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PREVENTION AND CONTROL OF HOMICIDES:
AN EVALUATION IN BRAZIL

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OBJECTIVE:

An evaluation of a criminality prevention and control program in Brazil, denominated Fica Vivo.

- The Fica Vivo impact evaluation.

- The Fica Vivo economic evaluation in the Pilot Area.

MOTIVATIONS :

✓ *High levels of violence in Brazil and LA.*

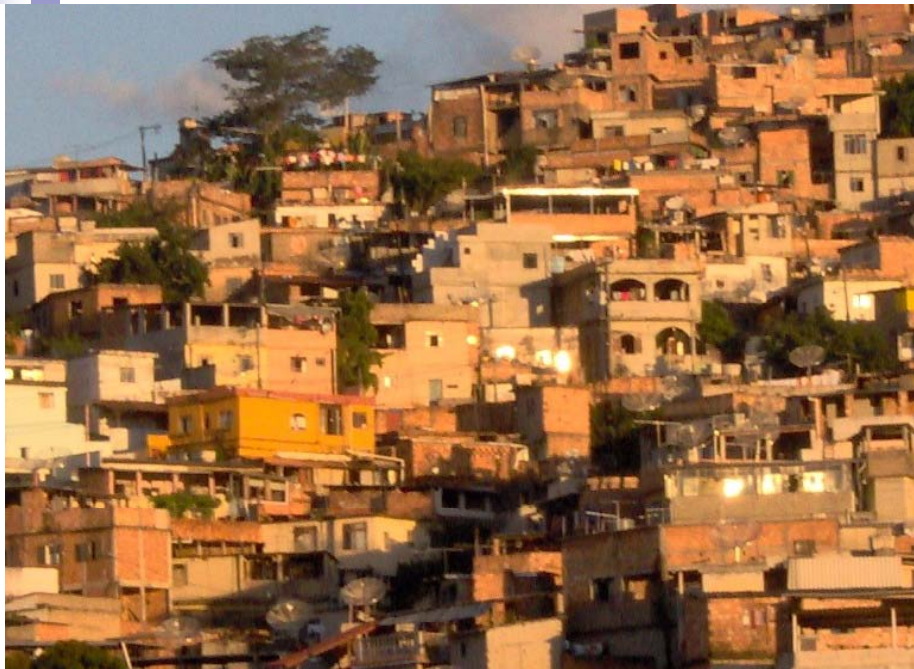✓ *Scarcity of economic evaluation focusing on prevention criminality program.*

✓ *Possibility of replication of this type of evaluation*

FICA VIVO PROGRAM

The main objective is homicide reduction in areas where its incidence is high, in general, *favelas* (slums).

It was based on the CeaseFire Project proposed by the University of Illinois.

Picture source: www.favelaeissoai.com.br

TWO TYPES OF ACTION :

1. *Strategic interventions*

2. *Social Protection*

TWO TYPES OF ACTION

1. *Strategic intervention:*

✓ association between the Police and the Judiciary for fast crime resolution

✓ police operations with repressive and community policing.

TWO TYPES OF ACTION

2. Social Protection:

- ✓ social mobilization as to violence
- ✓ actions of social support - Fica Vivo workshops
- ✓ constitution of protection networks.

Picture source: ojovemdeperiferia.blogspot.com e jornalficavivo.zip.net/index.html

Program Implementation

Eligibility Criterion (Definition of Intervention Areas)
High homicide rate and High social vulnerability level

August 2002	May 2003	After 2004
Pilot Area, *Morro das Pedras*	*Institutionalization by the Government of the State of Minas Gerais.*	*Extension to another nineteen violent areas*

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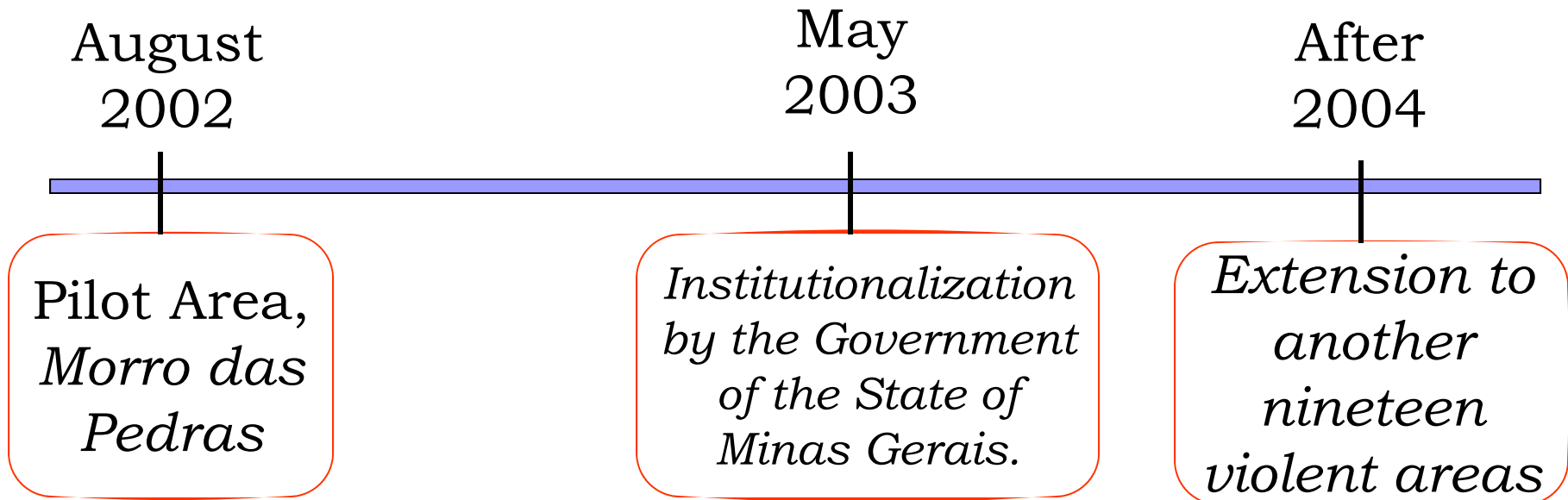
MAP OF BELO HORIZONTE CITY AND ITS FAVELAS

Conjunto Felicidade

Ribeiro de Abreu

Pedreira Prado Lopes

Alto Vera Cruz

Taquaril

Cabana

Morro das Pedras

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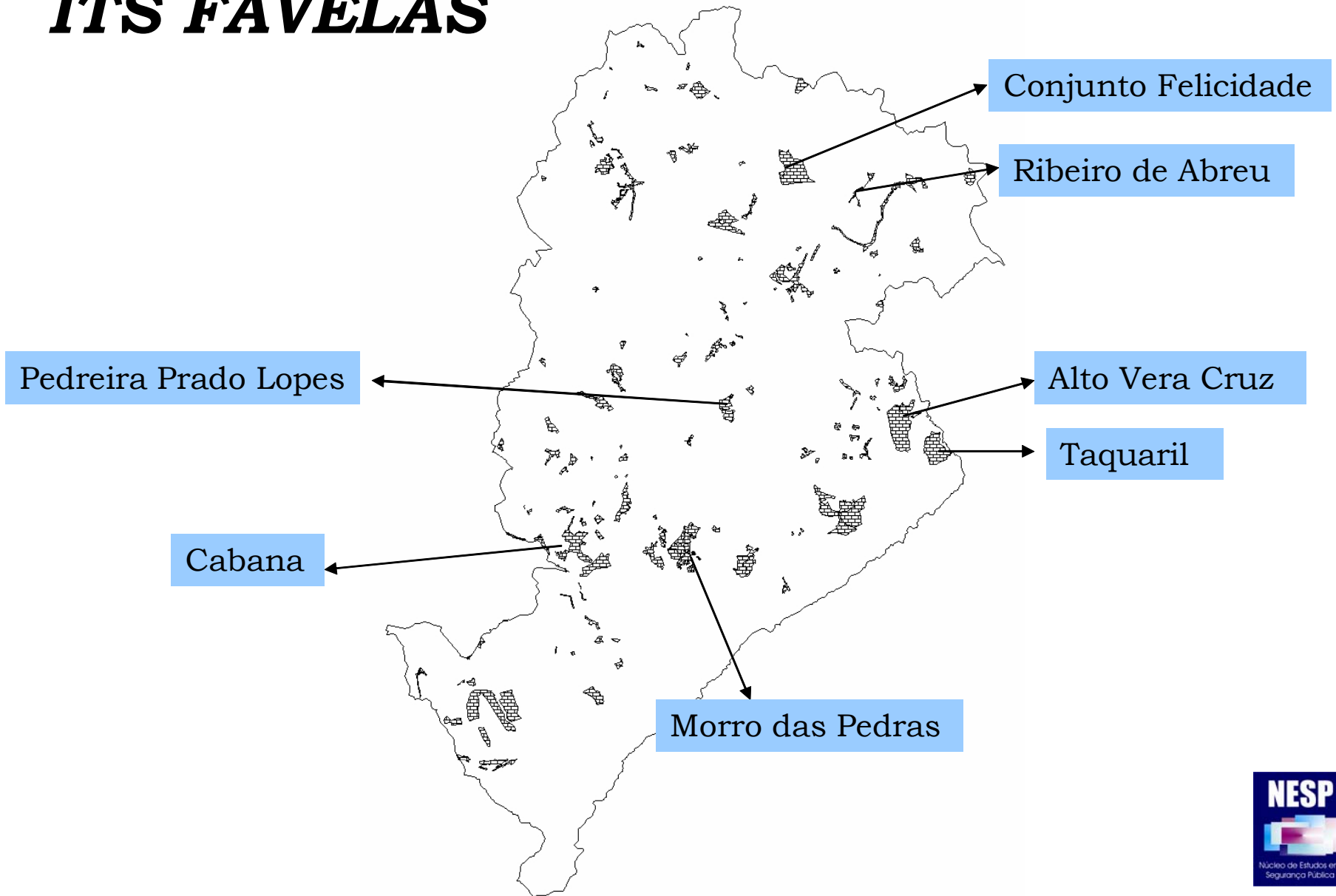
EVOLUTION OF THE AVERAGE HOMICIDE RATE PER ONE HUNDRED THOUSAND INHABITANTS FOR THE *FAVELA* TREATED, THOSE NOT TREATED AND BELO HORIZONTE WITHOUT *FAVELAS*.
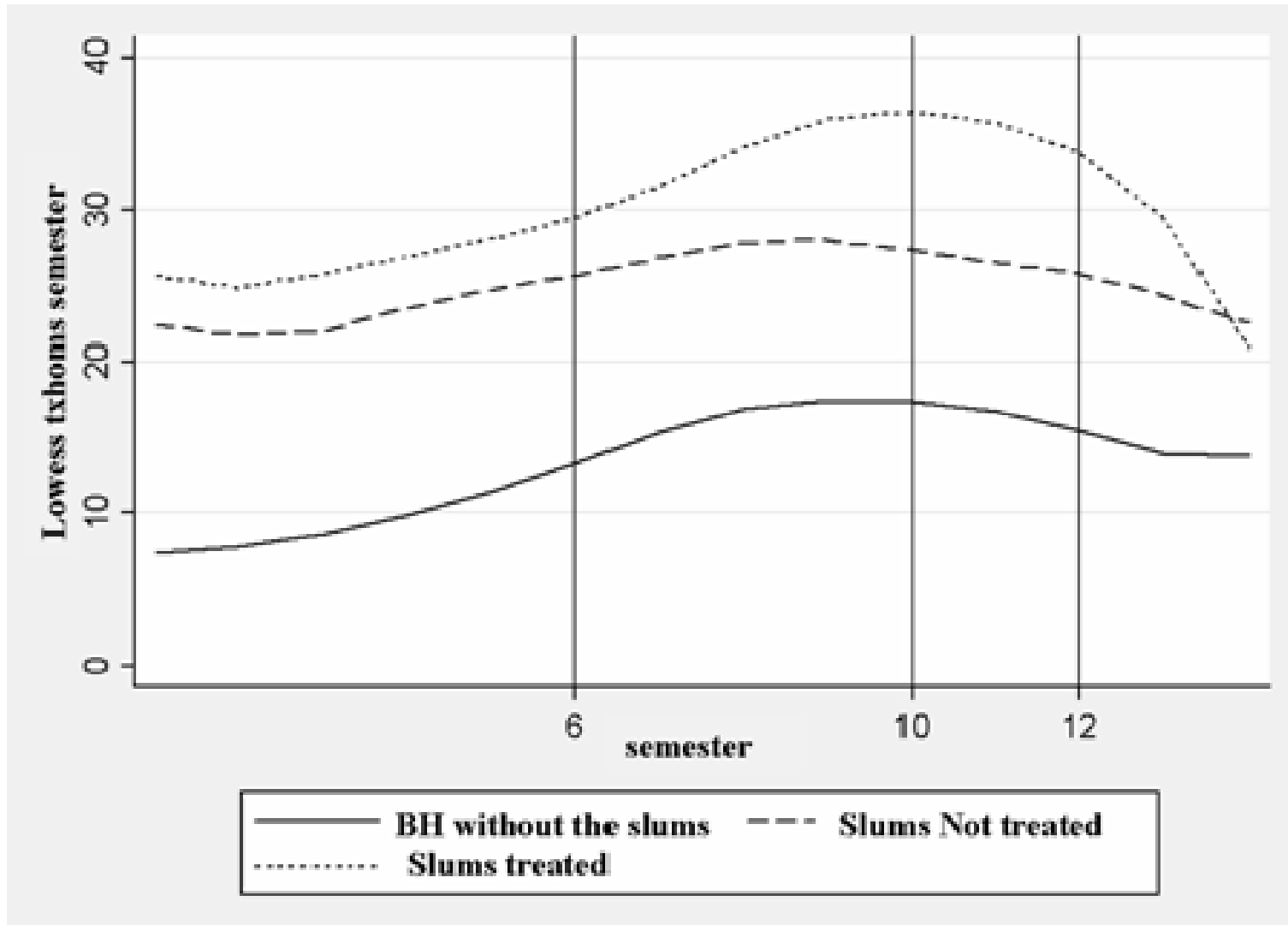
WHAT IS THE EVALUATION PROBLEM?

We need to find a control group with similar characteristics to the treatment group, before the program.

EVALUATION METHODOLOGY :

Double Difference Matching (DDM):
PSM (*Nearest Neighbor Matching*) *for selection the control group.*
DD *for estimating the impact.*

DATABASE

✓ *The Police georeferenced records from January 1, 2000 to December 31, 2006*

✓ *The 2000 Demographic Census.*

*1° analysis (**BH base**): all BH city neighborhoods*

*2° analysis (**Favela Base**): BH favelas*

CONTROL GROUP :

BH Base group *was built up from all neighborhoods in BH city*

Favela Base group *was built up from BH favelas.*

OUTPUT VARIABLE: *Homicide rate per one hundred thousand inhabitants per semester*

Program Steps	Semester/year	Areas	Variable
Step 0	1/2000 - 1/2002	None	Time0
Step 1	2/2002 - 1/2004	Pilot area	Time1
Step 2	2/2004 - 1/2005	Extend to other 5 *favelas*	Time2
Step 3	2/2005 - 2/2006	Extend to one more	Time3

RESULTS OF THE ESTIMATED DDM MODEL

Bases	Variable	Morro das Pedras	Pedreira Prado Lopes	Cabana de Pai Tomás	Alto Vera Cruz	Taquaril	Ribeiro de Abreu	Conjunto Felicidade
BH Base	Time1	-11.95***						
	Time2	-8.42***	81.28***	-5.53***	4.21***	23.95***	26.39***	
	Time3	-20.10***	15.12***	-10.45***	-2.50***	18.33***	15.92***	10.12***
Favela Base	Time1	-17,52***						
	Time2	-10,41**	79,29***	-7,52*	2,22	21,96***	24,40***	
	Time3	-23,42***	11,81***	-13,76***	-5,81	15,02***	12,61***	7,20

Note:(1) *** est. significant at 1%, ** est. significant at 5%, * est. significant at 1%.

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Slum Base	Time1	-17,52***						
	Time2	-10,41**	79,29***	-7,52*	2,22	21,96***	24,40***	
	Time3	-23,42***	11,81***	-13,76***	-5,81	15,02***	12,61***	7,20

Note:(1) *** est. significant at 1%, ** est. significant at 5%, * est. significant at 1%.

Robustness and Validity tests

1. *We estimated the model considering the simulation that the program started before the real date of its implementation. The results show that there wasn't difference between treated and control group.*

2. *We test the spillover effect, considering the favelas contiguous neighbors. The results show that the program has a similar effect in favelas contiguous neighbors as in favelas treated.*

Economic Evaluation in Pilot Area

The similar impact evaluation methodology was presented earlier.

The differences are the definition of treatment and control groups and the time variable

TREATMENT GROUP :

The census sectors corresponding to the pilot area, Morro das Pedras - 27 census sectors

CONTROL GROUP :

It was built up from all census sectors of BH city

TIME VARIABLE:

Variable	Semester/year	Areas
Time0	1/2000 - 1/2002	None
Time1	2/2002 - 2/2003	Pilot area, there aren't any available cost data
Time2	1/2004 - 2/2006	Pilot area, there are some available cost data

RESULTS OF THE ESTIMATED DDM MODEL

Variable	Coefficient
Constant	73,59***
MP	-33,25***
Time1	-1.92
Time2	0.39
MP*Time1	-1.88
MP*Time2	-10,72**
Statistic	
sigma_u	25.69
sigma_e	67.47
rho	0.13
N. obs.	1418
N. obs per group - min	9
N.obs per group - avg	14.6
N. obs per group - max	28
Wald chi2	6.33
R-sq within	0.0014
R-sq between	0.4976
R-sq overall	0.1131

Note:(1) *** est. significant at 1%, ** est. significant at 5%,
* est. significant at 10%.

(2) The full model is in the appendix

(3) GLS with random effect at average areas and cluster oprion for stardard erros.

NUMBER OF HOMICIDES AVOIDED PER SEMESTER BETWEEN 2004 AND 2006

$$H_s = (10{,}72 * POP_s)/(100.000)$$

Semester	Population	Number of Homicides Avoided
Semester 1/2004	22869	2,45
Semester 2/2004	23151	2,48
Semester 1/2005	23435	2,51
Semester 2/2005	23754	2,55
Semester 1/2006	24076	2,58
Semester 2/2006	24382	2,61
Total		*15,18*

ABSOLUTE VALUE AND ITS COMPOSITION OF THE *FICA VIVO COST*

Category	2004		2005		2006	
	$	%	$	%	$	%
Costs of Setting Up	279,329	12	564,001	14	385,627	5
Costs of Social Protection Actions	714,470	31	1,759,231	44	3,792,335	45
Costs of Police Actions	1,292,175	57	1,670,705	42	4,324,332	51
Total Cost of Fica Vivo	**2,285,974**	**100**	**3,993,936**	**100**	**8,502,293**	**100**

Note: Dollar (US$) at 2006.

✓ The costs is not discriminated by *favela*.

✓ We calculated the cost of the program specifically in the pilot area, applying the methodology of apportionment.

✓ The apportionment is done for each cost category.

APPORTIONMENT CRITERION

Cost Category	Criterion of apportionment
Costs of Setting Up	dividing between the areas where the program was set up in each year. We arbitrated a rate of depreciation of 10% per year to obtain the annual cost.
Costs of Social Protection Actions	1. proportion of direct beneficiaries of the social support actions who are the young people in regular attendance; 2. proportion of workshops performed for direct beneficiaries; 3. number of areas/year
Costs of Police Actions	1. some information is discriminated by pilot area 2. proportion of policemen allocated to Morro das Pedras in each year

FICA VIVO COSTS IN THE *PILOT AREA -* PROPORTION OF DIRECT BENEFICIARIES

Categoria	2004	2005	2006	*Total*
1. Costs of Setting Up	6,828	6,828	6,828	*20,483*
2. Costs of Social Protection Actions	328,473	332,399	398,229	*1,059,102*
3. Costs of Police Actions				
3.1.Transfers from the SEDS to police	131,166	13,292	52,256	*196,715*
3.2. Wages of military police directly involved in the Program	151,973	142,295	136,663	*430,931*
Total	*618,440*	*494,814*	*593,976*	*1,707,230*

Note: dollar (US$) at 2006

PROPORTION OF WORKSHOPS

Categoria	2004	2005	2006	*Total*
1. Costs of Setting Up	6,828	6,828	6,828	*20,483*
2. Costs of Social Protection Actions	246,334	280,231	261,784	*788,350*
3. Costs of Police Actions				
3.1.Transfers from the SEDS to police	131,166	13,292	52,256	*196,715*
3.2. Wages of military police directly involved in the Program	151,973	142,295	136,663	*430,931*
Total	*536,300*	*442,646*	*457,531*	*1,436,478*

Note: dollar (US$) at 2006

FICA VIVO COSTS IN THE *PILOT AREA* - NUMBER OF AREAS/YEAR

Categoria	2004	2005	2006	*Total*
1. Costs of Setting Up	6,828	6,828	6,828	*20,483*
2. Costs of Social Protection Actions	306,201	229,465	221,990	*757,656*
3. Costs of Police Actions				
3.1.Transfers from the SEDS to police	131,166	13,292	52,256	*196,715*
3.2. Wages of military police directly involved in the Program	151,973	142,295	136,663	*430,931*
Total	*596,168*	*391,879*	*417,737*	*1,405,785*

Note: dollar (US$) at 2006

The Fica Vivo cost per beneficiary is one third the Bolsa Familia program cost (brazilian cash transfer program)

RESULTS OF THE ECONOMIC EVALUATION

COST-EFFECTIVENESS RATIO (2004 – 2006)

Apportionment Methodology	Cost-Effectiveness Ration
Proportion of workshops direct beneficiaries	112.434
Proportion of Workshops	94.603
Number of Areas/Year	92.582

Note: dollar (US$) at 2006

COST-BENEFIT RATIO

We assume that the benefit to prevent homicide is the value of the loss which homicide imposes on society.

In Brazil such value hasn't been calculated. However the lost output cost due to homicide has.

Paper	Geografic area	Lost output cost for homicide - Dollar (US$) at 2006.
ISER (1998)	*Rio de Janeiro* city	133 049
Rondon e Andrade (2003)	*Belo Horizonte* city/MG - methodology 1	270 430
	Belo Horizonte city/ MG - methodology 2	207 502
Carvalho et al. (2007)	Brazil, 2000	89 994
	Minas Gerais State, 2000	71 711
	Brazil, 2001	88 271
	Minas Gerais State, 2001	75 215

PROPORTION OF EACH COMPONENT IN THE COST OF HOMICIDE TO SOCIETY

Paper	Component	Proportion of each component in the cost of the homicide for the society (%)
Brand e Price (2000) United Kingdon	Physical and emotional impact	63,79
	Victim services	0,43
	Lost output	*33,72*
	Health services	0,06
	Police activity	1,00
	Prosecution	0,04
	Magistrates courts	0,01
	Crown court	0,07
	Jury sevice	0,01
	legal aid	0,10
	Non legal-aid defence	0,02
	Probation service	0,04
	Prision service	0,38
	Other CJS costs	0,15
	Criminal injuries compensation admin	0,18
Dubourg e Hamed (2005) United Kingdon	Physical and emotional impact	68,88
	Lost output	*31,12*
Mayhew (2003) Australia	Health services	0,47
	Lost output	*74,65*
	Intangible cost	24,88

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COST-BENEFIT RATIO (2004-2006)

Apportionment Methodology	Cost-Benefit Ratio	
	Smallest	Largest
Proportion of workshops direct beneficiaries	0,85	7,73
Proportional of Workshops	1,02	9,19
Number of Areas/Year	1,04	9,39

RESULT

FICA VIVO RETURN RATE IS FAVORABLE

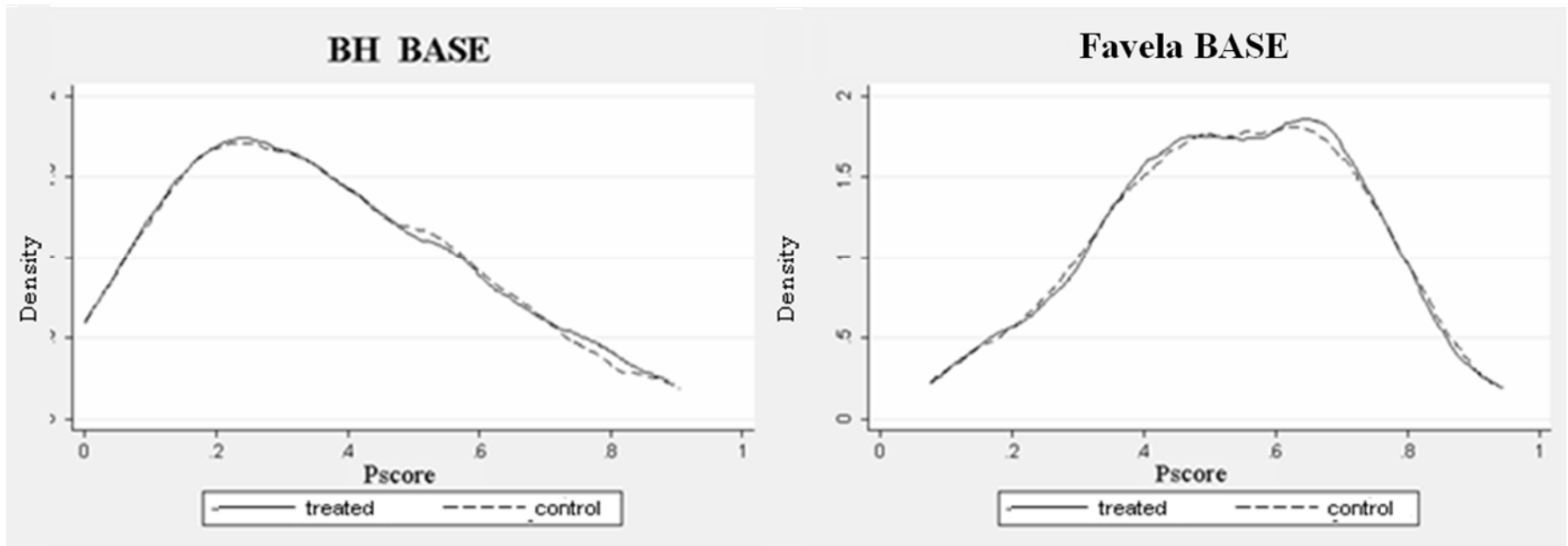## THERE IS RETURN TO SOCIETY!!!

FICA VIVO WORKS!!!!

THANK YOU!!!!

THE MATCHING

**PROPENSITY SCORE DENSITY FUNCTIONS FOR TREATED AND CONTROL GROUPS, IN THE SUB-SAMPLES OF BH AND *FAVELA* BASE**

THE MATCHING

DIFFERENCE OF TREATRED AND CONTROL GROUPS COVARIATE AVERAGES BEFORE AND AFTER MATCHING

Base	Difference of the treated and control groups covariate averages	Number of covariates	
		Before matching	After matching
BH Base	st. different averages at 1%	40	0
	st. different averages at 5%	3	0
	st. different averages at 10%	1	5
	Non-st. different averages	2	41
Slums Base	st. different averages at 1%	3	0
	st. different averages at 5%	2	2
	st. different averages at 10%	6	0
	Non-st. different averages	35	44

THE MATCHING

PROPENSITY SCORE DENSITY FUNCTIONs FOR TREATED AND CONTROL GROUPS
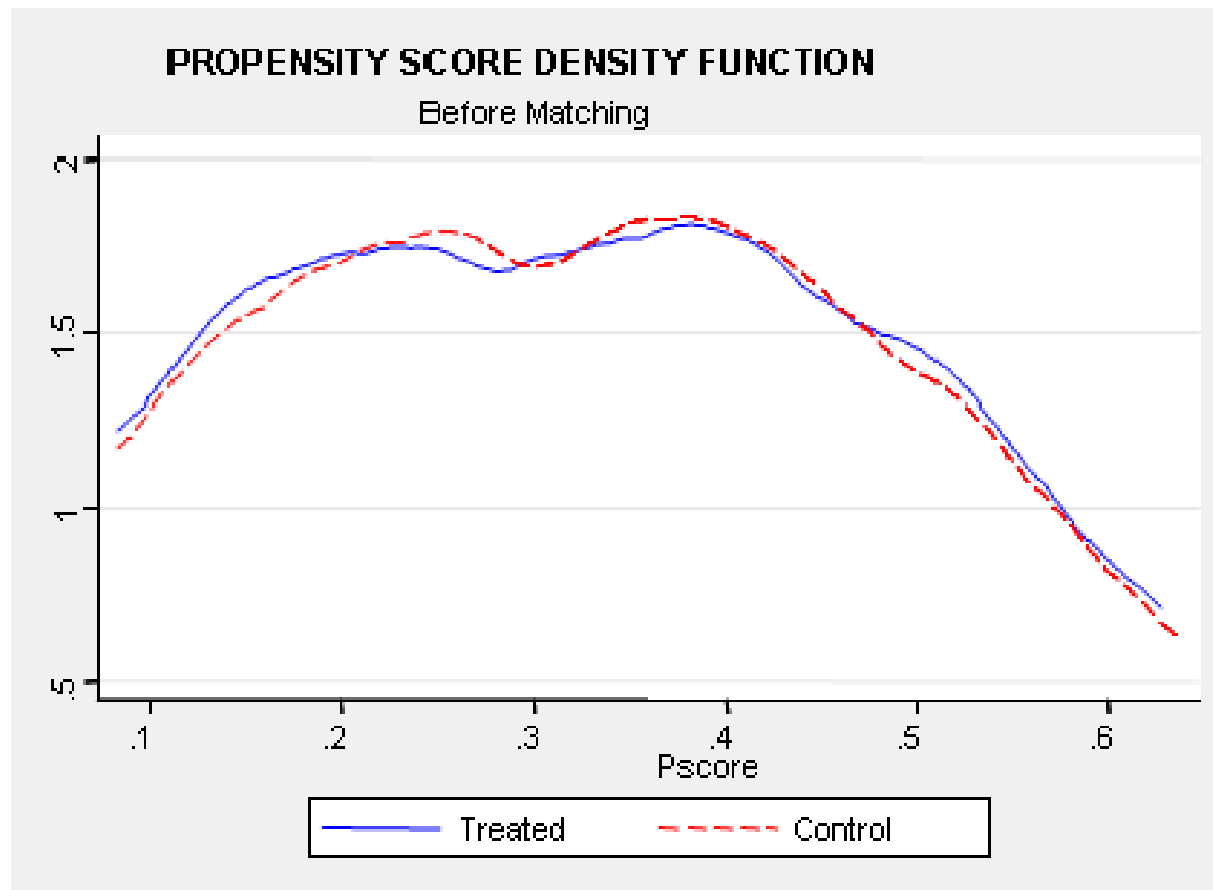
DIFFERENCE OF TREATRED AND CONTROL GROUPS COVARIATE AVERAGES BEFORE AND AFTER MATCHING

Variable	Before Matching			Average difference after Matching
	Trat. average	Comp. avarege.	Dif-Average	
Txhoms1	26.031	7.647	18,384***	-0.776
Txhoms2	35.745	9.418	26,327***	-41.939
Txhoms3	56.377	9.293	47,084***	-18.459
Txhoms4	35.828	8.268	27,560***	-2.671
Txhoms5	47.691	11.137	36,554***	-34.087
P_1banho	0.804	0.602	0,202***	-0.021
P_2banho	0.083	0.210	-0,127***	0.009
P_3banho	0.038	0.129	-0,091**	0.013
P_4mbanho	0.014	0.039	-0.025	-0.004
P_lixo	0.941	0.984	-0,044***	-0.018
P_homem	0.481	0.470	0,011**	-0.001
p_09aa	0.211	0.152	0,059***	0.001
p_1014aa	0.104	0.082	0,021***	-0.002
p_1519aa	0.115	0.097	0,017***	-0.006
p_2024aa	0.118	0.103	0,015***	0.002
p_2529aa	0.082	0.088	-0,007*	-0.004
p_30maa	0.371	0.477	-0,105***	0.010
P_rend0	0.112	0.069	0,043***	0.007
P_rend_1	0.252	0.112	0,140***	0.000
P_rend1_3	0.438	0.268	0,170***	-0.022
P_rend3_5	0.100	0.148	-0,048***	-0.009
P_rend5_10	0.047	0.188	-0,141***	0.010
Population in the semester 1	781.190	879.410	-98,220*	5.180
Population in the semester 2	789.610	878.200	-88.590	6.280
Population in the semester 3	798.110	877.460	-79.350	7.380
Population in the semester 4	807.270	887.250	-79.980	8.140
Population in the semester 5	816.540	898.440	-81.900	8.890

Note: *** est. significant at 1%, ** est. significant at 5%, * est. significant at 10%.

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