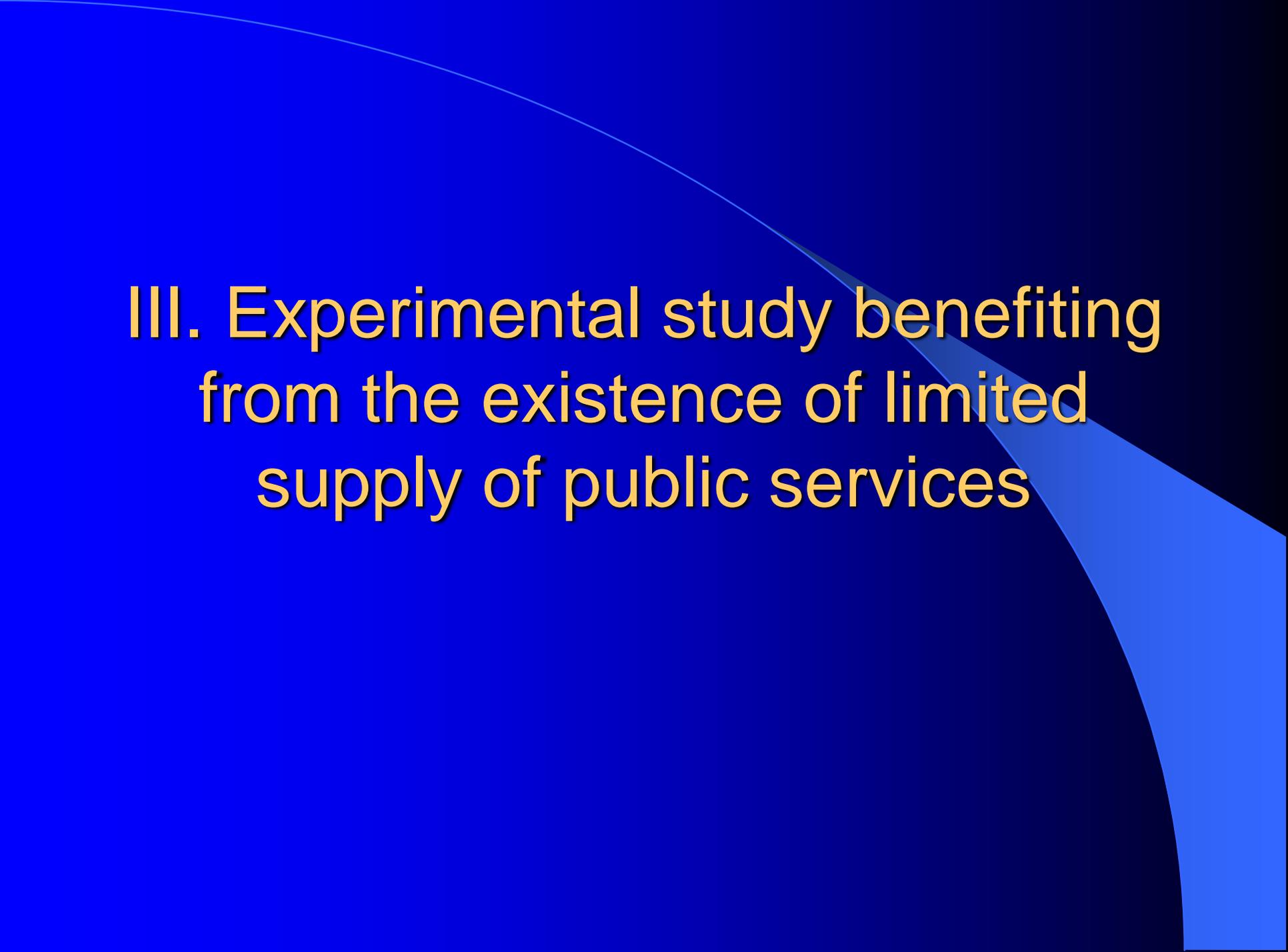


# Relationship between children development and daycare expenditure



# Limitations

- Small sample size
- Weak identification strategy (observational study)

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### III. Experimental study benefiting from the existence of limited supply of public services



**Excess Demand**

# Excess demand for Daycare in Rio de Janeiro municipality

Indicator	Value
<i>Coverage rate at the top 10% (%)</i>	55
<i>Average coverage rate (%)</i>	25
<i>Difference (percentage points)</i>	30
<i>Excess demand (thousands)</i>	83
<hr/>	
<i>Municipal vacancies for 2008 (thousands)</i>	12
<i>2008 Applicants for municipal daycare centers (thousands)</i>	25
<i>Applicants per vacancy in municipal daycare centers (2008)</i>	2.1

## Perception of daycare centers directors on the shortage of vacancies

Indicator	Percentage
<i>Percentage of daycare centers directors who believe that the number of vacancies available is not enough <u>(at least some extra vacancies are necessary)</u> :</i>	<b>76</b>
<i>Percentage of daycare centers directors who believe that the number of vacancies available is not enough <u>(a considerable amount of additional vacancies are necessary)</u> :</i>	<b>56</b>

Source: Estimates based on the Survey "Sistema de Seleção de Beneficiários das Creches do Município do Rio de Janeiro - Diretores de Creches, 2007"

# Constraints to the application process

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# Information about vacancies and the application process

Indicators	Percentage
<i>Percentage of directors who spend more than 15 days informing the community about vacancies and the application process</i>	91
<i>Percentage of directors who considers that everybody who needs the service is well informed about the application process</i>	73
<i>Percentage of directors who would spend more in the community information, if they had additional resources.</i>	39

Source: Estimates based on the Survey "Sistema de Seleção de Beneficiários das Creches do Município do Rio de Janeiro - Diretores de Creches, 2007"

## Constraints to the application process

Indicators	Percentage
<i>Percentage of directors who consider the two days application window enough for all families to apply</i>	<b>63</b>
<i>Percentage of directors who consider that all parents who need daycare services and are well informed about deadlines apply</i>	<b>80</b>
<i>Percentage of directors who consider that the lack of documents prevent candidate to apply</i>	<b>14</b>

Source: Estimates based on the Survey "Sistema de Seleção de Beneficiários das Creches do Município do Rio de Janeiro - Diretores de Creches, 2007"

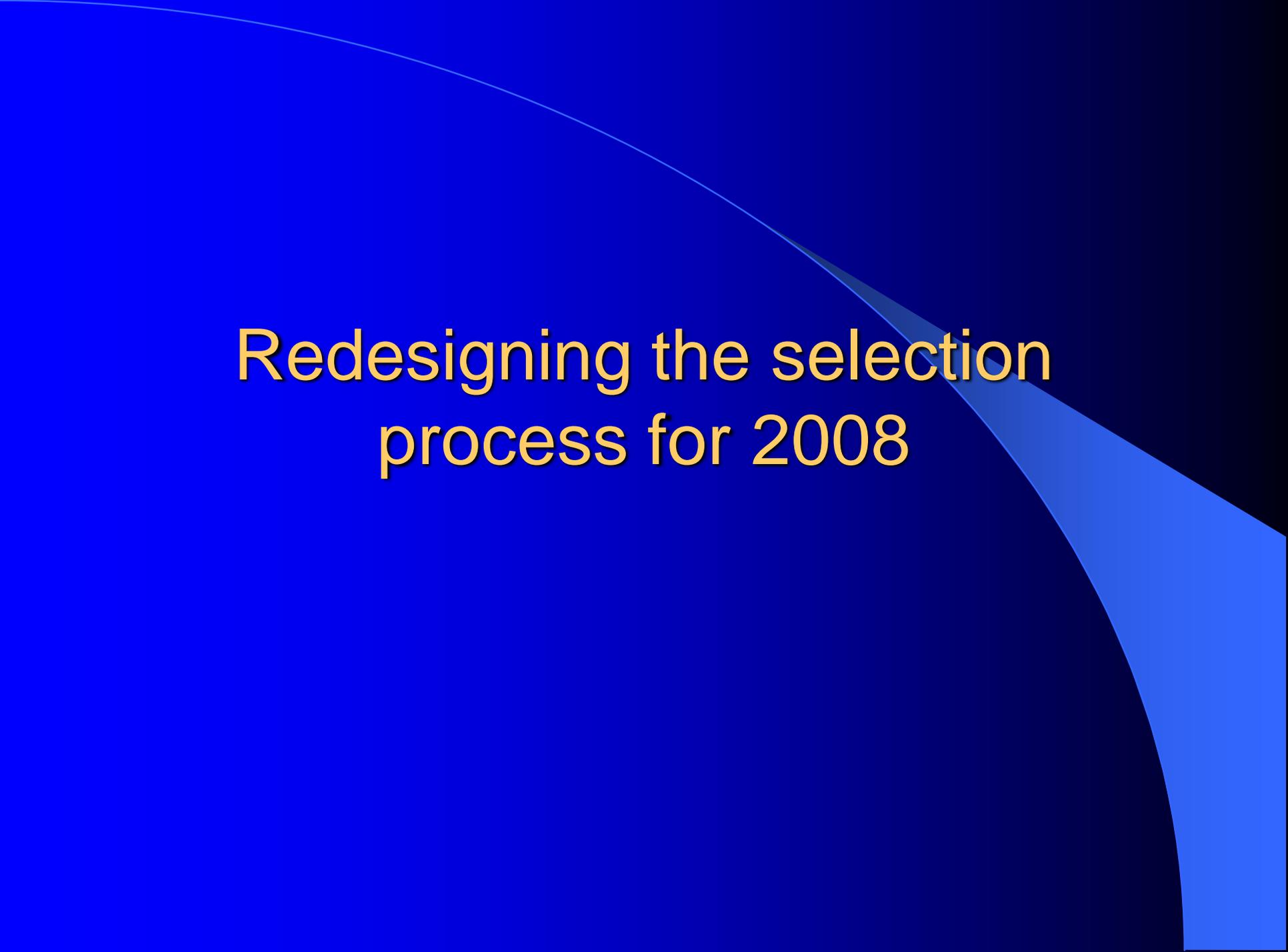


Local autonomy

# Local autonomy and procedures

Indicators	Percentage
<i>Percentage of daycare centers directors who do not need to justify their choices to any government official</i>	<b>95</b>
<i>Percentage of daycare centers that use objective criteria to rank applicants</i>	<b>100</b>
<i>Percentage of daycare centers using lexicographic procedures</i>	<b>42</b>
<i>Percentage of daycare centers using synthetic indicator</i>	<b>58</b>

Source: Estimates based on the Survey "Sistema de Seleção de Beneficiários das Creches do Município do Rio de Janeiro - Diretores de Creches, 2007"



# Redesigning the selection process for 2008

# Selection procedure for 2008

- **Two** days application window
- All applicants with special needs have priority access up to **two** per class. One or two children with special needs count as five vacancies.
- Each daycare center director could fill, during the application window, up to **10%** of their vacancies or at least **4 slots** using whatever subjective criteria they wish
- All remaining vacancies were publicly randomly allocated among the applicants fulfilling **at least one** of the objective criteria established by the municipality:
  - Mother need the daycare center services to work
  - Total family income below 2 minimum wages
  - Any member of the family have a chronic disease
  - Any member of the family have a alcohol problem or is a drug user
  - Children in families with episodes of domestic violence
  - Any member of the family is in conflict with the Law.

## ***Distribution of vacancies in municipal daycare centers***

<b>Age group</b>	<b><i>Flow (%)</i></b>	<b><i>Stock (%)</i></b>
Berçário I (up to 11 months)	<b>28</b>	<b>11</b>
Berçário II (from 12 months to 23 months)	<b>19</b>	<b>18</b>
Maternal I (from 24 months to 35 months)	<b>40</b>	<b>33</b>
Maternal II (from 36 months to 47 months)	<b>14</b>	<b>38</b>

## Daycare centers in Rio de Janeiro 2008 - supply and demand

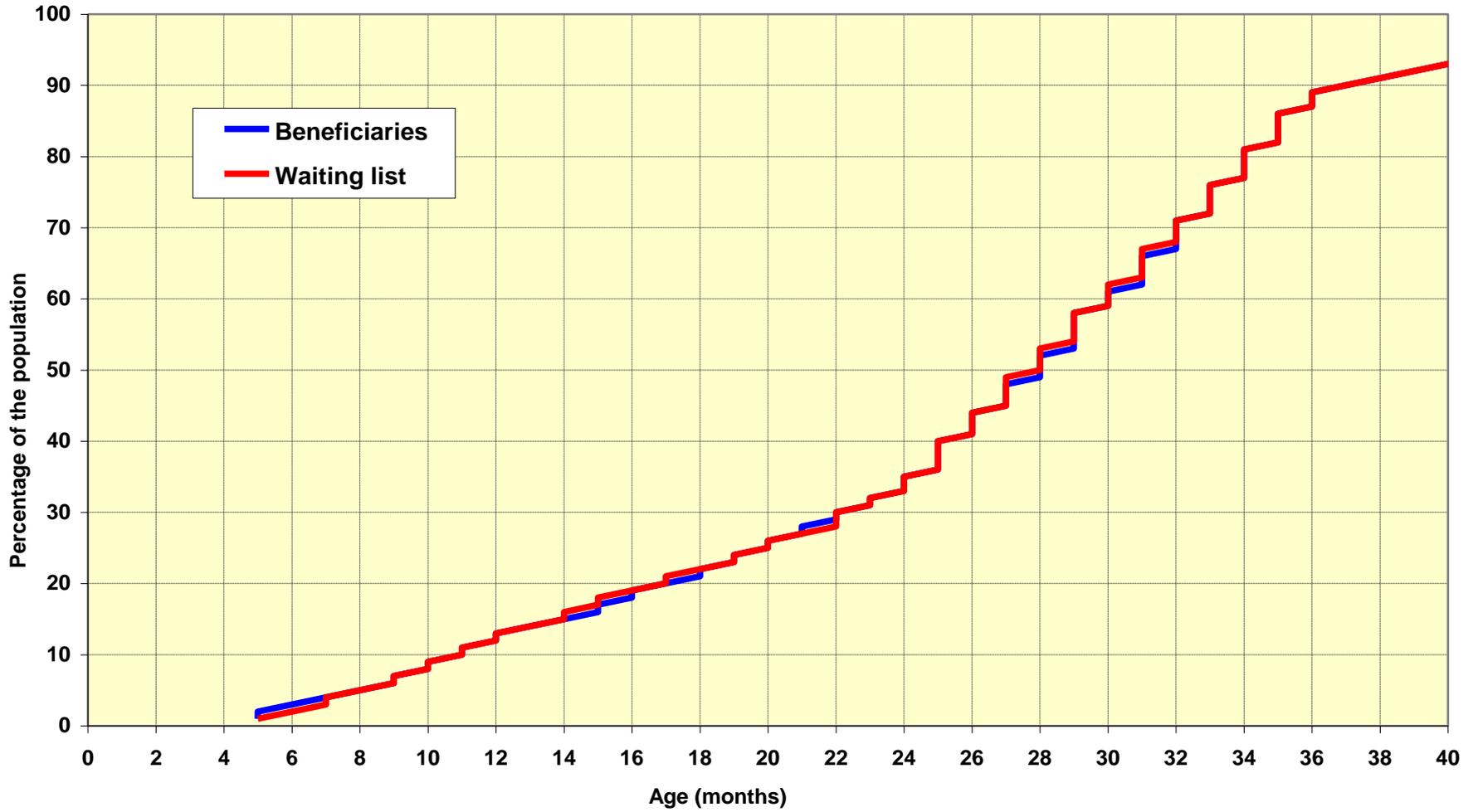
CRE	Vacancies	Demand (number of children applying)	Children with special needs	High priority children	Available vacancies	Qualify for receiving the service (according to municipal rules)			Waiting list	Open vacancies
						Yes	No	Total		
1	1344	3051	39	108	1133	2895	9	2904	1815	44
2	1402	1685	18	79	1244	1575	13	1588	747	403
3	919	2132	30	77	779	2013	12	2025	1297	51
4	1367	3192	49	111	1183	3007	25	3032	2029	180
5	1022	1452	17	68	902	1361	6	1367	676	211
6	950	2214	22	74	826	2103	15	2118	1373	81
7	947	3291	52	98	764	3113	28	3141	2397	20
8	1124	2749	17	105	981	2599	28	2627	1685	39
9	1073	2326	24	87	930	2191	24	2215	1332	47
10	1529	3322	46	158	1291	3102	16	3118	1993	166
<b>Total</b>	<b>11677</b>	<b>25414</b>	<b>314</b>	<b>965</b>	<b>10033</b>	<b>23959</b>	<b>176</b>	<b>24135</b>	<b>15344</b>	<b>1242</b>

## ***Group characteristics***

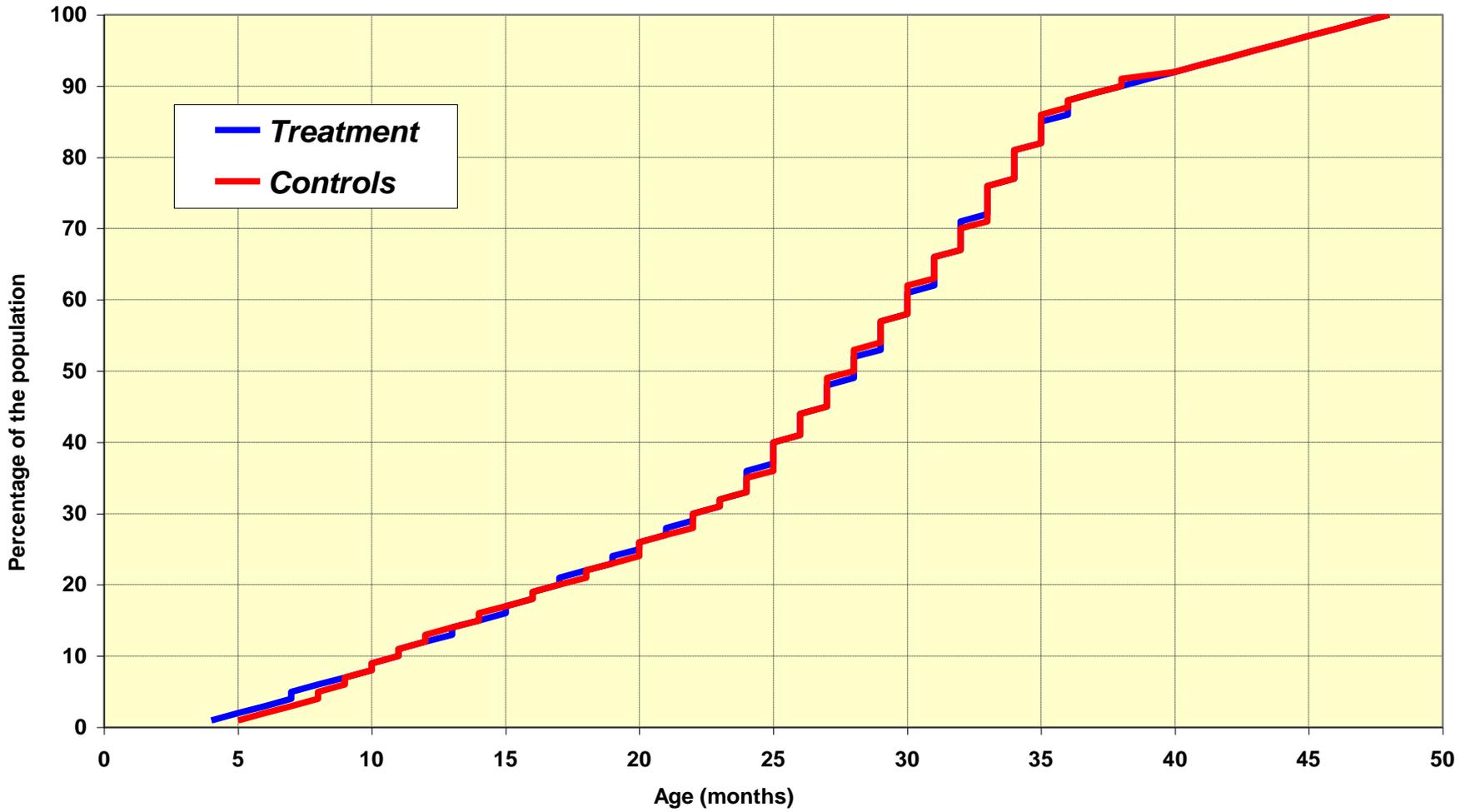
Type of group	Number of groups
All	813
Offering vacancies in 2008	614
With available vacancies	550
With excess demand	393
In the sample	209

# Evaluating the success of the randomization procedure

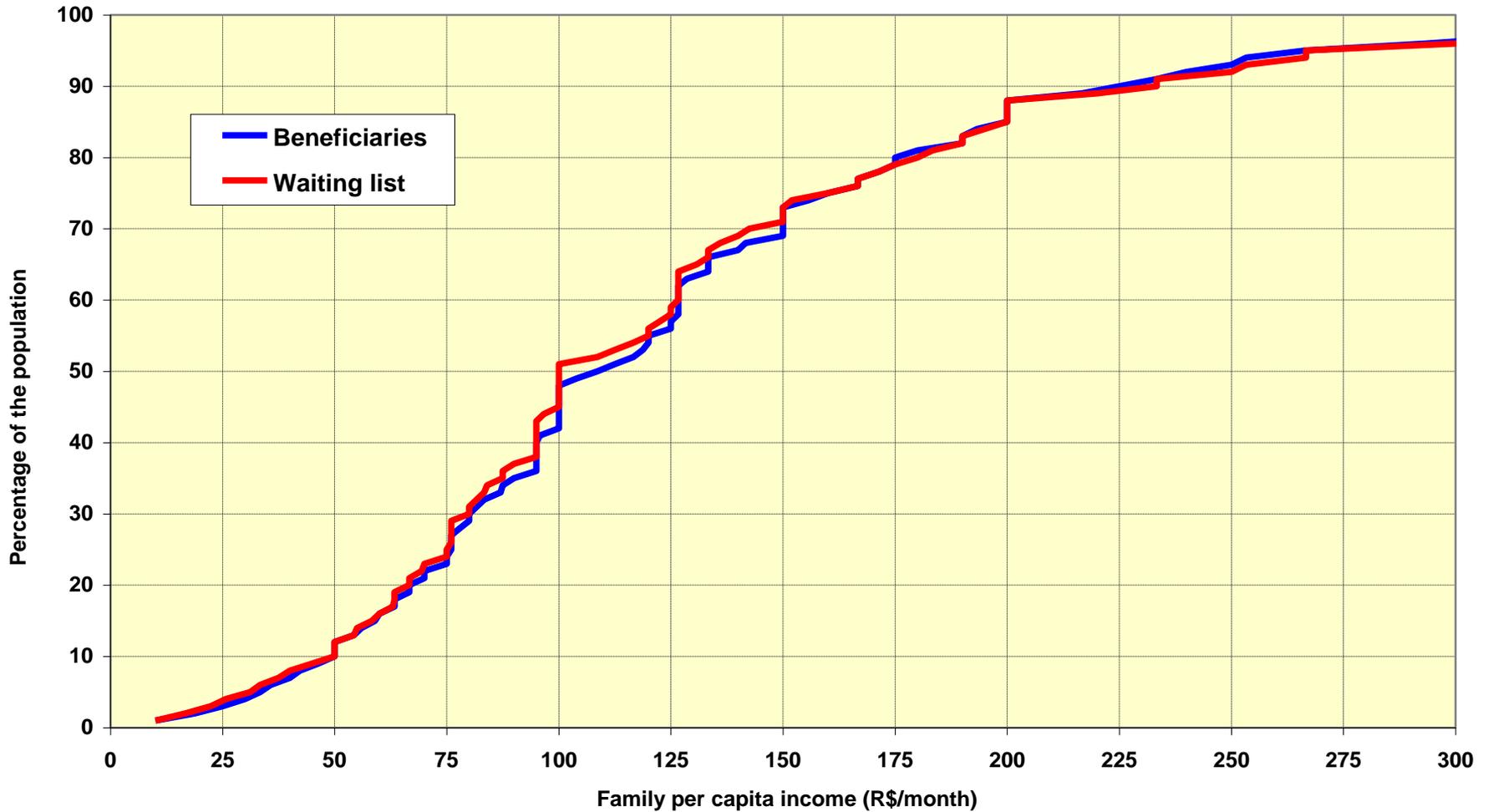
# Age cumulative distribution



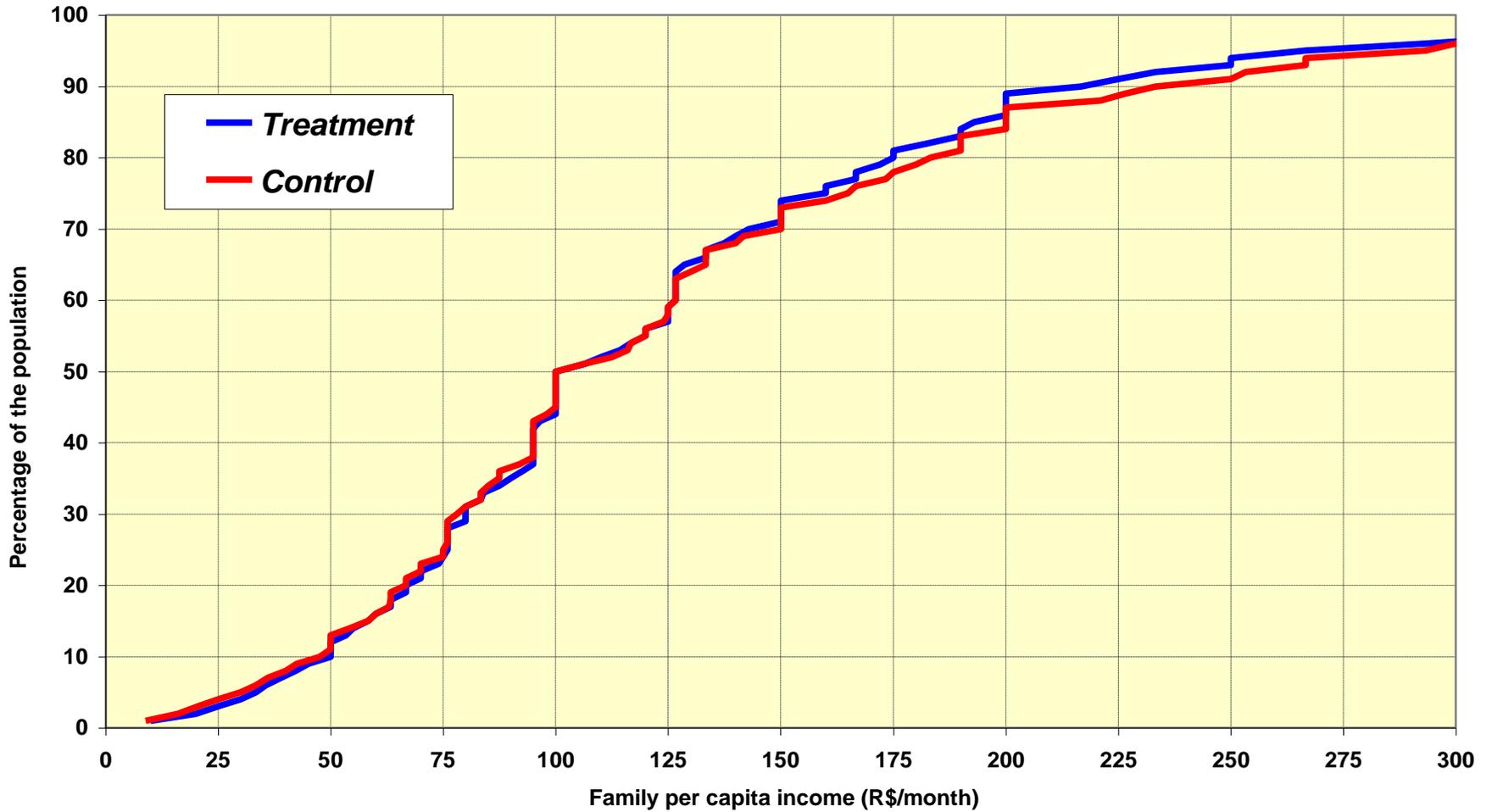
# Age cumulative distribution: sample



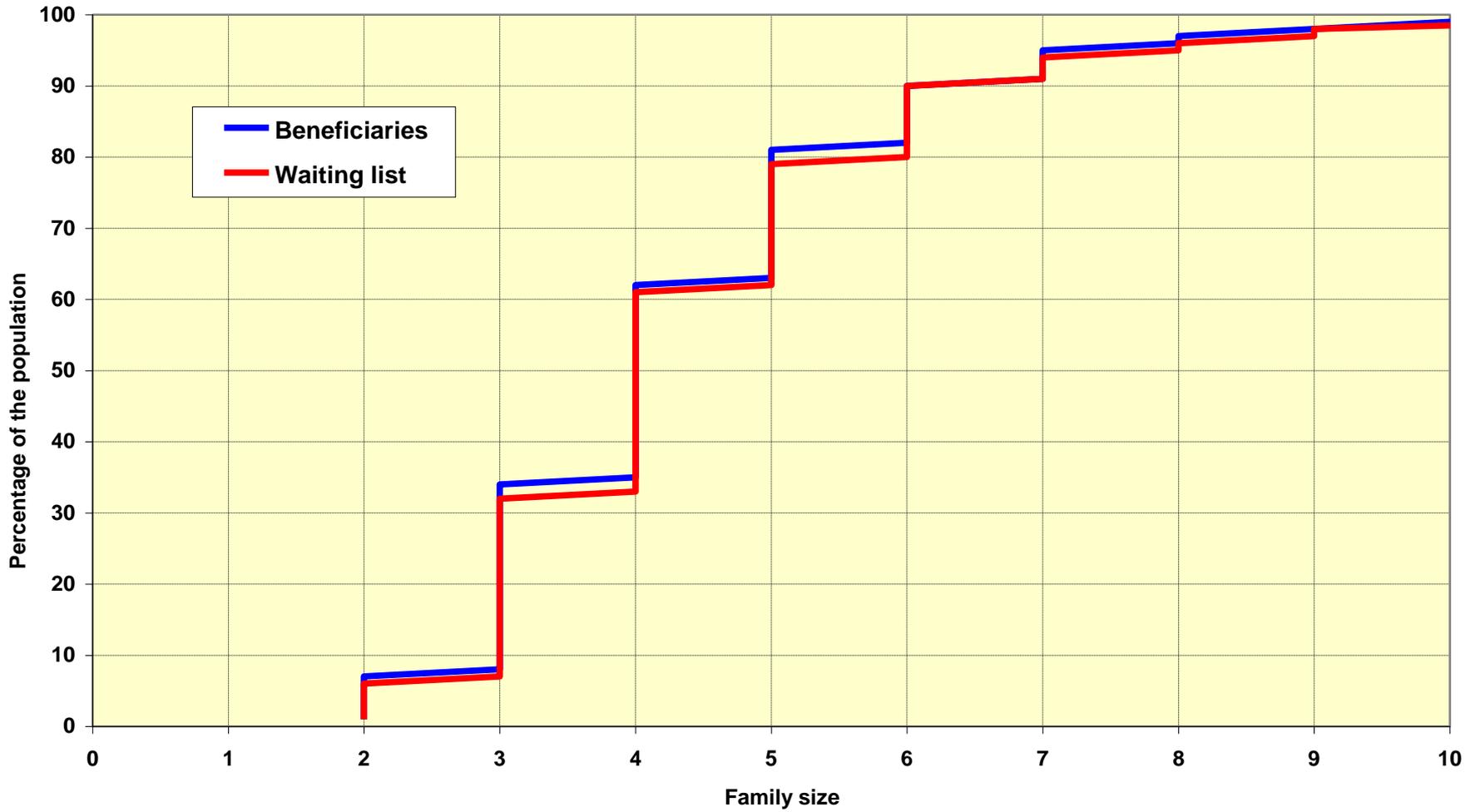
# Family per capita income cumulative distribution



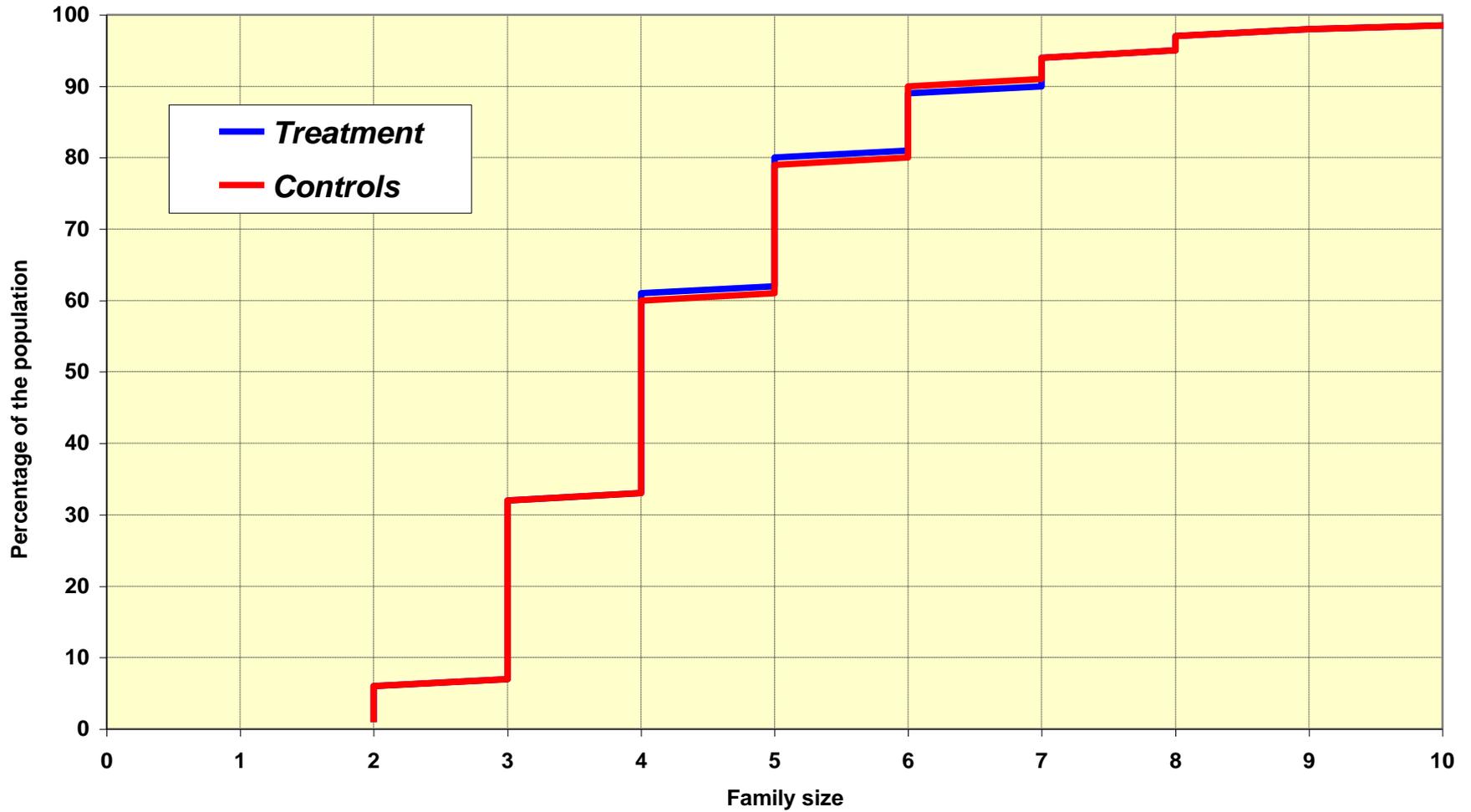
# Family per capita cumulative distribution: sample



## Family size cumulative distribution



## Family size cumulative distribution: sample



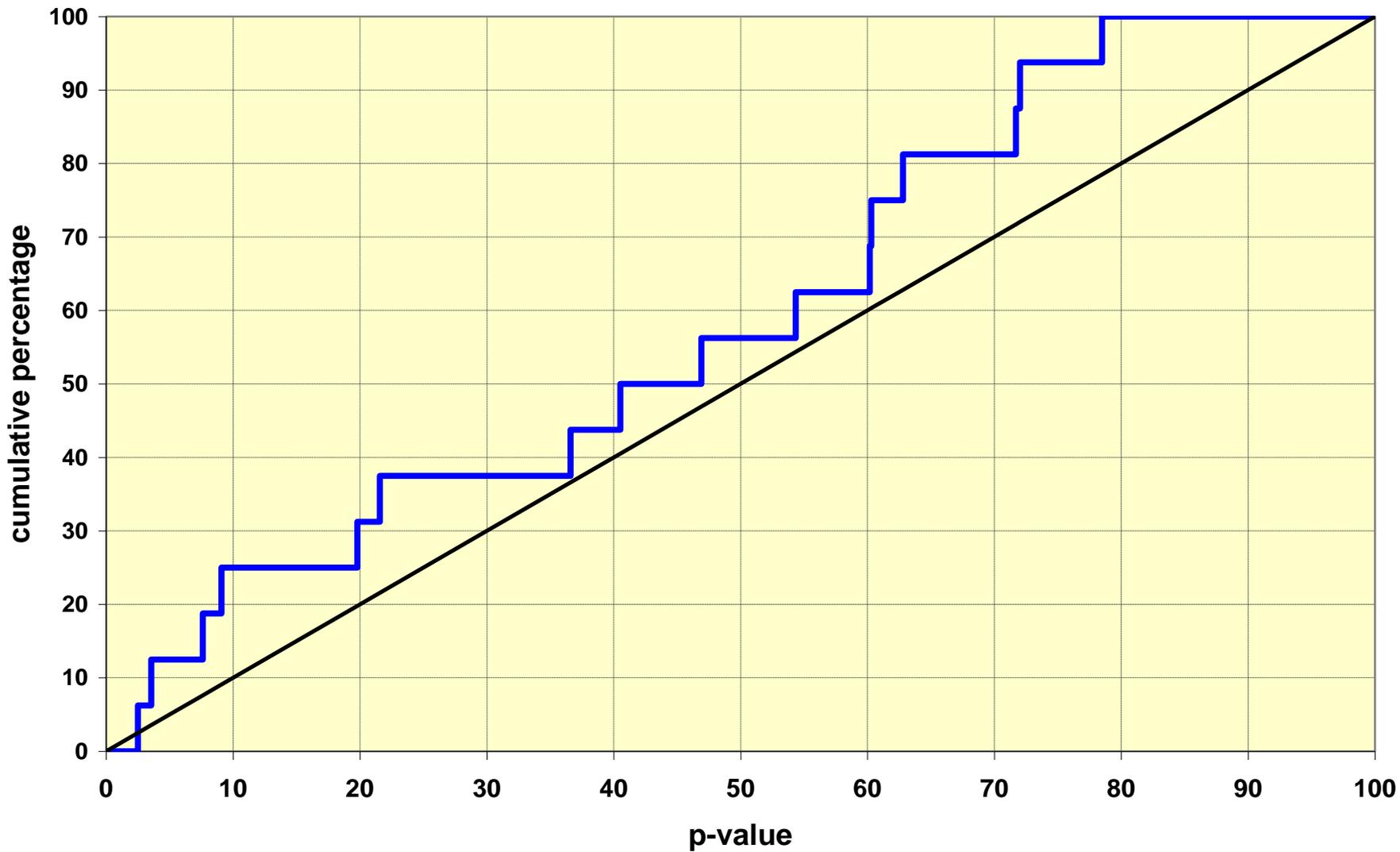
Kolmogorov-Smirnov two sample test:  
differences in the distributions among  
beneficiaries and non beneficiaries

Indicator	P-value (%)	
	Universe	Sample
Age	100	100
Per capita family income	98	42
Family size	100	100

# Characteristics of children, persons responsible for them and their families

Indicator	Mean		Gap	P-value for the test of equality of means
	Beneficiaries	Waiting list		
<b>Children characteristics</b>				
Percentage male	53.4	51.0	2.4	3
Age (months)	26.3	26.2	0.1	78
<b>Family characteristic</b>				
Total family income (R\$ per month)	630	690	-60.3	37
Family size	4.6	4.6	-0.1	54
Per capita income (R\$ per month)	172	179	-7.3	72
<b>Labor force participation of the person responsible for the children</b>				
Percentage working	68.1	68.5	-0.4	72
Percentage seeking work	29.0	28.3	0.7	47
Percentage who need daycare center to work	98.9	98.4	0.5	4
<b>Health</b>				
Percentage of children with chronic disease	7.0	7.9	-1.0	9
Percentage of families with at least one person with a chronic disease	19.6	19.1	0.4	60
<b>Vulnerability</b>				
Incidence of family violence	7.4	7.7	-0.3	63
Percentage of families with at least one person with alcohol problem	13.1	12.2	0.9	22
Percentage of families with at least one drug user	9.1	8.6	0.5	41
Percentage of families with at least one member who is or has been in prison	11.0	11.4	-0.4	60
<b>Family characteristic</b>				
Percentage of families that already have another children in the daycare center	8.5	9.6	-1.1	8
Percentage of families living in the community	90.0	90.8	-0.8	20

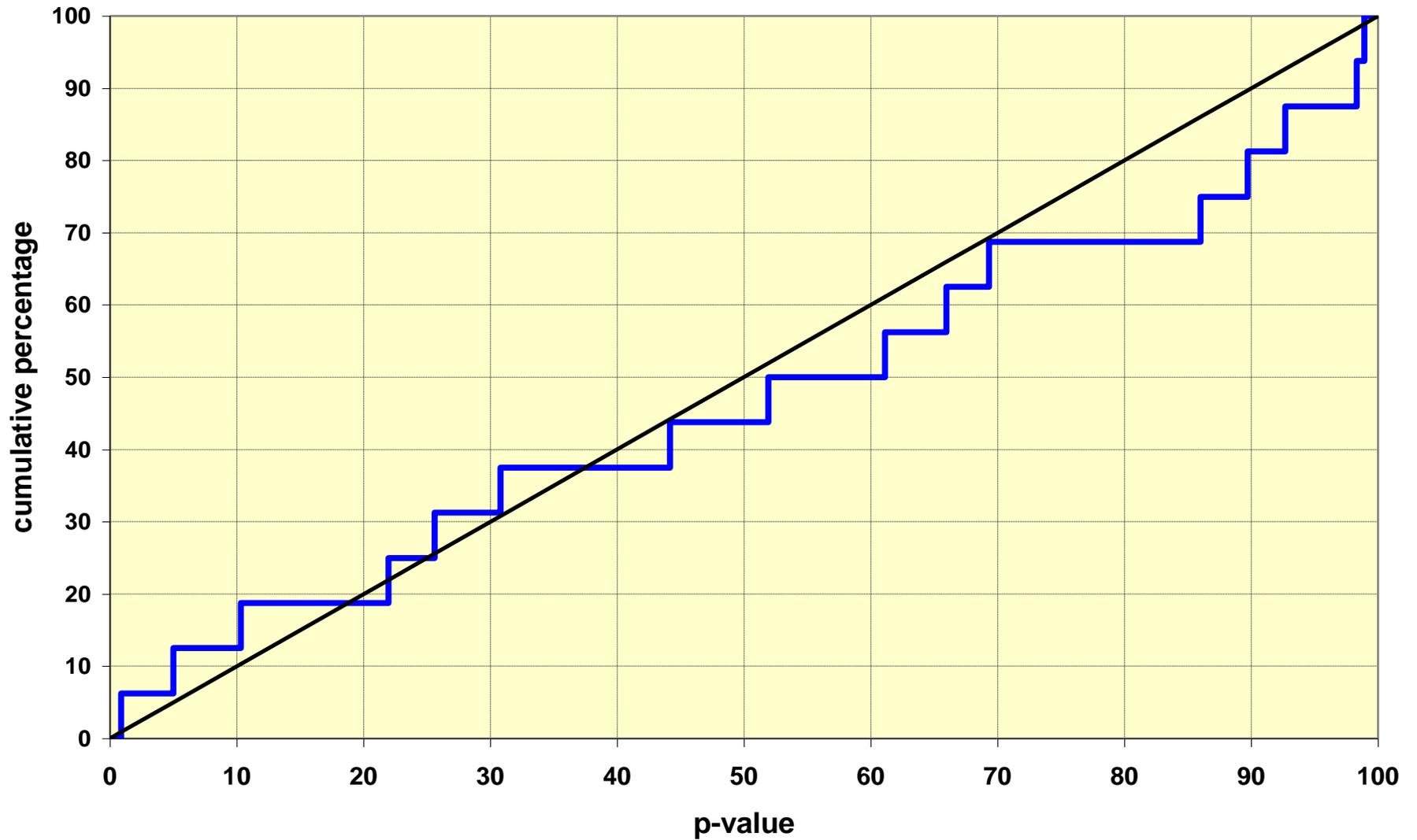
# P-value cumulative distribution



# Characteristics of children, persons responsible for them and their families: sample

Indicator	Mean		Gap	P-value for the test of equality of means
	Treatment	Control		
<b>Children characteristics</b>				
Percentage male	53.6	51.1	2.5	10
Age (months)	26.3	26.4	0.0	93
<b>Family characteristic</b>				
Total family income (R\$ per month)	628	599	29.8	69
Family size	4.7	4.6	0.1	61
Per capita income (R\$ per month)	171	148	23.1	31
<b>Labor force participation of the person responsible for the children</b>				
Percentage working	68.6	68.9	-0.2	86
Percentage seeking work	28.4	27.5	0.9	52
Percentage who need daycare center to work	99.0	98.0	1.0	1
<b>Health</b>				
Percentage of children with chronic disease	6.5	8.1	-1.6	5
Percentage of families with at least one person with a chronic disease	19.7	18.2	1.5	22
<b>Vulnerability</b>				
Incidence of family violence	6.7	6.8	-0.1	90
Percentage of families with at least one person with alcohol problem	11.9	12.3	-0.4	66
Percentage of families with at least one drug user	8.1	8.1	0.0	99
Percentage of families with at least one member who is or has been in prison	10.5	11.6	-1.1	26
<b>Family characteristic</b>				
Percentage of families that already have another children in the daycare center	9.7	9.7	0.0	98
Percentage of families living in the community	89.1	89.8	-0.7	44

# P-value cumulative distribution: sample



Deviations from the original  
design: no show and  
contamination

## Monitoring the Admission Process

CRE	Children selected to the sample of beneficiaries (treatment group)	Children with admission checked	Children admitted	Children not admitted	Percentage of children not admitted
1	290	290	246	44	15
2	110	110	63	46	42
3	200	200	172	28	14
4	235	215	167	48	22
5	75	75	68	7	9
6	240	240	221	19	8
7	290	290	265	25	9
8	309	309	277	32	10
9	215	200	176	24	12
10	210	210	178	32	15
<b>Total</b>	<b>2174</b>	<b>2139</b>	<b>1833</b>	<b>305</b>	<b>14</b>

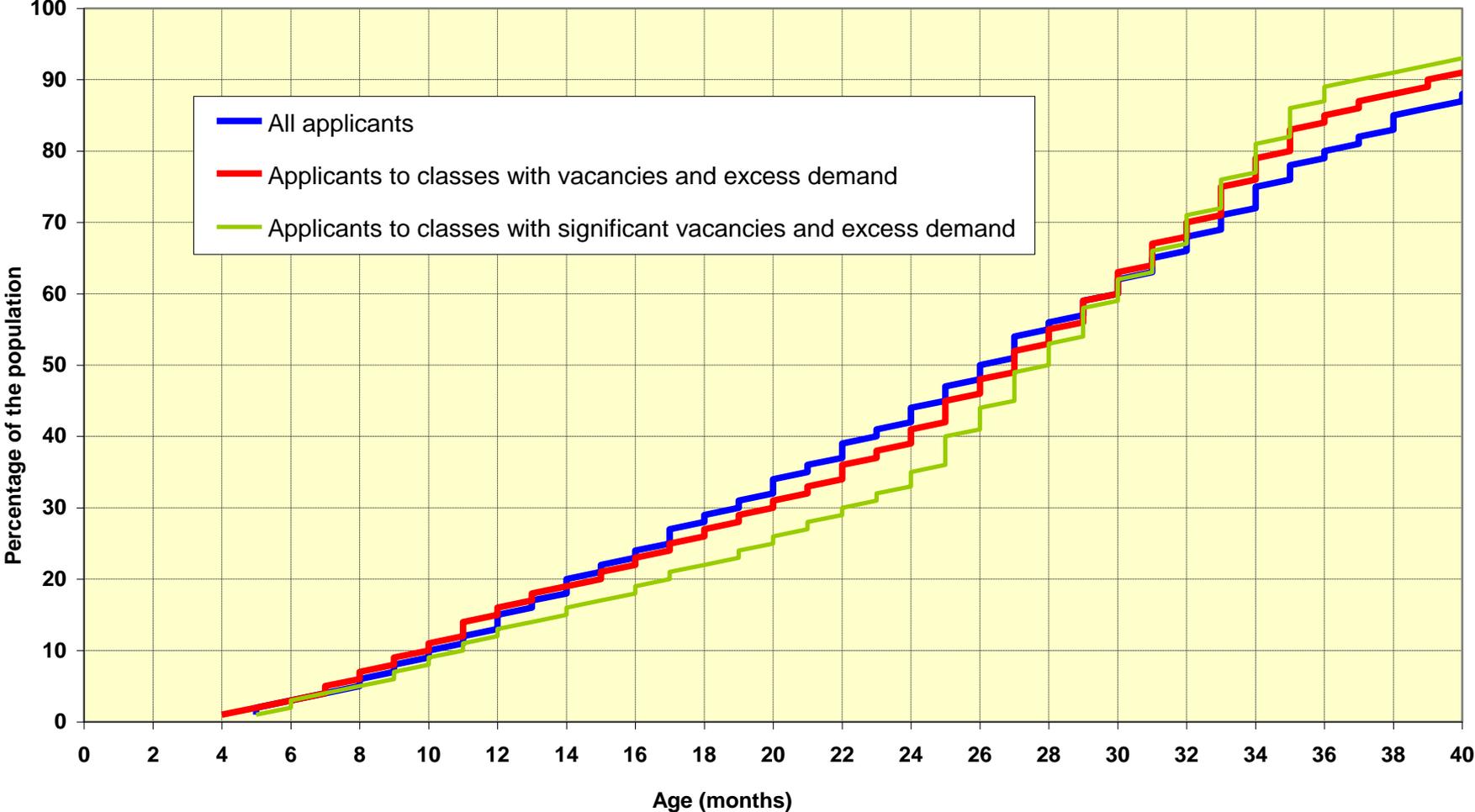
# External validity

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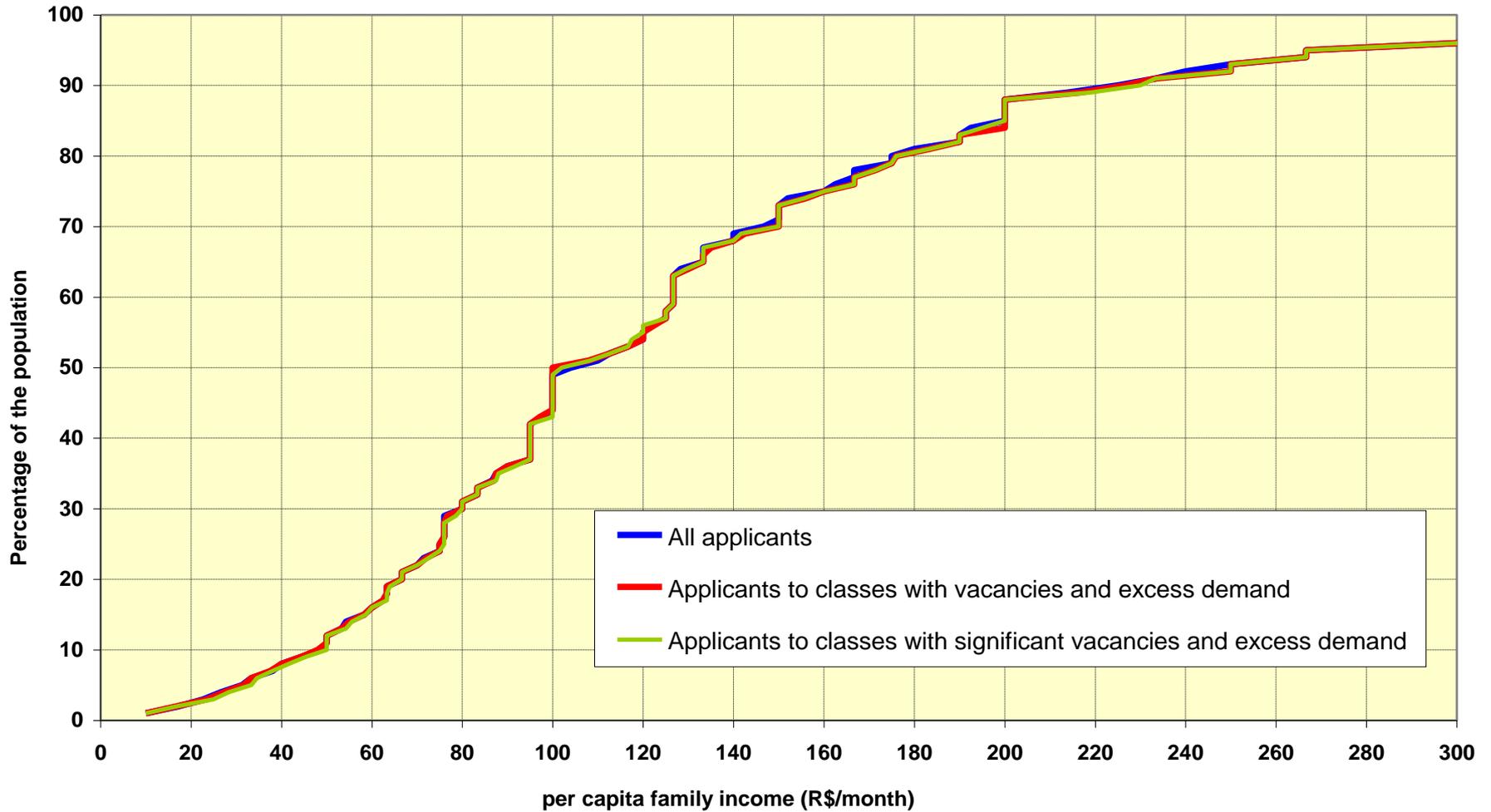
# Characteristics of children, persons responsible for them and their families

Indicator	Mean			P-value for the test of equality of means between	
	All applicants	Applicants for classes with vacancies and excess demand	Applicants for classes with significant vacancies and excess demand	All applicants and applicants for classes with vacancies and excess demand	All applicants and applicants for classes with significant vacancies and excess demand
<b>Children characteristics</b>					
Percentage male	52.2	52.5	52.4	71	64
Age (months)	25.9	25.6	26.3	0	0
<b>Family characteristic</b>					
Total family income (R\$ per month)	632	643	675	21	3
Family size	4.6	4.6	4.6	95	39
Per capita income (R\$ per month)	164	169	178	16	3
<b>Labor force participation of the person responsible for the children</b>					
Percentage working	67.8	68.6	68.9	4	11
Percentage seeking work	29.4	28.6	28.2	2	5
Percentage who need daycare center to work	98.6	98.7	98.7	69	72
<b>Health</b>					
Percentage of children with chronic disease	7.8	7.5	7.4	15	28
Percentage of families with at least one person with a chronic disease	19.8	20.0	19.6	66	2
<b>Vulnerability</b>					
Incidence of family violence	7.4	7.6	7.7	42	38
Percentage of families with at least one person with alcohol problem	12.2	12.7	12.6	39	35
Percentage of families with at least one drug user	8.0	8.6	8.9	1	6
Percentage of families with at least one member who is or has been in prison	11.0	11.3	11.2	68	26
<b>Family characteristic</b>					
Percentage of families that already have another children in the daycare center	9.4	9.3	9.2	57	35
Percentage of families living in the community	91.0	90.4	90.5	11	72

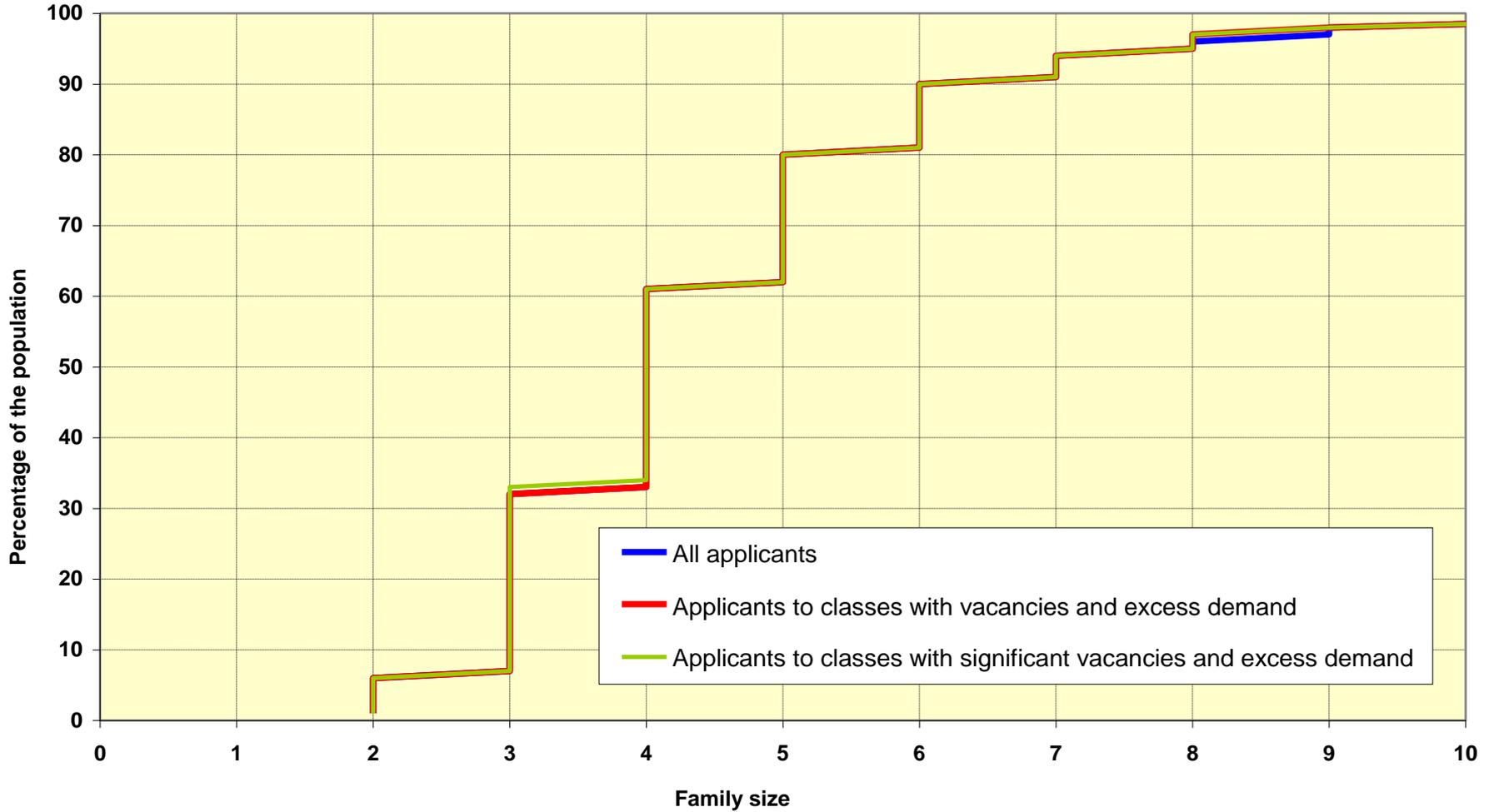
# Age cumulative distribution



## Per capita family income cumulative distribution



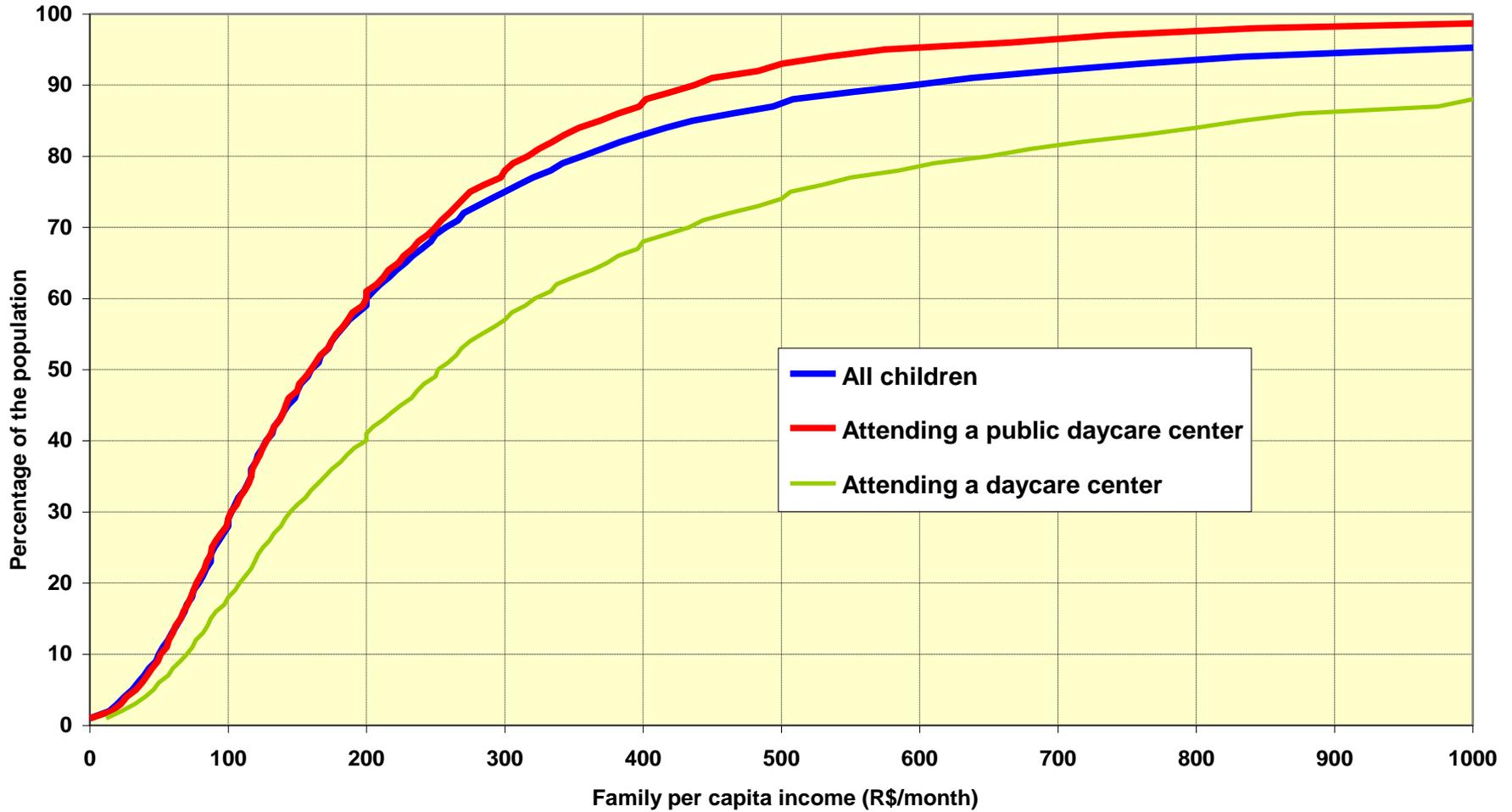
# Family size cumulative distribution



Kolmogorov-Smirnov two sample test: differences between the distribution among all applicants and the distribution among applicants for classes with vacancies and excess demand

Variable	P-value (%)
Age	0
Per capita family income	92
Family size	74

## Family per capita income cumulative distribution



# Sample Design



## Sample Design

Group	Net vacancies	Children in the waiting list	Sample of beneficiaries	Sample of children in waiting list	Number of combinations group-day care where random selection was necessary	Size of the group
<b>1</b>	Less than 7	Any	0	0	101	0
	More than 7	Less than 7	0	0	83	0
<b>2</b>	Between 7 and 12	More than 7	5	5	43	430
	More than 12	Between 7 and 12	5	5	34	340
<b>3</b>	Between 12 and 17	More than 12	10	10	39	780
	More than 17	Between 12 and 17	10	10	25	500
<b>4</b>	Between 17 and 22	More than 17	15	15	34	1020
	More than 22	Between 17 and 22	15	15	8	240
<b>5</b>	More than 22	More than 22	20	20	26	1040
<b>Total</b>					<b>209</b>	<b>4350</b>

# Data collection challenges

- More comprehensive test of internal validity
- Identification of exposure to treatment: second alternative, no-show and contamination
- Collection of retrospective information that could be valid as a baseline
- Impact evaluation based on the measurement of outcomes with quick response like female labor force participation and stress
- How important would be to collect information on child development three months after intervention begin?