Income Inequality and Homicide Rates in Rio de Janeiro, Brazil

ABSTRACT

Objectives. This study determined the effect of income inequality on homicide rates in the state of Rio de Janeiro, Brazil.

Methods. We conducted an ecological study at 2 geographical levels, municipalities in the state of Rio de Janeiro and administrative regions in the municipality of Rio de Janeiro. The association between homicide and income inequality was tested by multiple regression procedures, with adjustment for other socioeconomic indicators.

Results. For the municipalities of Rio de Janeiro State, no association between homicide and income concentration was found, an outcome that can be explained by the municipalities' different degrees of urbanization. However, for the administrative regions in the city of Rio de Janeiro, the 2 income inequality indicators were strongly correlated with the outcome variable ($P<.01$). Higher homicide rates were found precisely in the sector of the city that has the greatest concentration of slum residents and the highest degree of income inequality.

Conclusions. The findings suggest that social policies specifically aimed at low-income urban youth, particularly programs to reduce the harmful effects of relative deprivation, may have an important impact on the homicide rate. (*Am J Public Health* 1999;89:845–850)

Célia Landmann Szwarcwald, DrPH, MMath, Francisco Inácio Bastos, MD, DrPH, Francisco Viacava, MD, MPH, and Carla Lourenço Tavares de Andrade, BS

The relationship of health to socioeconomic status is well established: those at the bottom of the social scale have poorer health than those at the top.[1,2] This association is consistent and found almost everywhere, for most diseases and for different measures of socioeconomic level, whether described by social class, income, education, occupation, housing, or other criteria.

However, the ecological association between health status and a population's socioeconomic level has been shown to be much weaker.[3] Recent findings suggest that it may be more important to consider relative income than absolute income in assessing the relationship of socioeconomic indicators to health standards. It is likely that health inequalities result from the extent of relative deprivation in each society rather than from absolute socioeconomic differences between them.[4]

The relationship of income inequality to health status has been empirically demonstrated in a variety of studies, including international comparisons across many industrialized countries,[5] as well as within individual countries.[6–8] These studies have related different indices of income inequality to several health indicators, such as infant mortality, life expectancy, and all-cause and cause-specific mortality, consistently finding that the more polarized the income, the worse the population's health status.

The health indicator that seems to be most strongly related to inequalities in the distribution of income is the homicide rate. With regard to longitudinal trends in mortality in Britain and the United States, the continuing secular decline in mortality has not been reversed, although that trend may have been slowed by rising inequality. On the other hand, homicide rates have been increasing, especially for young people living in deprived areas.[9] The same trend has been evidenced in the Latin American region. Despite the fact that death rates for most of the countries in the region have declined during the last 20 years and life expectancy has increased, injuries as a cause of mortality have increased considerably.[10]

Further evidence of the strong association between violence and unequal income distribution has been provided by Kennedy et al.[7] Using the US states as the experimental units, they showed that homicide was the cause of death most strongly related to income inequality. Additionally, Kaplan et al.[6] have shown that larger income differences are related to several social variables, such as work disability, unemployment, imprisonment, and violent crime.

Relative deprivation and underinvestment in human capital are frequently discerned among the factors believed to underlie the association between income inequality and violence.[6,8,9] Societies that tolerate extensive degrees of income inequality are usually the same ones that underinvest in social programs, which results in insufficient public education and medical care, inadequate housing, and deficient skills training.

In a recent article, concern was expressed about the strength of the correlation between income inequality and health status.[11] On the basis of an analysis of life expectancy in 13 countries within the Organization for Economic Cooperation and Development between 1984 and 1987, Judge[11] found no association between life expectancy and several indices of income

The authors are with the Department of Information on Health, Oswaldo Cruz Foundation, Rio de Janeiro, Brazil.

Requests for reprints should be sent to Célia Landmann Szwarcwald, Department of Information on Health, Oswaldo Cruz Foundation, Av Brasil, 4365, Rio de Janeiro RJ 21045-900, Brazil.

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TABLE 1—Quintile Average Incomes, Median and Range of Demographic and Socioeconomic Indicators, and Homicide Rate in the Regions of the State of Rio de Janeiro and in the Sectors of the Municipality of Rio de Janeiro, 1991

Region/Sector[a]	Quintile Average Incomes	Population (× 1000)	Gini Coefficient	Top 10%–Bottom 40% Income Ratio	Illiteracy Rate	Poverty Index	Demographic Density Indicator	Proportion (%) of Urban Residents	Homicide Rate (/100 000 Population)
Northern (10)	0.2; 0.6; 0.9; 1.7; 29.3	7.4–78.0 22.3	0.72–0.77 0.76	56.4–87.7 80.9	23.2–34.6 27.9	49.3–73.8 60.6	3.3–4.4 3.9	46.8–85.2 64.3	0.0–58.8 46.3
North (6)	0.3; 0.8; 1.3; 2.4; 27.2	10.5–389.1 47.1	0.63–0.78 0.71	33.9–91.8 53.3	16.6–38.8 27.4	28.3-57.3 49.1	2.7–4.5 3.8	44.5–88.9 74.4	21.7–128.5 100.7
Middle–South (9)	0.3; 0.7; 1.3; 2.3; 27.1	12.1–81.2 21.1	0.66–0.74 0.71	37.6–71.9 53.6	17.0–35.6 19.5	36.5-51.7 44.4	3.5–5.4 4.2	62.8–99.3 82.8	0.0–87.6 45.4
Southern Coast (9)	0.3; 0.8; 1.3; 2.4; 27.6	18.1–84.9 40.2	0.63–0.77 0.69	30.7–84.7 46.0	16.3–41.0 24.0	26.9–62.6 41.1	2.9–5.5 4.6	54.5–100.0 85.0	53.7–230.5 90.0
Paraíba Valley (9)	0.4; 1.1; 1.9; 3.4; 26.3	6.4–220.3 60.8	0.60–0.76 0.66	27.6–76.7 39.6	9.5–33.0 16.3	20.8–57.9 32.4	2.7–7.2 4.3	59.3–99.9 83.6	24.6–246.0 78.4
Ilha Grande Bay (2)	0.4; 1.1; 1.8; 3.2; 24.5	23.9–85.6 54.7	0.63–0.65 0.64	30.2–36.1 33.1	17.2–26.6 21.9	25.4–28.3 26.8	3.3–4.7 4.0	48.5–92.6 70.5	98.3–102.8 100.6
Mountain Range (13)	0.4; 0.9; 1.6; 3.0; 26.8	8.1–255.5 15.5	0.65–0.76 0.70	35.5–73.0 50.1	13.2–38.3 29.2	27.4–65.1 49.2	2.5–5.8 3.7	17.0–97.8; 48.4	0.0–108.9 33.2
Metropolitan Belt (11)	0.4; 1.1; 1.7; 3.1; 27.1	17.9–1297.7 191.7	0.58–0.72 0.66	27.1–58.1 36.7	6.1–22.1 15.8	16.3–40.8 29.1	4.1–9.4 7.3	71.8–100.0; 99.5	121.1–263.1 196.5
Municipality of Rio de Janeiro (1)	0.6; 1.7; 3.2; 6.5; 31.2	5480.8	0.61	29.3	7.3	15.9	8.4	100.0	163.1
Beach Sector (4)	1.3; 4.5; 9.3; 17.9; 41.3	98.2–251.7 194.8	0.43–0.50 0.44	10.0–16.2 11.0	2.4–7.0 4.7	3.2–13.5 8.1	6.3–10.3 9.4	100.0	37.8–76.6 49.1
North–Downtown Sector (7)	0.8; 2.4; 4.8; 8.7; 27.8	3.2–414.8 194.5	0.47–0.60 0.55	12.7–26.1 20.5	3.6–9.7 4.1	6.7–21.0 12.8	7.7–9.6 8.9	100.0	0.0–156.9 105.6
West Sector (6)	0.5; 1.4; 2.3; 4.0; 25.3	60.8–596.0 377.3	0.58–0.67 0.61	23.9–41.8 27.7	6.6–16.0 9.0	17.0–37.5 22.0	6.0–9.4 7.9	100.0	106.6–174.4 125.4
Harbor Sector (9)	0.5; 1.3; 2.2; 3.8; 24.1	44.1–315.0 179.3	0.57–0.65 0.61	21.7–36.9 28.6	5.1–13.5 10.0	15.4–26.2 23.1	8.6–9.7 9.4	100.0	170.9–387.0 227.6

[a]Number in parentheses is the number of municipalities or administrative regions.

distribution, concluding that the choice of income distribution indicator is relevant when investigating the income inequality hypothesis. In a study comparing US states, however, Kawachi and Kennedy[8] showed that the choice of indicator was unlikely to have affected the conclusions reached in previous studies, since all income inequality indicators used by the authors were highly correlated with each other.

Although Judge's argument has been refuted, 2 interesting issues emerge from his study: the problem of data comparability, reflecting the difficulty of comparing the income distribution of different countries, and the need to use multivariate statistical methods, taking into account potential confounders. Another issue is the selection of the geographical scale. As suggested by Wilkinson,[12] the geographical scale may affect the relationship between mortality and income inequality. The effect of relative deprivation may be missed in a geographical scale of analysis composed only of socially homogeneous demographic units.

According to a recent World Bank report,[13] Brazil has one of the most unbalanced systems of income distribution in the world. Rates of mortality from violence significantly increased during the 1980s. In the state of Rio de Janeiro, which has the highest homicide rate among all the Brazilian states, the firearm mortality rate increased at a rate of 10% per year from 1980 to 1992.[14]

The main purpose of this study was to examine the relationship of income inequality to homicide within the state of Rio de Janeiro. Associations of several income inequality indicators and homicide were tested at 2 different geographical levels, with adjustment for other socioeconomic indicators through the use of multivariate statistical methods.

Methods

In 1991, the state of Rio de Janeiro had a population of approximately 13 million and was divided into 70 municipalities. Its capital, the municipality of Rio de Janeiro, is a huge city that comprises about 40% of the whole state population. In 1991, the city of Rio de Janeiro was divided into 26 administrative regions. Excluding the capital, the state of Rio de Janeiro is divided into 8 regions,[21] briefly described as follows.

1. The *Northern Region,* essentially a farming region, has been experiencing a significant decline in its economic activities in recent years.

2. The *North Region,* once an agricultural region growing mainly sugarcane, has benefited from petroleum exploitation and other industrial activities (e.g., alcohol manufacture) in recent decades.

3. The *Middle–South Region* has a mixed economic base, with activities such as cattle raising and brick factories.

4. The *Southern Coast* has as its main economic activities tourism and commerce/business.

5. The *Paraíba Valley* has large-scale heavy industries (e.g., iron and steel).

6. The *Ilha Grande Bay Area* has an economy linked primarily to harbor activities and shipbuilding.

7. The *Mountain Range* has tourism and textile and farming/industrial activities (e.g., poultry and dairy industries).

8. The *Metropolitan Belt* is composed of densely populated municipalities that

TABLE 2—Correlations Among Indicators for State of Rio de Janeiro Municipalities and Municipality of Rio de Janeiro Administrative Regions, 1991

	Gini Coefficient	Top 10%–Bottom 40% Income Ratio	Illiteracy Rate	Poverty Index	Median Income	Demographic Density Indicator	Homicide Indicator
State of Rio de Janeiro (n = 70)							
Gini coefficient	1.000	0.965*	0.739*	0.904*	–0.846*	–0.653*	–0.533*
Top 10%–bottom 40% income ratio	0.965*	1.000	0.649*	0.857*	–0.723*	–0.573*	–0.479*
Illiteracy rate	0.739*	0.649*	1.000	0.806*	–0.768*	–0.799*	–0.596*
Poverty index	0.904*	0.857*	0.806*	1.000	–0.868*	–0.697*	–0.639*
Median income	–0.846*	–0.723*	–0.768*	–0.868*	1.000	0.701*	0.564*
Demographic density indicator	–0.653*	–0.573*	–0.799*	–0.697*	0.701*	1.000	0.694*
Homicide indicator	–0.533*	–0.479*	–0.596*	–0.639*	0.564*	0.694*	1.000
Municipality of Rio de Janeiro (n = 26)							
Gini coefficient	1.000	0.972*	0.773*	0.901*	–0.914*	–0.334	0.601*
Top 10%–bottom 40% income ratio	0.972*	1.000	0.795*	0.924*	–0.838*	–0.408	0.572*
Illiteracy rate	0.773*	0.795*	1.000	0.901*	–0.601*	–0.562*	0.336
Poverty index	0.901*	0.924*	0.901*	1.000	–0.765*	–0.518*	0.451
Median income	–0.914*	–0.838*	–0.601*	–0.765*	1.000	0.127	–0.543*
Demographic density indicator	–0.334	–0.408	–0.562*	–0.518*	0.127	1.000	0.186
Homicide indicator	0.601*	0.572*	0.336	0.451	–0.543*	0.186	1.000

*Correlation is significant at the 0.01 level.

surround the capital; it comprises 38% of the state population and has primarily industrial and commercial activities.

Descriptive indicators for the 8 regions of the state of Rio de Janeiro and for the municipality of Rio de Janeiro are shown in Table 1.

In the present study, 2 geographical scales were considered for analysis, between municipalities within the state of Rio de Janeiro and between administrative regions within the municipality of Rio de Janeiro. Information on population, income, and literacy were obtained from 1991 census data for the state of Rio de Janeiro.[15] This file contains information on incomes of heads of household for 16 income classes based on minimum wage per month. (In Brazil, the minimum wage per month is a reference for both the formal and informal markets, especially in the context of very high inflation. In 1991, the minimum wage per month was around $100.) For each of the 16 income classes, the numbers of heads of household and average incomes were used to calculate deciles of the income distribution.

From the income distribution deciles, the following 2 income inequality indicators were estimated.

1. The *Gini coefficient,* an indicator of income inequality derived from the Lorenz curve, which is a graphical device for displaying the relation between the cumulative percentage of some group of items (e.g., households) and the cumulative percentage of the total amount of some variable (e.g., income) that they contain.[16] The Gini coefficient is calculated by the area between the Lorenz curve and the 45^0 line; it varies between 0.0 (perfect income equality) and 1.0 (perfect income inequality).

2. The *top 10%–bottom 40% income ratio,* calculated by taking the income earned by the top 10% of household heads and dividing it by the income earned by the bottom 40% of household heads. This index is frequently used to compare degrees of income inequality in different countries.[17]

Four other indicators were derived from the census database.

3. The *illiteracy rate,* calculated as the proportion of illiterate household heads. This rate was included in the analysis as a measure of primary education.

4. The *poverty index,* defined as the proportion of household heads who earned less than the minimum wage each month. Since the minimum wage is updated annually by the federal government to express changes in the price of basic food and services, it was chosen to be our poverty threshold.

5. The *median income,* calculated as the median of the income distribution of household heads.

6. The *demographic density indicator* is the logarithm of the demographic density (population per square kilometer). The logarithm was used as a variance-controlling transformation.

As most homicides in the state of Rio de Janeiro occur among young male adults (aged 15–29 years), representing approximately 50% of the total number of homicides in 1991, the homicide rate among males aged 15 to 29 years was selected as the outcome variable. Homicides among young women were not considered in the analysis, because they represent only a small percentage (6%) of the total. The number of homicides, defined by codes E960 to E969 of the *International Classification of Diseases, Ninth Revision* (*ICD-9*), was obtained from the Mortality Information System compiled by the Brazilian Ministry of Health.[18]

For the sake of the present analysis, the homicide rate was calculated as the mean rate for the 3-year period 1990 to 1992. The square-root transformation was used to stabilize the variance of the outcome variable, as suggested by Cressie[19] and Kleinbaum and Kupper.[20] The outcome variable—the square root of the homicide rate among men aged 15 to 29 years—was denominated the *homicide indicator.*

Associations between income inequality indicators and the homicide indicator were determined by multiple regression procedures that controlled for the other socioeconomic indicators considered in the study.

Results

In 1991, several municipalities in the state of Rio de Janeiro exhibited very poor living standards. In the Northern Region, the median illiteracy rate was 28% and the proportion of household heads who earned less than the minimum wage reached 74%.

Very high degrees of income inequality were also found. Among regions where farming activities have a significant role, the median values for the Gini coefficient were greater than 0.70. In the Northern Region, the median of the top 10%–bottom 40% income ratio was 81, while in the more industrialized areas—Rio

Table 3—Regression Results for State of Rio de Janeiro and Municipality of Rio de Janeiro Data, 1991

	Coefficient	Partial Correlation	Significance
State of Rio de Janeiro (n = 70)			
Model 1[a]			
Variable entered			
Constant	6.33	...	0.026
Demographic density indicator	1.31	...	0.000
Poverty index	–0.09	...	0.012
R^2	0.53	...	0.000
Excluded Variable			
Gini coefficient	...	0.19	0.114
Median income	...	–0.12	0.352
Illiteracy rate	...	0.10	0.410
Model 2[b]			
Variable entered			
Constant	6.33	...	0.026
Demographic density indicator	1.31	...	0.000
Poverty index	–0.09	...	0.012
R^2	0.53	...	0.000
Excluded variable			
Top 10%–bottom 40% ratio	...	0.16	0.188
Median income	...	–0.12	0.352
Illiteracy rate	...	0.10	0.410
Municipality of Rio de Janeiro (n = 26)			
Model 1[a]			
Variable entered			
Constant	–28.32	...	0.007
Gini coefficient	44.93	...	0.000
Demographic density indicator	1.60	...	0.033
R^2	0.50	...	0.001
Excluded variable			
Median income	...	0.30	0.180
Poverty index	...	0.05	0.821
Illiteracy rate	...	–0.01	0.952
Model 2[b]			
Variable entered			
Constant	–13.04	...	0.081
Top 10%–bottom 40% ratio	0.42	...	0.000
Demographic density indicator	1.64	...	0.026
R^2	0.52	...	0.000
Excluded variable			
Median income	...	0.161	0.474
Poverty index	...	0.030	0.894
Illiteracy rate	...	0.001	0.995

[a]Dependent variable: homicide indicator; independent variables: Gini coefficient, poverty index, illiteracy rate, demographic density indicator, median income.
[b]Dependent variable: homicide indicator; independent variables: top 10%–bottom 40% ratio, poverty index, illiteracy rate, demographic density indicator, median income.

de Janeiro, Ilha Grande Bay, Paraíba Valley, and the Metropolitan Belt—the values were lower than 40. However, the extreme concentration of income in the top quintile was observed in all regions of the state.

For the capital, better socioeconomic conditions and lower degrees of income inequality were found in comparison with the other municipalities of the state. The illiteracy rate was approximately 7% and the poverty index was 16%. Although relatively lower than in other regions of the state, the Gini coefficient for the capital was still very high (0.61). On the other hand, the homicide rates were markedly higher in the metropolitan area, composed of the capital and the municipalities located around the city of Rio de Janeiro. The median homicide rates ranged from 46 per 100000 (Northern Region) to 196 per 100000 (Metropolitan Belt).

Great disparities were found among the 4 sectors that compose the municipality of Rio de Janeiro (Table 1). In the Harbor Sector, the median Gini coefficient was 0.61 and the homicide rate ranged from 171 per 100000 to 387 per 100000. In contrast, in the Beach Sector, the median Gini coefficient was 0.44 and the maximum homicide rate was about 77 per 100000.

The correlation matrix among all considered indicators for the state of Rio de Janeiro is presented in Table 2. The homicide indicator was most highly correlated with the demographic density indicator. The poverty index and the illiteracy rate were strongly and positively correlated with each other and negatively correlated with the outcome variable. The 2 income inequality measures were highly correlated with each other but inversely correlated with the homicide indicator.

The correlation matrix for the administrative regions of the municipality of Rio de Janeiro is also shown in Table 2. For this geographical scale, the correlation coefficients confirm the income inequality hypothesis. The 2 measures of income inequality were highly correlated with each other (0.97) and with the poverty index, as well as significantly ($P<.01$) and positively correlated with the outcome variable, with both correlation coefficients approximately equal to 0.60. The correlation between the outcome variable and the illiteracy rate was not statistically different from 0 at the 5% significance level.

Regression results for both geographical scales are shown in Table 3. Backward and stepwise regression procedures, with either the Gini coefficient or the top 10%–bottom 40% ratio as the income inequality measure, provided exactly the same results. For the municipalities of the state of Rio de Janeiro, the regression results confirm the lack of association between homicide and income concentration for this geographical scale. Only the demographic density indicator and the poverty index were selected for inclusion in the regression model. None of the income inequality indicators showed significant effects on the homicide indicator. It is worth noting, however, that after the poverty index and the demographic density indicator were adjusted for, the partial correlations of both income inequality indicators became positive, although not statistically significant at the 5% level.

The regression results for the administrative regions of the municipality of Rio de Janeiro indicated that the most important predictors were the income inequality indicator and the demographic density indicator, together accounting for more than 50% of the total variance in homicide indicators (Table 3). After the income inequality and demographic density indicators were adjusted for, no other covariate showed a significant association with the outcome variable, including the poverty index.

Discussion

The present study provided further empirical evidence for the association between income inequality and homicide.

For the administrative regions of the municipality of Rio de Janeiro, the most important explanatory variables were the 2 indicators of income concentration. It is worth noting that in a country like Brazil, where poverty and inequality are much higher than in industrialized countries, the relationship of income inequality to homicide rates remains significant.

The analysis also showed the relevance of the choice of the geographical scale. When the municipalities of Rio de Janeiro State were used as the experimental units, a negative association was found between homicide and income inequality. Nevertheless, the negative correlation can be easily explained by the municipalities' different degrees of urbanization. Compared with the industrial sector, wage rates in agriculture and other primary-sector activities in Brazil are very low. In the farming areas of the state, the poverty index is very high and a middle class is virtually nonexistent. Therefore, the degree of income concentration is even higher in rural municipalities than in urban ones. Since violence is primarily an urban phenomenon, the highest homicide rates in the state are found in the most urbanized municipalities, and the correlations between the homicide indicator and the inequality income measures were found to be negative. For this geographical scale, the degree of income inequality may not be an important predictor of homicide rates.

This study also found that homicides were concentrated in the metropolitan area of the state, where, on average, people have better living standards. However, there is great economic disparity within the metropolitan area, where in addition to many more affluent neighborhoods there are several deprived communities, the inhabitants of which live mostly in slums—densely populated areas characterized by wooden housing, lack of drainage systems, and precarious sanitary conditions.

As has been discussed by Kawachi and Kennedy,[22] the growth of income inequality in many countries has been accompanied by an important growth in the residential concentration of poverty. Particularly in the city of Rio de Janeiro, the number of slum residents has increased significantly during the past 20 years, mainly concentrating in the harbor area and vicinity. In 1991, this sector of the city had approximately 23.5 slum residents per square kilometer (compared with 8.8 slum residents per square kilometer for the whole city). This is the sector of the city that has the highest degree of income inequality and the greatest homicide rate.

Recently, Kawachi et al.[23] have shown that in societies where income differences are wider, people experience their social environment as less trustworthy and more unfair and hostile. It is believed that more equitable societies tend to be more socially cohesive. In addition, Sampson et al.[24] have demonstrated that violence within neighborhoods of Chicago varies inversely with the level of collective efficacy, defined by the authors as "social cohesion among neighbors combined with their willingness to intervene on behalf of the common good."

Wallace[25] has discussed the effects of social disruption in a study of the Bronx section of New York City. The deterioration of health conditions has been explained as the outcome of the increasing social disorganization of poor communities. The concentration of homicides in the slum sector of the city of Rio de Janeiro suggests that the poorest slum communities are probably the least socially integrated.

A possible interpretation is that social cohesion deteriorates within communities according to their degree of relative deprivation, assessed not in relation to the community itself but compared with the standards of the larger society.[12] Indeed, the growing number of violent deaths among young residents in Rio de Janeiro slums is believed to be a consequence of increasing levels of frustration brought about by deprivation of social benefits and lack of opportunities for personal growth. Youths from low-income families are easily recruited into organized criminal activities linked to the drug traffic, seduced by the immediate offers of money and leadership positions; they frequently become involved in violent disputes over trafficking control points and rarely live to the age of 25 years.[26]

Although the relationship of drug trafficking to relative deprivation has not been empirically analyzed in Brazil, studies in low-income urban communities in the United States have shown that involvement in this activity is highly related to the belief that a "youth's wage-earning potential is limited to drug trafficking" and to "pressures by peers to engage in this activity."[27]

One limitation of the present study is that it is based on secondary data. Despite the fact that the rate of death registration in the state of Rio de Janeiro is approximately 97%,[28] homicide deaths may present problems of classification (homicide deaths are sometimes classified as "firearm injuries, undetermined whether accidentally or purposely inflicted" [*ICD-9* code E985]).[14]

Another limitation is the study's cross-sectional design, which does not permit analysis of the historical, environmental, and cultural dimensions that probably have been influencing the relations between social variables and the homicide rates. Further studies should also address time-trend analyses and other levels of geographical scales, such as neighborhoods.

In summary, this study provides empirical evidence of the severe and risky situation that youths in low-income urban areas are experiencing in the city of Rio de Janeiro. Specifically, homicides are clustered in the sector of the city that has the highest density of slum residents. The hostile environment and the increasing violence in those communities are understood as consequences of relative inequalities compared with the wider society, one of the most heterogeneous in the world.

Although there is growing recognition of the need for prevention policies directed at young residents in low-income urban areas, government programs are virtually nonexistent. The findings of this study strongly suggest that social policies specifically addressed to these youths, including programs to reduce the harmful effects of relative deprivation, may have an important impact on homicide mortality and should be urgently implemented. □

Contributors

C. L. Szwarcwald planned the study, supervised the statistical analysis, and wrote most of the paper. F. I. Bastos participated actively of the discussion of the results and wrote part of the paper. F. Viacava managed the primary databank and contributed to the writing of the paper. C. L. T. Andrade performed the statistical analysis.

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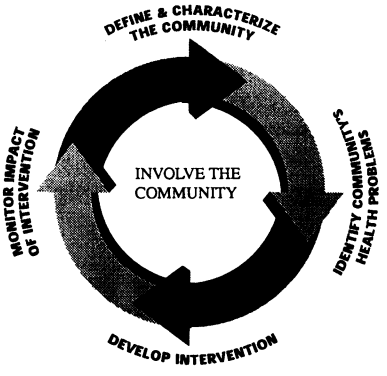

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