A Human Development Index for West Virginia Counties

by

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INTRODUCTION

West Virginia is a great place to live. If you had your choice of living anywhere in the state, where would you live? Where would your quality of life be the highest? How would you choose where to locate? Would your decision be based strictly on where you could find the highest paying job or would you also consider other non-market, social and environmental factors that might enable you to enjoy a long, healthy, and creative life? Using the United Nations Human Development reports as a model, this paper represents a first step in developing a way of assessing human development and the quality of life at the county level in West Virginia.

UNITED NATIONS HUMAN DEVELOPMENT REPORT

In 1990, the United Nations Development Programme (UNDP) published the first annual Human Development Report. The intent of the reports is to uncover the human dimension of development. The reports take a holistic view of development, placing people at the center. The authors' central argument is that the purpose of development is to offer people more options by enlarging their choices. The most obvious choices people have are "to live a long and healthy life, to be educated, and to have access to the resources needed for a decent standard of living" (United Nations Development Report, 1990, p.9). Furthermore, political freedom, human rights, and self-respect are also choices that development enables people to have. Thus the UNDP concept of human development involves the "process of widening people's choices and the level of their achieved well-being".

The Human Development Report (1998) analyzes human development in 130 countries by constructing a human development index (HDI). The index is composed of three key components: income, knowledge, and longevity. Income is measured by adjusted per capita income. Knowledge is measured by two educational indicators: adult literacy and mean years of schooling. This component is adjusted by weighting two-thirds to adult literacy and one-third to mean years of schooling. Longevity is measured by life expectancy at birth. The HDI sets a minimum and a maximum for each indicator. By taking the difference between the maximum and the minimum, each country is placed in a range between zero and one. In this way, an index is developed for the three key components. The three indices are averaged and then subtracted from one, resulting in the final human development index.

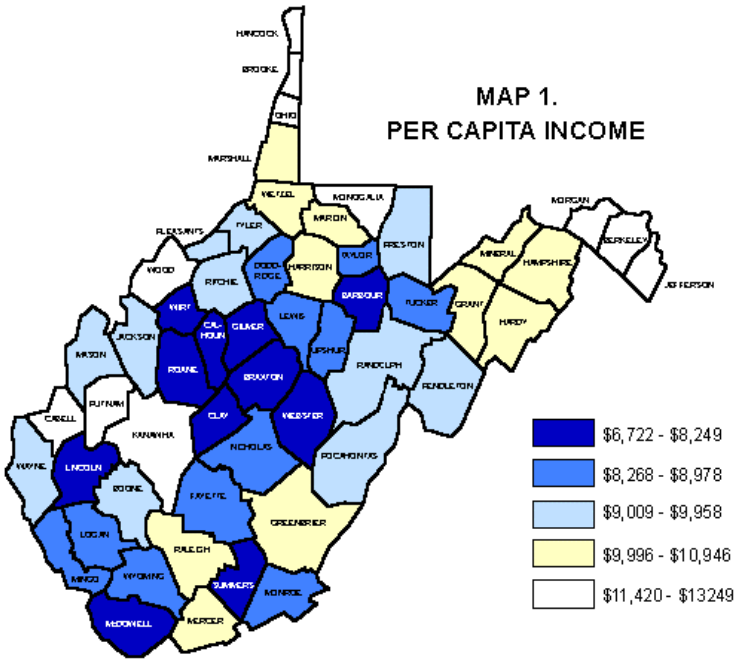
The UNDP HDI provides a useful model for comparing human development at other geographic scales. Agostini and Richardson (1997) have adapted the UNDP HDI to compare human development among US cities. Corrie (1994) has also used the same methodology to evaluate the social progress of black children in the United States. This paper represents a first step (defining indicators) in developing a county HDI for the state of West Virginia.

WEST VIRGINIA HUMAN DEVELOPMENT INDICATORS

The key components proposed for a West Virginia Human Development Index are very similar to those used by the UNDP: income, education, and mortality. The indicators used to measure these components were modified due to data constraints at the county level, following the work of Agostini and Richardson.

Income

The income component for West Virginia is measured by the following indicators: per capita income in 1989, the inequality of income distribution in 1989 (measured by calculating a Gini coefficient for each county), and the percentage of families in poverty in 1989. (Data are based on the 1990 census.) In 1989, per capita income for the state was $10,520, which lagged behind the national level of $14,420. Per capita income in West Virginia counties ranged from $6,722 in Clay County to almost double that amount ($13,249) in Jefferson County (Map 1). Per capita incomes were generally higher in the northern and eastern panhandles and several pockets in western areas of the state. Several clusters of counties in the central and southern regions of the state had the lowest per capita incomes.



Using the USDA Rural-Urban Continuum Codes (1990), counties can be distinguished between metropolitan and non-metropolitan. Metropolitan counties are determined by size of population, and non-metropolitan counties by the degree of urbanization or proximity to metropolitan areas. There are no major metropolitan areas within West Virginia and only ten of West Virginia's 55 counties are classified as metropolitan counties. In general, non-metropolitan counties had lower per capita incomes and than metropolitan, however several counties did not follow this trend. Monongalia and Morgan are two non-metro counties that were in the highest per capita income category. Wayne County is a metro county that had a per capita income in the middle of the range. County per capita income figures are computed by dividing personal income for all wage earners in a county by the total number of persons living in that county. Therefore, the variation in per capita incomes also reflects the ratio of wage earners to dependents, such as children, homemakers, elderly, people with disabilities, and those that have been unemployed for a long period of time.

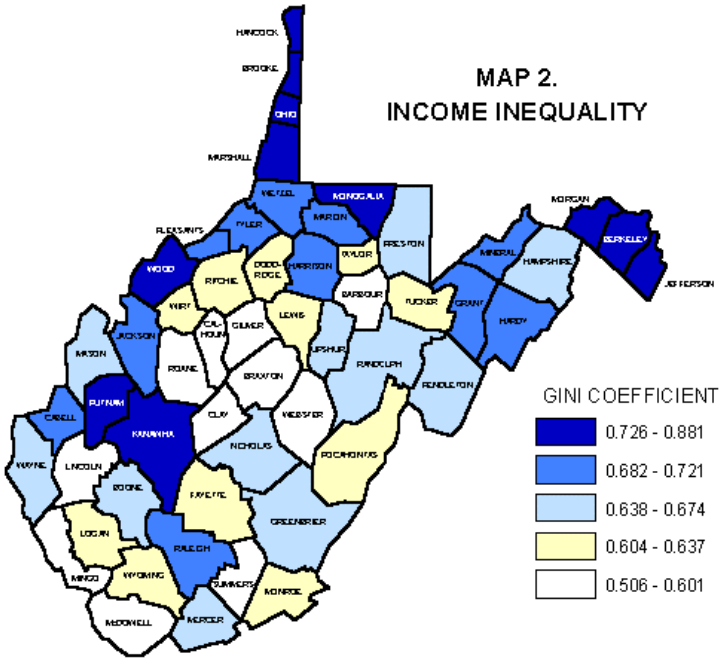
The distribution of income in West Virginia was analyzed by using a calculated Gini coefficient for each county in the state. The Gini coefficient is used as a measure of the inequality of income distribution and was calculated from 1989 household income data. The higher the coefficient, the greater the inequality in income distribution and, likewise, the lower the coefficient, the smaller the inequality. Many authors cite the Gini as a relative mean difference and use the acronym RMD. The definitional formula is expressed as:

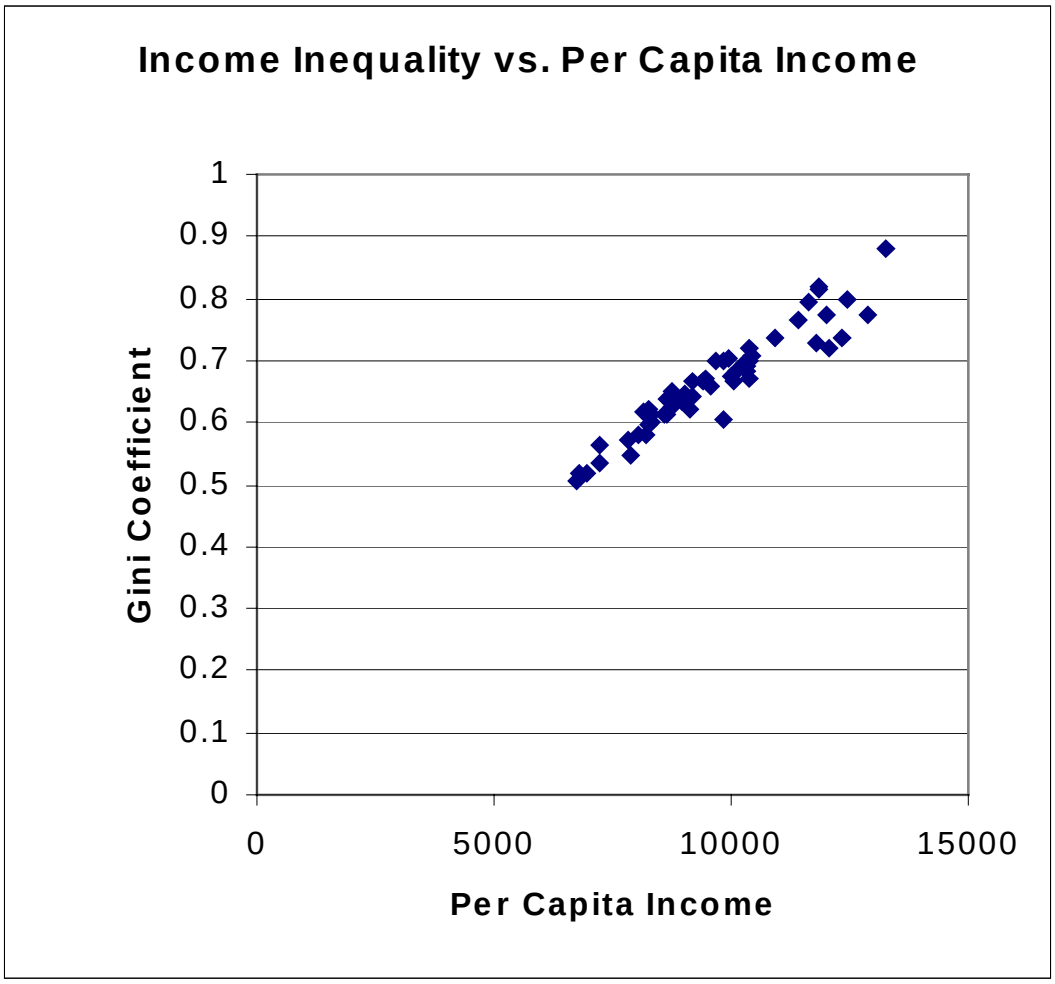
$$G = \frac{2(\sum_i P_i - 1)}{K - 1}$$

Where:
P_i = proportional share of total units possessed by the i^{th} component
i = component (person, place, or group) possessing a share of the units, for indices involving rank, i indicates rank by increasing component size, from i to K.
K = number of components or shares.

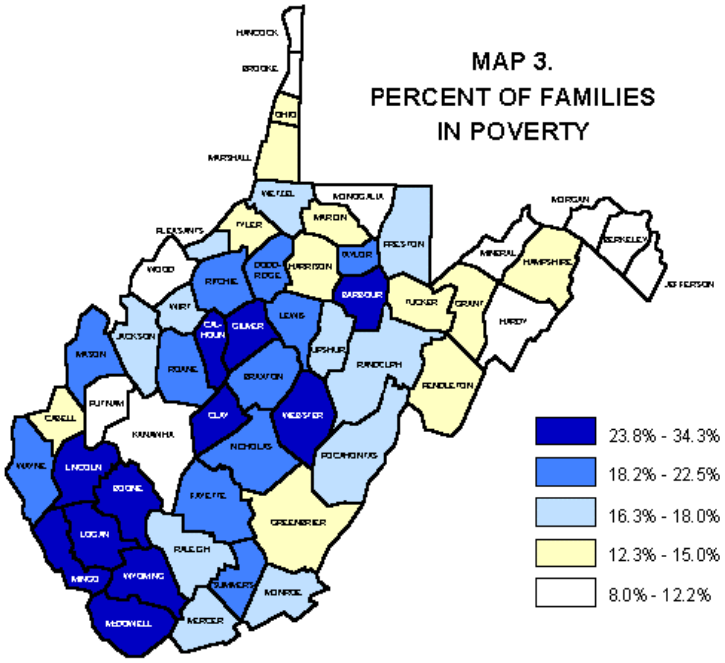
A great deal of variation in income inequality can be seen throughout West Virginia. One needs only to drive through the state to see stark differences in levels of material wealth. This phenomenon can be seen down to the very smallest geographic scale, i.e. within residential streets. In 1989, inequality in the distribution of income ranged from a low of 0.50 in Clay County to a high of 0.88 in Jefferson County (Map 2). This trend mirrors that of per capita income in 1989. In general, greater income inequality was seen in counties where households earned higher incomes and where household income levels spanned the range from high to low. Likewise, in counties where there were very few households in the higher income brackets, income inequality was smaller. In Jefferson County in 1989, roughly 1% of the population earned incomes of $150,000 or more and 5% earned less than $5,000. Forty-three percent of Jefferson County residents had household incomes over $35,000. Contrast this with Clay County where

0.2% of households had incomes of $150,000 or more, less than 1% had incomes over $75,000, and 21% had incomes less than $5,000 in 1989. Eighty-seven percent of the residents in Clay County had household incomes below $35,000. As with per capita income, income inequality was generally higher in the northern and eastern panhandles and several pockets in western areas of the state. Likewise, portions of the central and southern regions of the state had less income inequality.



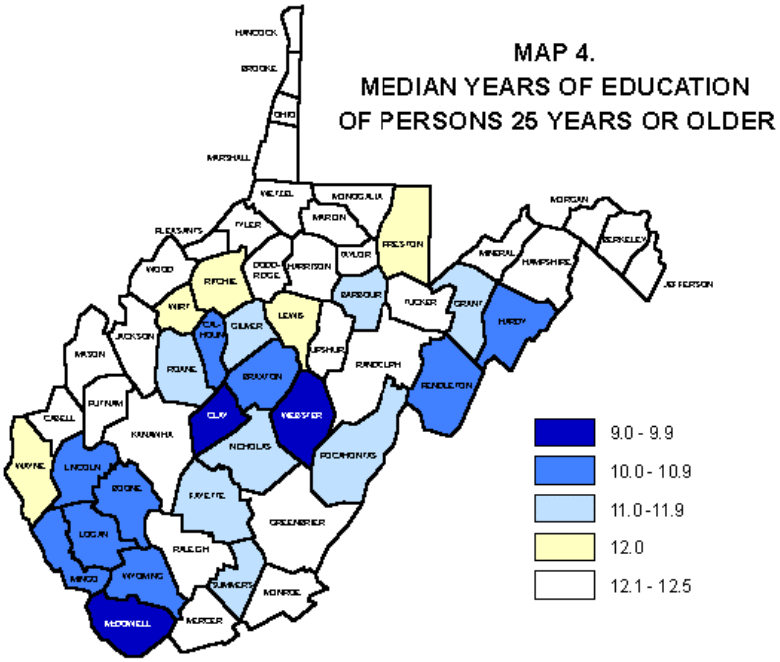


In 1990, the percentage of families in poverty in West Virginia was 16%, which was substantially higher than the national poverty rate of 10%. The percentage of families in poverty in West Virginia counties ranged from 8% in Jefferson County to slightly over 34% in Clay County (Map 3). The county trends in poverty were very similar to per capita and income inequality trends. Where income levels were low, poverty rates were high and vice versa. Geographically, higher levels of poverty were concentrated in the southern and central counties of the state and lower levels were concentrated in the northern and eastern counties.

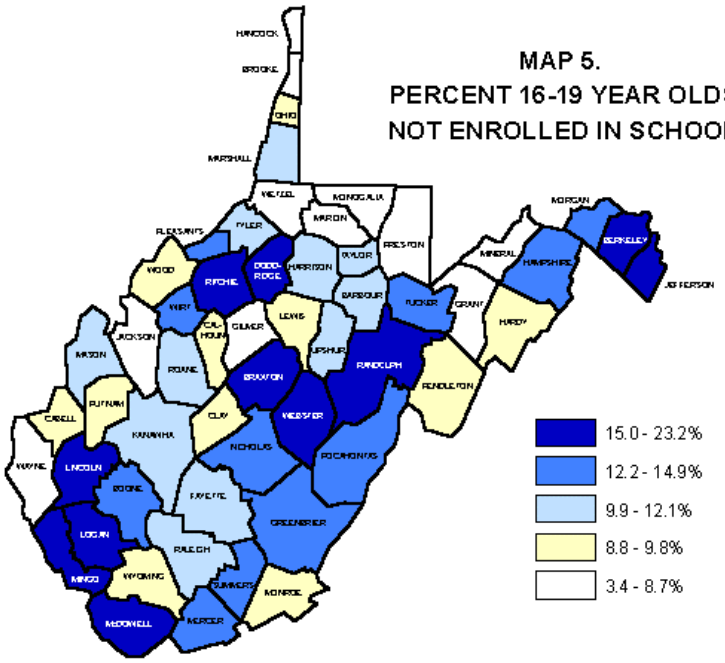


Education

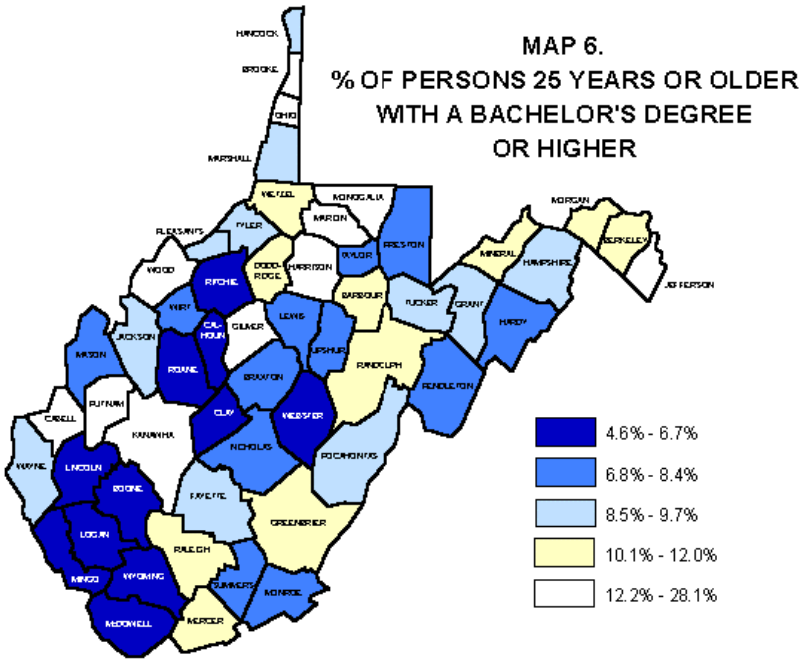
The education component of the West Virginia HDI is measured with the following indicators: median years of schooling of persons 25 years and older in 1990, the 1990 high school dropout rate, and the percentage of persons 25 years or older in 1990 with a bachelor=s degree or higher. (Data are based on the 1990 census.) In 1990, the average level of education in West Virginia was 12.2 years, which was slightly lower than the national average of 12.5 years. Median years of schooling in West Virginia counties ranged from just 9.1 years in Webster County to 12.5 years in Monongalia County (Map 4). Three counties (Webster, Clay, and McDowell) had a median level of ninth grade. Nine counties (Lincoln, Mingo, Calhoun, Hardy, Wyoming, Boone, Braxton, Pendleton, and Logan) had a 10th grade median level. Eight counties (Grant, Roane, Pocahontas, Gilmer, Fayette, Summers, Nicholas, and Barbour) had an 11th grade median level. Five counties (Wayne, Preston, Lewis, Wirt, and Ritchie) had a 12th grade median level. The majority (30 counties) had a median level between 12.1 and 12.5 years of schooling.



The high school dropout rate in West Virginia in 1990 was 10.9%, while it was 11.2% nationally. County dropout rates ranged from 3.4% in Brooke County to 23.2% in Doddridge County (Map 5). The high school dropout rate was calculated by dividing the number of 16-19 year olds not enrolled in school per county by the number of 16-19 year olds per county. Several clusters of high dropout rates occurred in some of the central, southern, and eastern areas of West Virginia. Lower dropout rates occurred in the northern counties of the state with other pockets of low rates in the western, central, and eastern counties.

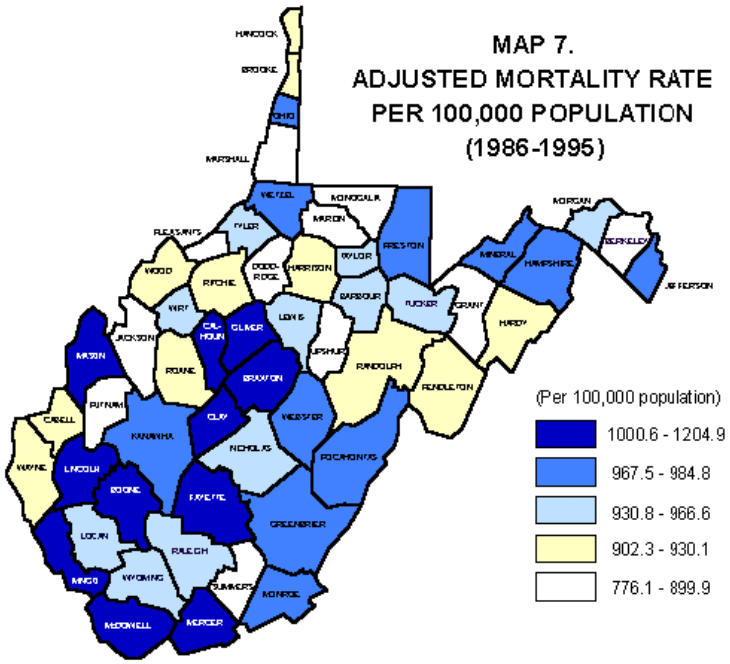


The percentage of 25 year olds in West Virginia in 1990 with a bachelor=s degree or higher was 10.1%, which was just half of the 20.3% national rate. Counties in West Virginia ranged from 4.6% in Mingo County to 28.1% in Monongalia County (Map 6). Again, portions of the southern and central regions of the state had much lower rates of educational attainment than parts of the northern, eastern, and western regions. Metropolitan counties had higher rates compared to nonmetro counties, with the exception of Monongalia County.

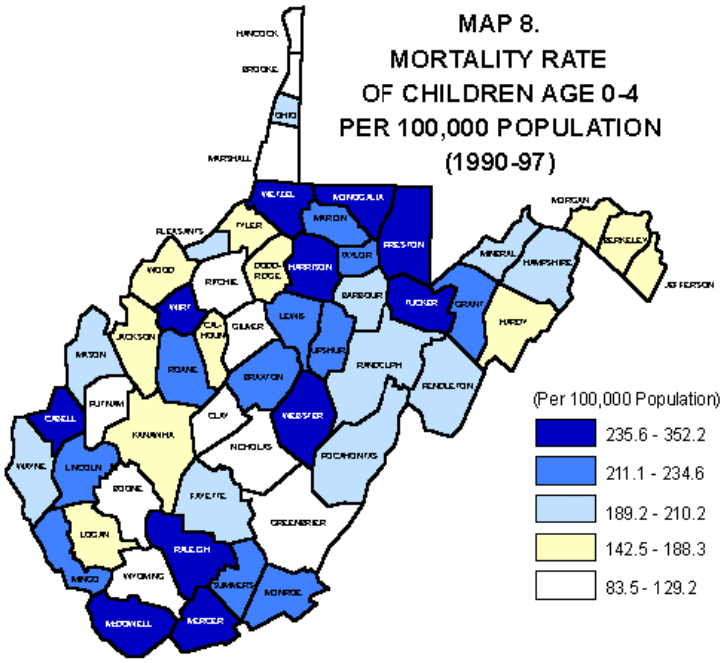


Mortality

As stated earlier, the UNDP HDI uses longevity as a key component. At the county level, data on longevity are not available. Therefore, we propose using mortality as an alternative to longevity. This component of the West Virginia HDI is measured using the following indicators: the 1986-1995 adjusted mortality rates (per 100,000 population), and the average mortality rate of children aged 0 to 4 from 1990 to 1997 (per 100,000 population). (Data generated by the West Virginia Department of Health and Human Resources, Office of Epidemiology and Health Promotion.) The state crude mortality rate from 1986-1995 was 963.5, which was slightly higher than the national rate of 863.8. The 1986-1995 adjusted mortality rates (per 100,000 population) for West Virginia counties range from a low of 776.1 in Pleasants Country to a high of 1204.9 in Mingo County (Map 7). Crude mortality rates were adjusted by age and sex to the 1990 U.S. population distribution. In general, higher mortality rates occurred in the southern and central counties of the state. A sprinkling of counties in the northern and eastern areas of the state also had high mortality rates. Lower mortality rates occurred in a cluster of western counties with the exception of Mason County. The northern, north-central, and eastern regions of the state were more evenly mixed. It is surprising that Jefferson County had a relatively high rate, given that the income and educational levels were among the highest.



The average mortality rate of children aged 0 to 4 from 1990 to 1997, per 100,000 population, ranged from 83.5 in Brooke County to 352.1 in Tucker County (Map 8). Child mortality rates were surprisingly high in the north-central region of the state where income and educational attainment levels were higher. Equally surprising were the low child mortality rates found in portions of the southern and central regions of the state.



CONSTRUCTING A WEST VIRGINIA HUMAN DEVELOPMENT INDEX

A West Virginia Human Development Index (WV HDI) was calculated following the UNDP method using three key components: income, education, and mortality. To standardize the data, an index was constructed for each of the indicators comprising the key components. In order to compute the indices, a fixed maximum and minimum value was established for each indicator. (See Appendix A) Each index can be expressed as:

$$\text{Index} = \frac{\text{Actual } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}{\text{Maximum } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}$$

The WV HDI is computed by averaging the three key component indices. The formula can be expressed as:

$$\text{WV HDI} = \frac{\text{Income Index} + \text{Education Index} + \text{Mortality Index}}{3}$$

Where:

$$\text{Income Index} = \frac{\text{Per Capita Income Index} + \text{Gini Index} + \text{Poverty Index}}{3}$$

$$\text{Education Index} = \frac{\text{Median Years of Schooling Index} + \text{High School Dropout Index} + \text{Educational Attainment Index}}{3}$$

$$\text{Mortality Index} = \frac{\text{Adjusted Mortality Index} + \text{Child Mortality Index}}{2}$$

Each of the indicators in the income, education, and mortality indices was given equal Weight. (See Appendix B for further information on calculating the indices.)

Table 1 contains the key components, the WV HDI, and county rankings.

Table 1. West Virginia Human Development Index

COUNTY	INCOME INDEX	EDUCATION INDEX	MORTALITY INDEX	WV HDI	WV HDI RANKING
Putnam	0.623	0.660	0.873	0.719	1
Brooke	0.623	0.676	0.803	0.701	2
Hancock	0.659	0.659	0.766	0.695	3
Wood	0.641	0.671	0.691	0.668	4
Marshall	0.595	0.637	0.756	0.662	5
Kanawha	0.683	0.680	0.607	0.657	6
Jefferson	0.679	0.639	0.642	0.653	7
Monongalia	0.644	0.746	0.558	0.649	8
Ohio	0.668	0.689	0.571	0.642	9
Morgan	0.622	0.624	0.661	0.636	10
Greenbrier	0.571	0.617	0.716	0.635	11
Gilmer	0.455	0.556	0.888	0.633	12
Tyler	0.537	0.633	0.701	0.624	13
Ritchie	0.515	0.583	0.760	0.620	14
Jackson	0.537	0.646	0.671	0.618	15
Pleasants	0.544	0.621	0.673	0.613	16
Pendleton	0.532	0.494	0.803	0.610	17
Berkeley	0.625	0.621	0.579	0.608	18
Marion	0.573	0.663	0.577	0.605	19
Mineral	0.579	0.648	0.566	0.598	20
Grant	0.579	0.527	0.680	0.595	21
Doddridge	0.480	0.584	0.719	0.594	22
Nicholas	0.482	0.548	0.737	0.589	23
Randolph	0.512	0.616	0.629	0.586	24
Hampshire	0.563	0.616	0.577	0.585	25

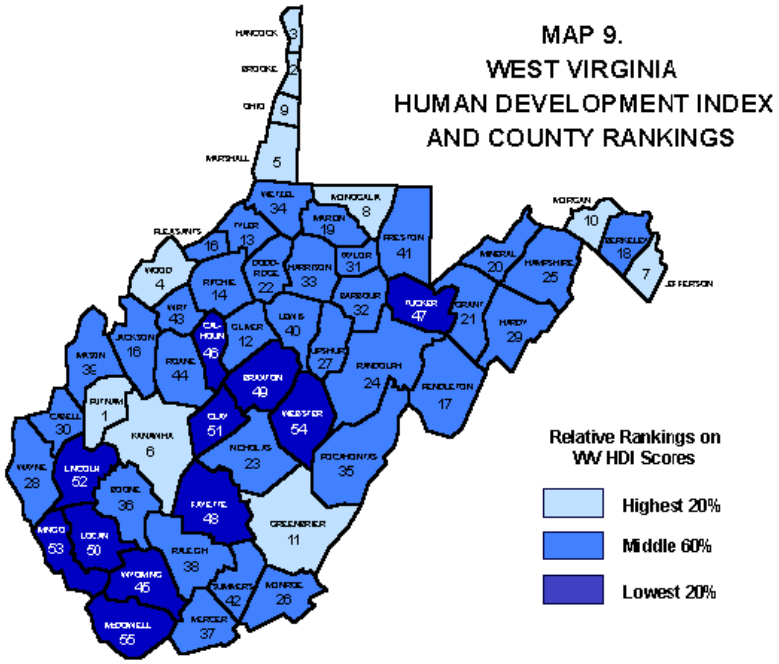
COUNTY	INCOME INDEX	EDUCATION INDEX	MORTALITY INDEX	WV HDI	WV HDI RANKING
Monroe	0.512	0.625	0.615	0.584	26
Upshur	0.493	0.641	0.616	0.583	27
Wayne	0.521	0.623	0.600	0.581	28
Hardy	0.576	0.455	0.709	0.580	29
Cabell	0.651	0.679	0.382	0.571	30
Taylor	0.501	0.630	0.556	0.562	31
Barbour	0.457	0.598	0.621	0.558	32
Harrison	0.568	0.655	0.445	0.556	33
Wetzel	0.564	0.643	0.457	0.555	34
Pocahontas	0.565	0.511	0.549	0.542	35
Boone	0.500	0.459	0.666	0.542	36
Mercer	0.575	0.625	0.424	0.541	37
Raleigh	0.562	0.623	0.413	0.533	38
Mason	0.526	0.611	0.452	0.529	39
Lewis	0.493	0.616	0.477	0.529	40
Preston	0.514	0.618	0.443	0.525	41
Summers	0.485	0.551	0.534	0.523	42
Wirt	0.479	0.598	0.491	0.523	43
Roane	0.456	0.501	0.595	0.517	44
Wyoming	0.458	0.459	0.594	0.504	45
Calhoun	0.423	0.444	0.627	0.498	46
Tucker	0.529	0.608	0.320	0.486	47
Fayette	0.493	0.540	0.423	0.485	48
Braxton	0.479	0.442	0.509	0.477	49
Logan	0.479	0.480	0.438	0.466	50
Clay	0.384	0.364	0.649	0.466	51
Lincoln	0.407	0.386	0.470	0.421	52
Mingo	0.454	0.397	0.231	0.360	53
Webster	0.397	0.282	0.317	0.332	54
McDowell	0.393	0.357	0.112	0.287	55

CONCLUSIONS

Several important conclusions can be drawn from this exercise. Map 9 illustrates the levels of human development and rankings in Table 1. The fifty-five counties of West Virginia were broken into quintiles. The top quintile represents counties with high human development index values (.635 to .719) and the bottom quintile represents counties with low index values (.287 to .504). Counties in the middle three quintiles represent areas with mid-level index values (.517 to .633).

Not surprisingly, a cluster of southern counties faired among the worst. Lincoln, Logan, McDowell, Mingo, and Wyoming Counties had human development index levels in the lowest quintile. The central portion of the state including Braxton, Calhoun, Clay, Fayette, and Webster counties also stands out as a region that faired poorly. Tucker County was also in the lowest quintile and stands out because it is surrounded by counties with much higher rankings. The four counties in the northern panhandle, Brooke, Hancock, Marshall, and Ohio, faired among the best in addition to Monongalia County. In the eastern panhandle, Morgan and Jefferson counties also had high human

development index levels. In the southern part of the state, Greenbrier, Kanawha, and Putnam counties stand out as areas with high index levels as does Wood County on the western boarder of the state. These counties either have urban areas located within the county or are in close proximity to these areas. Some surprises were seen in the eastern pandhandle where only Jefferson and Morgan counties had high index levels. The other thirty-three counties swell the mid-level category with index values ranging from .517 in Roane County to .633 in Gilmer County.



The results of this analysis form the starting point for developing an HDI for the state of West Virginia. What is missing is an assessment of environmental factors. Future research could include an environmental index to assess the health of environment at the county level. Nevertheless, researchers in other states and countries might find the method described in this paper useful in assessing human development levels in their geographic area and in comparing those levels to the rest of the country. Policy makers concerned with promoting West Virginia as a desirable place to live and work should find the information contained here to be very useful. Counties that rank high on the index will certainly use the index ranking to promote themselves. Those less fortunate counties at the lower end of the rankings will be able to use the index to help guide their development efforts. Politicians and others are fond of touting the people of West Virginia as the state=s greatest asset. This will undoubtedly be the case when a holistic view of development is adopted with policies that place people at the center of development efforts.

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APPENDIX A

INDICATOR	MINIMUM VALUE	MAXIMUM VALUE
Per Capita Income	$6,722	$13,249
Gini Coefficient	0	1.0
% Poverty	0	100
Median Years of Schooling	9.1	12.5
% 16-19 Yr. Olds Not Enrolled in School	0	100
% 25 Yrs. or Older with Bachelor's Degree or Higher	0	100
Adjusted Mortality Rate	776.1	1204.9
Child Mortality Rate	83.5	352.1

APPENDIX B

Per Capita Index = $\frac{\text{Actual } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}{\text{Maximum } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}$

Gini Index = 1- gini coefficient

Poverty Index = $1 - \frac{\text{Actual } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}{\text{Maximum } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}$

Median Years of Schooling Index = $\frac{\text{Actual } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}{\text{Maximum } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}$

High School Dropout Index = $1 - \frac{\text{Actual } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}{\text{Maximum } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}$

Educational Attainment Index = $\frac{\text{Actual } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}{\text{Maximum } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}$

Adjust Mortality Index = $1 - \frac{\text{Actual } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}{\text{Maximum } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}$

Child Mortality Index = $1 - \frac{\text{Actual } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}{\text{Maximum } x_1 \text{ value} - \text{minimum } x_1 \text{ value}}$