

This Place Is Killing Me: A Comparison of Counties Where the Incidence Rates of AIDS Increased the Most and the Least

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Background. The objective of this study was to identify the socioeconomic and health characteristics of communities with the largest proportional increases in incidence rates of acquired immunodeficiency syndrome (AIDS).

Methods. Reported AIDS cases (1981–1990 and 1995–1999) were used for a comparison between 20 US counties with the largest proportional increases in incidence rates of AIDS and 20 US counties with the smallest increases. Data were obtained from Community Health Status Indicators Reports of the Health Resources and Services Administration (HRSA) and from the US Census Bureau.

Results. Counties with the largest increases in the incidence of AIDS had lower levels of income, education, and literacy; higher incidence rates of syphilis, age-adjusted mortality (all causes), and infant mortality; more low-birth-weight infants; and higher levels on all 9 specific mortality measures in the HRSA reports.

Conclusions. The incidence of AIDS increased the most in areas where many other health problems occurred. Research is needed to identify and address the root causes of ill health.

Many of the important gains in health over the previous 3 centuries have been attributed to behavioral and environmental factors rather than to medical treatment [1]. A resurgence of interest in how environment influences health has been occurring recently [2–4]. Interest in communities and in general health does not discount the contributions of intervention approaches that focus on individuals and specific diseases but indicates the need for a complementary approach that builds on past successes in public health [5]. Major health problems call for multiple intervention approaches that may all contribute to improved health.

HIV infection is a major public health problem that has caused >500,000 deaths in the United States [6]. In 2003 alone, HIV infection caused ~3 million deaths worldwide, and ~40 million persons were living with HIV infection [7]. The epidemic has been slowly chang-

ing over time, by moving toward the poor and disenfranchised in nearly all countries [4]. In the United States, many of the early patients with AIDS were relatively affluent homosexual men, but the disease has shifted disproportionately into minority and disenfranchised communities [8]. We sought to characterize the types of communities in which the incidence of AIDS has been a growing problem in the United States. These counties were not necessarily the counties that had the most AIDS cases, but they should help identify where the epidemic is headed. Our hope was that these characteristics might suggest intervention strategies that could be implemented at the community level.

METHODS

AIDS cases reported to the Centers for Disease Control and Prevention (CDC; Atlanta) through December 2000 and population estimates from the US Census Bureau (Washington, DC) were used to calculate the mean annual incidence rates of AIDS for the time periods 1981–1990 and 1995–1999. The incidence rate for each multiyear period was calculated as the number of AIDS cases diagnosed during the period, after adjustment for reporting delay, divided by the sum of the annual population estimates for the period. The pro-

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proportional change in the incidence rates was determined by subtracting the incidence rate for the earlier interval from that for the later interval and then dividing the difference by the incidence rate for the earlier interval. To ensure stable estimates, we included only counties that had at least 50 AIDS cases during either interval. For comparison, we then selected the 20 counties with the largest proportional increases in the incidence rates of AIDS between the 2 intervals and the 20 counties with the smallest proportional increases.

County-level socioeconomic data were available from the database for the 1990 US Census [9]. Syphilis cases reported to the CDC were used to calculate each county's average incidence rate of syphilis for the years 1994–1998. County literacy estimates were obtained from the National Institute for Literacy [10]. Income inequality was estimated by using Gini coefficients [11] obtained from the US Census Bureau (via e-mail [hhes-info@census.gov]). A limited amount of county-level health information was available. We reviewed Community Health Status Indicators Reports from the Health Resources and Service Administration (HRSA; US Department of Health and Human Services, Rockville, MD) and compared all 9 of the age-adjusted causes of death contained in the reports, as well as several other indicators of health in the counties [12]. The death rates in the reports were calculated by using data through 1997 for the most recent 3, 5, or 10 years, depending on the county's size. For each characteristic, we determined the proportion of each county's population with that characteristic and then calculated the mean of these proportions for each group of 20 counties. The Wilcoxon rank-sum test was used to test for statistical significance.

RESULTS

Eighteen of the 20 counties with the largest proportional increases in the incidence rates of AIDS were located in the southeastern United States, compared with only 2 of the counties with the smallest increases. Compared with counties where the incidence of AIDS was increasing the least, counties where the incidence of AIDS was increasing the most had a higher proportion of low-income households, a higher proportion of households headed by a single mother, a larger proportion of the population that was African American, lower literacy levels, a higher proportion of persons with less than a 9th-grade education, a higher proportion of eligible voters who did not vote in the 2000 presidential election, and slightly more income inequality (mean Gini coefficients, 0.44 vs. 0.41, respectively; $P = .001$) (table 1).

County health indicators showed that the counties with the largest increases in the incidence of AIDS had higher rates of age-adjusted mortality (all causes), infant mortality, births to mothers <18 years of age, low-birth-weight infants, and syphilis

cases. The levels for all 9 of the specific mortality measures that HRSA lists in their Community Health Status Indicators Reports were higher in the counties with the largest increases in the incidence of AIDS, including the rates for death from unintentional injury, suicide, stroke, motor-vehicle injury, lung cancer, homicide, coronary heart disease, colon cancer, and breast cancer.

DISCUSSION

Many studies have identified individual-level risk factors for HIV infection, such as injection drug use. At the community level, the incidence of AIDS has been increasing the most in areas that have a disproportionate incidence of other health problems. This has been noted in the past for other diseases, such as syphilis [13], but the extent of the concentration of ill health illustrated by this analysis is striking. The levels of all 9 of the mortality indicators listed by the HRSA in their county profiles were higher for the counties where the incidence of AIDS has been increasing the most. Furthermore, many other health indicators show that morbidity rates were higher in these communities. The confluence of health problems suggests that the problems may have common underlying causes. Interventions that identify and address such root causes could have a major impact on overall health.

These counties have many social problems, such as poverty, low education levels, and low literacy levels. Lower voting rates suggest lower social capital or less of a feeling of control by the members of these communities. In the counties with the largest increases in incidence rates of AIDS, a larger percentage of the county population was African American. A similar association has been found for syphilis [14]. Possible explanations for this association with race include racism and differential access to resources [15–17].

The association between poor health and poor social conditions suggests that improving the social conditions may improve health [17, 18]. Identification of the root causes of ill health may be difficult, because (by definition) a highly specific link between a cause and a specific illness may be difficult to determine, unlike the expectation for research linking an organism or toxin to an illness. Although many people living in a community may have ideas about the causes of ill health in their community, the distance between root causes and health effects makes hypothesis testing difficult. Furthermore, the categorical nature of research institutes and funding encourages disease-specific interventions and leads to disease-specific research. However, the pattern of diseases in communities suggests a powerful force that, if addressed, could have a broad impact on health.

The prospects for influencing major underlying causes of ill health may seem discouraging. For example, the link between

Table 1. Characteristics of US counties with the largest and the smallest proportional increases in the incidence rates of AIDS, between the time periods 1981–1990 and 1995–1999.

Characteristic	20 Counties with largest increases in incidence rates of AIDS	20 Counties with smallest increases in incidence rates of AIDS	Ratio	<i>P</i>
Social factor, % of population				
Household income <\$10,000/year	22.6	10.8	2.1	<.001
Single mother as head of household	8.5	5.1	1.7	<.001
African American	30.8	3.9	7.9	<.001
Literacy level of 1	27.8	16.3	1.7	<.001
Less than a 9th-grade education	15.1	7.5	2.0	<.001
Eligible but did not vote	39.8	29.0	1.4	.001
Health indicator				
Age-adjusted mortality rate, per 1000 population	10.5	8.7	1.2	<.001
Infant mortality rate, per 1000 population	10.6	5.9	1.8	<.001
Births to women aged <18 years, % of births	8.2	3.6	2.3	<.001
Infants with birth weight <2500 g, % of births	9.3	6.0	1.6	<.001
Incidence rate of syphilis, per 100,000 population	58.9	6.7	8.8	<.001
Mortality rate, per 100,000 population, by cause of death				
Unintentional injury	24.7	19.7	1.3	.009
Suicide	12.1	11.5	1.1	.34
Stroke	81.9	65.3	1.3	.02
Motor-vehicle injury	23.7	14.5	1.6	<.001
Lung cancer	70.8	57.8	1.2	.002
Homicide	13.1	4.6	2.8	<.001
Coronary heart disease	251.6	207.4	1.2	.004
Colon cancer	25.8	22.4	1.2	.03
Breast cancer	30.0	28.5	1.1	.34

NOTE. For each characteristic, the mean of the proportions for the counties in each group was calculated.

health and poverty [19, 20] suggests a need to eliminate poverty in order to improve health. This is not an easy task. However, some areas have levels of health that far exceed expectations based on income level. In 1994, the Indian state of Kerala had a per capita gross national product less than one-sixth that of Brazil, but life expectancy was 8 years longer [21]. Rapid reductions in mortality rates occurred in Kerala without much economic growth and appear to be related to social conditions such as education, health care, and equitable land distribution [21, pp. 46–7, 91]. On a smaller scale, some of the most effective interventions for the prevention of teen pregnancy have been youth-development programs that give teens hope for the future [22]. Programs for younger children also may be effective. An intervention to enhance the involvement of elementary-school children in family and school decreased risky sexual behavior and the incidence of pregnancy at least until the participants reached age 21 years [23]. These youth-development programs also may have other health effects that have not been measured.

We selected counties on the basis of proportional changes in reported AIDS cases. Many factors influence these changes, including the incidence of new infections and the availabil-

ity of treatment. Migration also might influence AIDS-related trends: the county where a person lived at the time of diagnosis may not be the county where the infection was acquired. Regardless of the specific AIDS-related factors that influenced our selection of these counties, the differences between the 2 groups of counties are remarkable. We suspect that other approaches to the identification of counties where the incidence of ill health is high would find similar geographic clustering of diseases.

Although our study found close associations between poor health, poor socioeconomic conditions, and increasing incidence rates of AIDS, it did not identify any cause for this association. One question is whether the health in these areas is due to the behavior of the population or to the social and environmental conditions. Studies have suggested that both factors play a role [24]. A more important question is what can be done to improve the situation [25]. After all, the reason for determining causal factors of disease is to apply the knowledge to prevent disease [26, p. 295]. Research on health is not nearly as developed as research on disease, which can be conducted at the molecular or individual levels and for which controlled experimentation is easier to do. However, the potential for health research to produce health benefits is large. We need

research to develop ideas and test methods. Policy makers and funding agencies should consider approaches that will facilitate research on health in addition to research on specific diseases. Health is related to many different factors. We should identify and address all important causes of ill health [27].

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