

# Distribution of Personal and Property Crime in Brazil

Cyrus B. Dawsey III  
*Department of Geography*  
*Auburn University*  
*Auburn, AL 36849*

## SPATIAL ANALYSIS OF CRIME

Concern about crime is probably as old as society itself. Any definition of social behavior carries the implication of individual or group acts that do not conform to the accepted norm. Crime is not only a historical constant, but it is also a universal feature of the cultural landscape (Jakle, et al. 1976, 214; Richards 1977). Although the definition of a criminal act may vary from group to group, all societies differentiate acceptable or tolerable activities from those that are blatantly unacceptable. Because robbery, theft, assault, or homicide are considered reprehensible and punishable in almost all places and societies, a basis exists for the study of intercultural crime patterns. If criminal acts carry similar moral and ethical connotations in many regions, they can be examined as spatial variables. Despite cultural differences, for example, murder rates in China and Costa Rica can be compared quantitatively; in both areas the crime is similarly defined and understood.

Geographers have been interested in the analysis of crime patterns since the nineteenth century. Most early studies dealt with associations between social pathology and climate (Harries 1974, 8). As environmental determinism waned, social ecology studies by Shaw and McKay in Chicago provided the foundation for comparative criminology and later geographical studies (Shaw and McKay 1929). Primarily restricted to the United States or Western Europe, these studies have usually involved an analysis of data tabulated by subregional unit. Lottier showed in this way strong intercorrelations between murder and assault, as well as among burglary, robbery, larceny, and auto theft in the United States. The overall explained variance, however, was low (Lottier 1938). Spatial patterns have also been identified. The persistently high homicide rates of the southeastern United States, for example, have defied conclusive explanation (Shannon 1954; Harries 1971). Distributions have been studied at the regional and intraurban level, indicating, among other things, that rates decrease with increasing distance from urban centers (Evans 1980; Herbert 1982).

Studies of crime in the less-developed countries have not been as common (Clinnard and Abbott 1973). Several sources have indicated increased criminality throughout the world, yet few have made systematic international crime rate comparisons. Local or intranational descriptions have been more common. Clinnard and Abbott identified increased rates for all of the severe crime categories in Uganda between 1955 and 1968, and similar growth was encountered among juveniles in Venezuela, Thailand, Puerto Rico, and Jamaica (Clinnard and Abbott 1973; Mawdsley 1961; Lunden 1968; Kupperstein 1969; Allen 1980). Specific locations in Trinidad and Guatemala were shown to have experienced increasing crime rates as social change and dislocation occurred (Liebner 1981; Bossen 1984).

Even within developing countries, however, regional comparative studies are rarely performed and, just as international patterns have not been defined or mapped, intranational distributions have also not been considered.

Many problems confront the researcher interested in the spatial analysis of crime (Salas and Surette 1984). Some of them relate to data interpretability. Although broad categories of crime may be universally understood, the legal definitions of offenses vary significantly; an act that would bring arrest and conviction in one area may go unreported elsewhere. Crime data indicate not only criminal activity but also law enforcement diligence. This ambiguity is greatest in the less-developed world where police competence is very variable (Rico 1977; Richards 1977, 94). In countries where government officials and police assume a stance above the law, arrest and imprisonment are likely to be evidence of political or social animosity and harassment rather than true lawlessness. Many genuinely criminal acts are, conversely, apt to go unreported. Data on ordinary offenses become confounded when political turmoil fills local jails. Some have argued that the geography of crime, based on data collected by the establishment, is little more than a tool for oppressive social control; thus, the whole subdiscipline as a valid area of inquiry has been questioned (Peete et al. 1975). "Crime" by those in power is not counted. The practice of underestimating a sugarcane cutter's sheave weight, for example, is com- [end p. 51] mon in Northeast Brazil yet is nowhere tabulated as the theft that it truly represents (Aguiar 1979, 83).

Problems associated with data reliability may also reduce their usefulness. National statistical sources may not represent standardized criteria or dependable collection methods. Tabulated categories change almost yearly, and frequent gaps are likely to appear. Data may be manipulated, moreover, by a government so as to present a favorable image to the rest of the world.



Fig. 1. Brazilian state boundaries.

### **SPATIAL ANALYSIS OF CRIME IN LATIN AMERICA**

The difficulties related to reliability and interpretability of crime data are especially acute in Latin America. In an attempt to deal with such problems, the *Instituto Latinoamericano Para la Prevención del Delito y el Tratamiento del Delincuente* made a comprehensive compilation of criminal justice data for the region between 1950 and 1979. Although the study is valuable, the authors warned against over reliance on the results (Salas and Surette 1984, 785). The International Criminal Police Organization also collects and publishes data for broad crime categories and the World Health Organization provides statistics on homicide deaths. Salas and Surette, however, found important differences between these data and those released by local police in both Cuba and Jamaica (Salas and Surette 1984, 786). Some Latin American criminologists have expressed concern that centralized data collection by the United Nations may be another vehicle for the United States to exercise hegemony over the Third World and therefore argue for a resistant stance (Encinoza 1981).

The many problems associated with the quality of basic data have, unfortunately, limited the number of statistical investigations of crime in Latin America. Salas and Surette correlated crime rates with three proposedly related socioeconomic variables, but the only statistically significant relationship (positive) detected occurred between homicide and per capita GNP change (Salas and Surette 1984, 790). The study did demonstrate that basic descriptive analyses are possible even when the data may be less than completely reliable. When care is taken to avoid over manipulation and sweeping attribution of causality, results can be a fertile source of ideas and hypotheses.

Some of the pitfalls associated with the spatial analysis of crime can be reduced by restricting the study area to one country. Although not always true, firmer assumptions with regard to data standardization may usually be made. Criminal code definitions, data collection criteria, political stability, and other factors are not likely to be as variable internally as across international boundaries.

### **GEOGRAPHY OF PERSONAL AND PROPERTY CRIME IN BRAZIL**

A cross-sectional examination of crime rates was undertaken in Brazil, the largest and most populous of the Latin American countries (Figure 1). Although many areas remain rural and traditional, an ever greater proportion of the population is being encompassed in an industrial, urban, and rapidly modernizing society. Longstanding values are being changed by new mobility, greater availability of material goods, and a different attitude with respect to old institutions. Increasing crime and

fear of crime are reflected by the iron bars on windows and elaborate security systems found in upper and middle income neighborhoods (Kottack 1983, 235). Crime victimization is not restricted, of course, to the rich; poor on poor crime is far more prevalent but not as likely to attract public notice (De Jesus 1960; Pires 1985).

Data analyses were restricted to arrest records for two categories of severe crime: homicide and a grouped category including theft, robbery, and extortion. The two variables were taken to be broadly representative of crimes against person and crimes against property. Observations consisted of state tabulated data published in the *Anuario Estatístico do Brasil*, an annual summary released by the Instituto Brasileiro de Geografia e Estatística (IBGE 1976, 1983). While absolute validity of the source input at the local level cannot be guaranteed, the IBGE has a reputation for publishing standardized reliable data. Even the respected *Anuario*, however, suffers some of the flaws mentioned above. Tabulation by crime offense does not involve the [end p. 52] same category groupings from year to year, and crimes occurring within capital cities are not regularly included. Longitudinal studies are thus made difficult.

The objectives of this study are twofold: First, to test hypotheses based on results and theory derived from descriptions of other developing areas, and second, to identify significant spatial patterns and correlations between Brazilian crime indices and other variables. The first objective was narrowed to an examination of the relationship between levels of wealth and the two categories of crime. In developing countries with rising crime rates, greater increases have been associated with property crimes than with crimes against person. The ratio of murders to larcenies has been shown to decrease with economic growth, and comparisons with developed nations have shown the latter to experience a far greater percentage of property crime (Clinnard and Abbott 1973; Allen 1980). Brazil, as other rapidly developing countries, has experienced a substantial increase in reported crimes. Total arrests for homicide, theft, robbery, and extortion in 1974 were 53.8 per 100,000 while, in 1980, the total had jumped to 100.8 per 100,000. At least 34 percent of the 1974 total involved homicide, but by 1980 the figure had dropped to less than 20 percent (IBGE, 1976, 1983).

Increasing crime has also been linked to urbanization, although crowding itself may not be at fault (Stokols 1972). In cities, wealth and economic frustration are often juxtaposed in an atmosphere of anomie, and actions outside established law become viable options for survival and profit among the underprivileged (De Jesus 1960; Aguiar 1979). These options are generally not available in a rural setting where crime opportunity is more limited and social structure more rigid. City life places the very rich and the very poor on the same street where auto theft is rapidly increasing and, even in the same house, where a service class still does most of the work. Cities are often considered breeding sites of delinquency and violence and may, therefore, promote personal as well as property crime.

The first objective of this study was to discover whether the connection between crime and income level applied to Brazil. A further question was asked if income's link to property crime was stronger than to personal crime as appears to be true in other countries? The following hypotheses were developed for testing. The relationship between property crime (here consisting of the grouped theft, robbery, and extortion) and an income surrogate is positive and significant. Second, the relationship between homicide and the income surrogate is positive, but the explained variance is not as great as for the first hypothesized relationship.

Because the Brazilian census does not directly measure income, the estimated per capita gross income tax was used as a surrogate measure of per capita state wealth. Any of many variables, or combinations of several, obviously might have been used as independent variables indicative of wealth. The income surrogate was strongly related to the urban population percentage and to the total population and potentially related to many other items not included in the study. The income surrogate, therefore, was also a surrogate measure for a broad combination of characteristics that differentiate economically developed areas from others. Because the chosen variable was not tabulated for the territories of Brazil, Roraima and Amapa in the north and the Federal District of Brasilia were omitted from the analyses.

## **RESEARCH RESULTS**

The hypotheses were tested with a simple linear regression model, and a positive association between income (independent variable) and property crime (dependent variable) was confirmed at the 0.95 confidence level. Income and homicide, on the other hand, were not significantly related. The results, therefore, provided evidence in support of the findings from other developing nations correlating economic development and increased property crime. The combined effect of increased wealth and an expanding urban setting appear to be most reesponsible. These factors do not appear to be promoting personal crime, however, to the same extent.

The second general objective of the study was to examine spatial patterns and correlations between several socioeconomic variables and the crime data. Formalized hypothesis testing was not the goal; suggestive relationships, intriguing features, or any other set of conditions that might lead to theory development were sought. The relationship between income and property crime is indicated in Figure 2, where the ratio of homicide to property crime is mapped. Brazil's poor northeastern states stand out sharply; three of them registered more than twice as many murders as the grouped property crimes. Mapping

of the residual values of the income x property crime regression also provided an interesting spatial pattern. As illustrated in Figure 3, two northeastern states, Mato Grosso, and the extreme south all showed substantially less crime than estimated by the model. This suggested that a linear model may not be the most appropriate, and that the addition of other independent variables might add explanation. Perhaps differences related to a Germanic cultural influence in southern Brazil, or perhaps limitations in data gathering by police in [end p. 53] the northeast core caused these areas to report less than the predicted rates. For heavily populated São Paulo and Rio de Janeiro, as well as for the far north, more property crime occurred than predicted by the income surrogate. Again, a nonlinear model and the incorporation of added variables is suggested.

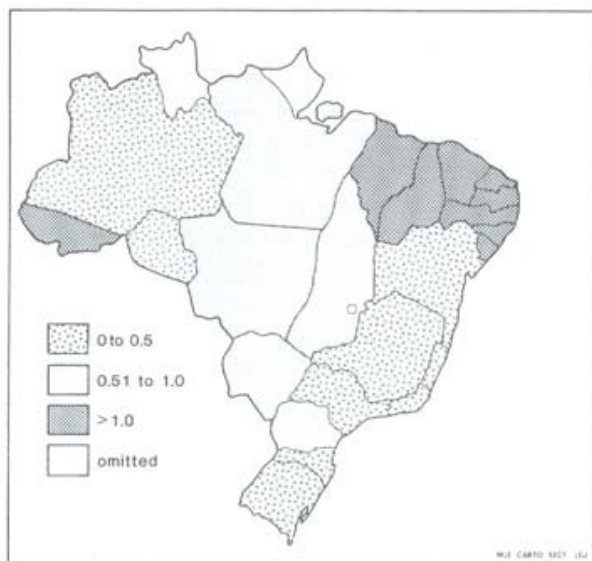


Fig. 2. Ratio of homicides to property crime—1980. Source: IBGE.

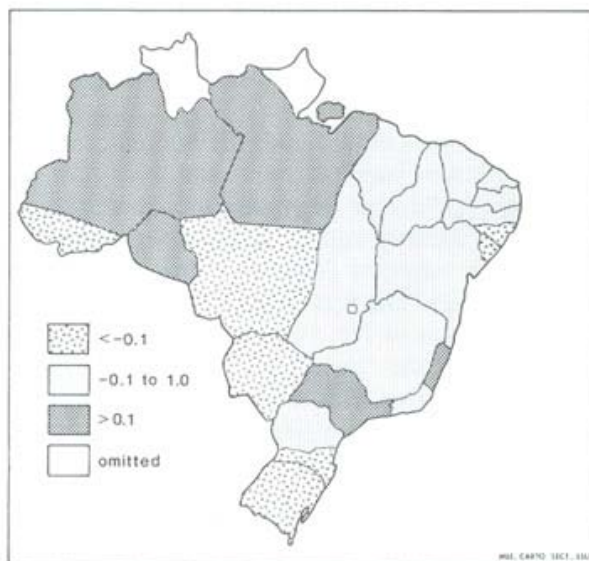


Fig. 3. Residuals of the income x property crime linear regressions. Crimes per 100,000—1980 Source: IBGE

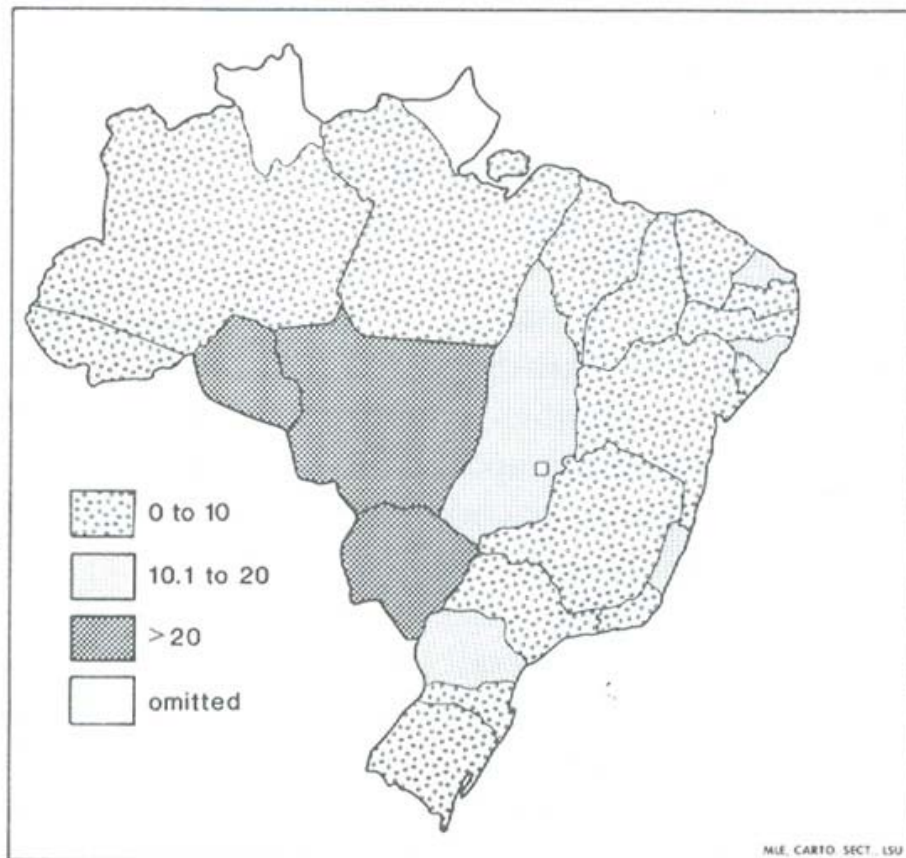


Fig. 4. Homicides per 100,000 population—1980.  
Source: IBOE

Table 1. Correlation coefficients between crime categories and additional variable for Brazil, 1980.

	PYM*	PIN	URB	TOP	CPO	WHI
Per Capita Homicides in 1980	NS**	NS	NS	NS	0.56	NS
Per Capita Property Crime in 1980	NS	0.72	0.43	NS	0.73	NS

\*Variables: PYM: Percent Male Aged 15 to 19  
 PIN: Per Capita Income  
 URB: Percent Urban  
 TOP: Total 1980 Population  
 CPO: Percent change in Total Population (1974-80)  
 WHI: Percent White Racial Category  
 \*\*NS: Not significant at the 0.95 level.

Source: IBGE *Anuario Estatístico do Brasil*

The results of a correlation of several variables with the crime data are presented in Table 1. Only coefficients with values significant at the 0.95 level are listed, and only those pertinent to the two crime categories are shown. The relationship identified in the regression study is again reflected in the table and associations with other variables are also manifested. Per capita property crime, as indicated, was positively related to per capita income and the percentage urban as well as to the variable describing percentage change in population. Noteworthy also is the positive relationship between percent

population growth (highest for Rondônia in northwest Brazil) and per capita homicides (Figure 4). Jonathan Kandell's description of the violence associated with land claims in this new frontier appears to be supported by the findings (Kandell 1985).

Finally, additional correlations indicated a positive relationship between 1974-80 differences in per capita homicides and the 1974-80 differences in per capita property crime. Areas experiencing increase in one category were likely to experience increases in the other as well. This might be indicative of increased criminality or, conversely, of greater diligence and better reporting. Any number of additional explanations for the various patterns might be forwarded but, owing to the limited data, extreme care must be taken not to jump to quick conclusions regarding the associations.

The lack of detailed, reliable, and varied data remains a major handicap to an in-depth analysis of crime patterns in Brazil. As shown above, however, this limitation does not preclude all examination. Basic tests of significance or simple linear regressions are possible, and correlation analyses can be fertile ground for hypothesis development. The inability to make statements of absolute certainty at the 95th or higher confidence level does not mean that an area of study as important as crime should be avoided. Offenses against person and property are rapidly increasing and should be a source of concern to all. They highlight, if nothing else, the economic disparities and centrifugal forces operating within developing countries. The spatial analysis of crime data, however limited, can provide valuable insights into the problems facing developing societies.

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