



## ***E. coli* O157:H7 Outbreak Associated with Spinach in Kentucky – September, 2006**

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### **Background**

*Escherichia coli* O157:H7 is a gram negative bacterium that causes an average of 70,000 cases of disease, 20,000 hospitalizations, and 60 deaths yearly in the U.S. It is also a frequent cause of Hemolytic-Uremic Syndrome (HUS), a triad of renal insufficiency, anemia, and thrombocytopenia (lowered platelet count) that can lead to permanent need for dialysis and even death. It is one of several hundred types of *E. coli* bacteria and is found in the intestines of cattle, sheep, and goats. It is a common cause of foodborne illness, although the Centers for Disease Control and Prevention (CDC) reports that the incidence of *E. coli* O157:H7 is decreasing. On September 13, 2006, CDC was alerted to an *E. coli* O157:H7 outbreak likely caused by bagged spinach in Wisconsin and Oregon. On the same date, Kentucky epidemiologists were notified of several residents who were infected with *E. coli* O157:H7. This article describes the investigation and events related to this outbreak in Kentucky and the national investigation of this outbreak.

### **Investigation Methods**

On September 8, 2006, Wisconsin officials reported to CDC that they had multiple cases of *E. coli* O157:H7 in their state. On September 12, CDC reported to Wisconsin that the pulsed-field gel electrophoresis (PFGE) patterns were matching in their cases. Public health officials in Wisconsin and Oregon conducted a survey of patients' eating habits prior to illness which showed a strong association between disease and raw spinach consumption in

patients infected with *E. coli*. State officials in Wisconsin and Oregon notified CDC of their findings on September 13<sup>th</sup>. New Mexico epidemiologists contacted Wisconsin and Oregon officials on the same date regarding an *E. coli* O157:H7 outbreak in their state which also appeared to be related to the consumption of fresh spinach. State officials and CDC determined that a multi-state outbreak of *E. coli* was in progress. CDC created a one-page questionnaire which focused on spinach consumption to be administered to cases.

On September 15, 2006, Kentucky Department for Public Health (DPH) laboratorians and epidemiologists confirmed that their first case-patient's clinical specimen matched the national outbreak strain. Three additional outbreak cases in Kentucky residents were confirmed later that day. Using the CDC spinach questionnaire, Kentucky case patients were questioned by local health department epidemiologists about timing of spinach consumption, location where the spinach was purchased, and if spinach packaging with universal product code (UPC) and lot numbers was available. Data regarding need for hospitalization and development of HUS were obtained on the questionnaire. This questionnaire was used both with Kentucky case patients as well as patients throughout the country during the outbreak.

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Across the U.S., a confirmed case was defined as a patient with an illness onset date of August 1, 2006-September 18, 2006 or if onset was unknown, a patient with an *E. coli* O157:H7 isolate from August 15, 2006-September 18, 2006 matching the outbreak strain of *E. coli* and from the U.S. By September 22, 2006, a total of eight Kentucky residents were ultimately identified as part of the outbreak (Figure 1, page 3). Regional epidemiologists interviewed seven of the patients by phone or in person and completed the CDC spinach questionnaire. Several patients also completed the general food-borne illness questionnaire to identify other potential exposures. Epidemiologists and environmentalists worked with the state lab and CDC to obtain spinach samples in order to attempt to isolate *E. coli* in the spinach or packaging. Spinach specimens provided by case patients were tested in the state lab for the presence of *E. coli* O157:H7.

## Results

### *National*

Ultimately, 199 cases nationwide were confirmed positive for the *E. coli* outbreak strain associated with the outbreak. States reporting the greatest number of confirmed cases were Wisconsin (49), Ohio (25), and Utah (19). Ninety-five percent of patients reported spinach consumption prior to onset of illness. Ninety-eight people required hospitalization, and three people died. Thirty cases of HUS occurred nationally among those infected.

### *Kentucky*

Six Kentucky *E. coli* O157 case patients (75%) were female. Two patients (25%) developed HUS. Four Kentucky patients (50%) required hospitalization. There were no Kentucky fatalities. Of the seven patients who completed interviews detailing their exposures, six (85.7%) recalled eating spinach in the appropriate time frame prior to illness. One patient could not recall whether spinach was consumed prior to illness onset.

The ability of the regional epidemiologists and local environmentalists to work throughout the state to interview patients, ship samples to the state lab, and provide state epidemiologists with the spinach questionnaire responses played a critical role in

Kentucky's response to the outbreak. State and regional epidemiologists worked in concert to inform the state lab when environmental and patient specimens would be arriving. Regional epidemiologists also quickly provided state epidemiologists with completed questionnaires, thereby enabling state epidemiologists to share information with CDC and the U.S. Food and Drug Administration (FDA). The Public Health Protection and Safety team also was crucial to the success of the state investigation. The local environmentalists collected spinach samples from individuals involved in the outbreak, and worked with epidemiologists at the state level to coordinate testing at the state laboratory. They fielded questions from Kentucky residents about spinach safety. State food safety experts also worked with the laboratory and epidemiologists to arrange for local environmentalist services, and updated local health departments on FDA updates and the number of state residents who were part of the outbreak.

The CDC and the FDA used information including lot numbers, lab testing, and spinach brands provided by Kentucky and other involved states to trace the outbreak to four fields in California. Testing performed at these fields revealed that the fields contained pig and cattle feces contaminated with *E. coli* O157:H7 matching the outbreak strain. Investigators also found evidence that wild pigs had been present in the implicated farms.

## Discussion

*E. coli* O157:H7 is a virulent strain of *E. coli* that produces Shiga toxin. It may cause acute watery or bloody diarrhea due to its ability to invade the intestinal wall. It is diagnosed by a clinical stool specimen taken from the patient (refer to accompanying article on Pulsed-Field Gel Electrophoresis on page 5 for more information on laboratory testing for *E. coli*). The incubation period ranges from 1-8 days following ingestion, but most commonly symptoms begin 3-4 days after ingestion. *E. coli* O157:H7 is transmitted by ingestion of food or liquid contaminated with feces of an infected or asymptomatic carrier.

Foods previously implicated in transmission of *E.*

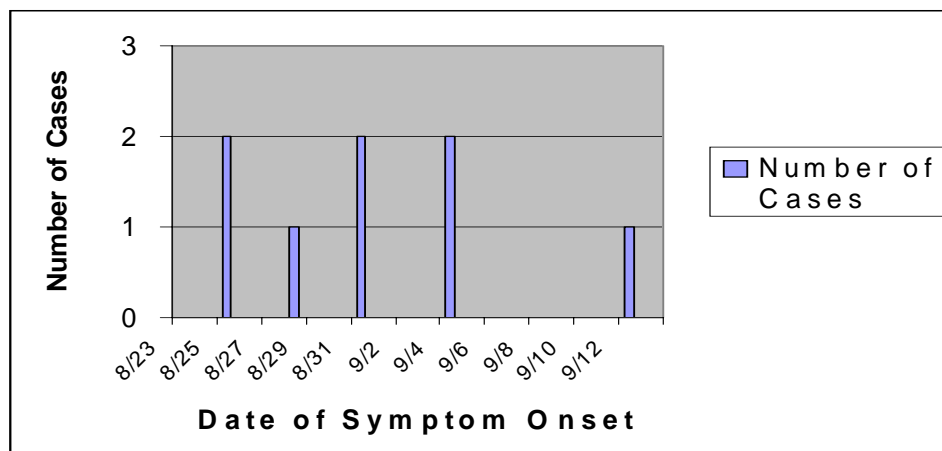
*coli* O157:H7 include raw milk, unpasteurized apple juice, ground beef, uncooked fruits, and vegetables. Petting zoos have also been the source of previous outbreaks. According to the FDA, 18 previous outbreaks have been caused by spinach in the last 10 years, including an outbreak in 2005 in which spinach was implicated. Lettuce or spinach may become contaminated via multiple mechanisms from the farm to consumption (by manure from an infected animal such as a cow; from contaminated irrigation water; from contamination during packaging and processing; or through individual contamination at restaurants or grocery stores). Infection may also result in HUS, or renal insufficiency, anemia, and thrombocytopenia. Children aged younger than five years are most likely to contract HUS, which most commonly occurs around two weeks after infection with *E. coli* O157; approximately 8% of children infected with *E. coli* O157:H7 subsequently develop HUS. Half of the children diagnosed with HUS ultimately require short- or long-term dialysis, and approximately 4% die. Antibiotics have not proven beneficial in the prevention of HUS.

Normally, transmission of *E. coli* infection is prevented by cooking ground beef until no longer pink, avoiding raw milk and unpasteurized products, and good hand hygiene. In this outbreak, the FDA also stated that cooking spinach for 15 seconds at a temperature of 160 degrees Fahrenheit would kill any *E. coli* present, therefore making the spinach safe to eat. It should be noted that meticulous attention to food preparation helps to prevent any foodborne illness. Cooks should be careful to avoid contamination of raw fruits and vegetables with items which have touched uncooked meat. In addition, refrigerating spinach will also prevent the growth of *E. coli* and other types of bacteria. In the present outbreak, however, the product was advertised as “pre-washed”. Bagged raw spinach is usually used for salad and is therefore not cooked. The FDA did not recommend rewashing pre-washed spinach, as the *E. coli* often is incorporated into the interior of the spinach leaf and therefore can't be removed by washing at home. Thus, prevention strategies for this type of transmission rely primarily on identification of sources of contamination prior to distribution and prevention of subsequent outbreaks via the same or similar mechanism.

### Closing Notes

Ultimately, the outbreak strain was not isolated from spinach supplied by Kentucky patients to the state lab. However, the implicated strain of *E. coli* was isolated from several spinach bags provided by ill patients in other states (New Mexico, Pennsylvania, Utah, and Nebraska). The FDA traced the infection to a spinach processing company by combining the epidemiologic information obtained from the spinach questionnaire with the laboratory testing performed on the implicated bags of spinach. The outbreak was halted by recalls of spinach and spinach products from the implicated companies and FDA advice to consumers to avoid eating raw spinach until the source of the outbreak could be determined. Future plans include development of an industry-wide plan with steps to prevent contamination, thereby reducing the risk of another outbreak.

**Figure 1. Epidemic curve of *E. coli* O157:H7 cases in Kentucky residents associated with national spinach-related outbreak, August-September, 2006**



### **The Role of the State's Public Health Laboratory in the Recent *E. coli* Outbreak Associated with Spinach**

*Success dependent upon timely, coordinated effort*

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The Pulse Field Gel Electrophoresis (PFGE) lab within the Public Health Laboratory participates in PulseNet, a system coordinated by the Centers for Disease Control and Prevention (CDC) that links public health laboratories nationwide and allows laboratorians to compare DNA "fingerprints" of enteric bacteria that cause foodborne illness. The communication Web site within PulseNet, known as the WebBoard, is used by state and federal labs to post messages about outbreaks and clusters. The WebBoard keeps laboratorians informed about ongoing clusters, outbreaks, and possible fingerprint matches in their state.

On September 8, 2006, Wisconsin posted an initial WebBoard message describing a cluster of eight *E. coli* O157:H7 isolates with the same "DNA fingerprint" in that state. The PFGE lab compared the Wisconsin cluster patterns to all of the *E. coli* O157:H7 DNA patterns in the Kentucky laboratory database and searched for any possible matches within the previous 60 days. No matches were found. The *E. coli* O157:H7 isolates in the database originate from cultures and samples that are submitted by hospitals and reference laboratories to the CDC's Enteric Lab for confirmation testing. PFGE testing is performed on all confirmed *E. coli* shiga-toxin positive isolates.

One week later, PFGE testing was performed on three confirmed *E. coli* O157:H7 cultures in Kentucky. When compared to the posted cluster patterns, all three appeared to be indistinguishable or matching. The PFGE lab notified the state epidemiology nurse consultant with this finding and posted a reply to the WebBoard about the three isolates ap-

pearing to match the cluster pattern. Continuing with routine protocol, the PFGE lab uploaded the three patterns into CDC's national database, where managers analyzed uploaded patterns from Kentucky and confirmed that their pattern names were the same pattern name as the posted cluster and therefore considered a match. While Kentucky was submitting patterns, several other states were likewise isolating the same cluster patterns and receiving confirmations on their patterns as also matching the cluster pattern. The cluster pattern eventually was referred to as the outbreak pattern.

By September 22, PFGE testing was completed on six additional confirmed *E. coli* O157:H7 isolates. Four of the six isolates appeared to be indistinguishable from the outbreak pattern. This information was posted to the WebBoard, bringing the total number of isolates matching the outbreak patterns to seven. The seven matching isolates were then sent to the CDC and the U.S. Food and Drug Administration (FDA) for further testing. Multi-Locus Variable Number of Tandem Repeat Analysis (MLVA -VNTR) testing was performed on all isolates with patterns indistinguishable from outbreak patterns. The MLVA test was performed because the patterns associated with this outbreak were common ones and additional testing was needed to further characterize the isolates suspected of being involved to confirm their relationship. During the following month, PFGE testing was performed on thirteen additional confirmed *E. coli* O157:H7 isolates and each was compared to the outbreak patterns. No matches were found until October 27. This isolate was also sent to CDC for MLVA testing. Since October 27th, the lab has received and performed PFGE testing on 12 *E. coli* O157:H7 isolates. Of those 12, one received in December exhibited the patterns associated with the spinach outbreak. To date, CDC has performed MLVA testing on 260 *E. coli* O157:H7 isolates related to the spinach outbreak, eight of those submitted by Kentucky. CDC determined that a majority of these isolates either shared the same MLVA type or one closely related.

Simultaneous with testing of the clinical samples, the Public Health Food lab received three spinach

samples to test for *E. coli* O157:H7. The spinach samples were collected and submitted by Environmental Health Specialists within the Public Health Protection and Safety Division (PHP), who serve as the regulatory arm of DPH. Environmental Health Specialists conduct routine, as well as investigatory inspections of retail food establishments for food safety assurances. Both PHP and the Division of Epidemiology collaborated to provide the Public Health Laboratory prior notification of the spinach samples in order for the laboratory to make necessary preparations to test the spinach.

The spinach samples submitted by the environmentalists were representative samples since the consumed spinach was not available for testing. The tested spinach samples were not of the one specific lot code or the specific brand reported to contain the *E. coli* O157:H7 by FDA. The results on the spinach samples tested negative for *E. coli* O157:H7. However, if *E. coli* O157:H7 had actually been isolated from the spinach samples received in our lab, PFGE testing would have been performed on the isolates and their patterns compared to the *E. coli* O157:H7 outbreak pattern. In the event of an indistinguishable match, the ramifications would have been significant in extending the outbreak to additional lot numbers and brands.

The success of the rapid recognition and timely investigation of an outbreak relies heavily on the partnership between the Public Health Lab and doctors, hospitals, reference labs, State Epidemiology, Public Health Protection and Safety, and the CDC. In order for the Public Health Lab to work effectively during an outbreak investigation, it is critical that all enteric isolates and samples that cause foodborne illness or diseases that are reportable in our state are received in a timely manner. Open lines of communication can lead to a safer and healthier public and a system that works more efficiently and effectively. The information and contributions from the Divisions of Public Health Protection and Safety, Epidemiology, and the Public Health Laboratory enhanced CDC's epidemiologists to define the scope of a major nationwide outbreak to pinpoint the spinach product involved.

### **Pulsed-Field Gel Electrophoresis and KYPHERS**

*Partnership heightens surveillance capabilities  
against foodborne illness outbreaks*

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In light of the many recent multi-state foodborne illness outbreaks detected, including *E. coli* O157:H7 in spinach and *Salmonella* typhimurium in tomatoes, the Kentucky Department for Public Health has made a concerted effort to heighten its surveillance capabilities. This includes, but is not limited to, an increased partnership between the Divisions of Laboratory Services (DLS) and Epidemiology and Health Planning. The laboratory is primarily responsible for the testing of isolates implicated in foodborne outbreaks (*E. coli*, *Salmonella*, *Shigella*, and *Listeria*), which entail various biochemical procedures and DNA fingerprinting known as Pulsed-Field Gel Electrophoresis (PFGE). While DLS is performing typing and reporting of PFGE patterns, the Division of Epidemiology and Health Planning is working to complete case history questionnaires and attack rates for suspected outbreaks. This data generated by Epidemiology is then entered into the Kentucky Public Health Electronic Records Systems (KYPHERS).

There are several steps involved in the production of a PFGE pattern for an organism. Initially, the implicated patient sample is identified to the species level in the Bacteriology Laboratory where it is then transferred to the PFGE Lab for DNA fingerprinting and naming with a specific pattern. If there is a suspected food related to the case, it is critical to receive this information along with the patient sample, in order to ensure that the lab in tandem with Epidemiology can link the two and prevent any additional illnesses by possibly instituting a recall. When a food sample is tested, it is initially analyzed in the Food Bacteriology Lab and if an organism is recovered, it is sent to the Bacteriology Lab and then on to the PFGE Lab, where it undergoes the same procedure and production of a PFGE pattern as the clinical or patient isolates.

The naming of the PFGE patterns as well as the

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cluster codes follows the schematic guidelines issued by the PulseNet network, a network operated by the Centers of Disease Control and Prevention (CDC) to track foodborne outbreaks via PFGE patterns and epidemiological data using a WebBoard accessible through the Internet. The pattern name contains ten characters (the first three are letters which indicate the organism type, the next three designate the type of enzyme used in the testing procedure, and the last four are numbers which are unique for that particular pattern). For example, the pattern EXHX01.0001 would be used to describe an *E. coli* O157:H7 isolate (EXH) that was digested with the Xba enzyme (X01) and was issued the 0001 as the identifier. Another name often used by PulseNet is the cluster code containing the year, month, state or multi-state three digit organism code and sequential number for a particular cluster. 0611KYEXH-1c would be the first *E. coli* O157:H7 cluster in November for Kentucky in 2006 ("ml" would replace "KY" if it was determined to be a multi-state cluster). The CDC will often drop the "c" from the end of the cluster code if they classify the cluster as an outbreak.

If the case is considered to be part of a cluster or outbreak based on its PFGE pattern, the information will now be included in KYPHERS, which is used by state and regional epidemiologists and contains information such as type and date of illness onset, daycare or food handler association, and hospitalization information. Including PFGE pattern and cluster information in KYPHERS will streamline the process of tracking a foodborne illness outbreak, aiding in organizing and pinpointing related cases immediately. Although particular isolates may have the same PFGE patterns, they may or may not be considered part of an outbreak or cluster. Factors such as timeline, history of consumption of implicated food, and date of onset should be considered. PulseNet often sees many of the same patterns each year for a particular organism.

By enhancing the communication and reporting capabilities of the Divisions of Laboratory Services, Public Health Protection and Safety, and Epidemiology and Health Planning, surveillance of foodborne diseases has been enhanced and these concerted efforts will assist in protecting the citizens of

the Commonwealth from foodborne illness.

### **Kentucky Health Emergency Listing of Professionals for Surge (K HELPS)**

*New program will allow health professionals to provide life-saving services during emergencies*

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In the event of a large-scale public emergency, the need for expanded surge capacity of health and medical systems would be critical. In Kentucky, there currently is approximately one public health worker for every 1,000 persons. This is compared to one firefighter for every 265 persons, one sworn officer for every 334 persons, and one EMT/paramedic for every 325 persons. If public health officials were required to open mass clinics in order to provide life-saving supplies and equipment to approximately four million Kentuckians, the need for extra workers would be essential for timely services.

To meet surge capacity, the Kentucky Department for Public Health (DPH) is creating the Kentucky Health Emergency Listing of Professionals for Surge (K HELPS). K HELPS is an electronic database of health and medical personnel who volunteer to provide aid in the event of an emergency. This new program will allow public health officials to register health professionals, apply emergency credentialing standards, and allow for the verification of the identity, credentials and qualifications of prospective volunteers.

Since 2003, the Medical Reserve Corps (MRC) program has grown rapidly across the U.S. Sponsored by the Office of the Surgeon General, MRC programs have been developed to supplement existing local public health and emergency preparedness initiatives. In Kentucky, 102 of 120 counties are now covered by an MRC, with most units sponsored by local health departments in conjunction with local emergency management agencies.

The new K HELPS program is designed to complement existing local MRC programs. Because state and local health departments will work to-

gether, the programs will require reduced manpower to coordinate. A volunteer can register with K HELPS online and choose the local MRC unit associated with the volunteer's geographical area. The K HELPS system will verify credentials of the volunteer and notify the local health department to complete the approval process. It will be the responsibility of the local health department to provide an orientation, offer training, and issue an identification badge for the volunteer. The K HELPS system has the ability to alert volunteers by either email, telephone call, or both. Local health departments will also have administrative rights to alert and activate volunteers when needed.

During Hurricane Katrina, approximately 1,400 health and medical professionals registered with DPH. Each of these volunteers will be contacted and asked to register in the K HELPS system. There currently are approximately 1,800 volunteers registered in Kentucky's MRC program. Each of these individuals will also be asked to register in the new system. The program will be promoted through a variety of methods including professional newsletters and associations.

To meet surge capacity needs, a variety of volunteers would be needed. Current emphasis is being placed on having physicians, nurses, pharmacists, social workers, radiological technologists, respiratory therapists, and clinical laboratory technologists and technicians registered, credentialed, and trained. To help meet behavioral health surge capacity needs, K HELPS is partnering with the Kentucky Community Crisis Response Board (KCCRB) to allow psychologists, counselors, and therapists to become involved.

Volunteers in the new K HELPS system will be required to receive training in incident management, with additional voluntary trainings to be offered to volunteers either online or in person. Volunteers will also be afforded the opportunity to participate in regional disaster drills and exercises. By spring 2008, Kentucky's goal is to have 2,000 volunteers that are credentialed, trained, and ready to respond to any public health emergency or disaster.

To register or obtain more information, contact

Rebecca Gillis at (502) 564-7818 Ext. 4268 or log onto <http://www.KHELPS.chfs.ky.gov>.

### **Kentucky Elder Oral Health Survey**

*Survey findings establish valuable benchmarks for Kentucky Elder Surveillance System*

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The Kentucky Elder Oral Health Survey (KEOHS) was recently conducted to learn the oral health status of elder Kentuckians (age 65 and older). Although elder Kentuckians are the fastest growing segment of the state's population, current data did not exist regarding the oral health of Kentucky's senior citizens prior to the administration of the survey.

The survey was funded by the Kentucky Oral Health Program of the Kentucky Department for Public Health and collaboration with the University of Kentucky College of Dentistry (UKCOD), Office of Aging Services, Department of Veterans Affairs (VA), and the University of Kentucky Sanders-Brown Research Center on Aging (SB). Dr. Bob Henry, principal investigator for the project (VA/UKCOD), conducted the survey in three phases: the design and development of the oral health survey instrument; the recruitment, training and calibration of volunteer dentists statewide to perform the clinical component of the survey; and the recruitment of elder Kentuckians to participate in the study. Research team members Nancy Sallee (UKCOD) and Dr. Lisa Durham (SB) were responsible for administering a survey consisting of 48 questions related to oral health to nursing homes (NH), well elders (WE) or Sanders-Brown (SB) elders. Case managers in the 15 Area Agencies on Aging (AAA) interviewed the homebound elders (HE). Additional assistance for the survey was received from graduate students for completion of their degree requirements.

A systematic sample of seniors was recruited from

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Table 1. Oral Health Issues Found in Kentucky Nursing Home Survey

## Oral Health Issues Found in Kentucky Nursing Home Survey\*

\*The Kentucky Elder Oral Health Survey, 2005, Lexington, Kentucky, Division of Dental Public Health, College of Dentistry, University of Kentucky, 2005.

Elder Responses from Questionnaire or Clinical Exam Finding	Nursing Home Elders (Elders residing in nursing homes in KY). 342 NH with 26,198 NH residents Sample: 413	Well Elders (Elders who are independent, living in their own home, and utilize Senior Centers). 477,580 in KY. Sample: 430
Dentate (With teeth)	Dentate: 56.2% (232)	Dentate: 57.4% (247)
1. Intraoral pathology (roof of mouth infection)	13.1% (54)	9.3% (40)
2. Oral Hygiene Status is Fair/Poor	51.6% (213)	23.1% (99)
3. Loose teeth	12.9% (30)	4.5% (11)
4. Gums that bleed (gingivitis)	55.6% (129)	34.8% (86)
5. Poor Periodontal Health (Gums not healthy)	64.2% (149)	47.3% (117)
6. Needing early (1 month) or immediate (ASAP) periodontal care (acute, symptomatic)	18.6% (43)	5.3% (13)
7. Decayed Teeth (Total) 4 or less decayed teeth 5 or more decayed teeth	52.2% (121) 37.9% (88) 14.2% (33)	25.5% (63) 22.7% (56) 2.9% (7)
8. Urgency of treatment needed for decayed teeth: Needing early or immediate care	Sample with decay=121 64.1% (80)	Sample with decay=63 36.6% (23)
9. Overall oral health status is Fair/Poor	79.8% (185)	50.6% (125)
10. Percentage of elders with NO TEETH Edentulous with NO DENTURES or Report their Dentures are INADEQUATE (comfort, function, esthetics)	43.8% (n=181) 10.9% (n=20) 77.1% (n=118)	42.6% (n=183) 7.7% (n=14) 25.0% (n=41)
11. Overall Treatment urgency (Those needing early or immediate care)	21.6% (89)	8.2% (35)
12. Length of time since last dental visit: Less than 1 year One to 5 years Five or more years	28.3% (117) 22.8% (94) 32.7% (135)	47.2% (203) 22.8% (94) 22.3% (96)
13. Top 3 reasons of most recent dental visit A. Dentures/Partials B. Prevention/cleaning C. Pain/Emergency/Ex traction D. Restorative/fillings	A. 39.5% (149) B. 32.4% (122) C. 13.3% (50)	B. Cleaning: 64.3% (45) A. Denture: 8.6% (6) D. Fillings: 10.0% (7)
14. Elders reporting difficulty in obtaining basic dental services (check-ups, cleanings, fillings)	51% (50)	32.5 (26)
15. Top 3 barriers to dental care/services A. No way to get there/transport B. No dental insurance C. Limited mobility D. Can't Afford E. Don't know where to go	A. 44.0% (51) B. 36.2% (42) C. 33.6% (39)	D. Afford: 55.4% (62) B. Insure: 44.6% (50) E. Where: 8.9% (10)

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**Cases of Selected Reportable Diseases in Kentucky  
(YTD Through MMWR Week 52 For Each Year) Preliminary Totals\***

Disease	2006	2005
AIDS**	144	171
Chlamydia	8940	8351
Gonorrhea	3277	2935
Syphilis (All forms)	73	52
Group A Streptococcus	40	35
Meningococcal Infections	11	20
Hepatitis A	33	24
Hepatitis B	68	67
Hepatitis C	36	16
E. coli Shigatoxin Positive	101	76
Salmonella	456	488
Shigella	235	334
Tuberculosis	84	123
Animal Rabies	30	17

Vector-Borne	2006	2005
Rocky Mountain Spotted Fever	3	3
Lyme Disease	7	5
Ehrlichiosis	4	5
Tularemia	0	3
Arboviral Encephalitis	6	5
Malaria	4	10

Vaccine Preventable	2006	2005
<i>Haemophilus influenzae</i> , invasive	5	14
Measles	0	0
Mumps	1	0
Pertussis	55	140
Rubella	0	1
<i>Streptococcus pneumoniae</i>	36	32
Tetanus	0	0

\*NOTE: Data for 2006 are preliminary due to reporting delays and are subject to change.

\*\*Reflects AIDS cases only, does not include those who have HIV, but not AIDS.

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senior citizen centers (WE), nursing homes (NH), and the SB Center (WE). The directors of the 15 AAAs identified the HE. Fifteen dentists in five regions of the state volunteered to provide clinical exams of seniors participating in the study.

The purpose of KEOHS was to provide a benchmark status report on the oral health of Kentucky's elders (age 65 and older). Findings from the survey have established the baseline for the Kentucky Elder Surveillance System. Policy makers can utilize the data from the KEOHS to establish a plan for the optimal oral health for Kentucky seniors.

Notable findings from the KEOHS are found in Table 1 (page 8).