Poverty and Ethnicity in Indiana

An Honors Thesis
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Abstract

This study attempts to explore poverty among selected ethnic/racial groups within Indiana, the United States, and the world. Data from the World Factbook and the United States Census 2000 are used to construct various graphics that suggest correlations between ethnicity and poverty within global, national, state, and county populations. Spearman's Correlation Coefficient is used to expose any linkages between ethnicity and poverty. Whites, Blacks, Asians, Hispanics, and Native Americans are tested for correlations with the following indicators of poverty: measures of income, family structure, housing pattern, educational background, employment, vehicle ownership, and poverty threshold.

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The aim of this study was to collect and visualize data that might suggest a correlation between ethnicity and poverty in Indiana. It became immediately apparent, however, that a local analysis has value only when set within a larger context. Poverty within the United States, while distressing for those experiencing it, is not as severe as poverty experienced in other parts of the world, especially in Africa, the Middle East, and Southeast Asia.

For instance, in Angola, the infant mortality rate was 191 deaths per 1,000 live births for the year 2004, compared to 6.5 deaths in the United States. The average life expectancy for the same period was 38.43 years in Angola compared to 77.71 years in the United States. Per capita Gross Domestic Product (GDP) in Angola was $2,100 (for 2004) while in the United States it was $40,100—nearly twenty times greater (World Factbook, 2005).

These comparisons seem to position the U.S. favorably in terms of quality of life measures such as per capita GDP and life expectancy, but further examination of the data show that poverty in the United States is a real and growing problem within some population groups.
in the World
For this study, poverty within the United States was measured by two variables, poverty thresholds (income levels) and family income as compared with these thresholds. The 48 thresholds were determined by family size (from one to nine or more persons) and number of family members less than 18 years of age (from none to eight or more dependents). For example, for the year of this study, 1999, the poverty threshold for a four-person family with two members under age 18 was $16,895 (Bishaw and Iceland, 2003). If a family's total income was less than the threshold determined by size and age composition, then everyone in the family was considered poor. If the total family income was greater than the threshold, then everyone in the family was considered to be above the poverty level.

For purposes of this study, the nation was grouped into four categories based on the percentage of the population within each county living below the poverty threshold: Category I (0.0-12.3 percent), Category II (12.4 [the national poverty rate]-19.9 percent), Category III (20.0-39.9 percent), and Category IV (40.0 percent or greater). Counties with a Category I ranking were considered the most favorable in terms of quality of life because their poverty rates were less than the national average. Categories III and IV were considered to be high poverty areas.

Of special note, of the 51.9 million people classed within the lowest poverty areas (Category III or IV), 42.9 percent live in the U.S. South. Interestingly, only 35.6 percent of the total United States population lives in the South (Bishaw, 2005), showing that poverty is disproportionately concentrated in this region. Of note also, over half of the total Black population of the United States (56 percent) lives in the South.

1 Poverty thresholds were not adjusted for regional, state, or local variation in the cost of living.
In the United States

Poverty by Category

Counties within the United States were divided into four categories based on the percentage of the population living below a designated poverty threshold. Poverty rates of 0.0-12.3% fall within Category I. Poverty rates of 12.3-19.9% fall within Category II. Category III has poverty rates of 20.0-39.9%, and Category IV has poverty rates of 40.0% or more.
in the United States

Percentage
Hispanic

- 0-25%
- 26-50%
- 51-75%
- 76-100%

Percentage
Native American

- 0-25%
- 26-50%
- 51-75%
- 76-100%
Narrowing the focus to Indiana, the data showed that over three-fourths of the population lived in Category I (0.0-12.3 percent living in poverty). The data also showed that Indiana was not among the states with the greatest poverty. Indiana's poverty rate was 6.7 percent, while the national rate was 12.4 percent for the same year.

Of the other variables considered, Indiana's unemployment rate was 3.3 percent, compared to the national rate of 5.8 percent, and Indiana's median income was $41,567, compared to the national average of $42,781. Indiana compared favorably with the national average in education. Eighteen percent of the population had less than a high school education while the national average was 20 percent. Indiana compared favorably with the national average in family structure. Seven percent of all households (160,311 households) were single mother families in Indiana ("Indiana," 2002), compared to the national average of 10.2 percent (U.S. Census, 2000).

These numbers are important because, compared to the nation as a whole, the data for Indiana indicated favorable numbers when evaluated by quality of life measures. This was due, in part, to the ethnic makeup of Indiana which did not parallel the national distribution. Indiana population structure for the year of the study was 5,320,022 White, 510,034 Black, 59,126 Asian, 15,815 Native American, with 214,536 people identifying themselves as Hispanic in origin ("Indiana," 2002).
Spearman’s Correlation Coefficient is used to evaluate data for evidence of an association between two quantitative variables, in this case between different ethnicities and indicators of poverty. Spearman’s Correlation Coefficient is nonparametric based on the rank order of the data. This means that a normal data distribution is not necessary to perform the statistical test. Values for Spearman’s “r” can range from negative one to positive one. A value close to zero indicates a weak association, while a value close to one or negative one would be a stronger association. If the sign in front of the “r” is positive, then the association is positive and vice versa.

In order for the “r” value to be statistically meaningful, the p-value must be less than or equal to 0.05.

In the chart above, the strongest correlation is between the percentage of the population which is White and the median number of vehicles owned. The p-value is less than 0.05, which indicates a meaningful value, and because the value is close to one (0.729) and the sign is positive, it can be said that there is a moderately-strong, positive correlation between the two variables. In other words, as the percentage of Whites goes up, the median number of vehicles owned also increases.
Home ownership is a frequently used measure of quality of life with higher ownership rates being associated with wealthier areas. Of the 105.5 million occupied housing units for the U.S. (total) reported in the 2000 U.S. Census, 66.2 percent were owner-occupied. The data showed that in areas of high poverty, the number of home owners was less than in areas of diminished poverty. In Category I census tracts, 73.9 percent of all occupied housing units were owned by the occupant. By contrast, in Category IV only 27.2 percent of the homes were owned by the occupant (Bishaw and Iceland, 2005). In Indiana, 71.4 percent of all occupied housing units were owner occupied. This compared favorably with the national average of 66.2 percent. Of all housing units in the nation, 9.9 percent were vacant while in Indiana this figure was 7.7 percent.

The percentage of owner occupied housing in Indiana, as expected, was negatively correlated with the percentage living in poverty ($r = -0.607, p < 0.001$) meaning that as poverty rates increased, home ownership decreased. The percentage vacant housing units was positively correlated with the percentage in poverty ($r = 0.577, p < 0.001$) meaning that as poverty rates increased, the number of vacant housing units also increased.

In Indiana, ethnicity and home ownership also showed a correlation. The percentage of owner occupied housing was positively correlated with the percentage of Whites living in each census tract ($r = 0.610, p < 0.001$), and it was negatively correlated with the percentage of Blacks, Asians, and Hispanics ($r = -0.570, -0.171, -0.429$ respectively, $p < 0.001$). Vacant housing also paralleled the national trend. The percentage of vacant housing units was negatively correlated with the percentage of Whites and Asians ($r = -0.254$ and $-0.213$ respectively, $p < 0.001$) while it was positively correlated with the percentage of Blacks and Hispanics ($r = 0.245$ and $0.112$ respectively, $p < 0.001$). This means that Whites and Asians live in areas with fewer vacant housing units, while Blacks and Hispanics live in areas with more vacant housing units.
HOUSING

Vacant Homes
- 22-36%
- 14-22%
- 8-13%
- 0-7%

Dominant Ethnicity
- White
- Black
- Hispanic

Fort Wayne

East Chicago
Vacant Units

Indianapolis
Education is the key to employment opportunities and, therefore is a key variable in measuring quality of life. In 2000, 20 percent of Americans over age 18 had less than a high school education. Within the categories established for the nation as a whole, 14.3 percent of people living in Category I had less than a high school education, while in Category IV this percentage was 37.9 (Bishaw, 2005). At a national level, therefore, education is inversely proportional to poverty. As education levels decreased, the rate of poverty increased.

In comparison to the U.S. findings, statistics for Indiana high school education were slightly better than the national average. Within Indiana, 18 percent of the population had less than a high school education (compared to the national average of 20 percent) (“Indiana,” 2002). Education and ethnicity correlations were notable. Having less than a high school education was positively associated with a higher proportion of Blacks and Hispanics ($r = 0.182$ and $0.134$ respectively, $p < 0.001$), while the correlation between education among Whites and Asians was negative ($r = -0.193$ and $-0.444$ respectively, $p < 0.001$). This means that as the percentage of Blacks and Hispanics increases, the number of people with less than a high school education also increases. Conversely, as the percentage of Whites and Asians increase, the number of people with less than a high school education decreases.

College education correlations with ethnicity were also similar to the national norm. Asian populations were positively associated with securing a Bachelor’s degree and/or a graduate degree ($r = 0.583$ and $0.495$ respectively, $p < 0.001$), while for Whites, Blacks, and Hispanics, education and ethnicity correlations showed no meaningful associations.

These relationships between education, ethnicity, and poverty are illustrated in the following map sequence. Having less than a high school education is positively associated with poverty ($r = 0.676$, $p < 0.001$). Having a Bachelor’s and/or graduate degree is negatively associated with poverty. People with advanced degrees are more likely to live within Category I census tracts.
EDUCATION

Less than a High School Education

- 33-57%
- 21-32%
- 11-20%
- 0-10%

Dominant Ethnicity

- White
- Black
- Hispanic

Fort Wayne

East Chicago
Less than High School

Indianapolis
Bachelor's Degree

- 27-44%
- 17-26%
- 9-16%
- 0-8%

Dominant Ethnicity

- White
- Black
- Hispanic

Fort Wayne

East Chicago
In the United States, a vehicle is considered a minimum quality of life item given the limited availability of public transportation and the importance of a vehicle for transport to and from a place of work. People living in areas with high percentages of Whites were likely to have more vehicles than those living in areas with high percentages of Blacks, Asians, or Hispanics. The median number of vehicles per household in Indiana was positively correlated with high populations of Whites ($r = 0.729, p < 0.001$) and was negatively correlated with high populations of Blacks, Asians, or Hispanics ($r = -0.700, -0.196, -0.505$ respectively, $p < 0.001$).

This relationship is illustrated in the map sequence and data analysis that follow. In correlating vehicle ownership with poverty, the median number of vehicles per household was negatively correlated with poverty ($r = -0.571, p < 0.001$). Areas of higher poverty were likely to have fewer vehicles per household.
Median Vehicles per Household

- 2.1-2.7
- 1.6-2.0
- 0.0-1.5

Dominant Ethnicity

- White
- Black
- Hispanic
Vehicle Ownership

Indianapolis
Family structure is considered a sensitive measure of quality of life. In comparing the rates of single mother families and ethnicity, a striking difference was observed. The number of single mother families in areas of high White concentrations was dramatically lower than in areas of high Black concentrations. A moderately-strong, negative correlation existed between single mother families and Whites ($r = -0.642, p < 0.001$) while a moderately-strong, positive correlation existed between single mother families and Blacks ($r = 0.629, p < 0.001$). A positive correlation also existed between Hispanic populations and single mother families ($r = 0.414, p < 0.001$). Single mother households are more commonly found in concentrated Black populations than in concentrated White populations.

For the state as a whole, poverty was positively associated with single mother families ($r = 0.545, p < 0.001$).
Single Mother Families

- 36-76%
- 22-35%
- 12-21%
- 1-11%

Dominant Ethnicity

- White
- Black
- Hispanic

Fort Wayne

East Chicago
Single Mother Families

Indianapolis
Employment is the single variable that most readily identifies candidates for the various poverty categories. As expected, unemployment was highest in Category IV census tracts and lowest in Category I (Bishaw and Iceland, 2005).

In Indiana, a surprising contrast to the national average was evident. The unemployment rate of Indiana was nearly half the national average: 3.3 percent compared to the national average of 5.8 percent. Following the national trend in employment based on ethnicity, Indiana unemployment was positively correlated with areas of high Black and Hispanic populations ($r = 0.447$ and $0.260$ respectively, $p < 0.001$) and negatively correlated with high percentages of Whites and Asians ($r = -0.441$ and $-0.136$ respectively, $p < 0.001$).

Unemployment, as expected, was positively correlated with Indiana poverty rates ($r = 0.622$, $p < 0.001$). Greater unemployment occurred more frequently among non-Whites than among Whites.
Unemployment Rate
- 11-21%
- 7-10%
- 4-6%
- 0-3%

Dominant Ethnicity
- White
- Black
- Hispanic

Fort Wayne

East Chicago
For census year 1999, nationwide, approximately 70 percent of Whites lived Category I – that having the least poverty. Of those classified as non-white, 32 percent of Blacks, 36 percent of Hispanics, and 66 percent of Asians lived in Category I, the more favorable category with the least poverty. In contrast, three percent of Asians, seven percent of Hispanics, and nine percent of Blacks lived in the least favorable Category IV, while only one percent of Whites lived in Category IV (Bishaw, 2005).

In Indiana, ethnicity and poverty correlations followed the national norm: poverty was negatively correlated with a high proportion of Whites and Asians ($r = -0.351$ and $-0.233$ respectively, $p < 0.001$) and positively correlated with areas having a high proportion of Blacks and Hispanics ($r = 0.342$ and $0.158$ respectively, $p < 0.001$).
Poverty Rate

- Category IV
- Category III
- Category II
- Category I

Dominant Ethnicity

- White
- Black
- Hispanic

Fort Wayne

East Chicago
Poverty

Indianapolis
Conclusions

In measures of quality of life, the United States ranks among the wealthiest countries of the world and, as this study shows, Indiana ranks among the wealthiest of the fifty states. The study also shows that areas of high concentrations of minorities often have higher poverty rates than areas of lesser concentrations. In Indiana, high values of education, employment, and household structure were associated with low poverty. Blacks are shown to own fewer homes and to live in areas with more vacant housing units. Blacks also have, on average, less than a high school education, no Bachelor’s or graduate degree, own fewer vehicles, live in single mother families, have a higher unemployment rate, and have higher rates of poverty more often than Whites. Blacks are also much more likely to live in areas of high population density. In summary, when minorities (except Asians) are negatively correlated with a variable, Whites are positively correlated, and Whites are always correlated favorably with higher quality of life measures.

Methodology

Data for this project were obtained from American FactFinder, a U.S. Census database classed from the national to census block level. Data on education and employment were obtained from The Right Site© Census 2000 Reports sponsored by Easy Analytical Software Incorporated®. All data were compiled into a spreadsheet using Microsoft Excel® and normalized using population or area.

Data on life expectancy (2005), infant mortality (2005), internet usage (2002 - 2005), and Gross Domestic Product (2001 - 2004) for the map on global poverty were obtained from the U.S. Central Intelligence Agency’s World Factbook. Each variable was divided into quartiles and assigned a “poverty score” ranging from one to four with one being wealthy and four being impoverished. The score in all four categories for each country was totaled, and final score values ranged from 4-16. Therefore, a score of four indicated a very wealthy nation, while a score of 16 indicated a very poor nation.

Analyses such as correlation coefficient, descriptive statistics, and boxplots were performed using MINITAB® 14. Graphics derived from these analyses were created using Adobe Illustrator® CS2.

Because exploratory data analysis revealed that many of the variables were not normally distributed, Spearman’s Correlation Coefficient was used instead of Pearson’s Correlation Coefficient. Spearman’s is a nonparametric procedure for assessing associations among the ranked values of the data and is more suitable for non-normally distributed data (LeBlanc, 2004).

Georeferenced maps of the world, nation, and Indiana were obtained from Ball State University’s geographic data network. The attribute files of these maps were exported to Microsoft Excel where the U.S. census data and international poverty data were matched to their corresponding geographic areas. The geographic files, joined to the poverty attributes, were then imported into ArcMap® (a program of ArcGIS® 9.0 by Environmental Systems Research Institute (ESRI)) for actual mapping of the three base maps of the world, the U.S., and Indiana.

The map of Indiana was projected to
Universal Transverse Mercator Zone 16 North (North American Datum 1983) using ArcMap. The United States map was projected to United States of America Contiguous Albers Equal Area Conic (North American Datum 1983), and the world was projected as Robinson Projection (Geographic Coordinate System World Geodetic System 1984).

Choropleth maps and proportional-symbol maps circles were created using ArcMap’s “Symbology” function. With the exception of “Poverty,” all variables were classed using the default Jenks Natural Breaks classification method. This is also known as the goodness of variance fit because it minimizes the squared deviations of the class means (ESRI, 2005). All maps involving the variable “Poverty” were manually classified using the method commonly found in U.S. Census Bureau reports, categorizes census tracts or counties based on their poverty rates: Category I (0.0-12.3 percent of the population living in poverty), Category II (12.4-19.9 percent living in poverty), Category III (20.0-39.9 percent), and Category IV (40.0 percent or more).

The classified basemaps were exported to Adobe Illustrator® CS2 where color schemes, graphical elements, and legends were created. These maps were then imported into Adobe InDesign® CS2 where the final atlas was produced.
Works Cited


