Kentucky

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Emerging Infectious Diseases

A Perspective from the State Epidemiologist

Throughout most of human history, mankind has battled infectious diseases. In Old Testament times, several chapters of what we might call administrative regulations (1) are devoted to the diagnosis, management, and prevention of infectious skin diseases. In the fourteenth century, bubonic plague is estimated to have wiped out a fourth of the population of Europe (2). Only in this century have heart disease, cancer, and injuries overtaken infectious diseases as leading causes of death. Seen in this context, the worldwide HIV epidemic, the appearance of hantavirus pulmonary syndrome in the southwestern USA in 1993, and the rapid spread of pandemic cholera across South America in this decade represent more of a return to the norm than a new trend. Clearly, detection, prevention, control, and, where possible, eradication of infectious diseases deserve not only our best scientific efforts but a high priority ranking for our nation's financial resources.

The intent of this article is to focus on emerging infectious diseases. By an emerging disease we mean one which either 1) is entirely new or newly recognized; 2) has moved into a new population at risk; or 3) has changed its behavior in some way (such as become resistant to therapy) which affects its epidemiology or control. The 1992 Institute of Medicine report "Emerging Infections: Microbial Threats to Health in the United States" (3) gives six major factors associated with emergence:

1 Human demographics and behavior (example: HIV infections, transmitted sexually);
2 Technology and industry (example: bloodstream infections from invasive devices used in hospitals);
3 Economic development and land use (example: Lyme Disease, from tick exposures in people who have built houses in forested habitats);
4 Microbial adaptation and change (example: penicillin resistance in pneumococci, brought on by widespread use of penicillin);
5 International travel and commerce (example: cases of malaria occurring in USA from mosquito exposures in Asia and Africa); and
6 Breakdown of public health measures (example: measles resurgence in USA in 1989-91 due to low vaccination rates in preschool children).

In addition to this array of national and international examples, we have one excellent illustration here in Kentucky of an emerging infectious disease. In the 1970s, control of tuberculosis using drugs which can be given orally and monitored in an ambulatory setting had progressed to the point where sanatoria closed, resources were diverted to other priorities, and expertise within the state was allowed to wane. In a rural community in eastern Kentucky, beginning in 1979, one young man with infectious tuberculosis failed to comply with his medication regimen, and evaded effective followup for four years before eventually being cured. From 1983-88, four more cases, probably connected to the first, appeared in similarly noncompliant men who remained infectious for up to six years, thereby creating a focus of resistant TB organisms in the community which became widespread in 1993-95 and still persists. Not until 1994 did the state TB program gain access to a combination of state and federal funds which allowed it to apply adequate resources to the control of tuberculosis in this and other communities at risk in Kentucky. This is an instance where timely surveillance, laboratory support, and field intervention could have saved considerable resources in the long term.

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Besides the fact that each of the factors associated with emergence is at work in the United States, and in Kentucky, there are three additional reasons why we should be well prepared for emerging infections:

1 The world has now become so interconnected that the emergence of an infectious organism anywhere poses a potential threat on all continents, if factors facilitating the survival and transmission of the organism exist. We still vaccinate against polio in this country, and will for some time to come, because rapid transmission of wild virus from the stool of an infected person in Asia or Africa is quite possible. For example in 1992, after the last indigenous polio case in the Americas, wild virus was isolated in Alberta, Canada, in a person linked to an outbreak in the Netherlands. Fortunately, the importation was temporary and no cases occurred.

2 Outbreaks of infectious disease cause substantial public concern. Though we try to focus most of our energy on those diseases resulting in death, disability, or severe illness, we in public health cannot ignore other conditions (such as head lice) which cause none of the above but which are disruptive to communities. Resources must be set aside for these problems as well.

3 A continuing trend toward antibiotic misuse and overuse has contributed to the emergence of a variety of resistant bacterial infections, and threatens to sharply reduce the value of antibiotic therapy in general, in the overall battle against infectious disease. Already the term "post-antibiotic era" is being heard at professional meetings occasionally. A seminar, scheduled for September 28, is described below during which modification of antibiotic prescribing practices will be addressed in more detail.

In light of all these factors, what are the most appropriate responses for Kentucky's medical and public health community? Clearly, complacency and panic are both to be avoided. We must educate each other, our patients, and the public about the natural history, risk factors, and methods of prevention for the different infectious diseases. We must communicate significant findings from clinical practice, from research, and from the laboratory as rapidly as possible. We must, at every opportunity, urge our elected and appointed policymakers to give high priority not only to providing adequate domestic public health resources, but to the support of global infectious disease control as well. This support is most crucial for eradication campaigns, such as for polio, currently -- and measles, in the near future. Each of these efforts, ultimately, will save resources when routine vaccination can be discontinued.

The Department for Public Health is leading the way to address one other priority -- adequate surveillance for infectious diseases. Beginning in 1997, a completely restructured public health surveillance system will replace the current array of systems which all too often are separated and do not meet the standards for timeliness, accuracy, and cost-efficiency that are needed. The "reportable disease" list will become shorter, and more emphasis will be placed on gathering accurate and timely data on those diseases of real importance. Laboratory-based and sentinel surveillance will play a greater role. Further, we will begin to put mechanisms in place to increase the probability that an emerging infectious disease will be detected promptly upon its first appearance in the Commonwealth. We will need the close cooperation of the medical community to reach these goals. More details will be forthcoming in the near future.

References available upon request.

Controlling Antibiotic Overuse as a Strategy for Preventing Emergence of Resistant Infections

On Saturday, September 28, at 2:15 pm in the Commonwealth Convention Center, Louisville, Kentucky, a seminar will be held entitled **Controlling Antibiotic Overuse as a Strategy for Preventing Emergence of Resistant Infections.** This seminar is being held as part of the Kentucky Association of Public Health Physicians subspecialty session of the Kentucky Medical Association Annual Meeting.

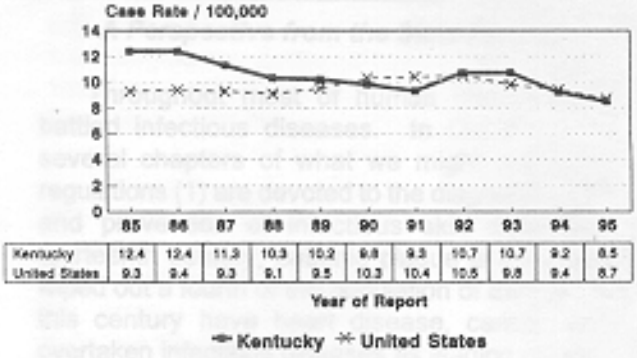
Reginald Finger, MD, MPH, State Epidemiologist, Kentucky Department for Public Health, will outline the scope of the problem and describe strategies being undertaken both in Kentucky and nationally, to influence antibiotic prescribing, as well as to influence demand for antibiotics by patients. Dr. Finger has recently become part of a national task force on resistant infections, led by the Texas Department of Health.

Arch Mainous, III, PhD, University of Kentucky Department of Family Practice, will then present data on inappropriate prescription of antibiotics to Kentucky Medicaid patients presenting with acute bronchitis, common cold, and other viral illnesses. Stan Bloch, MD, pediatrician, Bardstown, Kentucky, will present a pediatricians perspective on antibiotic overuse and describe some of the difficulties with implementing scientifically sound practice in the real world of the medical office. Opportunity for discussion will be provided.

Tuberculosis in Kentucky, 1995

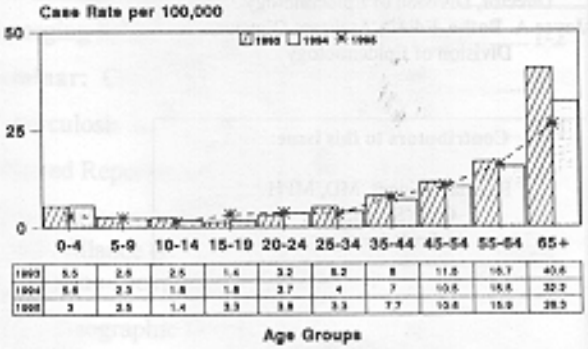
Kentucky reported 327 tuberculosis (TB) cases during 1995, a decrease of 18 cases (this decline is the second in a row, 5.2% below 1994). With a case rate of 8.5 per 100,000 population for 1995, Kentucky falls below the national TB case rate (Figure 1). Analysis of Kentucky's TB cases indicates that the recorded statewide resistance to isoniazid (INH) on initial isolates was 4.3% in 1995.

Figure 1. Kentucky Vs. United States Tuberculosis Case Rates, 1985-1995



	85	86	87	88	89	90	91	92	93	94	95
Kentucky	12.4	12.4	11.3	10.3	10.2	9.8	9.3	10.7	10.7	9.2	8.5
United States	9.3	9.4	9.3	9.1	9.5	10.3	10.4	10.5	9.8	9.4	8.7

Figure 2. Tuberculosis by Age Groups Case Rate per 100,000, Kentucky, 1993-1995



	0-4	5-9	10-14	15-19	20-24	25-34	35-44	45-54	55-64	65+
1993	5.5	2.5	2.5	1.4	3.2	5.2	8	11.8	16.7	40.6
1994	5.6	2.3	1.8	1.8	3.7	4	7	10.6	15.6	32.3
1995	3	2.5	1.4	3.3	3.8	3.3	7.7	13.6	15.9	26.3

During a recent visit to Kentucky, Dr. Alan Bloch of the Centers for Disease Control and Prevention (CDC), Division of Tuberculosis Elimination (DTBE), recommended that a four drug regimen (INH, rifampin, pyrazinamide, and ethambutol or streptomycin) be initiated for all new TB cases and suspect cases in the Commonwealth. This recommendation is endorsed by the State Tuberculosis Control Program.

CDC reports infection with HIV has significantly contributed to recent national increases in TB. Kentucky's local health departments report that only 1 TB patient in 1995 had a positive HIV test. The 1995 figures, however, are incomplete as 65% of TB patients were not offered the HIV screen. The Division of Epidemiology performs an annual confidential case register match between TB cases and reported AIDS cases. The 1995 TB/AIDS match reveals a decrease of nine "co-infected" cases (1 in 1995 vs.10 in 1994).

The incidence of tuberculosis in Kentucky peaks at the end of the age spectrum, with the highest case rate (26.3 per 100,000 population) occurring in the 65+ age group (Figure 2). This age-specific rate is higher than the 1994 national rate of 16.7 per 100,000. Pediatric tuberculosis has historically been a problem in Kentucky, but with a case rate of 3.0 per 100,000 for 1995, the 0-4 age group incidence decreased (down from 5.6 per 100,000 in 1994) and is lower than the 1994 national case rate (5.2 per 100,000) for this age group.

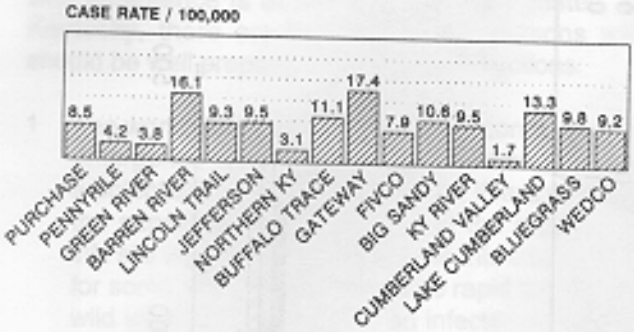
In 1994, Kentucky had a 64/36 male to female tuberculosis case ratio. For 1995, the ratio shows very little change (63/37). For 1995, the number of reported cases among males is 207, and among females, the number of cases is 120.

There was a significant increase in the number of tuberculosis cases in Kentucky's nonwhite population (73 in 1995 vs. 57 in 1994 - a 28% rise). Further analysis reveals a continued disproportionate impact with the nonwhite tuberculosis case rate (26.5 per 100,000) being nearly four times higher than the tuberculosis case rate (7.2 per 100,000) among the white population.

Distribution of Kentucky's tuberculosis cases for 1995 is presented by region in Figure 3. The Gateway Region, which includes Bath, Menifee, Montgomery, Morgan, and Rowan Counties, recorded the highest regional rate (17.4 per 100,000) of TB for 1995. A dot-density map (Figure 4, page 6) illustrates geographic distribution of cases statewide.

CDC has identified homelessness as a risk factor for TB, and Kentucky now requires that tuberculosis patients who are homeless be so identified. The 1995 data indicate 18 (or 5.5%) were identified as homeless. In order to successfully treat these tuberculosis cases, every effort is made to assist the patient to obtain temporary housing. The use of directly observed therapy (DOT) is "tied" to financial assistance in the provision of housing, hospitalization or secure isolation.

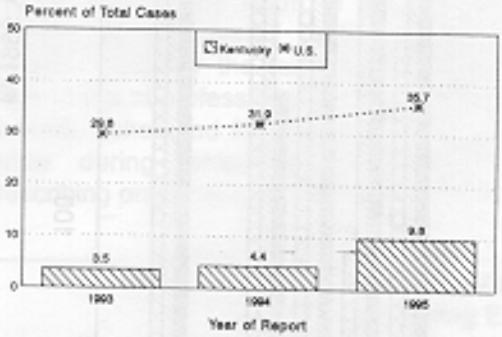
Figure 3. Tuberculosis Case Rates (By Regions) Kentucky, 1995



Kentucky State Case Rate/100,000 = 8.5

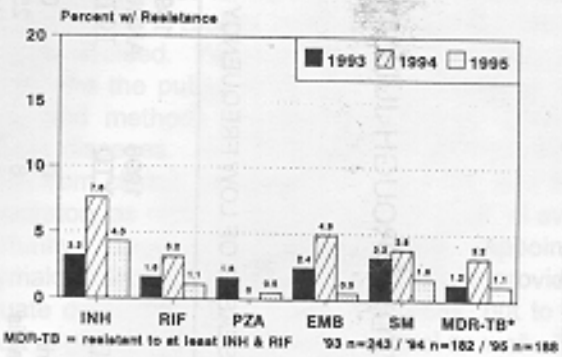
The 1995 national data from CDC regarding TB suggest that approximately 35.7% of the morbidity in the United States (U.S.) is found in foreign-born persons. In Kentucky, 32 (9.8%) of the tuberculosis cases reported for 1995 are foreign-born, more than twice the number reported in 1994 (Figure 5). Foreign-born individuals seeking medical attention for respiratory illness should be evaluated for TB. An inadequate treatment regimen may have been obtained in the country of origin, and public or private health care providers should maintain a high index of suspicion for drug resistance in this population.

Figure 5. Impact of the Foreign Born Kentucky, 1993-1995



Although Kentucky experienced a recent reduction in the total number of cases, multi-drug resistant tuberculosis (MDR-TB) continues to receive close attention. The State Tuberculosis Control Program monitors all tuberculosis drug susceptibility studies reported by the State Division of Laboratory Services, and those received from private labs. For calendar year 1995, 188 initial drug susceptibility tests (approximately 57% of the cases) were available at the time of this report. A comparative analysis of the initial drug susceptibility studies reported to TB Control during 1993, 1994, and 1995 may be found in Figure 6. Resistance to INH continues to exceed 4% statewide; therefore, as previously mentioned, CDC recommends universal application of an initial four drug regimen for TB cases and suspects.

Figure 6. Resistant Tuberculosis - Initial Isolates Kentucky, 1993-1995



Preventing the emergence of drug resistance and ensuring the completion of therapy are the two main goals of the DOT program. This program requires a public health worker to monitor patient adherence to treatment by observing the ingestion of anti-TB medication. The State TB Control Program allocates funds provided by CDC to place DOT staff (nurses, outreach workers, etc.) in local health departments in many parts of the state. These positions are intended to serve the community by performing the following functions in the field:

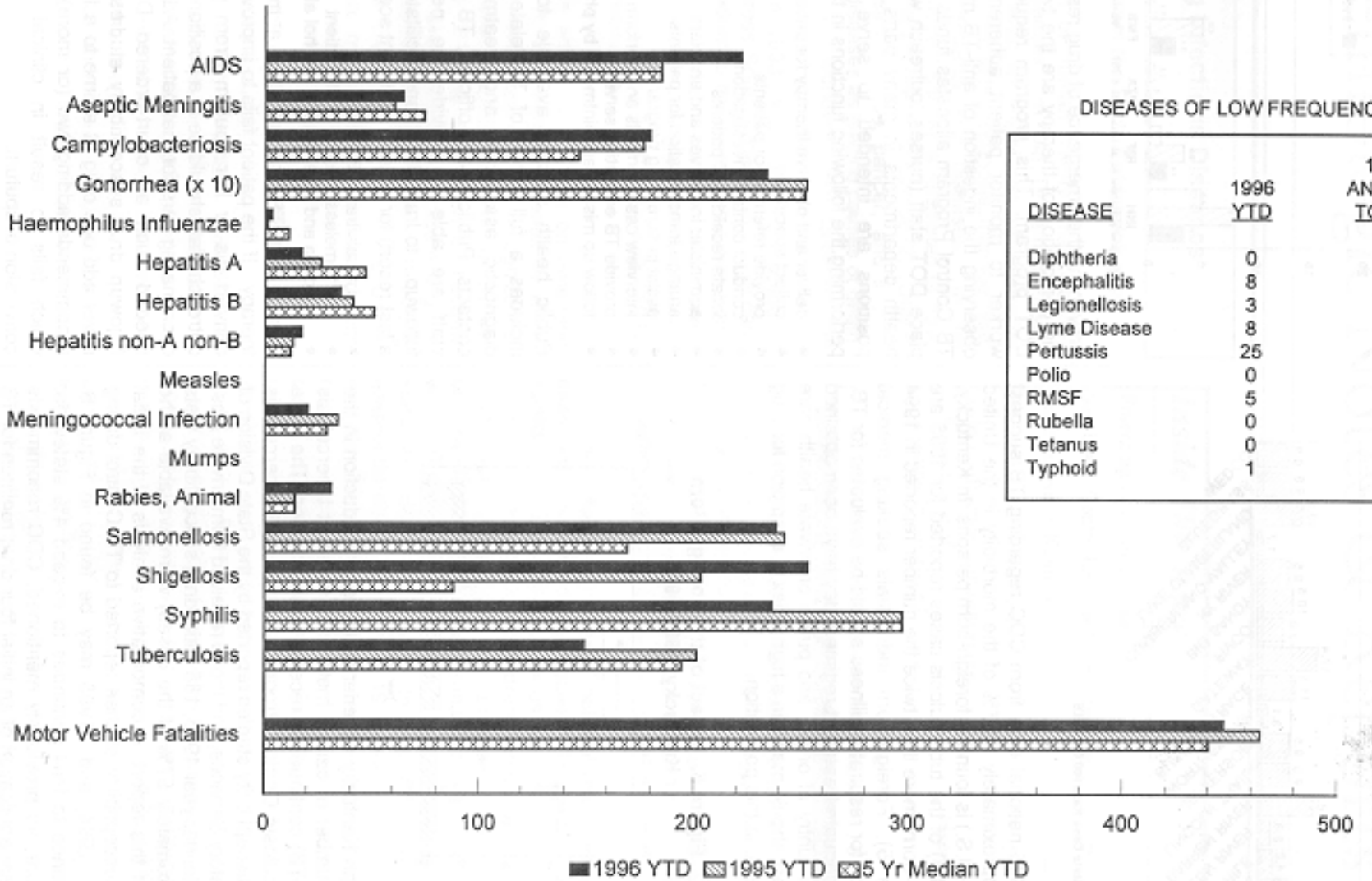
- deliver and observe therapy for patients
- collect specimens
- provide referrals for patients
- conduct contact investigations
- locate recalcitrant patients
- administer incentives and enablers
- arrange transportation for patients
- assist in screening programs
- interview case contacts and perform follow-up
- provide TB education services
- follow up missed appointments by phone, mail, or home visit

Public health support available to private physicians includes a full range of TB-related services such as diagnostic assistance and treatment for cases and contacts. Public health officials, TB nurses and outreach staff are able to provide the necessary community followup... to track, treat, and facilitate secure isolation (as a last resort) for difficult treatment scenarios such as:

- the recalcitrant TB patient
- the homeless, infectious TB patient
- injecting and other drug or alcohol abuse patient

Public health TB staff are adept at monitoring response to therapy. If the patient fails to improve clinically, or fails to convert his or her sputum (from positive to negative) outreach staff should be in a position to alert the physician coordinating care for that patient. Additional steps may be needed such as court-ordered DOT or requests for followup drug susceptibility studies. In such situations, never add one drug at a time to a failing regimen. CDC recommends adding two (or more) drugs to a regimen which fails to result in clinical improvement and/or conversion of sputum.

CASES OF SELECTED REPORTABLE DISEASES IN KENTUCKY, YEAR TO DATE (YTD) THROUGH JULY 1996



DISEASES OF LOW FREQUENCY

DISEASE	1996 YTD	1995 ANNUAL TOTAL
Diphtheria	0	0
Encephalitis	8	25
Legionellosis	3	10
Lyme Disease	8	16
Pertussis	25	27
Polio	0	0
RMSF	5	16
Rubella	0	0
Tetanus	0	0
Typhoid	1	0

Disease numbers reflect only those cases which meet the surveillance definition.

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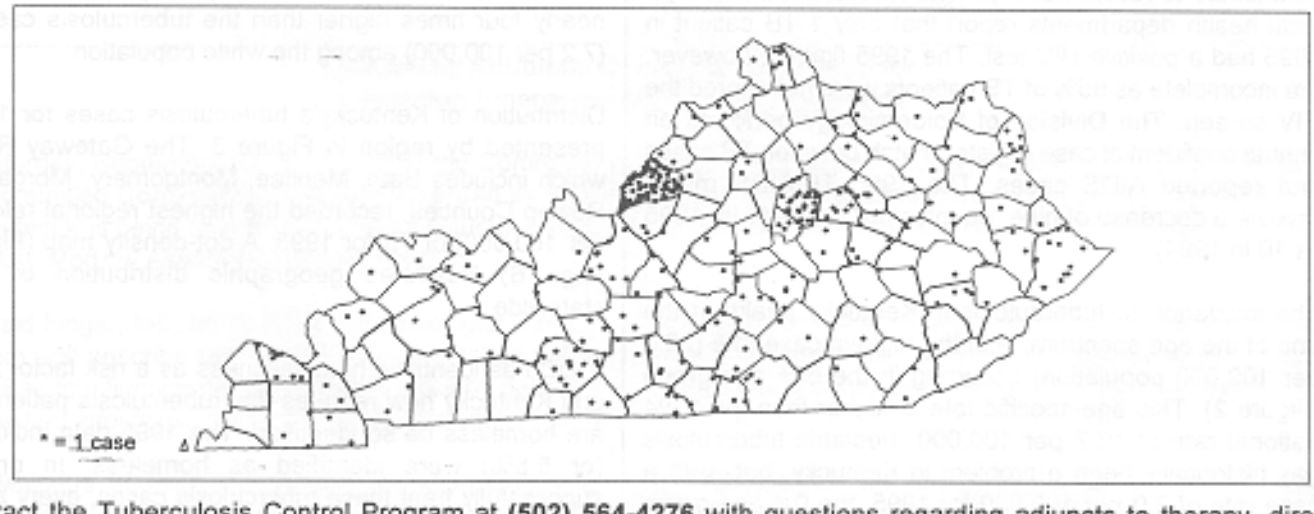
Figure 4. Geographic Distribution* of Tuberculosis Cases, Kentucky 1995



Contact the Tuberculosis Control Program at **(502) 564-4276** with questions regarding adjuncts to therapy, directly observed therapy, access to community-based follow-up, or current TB treatment literature.