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# Impact of the Staying Alive Program on the reduction of homicides in a community in Belo Horizonte

## ABSTRACT

**OBJECTIVE:** To evaluate the impact of a homicide prevention program.

**METHODS:** A quasi-experimental study was performed using time series analysis of homicide incidence in the Morro das Pedras area in the city of Belo Horizonte, Southeastern Brazil, from 2002 to 2006. The number of homicides occurring in this location was compared to other violent and non-violent favelas and to other neighborhoods of the city, during each of the Program phases. To test the hypothesis that homicide reduction was caused by the actions implemented by the program, a statistical model was developed based on generalized linear models.

**RESULTS:** In the first six months a 69% reduction in the number of homicides was obtained. During the other Program periods, the effect on the reduction of homicides lessened, but the difference among coefficients compared to the initial period was not statistically significant. Even with full Program implementation, the effect continued to be similar to the previous periods, probably because the program was implemented in other violent favelas in the city.

**CONCLUSIONS:** The results suggest that the Staying Alive Program model can be an important alternative for the prevention of youth homicides in communities that have characteristics similar to the pilot program in Morro das Pedras.

**DESCRIPTORS: Homicide, prevention & control. Adolescent. Young Adult. Program Evaluation.**

## INTRODUCTION

Reports on homicide prevention programs in Brazil are rare. Nonetheless, the literature describes successful experiences with prevention, such as The Boston Gun Project's – Operation Ceasefire[a], which confronted the problem of youth homicides in Boston and motivated other municipalities through programs such as Reducing Gun Violence – Community Problem Solving in Atlanta,[b] the Reducing Gun Violence – Operation Ceasefire in Los Angeles[c] and the Staying Alive Program in Minas Gerais. The original program was evaluated through quasi-experimental means using comparative models before and after

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the intervention in the program area. The evaluation utilized generalized linear statistical models. The Staying Alive Program was subjected to an effectiveness evaluation through double difference matching.[d]

In Latin America, the Program for Development, Security and Peace (*Programa de Desarollo, Seguridad y Paz,* DESEPAZ) was implemented in Cali, Colombia, and reduced assassinations by 50% in 1993.[4] The Citizenship Culture program (*Cultura Cidadã*) implemented by the city of Bogotá, Colombia between 1995 and 1997 reduced the homicide rate from 72 to 51 per 100,000 residents.[4] In Brazil a series of preventative measures in Diadema city in São Paulo state, southeast region, reduced homicides by 74% between 1999 and 2005.[6]

The objective of the present study was to evaluate the impact of the Staying Alive Program on the prevention of homicides in a community.

## METHODS

Belo Horizonte, the capital of Minas Gerais state, Southeastern Brazil, had an increase of 171% in the number of homicides between 1990 and 2001. Based on successful interventions described in the literature,[e] the Center for Criminality and Public Security Studies at the Federal University of Minas Gerais (CRISP/UFMG) began in August of 2002, the process of creating the Homicide Control Program (*Programa Controle de Homicídios*) which was later named Staying Alive. For the development of the program a general coordination team was created from representatives of two operative groups for the program: the community mobilization group made up of community leaders, local public administrators, representatives of non-governmental organizations (NGO), companies and the UFMG; and the strategic intervention group made up of members of the public ministry, military police, civil police, judiciary and the UFMG.

The area called "Morro das Pedras" is situated in the western region of Belo Horizonte and consisted of about 18,000 residents in 2002. The location was selected to host the Program due to its high homicide incidence and the presence of public instruments and community leaders motivated to address the problem.

Program implementation began with a series of communication activities to inform the residents about the characteristics of program actions, to show criminals that homicides would no longer be tolerated as a form of conflict resolution and to stimulate community participation. This occurred through posters, presentations at schools, meetings in the community and public service announcements on television. Then strategic interventions were begun with the issuance of search and arrest warrants; mobilization of military and civil police for the apprehension of delinquents, particularly illicit homicides; undercover and investigative police actions; operations for search and seizure of arms; and police occupation of trafficking places for indeterminate time when homicides occur. The goal of these actions was to enforce the law, guarantee security for the community and impede the drug trade. Also, a Group for Policing Special Risk Areas (GEPAR), made up of military police that seek permanent interaction with the community, was also initiated. It undertook workshops and events (sporting, cultural, recreational, citizenship, health and professional) targeted to residents from 12 to 24 years, and it created working groups focused on solving local problems in the health, education and productive involvement areas. They sought to identify a potential social protection network and understand fluctuations for its utilization.

The 47% reduction in homicides over six months brought about the institutionalization of the Program by the state government in 2003 with management by the State Secretary of Social Defense (SEDS-MG).[2,g] This development necessitated the creation of a devoted structure for the program, with the formation of a Crime Prevention Center in the community, hiring of technicians, remuneration for workshop monitors, setting the budget and replicating the model in 25 other communities in the state.

A quasi-experimental model design was utilized with time series analysis of homicides. The Morro das Pedras area was compared to violent favelas (Alto Vera Cruz, Cabana, Paulo VI, Pedreira Prado Lopes, Ribeiro de Abreu and Taquaril), which have 64 thousand residents and were selected because they have characteristics similar to Morro das Pedras. Morro das Pedras was also compared to non-violent favelas, where the program was not implemented (225 residents), and with the neighborhoods of Belo Horizonte (1.92 million residents).

The delineation of the geographical area of the favelas in Belo Horizonte municipality followed the methodology of a previous study about the detecting clusters of homicides and drug trafficking.[1] For the present study these same geographical regions were utilized for the favelas and utilized in the categorization regarding the degree of violence in violent favelas, other favelas and other neighborhoods, in order to compare the Program impact to other types of favelas.

[d] Banco Mundial. Prevenção comunitária do crime e da violência em áreas urbanas da América Latina: um guia de recursos municipais [internet]. 2003 [2005 Set 04]. Available from: http://www.observatorioseguranca.org/pdf/01%20(25).pdf

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The Figure represents the city of Belo Horizonte with the respective geographical areas of favelas, with emphasis on those previously defined as violent favelas among which includes Morro das Pedras. In this figure, the spatial concentration of homicides was constructed from a historical series of homicides registered by the Military Police of Minas Gerais, during the period between 2000 and 2006, with a total of 4,480 georeferenced occurrences. The georeferenced occurrences are those for which it was possible to obtain geographical coordinates from the address described in the police record.

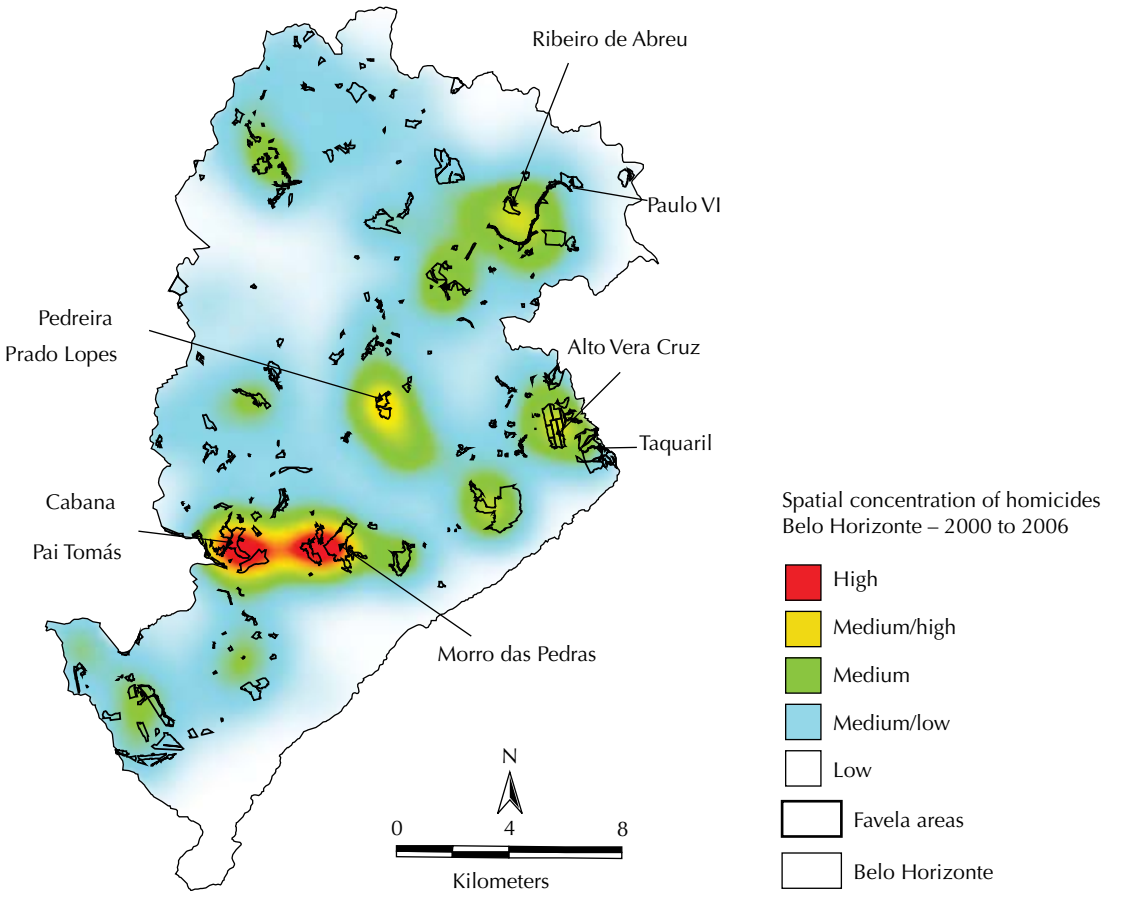
The homicide data registered by the Military Police was analyzed with the statistical programs R, version 2.7.2; MapInfo Professional, version 8.5; and SPSS, version 12.0.

Initially, the weekly number of homicides was estimated in Morro das Pedras, non-violent favelas, violent neighborhoods of Belo Horizonte at various times, from 2000 to 2006. The periods were divided as explained in Table 1.

The program was gradually expanded to other violent favelas of Belo Horizonte during period 5 (to Pedreira Prado Lopes, Alto Vera Cruz, Cabana and Ribeiro de Abreu favelas in December of 2004, March of 2005, April of 2005 and June of 2005, respectively).

In order to test the hypothesis that the reduction in homicides was due to the Program activities, a unique statistical model, which utilized the structure of generalized linear models, was developed to evaluate the study's questions.[7]

We initially considered the two time series for homicide data: the one from Morro das Pedras ($Y_t$) and the aggregated data of other violent favelas (represented by $X_t$). The Program was implemented in violent favelas only during the last analysis period. The $t$ rate varies from 1 (January of 2000) to 84 (December of 2006) and indicated the month. We assumed that the data for violent favelas are independent random variables and follow an average Poisson distribution of $\lambda_t^V$. The value of $\lambda_t^V$ can vary from month to month in a completely independent manner, increasing, decreasing or remaining stable. Therefore, there are as many parameters as there are observations. Since significant population changes did not occur in small areas in Belo Horizonte during




Source: CRISP/UFMG, 2009

**Figure.** Spatial concentration of homicides in the city of Belo Horizonte, Southeastern Brazil.

the study period, we ignored the potential variation in number of homicides that could be caused by variations over time in the population at risk.

For Morro das Pedras, we assumed that the reports are independent and also have an average Poisson distribution of $\lambda_t^P = \lambda_t^V \eta_t$. The value of $\eta_t$ measures the relative impact on the expected number of homicides for violent favelas and Morro das Pedras during month *t.* In other words, for month *t,* what is expected in Morro das Pedras $(\lambda_t^P)$ is equal to the expectation for other favelas $(\lambda_t^V)$ multiplied by $\eta_t$ . A simple model for the impact of Morro das Pedras relative to other violent favelas (to capture the relative difference between Morro das Pedras and the other violent favelas) is to assume that $\eta_t$ is a constant factor over time multiplied by four multiplicative factors, each one associated to one of the experimental periods.

Specifically, these are:

$$\eta_t = \begin{cases} \exp(\beta_0) & \text{if } t \in \text{period 1} \\ \exp(\beta_0)\exp(\beta_1) & \text{if } t \in \text{period 2} \\ \exp(\beta_0)\exp(\beta_2) & \text{if } t \in \text{period 3} \\ \exp(\beta_0)\exp(\beta_3) & \text{if } t \in \text{period 4} \\ \exp(\beta_0)\exp(\beta_4 & \text{if } t \in \text{period 5} \end{cases}$$

The value $\exp(\beta_0)$ represents how much less (or more) frequently it is observed on average in Morro das Pedras relative to the other violent favelas in a given month when no program to control homicides is being implemented. These months correspond to period 1, which is the reference period. The other parameters, $\exp(\beta_1), \exp(\beta_2), \exp(\beta_3)$, e $\exp(\beta_4)$, represent the relative impact during the various program implementation stages. If we find that $\beta_k = 0$, then the program has no impact during the period $k$ in relation to the violent favelas. If we find that $\beta_k < 0$ (or that $\beta_k > 0$), then the program reduces (or increases) monthly homicides on average by $\exp(\beta_k)$ relative to the other violent favelas during the period $k$. To test if $\beta_k > 0$ versus $\beta_k > 0$ (or $\beta_k > 0$), we used a conditional model. The inference was dependent on the total number of homicides in the two regions, and therefore, the statistical formula was independent and identical to the normal logistic regression model. Estimating the parameters using the maximum likelihood method provides confidence intervals and p-values for testing the hypothesis.

The same model was used to compare the homicide incidence in Morro das Pedras with what occurred at the same time in non-violent favelas, which did not have the program, and in other neighborhoods of Belo Horizonte.

Since the study utilized secondary data, it was not submitted to the Research Ethics Committee of the UFMG. The data was provided by the Military Police of Minas Gerais and also published in the written press of Minas Gerais. The researchers did not have access to the unaggregated data or the identity of victims.

## RESULTS

Table 2 presents the homicide data by period and locations. The first three columns, concerning a period in which there were no public policies for the prevention of homicides in the municipality, show values that suggest increases in the regions studied. The violent favelas correspond to approximately 4% of the city's territory, which makes homicide rates that seem low be very high when compared to the population size of the area. In the period from August to December of 2002, a marked reduction in the monthly number of homicides occurred only in Morro das Pedras. This period corresponds to the beginning of Program implementation, involving police actions in which occupations of areas, search and seizure operations, enforcement of prison warrants and the GEPAR operation all occurred. Between January and July of 2003, a reduction in all Program activities occurred along

**Table 1.** Phases of the Staying Alive Program in Morro das Pedras. City of Belo Horizonte, Southeastern Brazil, 2002-2006.

| Program Phases | Description | Number of Homicides in Morro das Pedras |
|---|---|---|
| Phase 1<br>01/2000 to 07/2002 | Period before the rollout of the Staying Alive Program in Morro das Pedras (months 1 to 31). | 62 |
| Phase 2<br>08/2002 to 12/2002 | Beginning of Program implementation exclusively with police actions (months 32 to 36). | 6 |
| Phase 3<br>01 to 06/2003 | Program slow down due to the need to prioritize civil defense activities in response to the strong rains which caused landslides and burrying of shacks (months 37 to 42). | 7 |
| Phase 4<br>07/2003 to 04/ 2004 | Restarting of program implementation, with weak structure due to lack of a physical local structure (Prevention Center) and a complete technical team (months 43 to 52) | 13 |
| Phase 5<br>05/2004 to 12/2006 | Continuous and stable actions and increased and regular provisioning of workshops for youth | 43 |

**Table 2.** Average homicides in Morro das Pedras, favelas and neighborhoods of Belo Horizonte, Southeastern Brazil, 2002-2006.

| Year | 2000 | 2001 | 2002 | 2002 | 2003 | 2003/04 | 2004/05 | 2005 | 2006 |
|---|---|---|---|---|---|---|---|---|---|
| Location Phase | Before the program | | | Phase 1 | Phase 2 | Phase 3 | Phase 4 | Phase 5 | |
| Morro das Pedras | 1.92 | 2.17 | 1.86 | 1.2 | 1.17 | 1.3 | 1.5 | 1.63 | 1 |
| Violent favelas | 2.92 | 1.58 | 4.29 | 5.2 | 3.83 | 4.6 | 5.67 | 4.75 | 2.83 |
| Non-violent favelas | 8 | 7.83 | 8 | 13.2 | 12.67 | 10.8 | 11.42 | 10.38 | 10.17 |
| Neighborhoods | 23.08 | 24.58 | 23.71 | 35.4 | 41.17 | 45.6 | 52.08 | 38.25 | 53.58 |

with a small decrease in average monthly homicides in Morro das Pedras and other favelas and an increase in homicides in the neighborhoods of Belo Horizonte. In the following period, from July of 2003 to April of 2004, when the Program restarted its activities in a more systematic way, but still without a local planning center, the trend of increasing homicides returned, represented by the increase in averages during the period in almost all areas except in non-violent favelas. This increase is small and was not considered statistically significant. The comparison of the averages shows a decrease in homicides in Morro das Pedras, as well as in other violent favelas beginning in May of 2005. The Program was implemented in these locations at different times during the period between December of 2004 and July of 2005. In non-violent favelas and in neighborhoods that did not receive the Program a decreasing trend in these events was not observed. On the contrary, it appears that an increase in average monthly homicides occurred, as shown in Table 2.

Table 3 shows the estimates for the maximum likelihood between Morro das Pedras and other favelas. The monthly homicide average in Morro das Pedras was 76% of other violent favelas during period 1. Among other factors, this reduction reflects the smaller population in Morro das Pedras than in the other violent favelas combined. After beginning the Program in Morro das Pedras in period 2, an additional reduction of 69% was obtained in relation to the violent favelas in period 2, a statistically significant difference. The effect of the Program for this first moment is found by multiplying the number of average homicides of the other violent favelas by 0.31. In periods 3 and 4, when the Program slowed then partially restarted, there was a decreasing effect, but the difference between these coefficients and the coefficient for period 2 is not statistically significant (p-value equal to 0.34 and 0.10 respectively). In the last period when the Program was restarted in stages, the effect continued to be less strong and similar to periods 3 and 4. One of the possible reasons is the fact that the Program was also implemented in the other favelas throughout period 5.

The same trend was observed when comparing Morro das Pedras to the non-violent favelas and the other neighborhoods of Belo Horizonte (line 4): the Program had a large initial impact that was even larger during the other periods when considering that homicides increased in Belo Horizonte.

## DISCUSSION

The evaluation of Program impact on the homicide rate had to consider the difficulty in isolating its effects from those of other interventions occurring in the area studied. In terms of policing interventions, the Active Prevention Program (*Programa de Prevenção Ativa*, PPA) began in November of 2004 and the Public Safety Integration and Development Program (*Programa de Integração e Gestão de Segurança Pública*, IGESP) began in May of 2005, in the entire municipality of Belo Horizonte. The PPA operates through community policing which organizes its activities by prioritizing a police presence in areas where crime is more frequent. The IGESP has the goal of managing and evaluating police strategies to control and prevent crime in the state of Minas Gerais. Impacts from these programs upon the homicide rate cannot be discounted.

The Program in Morro das Pedras was responsible for substantial and sustained, but varying, reductions in homicides since its implementation in 2002. The marked drop in the first months of implementation, when the social protection actions did not practically

**Table 3.** Estimates of maximum range by the models. City of Belo Horizonte, Southeastern Brazil, 2002-2006.

| Location | Período 1 | Período 2 | Período 3 | Período 4 | Período 5 |
|---|---|---|---|---|---|
| Violent favelas | 0.76 (0.55;1.04) | 0.31 (0.12;0.78) | 0.40 (0.16;1.00) | 0.37 (0.19;0.75) | 0.39 (0.25;0.63) |
| Non-violent favelas | 0.25 (0.19;0.33) | 0.36 (0.15;0.87) | 0.36 (0.16;0.83) | 0.48 (0.25;0.90) | 0.48 (0.32;0.74) |
| Other neighborhoods | 0.09 (0.07;0.11) | 0.40 (0.17;0.93) | 0.33 (0.15;0.73) | 0.33 (0.18;0.61) | 0.31 (0.21;0.46) |

occur, points to the importance of actions with a police and repressive nature for the reduction of homicides. The safety brought about by these actions allowed for the later implementation of social protection measures. Another indication of the importance of the Program activities in the reduction of homicides was the increase in these events during the first half of 2003, a period in which and interruption occurred in practically all program actions. When the Program was restarted beginning in July of 2003 the average homicides in Morro das Pedras increased, later decreasing again from January of 2006 when they reached the lowest values in the time period studied.

Another possible explanation for the reduction in homicides could be movement of criminal groups to other areas.[5] Information, from the monitoring of homicides by the Military Police of Minas Gerais during the period, do not support his hypothesis. Nonetheless, the fact that local criminal groups may have changed their components and altered their practices cannot be disregarded. If the Program forced these changes through imprisonments for homicides, this would demonstrate its effect.

The Program has characteristics similar to other successful programs described in the literature.[6,c,d,e] Those projects obtained reductions in crime over a short time through repressive and criminal justice actions. These actions support the implementation of social protection measures, which guarantee additional reductions in the number of crimes, creating a virtuous cycle and assuring good results over the long-term.[3,8] Nonetheless, in some locations the number of homicides began increasing again after a few years, necessitating new measures and efforts to maintain community mobilization around the problem.[3] The experience of Staying Alive reinforces the importance of detailed an vigorous vigilance of homicides. The successful preventive interventions were based on knowledge of local social dynamics that helped explain these violent deaths. Intersectoral interventions that strengthen the presence of the State in the most overlooked areas are also necessary, taking actions in health, education and public safety along with mobilization and participation of the population in the planning, monitoring and evaluation of the actions implemented.

The results of the study suggest that the Staying Alive Program can make up an importation alternative in homicide prevention for communities that share characteristics with the area in which it was originally implemented.

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