

Communicable Diseases

The prevention of infectious diseases is historically part of the bedrock of public health practice. Fortunately, many infectious diseases such as chicken pox, measles, influenza, and hepatitis B can now be prevented through immunizations. However, people do not always receive the recommended vaccinations and therefore still become sick, disabled, or die from infectious diseases that are entirely preventable. Food-borne illnesses are among the most common of infectious diseases. They can lead to acute illness, hospitalization, and even death. Foodborne illnesses are not vaccine preventable but nonetheless are potentially preventable through safe food preparation and storage tactics.¹

Sexually transmitted diseases (STDs), including human immunodeficiency virus (HIV) infection, and unintended pregnancy affect tens of thousands of North Carolinians every year. These preventable conditions can lead to reduced quality of life as well as premature death and disability and result in millions of dollars in preventable health expenditures annually. As with many diseases and health conditions, the burden of sexually transmitted diseases and unintended pregnancy falls disproportionately on disadvantaged populations, young people, and minorities.²

This chapter includes:

- ❖ [Vaccines and Vaccine-preventable diseases](#)
- ❖ [Infectious diseases \(not sexually transmitted\) / TB](#)
- ❖ [Sexually transmitted infections](#)
- ❖ [Outbreaks](#), including Influenza, H1N1, Food-borne illness and Hepatitis B

Section 8.01 Vaccines and vaccine-preventable diseases

Overview

Vaccines work to safeguard children and adults from illnesses and death caused by infectious diseases. The decline in vaccine-preventable diseases is termed one of the decade’s great U.S. public health achievements. The prevention of infectious disease is paramount to public health practice, as the spread of vaccine preventable diseases presents a real threat to health and quality of life. Immunizing individual children also helps to protect the health of the community. When a critical portion of a community is immunized against a contagious disease, most members of the community are protected against that disease because there is little opportunity for an outbreak. Even those who are not eligible for certain vaccines—such as infants, pregnant women, or immune-compromised individuals—get some protection because the spread of contagious disease is contained. This is known as “community immunity.”³

Vaccines are responsible for the control of many infectious diseases that were once common in this country, such as whooping cough, measles, mumps, rubella, polio, and diphtheria. Durham County achieved a rate of 86% for children 24-35 months of age that received complete childhood immunizations. Achieving and maintaining high vaccination coverage levels is important to reduce the burden of vaccine-preventable diseases and prevent a resurgence of these diseases in the United States, particularly in under-vaccinated populations. Continued partnerships among national, state, local, private, and public entities are needed to sustain vaccination coverage levels and ensure that coverage levels for the more recently recommended vaccines continue to increase.

Healthy NC 2020 Objective

Infectious Disease / Foodborne Illness

Healthy NC 2020 Objective ⁴	Current Durham	Current NC ⁵	2020 Target
1. Increase the percentage of children aged 19-35 months who receive the recommended vaccines.	64%* Not available	63%* 77.3% (2007)	91.3%
2. Reduce the pneumonia and influenza mortality rate (per 100,000 population)	19.9% (2009)	18.3% (2009)	13.5%

*2010 North Carolina Immunization Registry (NCIR) Annual Immunization Rate Assessment of children **24-35 months of age** in Durham County for whom immunization data was entered into the NCIR and that received 4 DTaP, 3 Polio, 1 MMR, 2 HIB, 3 Hep B and 1 Varicella vaccine. Durham County Health Dept.’s rate was 86%.

Secondary Data: *Major findings*

The Centers for Disease Control (CDC) published "Ten Great Public Health Achievements—United States, 2001-2010" in the May 20 issue of MMWR. The following is an abstract from the section titled Vaccine-Preventable Disease:

“The past decade has seen substantial declines in cases, hospitalizations, deaths, and healthcare costs associated with vaccine-preventable diseases. New vaccines (i.e., rotavirus, quadrivalent meningococcal conjugate, herpes zoster, pneumococcal conjugate, and human papillomavirus vaccines, as well as tetanus, diphtheria, and acellular pertussis vaccine for adults and adolescents) were introduced, bringing to 17 the number of diseases targeted by U.S. immunization policy. A recent economic analysis indicated that vaccination of each U.S. birth cohort with the current childhood immunization schedule prevents approximately 42,000 deaths and 20 million cases of disease, with net savings of nearly \$14 billion in direct costs and \$69 billion in total societal costs.

The impact of two vaccines has been particularly striking. Following the introduction of pneumococcal conjugate vaccine, an estimated 211,000 serious pneumococcal infections and 13,000 deaths were prevented during 2000-2008. Routine rotavirus vaccination, implemented in 2006, now prevents an estimated 40,000-60,000 rotavirus hospitalizations each year.”⁶

Vaccinations: infants, children and teens

The North Carolina General Statutes (G.S. 130-A-152(a)) require immunizations for every child present in this state. Every parent, guardian or person in loco parentis is responsible for ensuring that their child or children receive required immunizations.

North Carolina has made a concerted effort to ensure that all children receive age-appropriate immunizations. These efforts have paid off, with North Carolina consistently recognized as having one of the highest percentages of immunized two year olds in the country. Eighty percent of children ages 19–35 months were appropriately immunized in 2007, which was comparable to the national average of 80.1%. Since 1995, the vaccination rate among two year olds has increased from less than 60% to 80%.

Children in North Carolina are required to receive vaccinations against ten different diseases by the time they enroll in kindergarten. In Durham County, 94 % of kindergarten students are up to date with required vaccines for the 2010-2011 school years.⁷ Beginning with the 2008–2009 school year, new immunization requirements were enacted for kindergarten, 6th grade, and college students in North Carolina. Administrative rules now require a booster of tetanus, diphtheria, and acellular pertussis (Tdap) vaccine and a second dose of the mumps vaccine. The changes were based on recommendations from the Centers for Disease Control (CDC) and are aimed at reducing the incidence of whooping cough and mumps in the state.⁸

In an effort to facilitate better reporting and surveillance of childhood immunizations, the Division of Public Health continues to expand the North Carolina Immunization Registry (NCIR). The electronic registry is a secure, web-based clinical tool designed to have a single consolidated immunization record for each child in the state, regardless of how many immunization providers have seen the child. This system allows providers to look up the immunization status of a child and determine what additional immunizations may be needed. It will also provide quick access in the event of an outbreak, vaccine recall, or other situation that

requires rapid identification of immunizations administered. Currently, all local public health departments are participating in the North Carolina Immunization Registry. In addition, more than 600 private medical providers are participating.⁹ More accurate statistics on the vaccination status of children in Durham County will be available when all providers participate in the NCIR.

According to 2009 National Immunization Survey-Teen, adolescent vaccination rates are increasing across the United States. Continued increases—as much as 15 percent—were made in nationwide coverage for vaccines specifically recommended for pre-teens.¹⁰

Vaccinations: college students

College freshmen, especially those who live in dormitories, are at a slightly increased risk for bacterial meningitis caused by *Neisseria meningitidis* bacteria (meningococcal disease) compared with other persons of the same age. As of 2009, a total of 34 states have adopted legislation requiring colleges to provide information on risks of meningococcal disease to incoming students and/or students residing on campus, and 15 states have mandated vaccination for certain students, unless a vaccination waiver is provided.¹¹

In Durham County, Duke University and North Carolina Central University (NCCU) require undergraduates to meet the North Carolina immunization requirements for college entry. In addition, Duke University is currently requiring undergraduates to be vaccinated against meningococcal disease and NCCU is strongly recommending it.^{12, 13}

Six confirmed cases of meningococcal invasive disease in ages 8 years – 70 years were reported in Durham County during the period of January 2008 to January 2011. One case was in an 18 year old college student that had not received the meningococcal vaccine.

Vaccinations: refugees

In 2010, Durham County Health Dept Immunization Program provided immunizations services to 203 refugees from many different countries including Vietnam, Iraq, Bhutan, Ethiopia, Malaysia, Congo, Burma and Thailand. The I-693, Report Vaccination Record was provided to 93 refugees. Table 8.01(a) below depicts the number of refugees in Durham County receiving the I-693 vaccine between the years of 2004-2010.

Table 8.01(a)

**Number of Refugees receiving I-693 Vaccination
Report of Vaccination Record at DCHD¹⁴**

2004	55
2005	80
2006	75
2007	38
2008	53
2009	41
2010	93

Pneumonia and influenza:

Individuals aged more than 65 years, those with chronic health conditions, pregnant women, and young children are at higher risk of developing complications such as pneumonia from the flu.¹⁵ From 2005-2009, pneumonia and influenza were the 8th leading cause of death among Durham County residents with a total of 226 deaths. In North Carolina, it was the 7th leading cause of death with a total of 8,632 deaths.¹⁶

On February 24, 2010 vaccine experts voted that everyone 6 months and older should get a flu vaccine each year starting with the 2010-2011 influenza season. Durham County Health Department administered 3,429 influenza vaccines during the 2010-2011 influenza season.

Primary Data

The 2010 Durham County Community Health Opinion Survey Results showed that when residents were asked to pick the top three unhealthy behaviors in Durham County that have the largest impact on the community as a whole, less than 5% chose “not getting immunizations.”¹⁷

In 2010, 47.6% of Durham County residents compared to 42.2% of North Carolinians reported receiving an influenza vaccine in their arm. In 2010, 28.9% of Durham County residents reported that they had EVER had a pneumonia shot, which was similar to the state results. Individuals older than 45 years (42.8%) were much more likely to report receiving this injection.¹⁸

Only 10% of the influenza vaccines administered by the Durham County Health Department during 2010-2011 were administered to persons 65 years of age and older.¹⁹ Over the last several years seniors have reported that influenza vaccine is readily available in the community at grocery stores, pharmacies, and at their primary care providers.

Interpretations: Disparities, gaps, emerging issues*Disparities*

Since 1994, The National Immunization Survey (NIS) has collected data to monitor childhood and adolescent immunization coverage. This survey found that coverage differed by race/ethnicity. In general, racial minorities were less likely to receive certain immunizations compared to white children and adolescents. For example, compared to white children, black and multiracial children were less likely to receive Rotavirus, and black and American Indian/Alaska Native children were less likely to receive Hepatitis A. One exception was that Hispanic children were more likely than white children to receive the Hepatitis B birth dose.²⁰ Among adolescents, blacks and Hispanics had significantly lower coverage compared to whites for the recommended three doses of HPV vaccine.²¹

The 2010 North Carolina Behavioral Risk Factor Surveillance System (BRFSS) illustrated that when Durham County adult residents were surveyed and asked whether they had received an influenza vaccine in the last year, disparities existed as evidenced by Figure 8.01 (a) below. For example, females, whites, those older than 45 years, and those with annual incomes of more than \$50,000 per year are more likely to have been vaccinated.²²

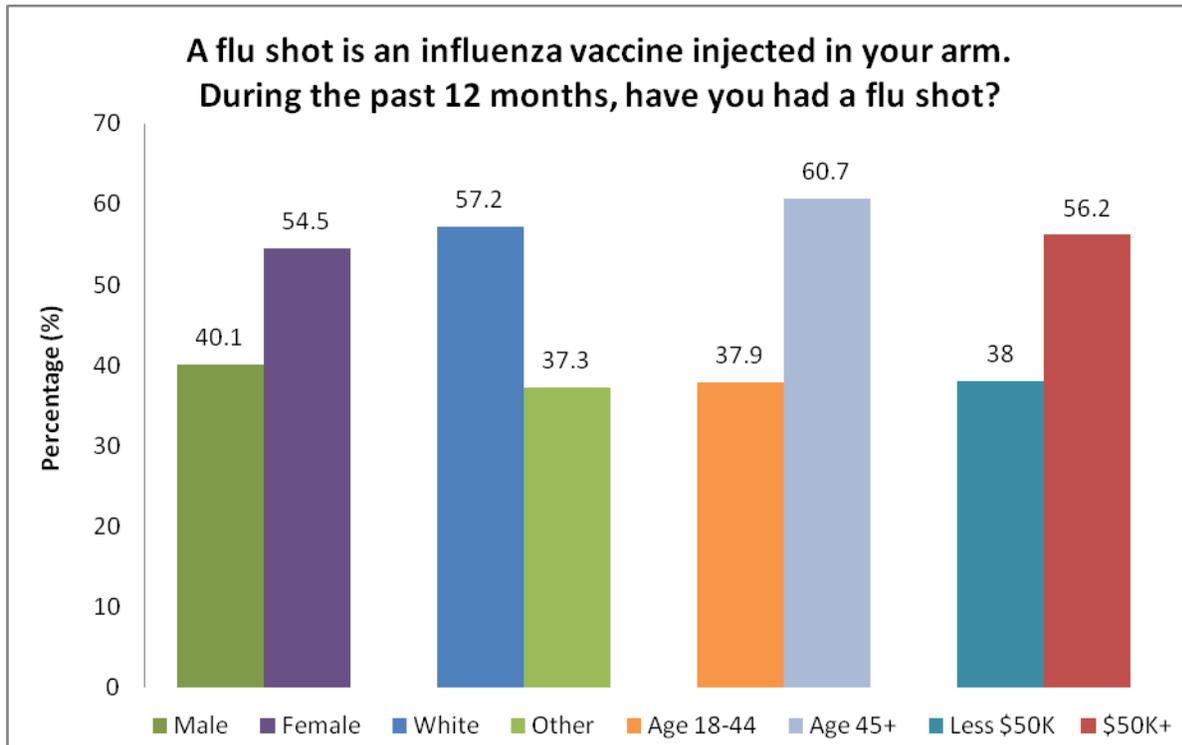


Figure 8.01 (a) BRFSS Data

Emerging issues

The Vaccines for Children (VFC) program has been effective in reducing gaps in coverage levels related to poverty status. Effective July 1, 2010, the North Carolina Immunization Program (NCIP) changed to a VFC-only program. This means only children who qualify for the federal VFC entitlement program may receive vaccines at no cost from the state. Prior to this change, the NC Immunization Branch used federal funds for children eligible for the federal VFC program, and used state funds to provide vaccines for children who were not eligible for the VFC program. Currently, the NC Immunization Branch will no longer provide vaccines for children who are ineligible for the federal VFC program. The NCIP will continue to exist and serve the approximately 67% of children in North Carolina who qualify for VFC vaccines.²³

Unfortunately, the United States has recently seen a return of children falling ill from immunizable conditions such as measles and whooping cough. Complications from these conditions can be severe for children — resulting in hospitalization, disability, and even death. Nationally, some recent cases have been associated with parents intentionally rejecting vaccines out of religious beliefs or concerns that some immunizations might be linked to autism and other disorders.²⁴ The most common and specific claims are that autism stems from the measles-

mumps-rubella (MMR) vaccine or from vaccines that contain the preservative, thimerosal. Many large studies have been conducted to investigate these specific concerns, but no link has ever been found between vaccines and autism. Still, these unproven claims persist, and they have led some parents to refuse vaccination for their children.

During the 2010-2011 influenza season, the Durham County Health Department (DCHD) offered 33 outreaches clinics for influenza vaccine, three Mass Vaccination Clinics where a total of 1,154 vaccines were administered on one Saturday, and 9 community outreach events for senior citizens at the Durham Center for Senior Life group meal sites and two local churches. Two other strategies used to increase immunizations rates at Durham County Health Department are standing orders which allow nurses and other healthcare personnel to vaccinate eligible patients without direct physician intervention or involvement and walk-in influenza/pneumonia vaccination-only clinics that do not require an appointment.

Recommended Strategies

1. Promote the North Carolina Immunization Registry (NCIR) to all providers:

Immunization providers may access all recorded childhood immunizations administered in North Carolina, regardless of where the immunizations were given. The primary purposes of the NCIR are:

- To give patients, parents, health care providers, schools and child care facilities timely access to complete, accurate and relevant immunization data;
 - To assist in the evaluation of a child's immunization status and identify children who need (or are past due for) immunizations;
 - To assist communities in assessing their immunization coverage and identifying areas of under-immunization; and
 - To fulfill federal and state immunization reporting needs.
2. Promote the Immunization Action Coalition (IAC) as a premier source of childhood, adolescent, and adult immunization information for healthcare professionals. The IAC (<http://www.immunize.org>) works to increase immunization rates and prevent disease by creating and distributing educational materials for health professionals and the public that enhance the delivery of safe and effective immunization services. IAC also facilitates communication about the safety, efficacy, and use of vaccines within the broad immunization community of patients, parents, healthcare organizations, and government health agencies.
 3. Promote the CDCs highly informative websites related to vaccines such as:
 - CDC's Vaccine & Immunization Homepage: <http://www.cdc.gov/vaccines>
 - New Preteen and Teen Vaccines: <http://www.cdc.gov/vaccines/who/teens>
 - CDC's Travel Vaccinations: <http://wwwnc.cdc.gov/travel/page/vaccinations.htm>

4. CDC encourages the use of evidence-based methods of improving coverage, which include parent and provider reminders, reducing out-of-pocket costs, increasing access to vaccination, and multi-component interventions that include education. Research is under way to understand barriers to implementing proven methods of improving coverage and identify approaches to promoting more widespread implementation.²⁵

Current Initiatives & Activities

- ***North Carolina (NC) Immunization Branch***

The NC Immunization Branch promotes public health through the identification and elimination of vaccine-preventable diseases. In 2001, the Branch incorporated an adult education component into the program to raise awareness of the agelessness of immunizations. There is information available for parents, adults, and about child care, schools, and colleges.

Website: <http://www.immunize.nc.gov/>
Phone: (919) 707-5550

- ***Durham County Health Department (DCHD) Immunization Clinic***

The clinic offers immunizations by appointment M-F from 8:30am -11:30am and 1:00 p.m.-4:00 p.m. The DCHD is closed the first Wed. afternoon of each month for staff development. This Clinic also provides immunizations services to refugees.

Website: <http://www.durhamcountync.gov/departments/phth/>
Phone: (919) 560-7608

- ***Lincoln Community Health Center (LCHC), Inc.***

LCHC is a JCAHO accredited facility that provides accessible and affordable outpatient health care services to the medically underserved including pediatric services that includes immunizations.

Website: <http://www.lincolnchc.org/>
Phone: (919) 956-4000

- ***For parents with concerns about vaccines and autism:***

The American Academy of Pediatrics has issued a statement

Website: www.aap.org/advocacy/releases/autismparentfacts.htm
www.aap.org/healthtopics/Autism.cfm
www.immunize.org/catg.d/p4026.pdf
www.immunize.org/catg.d/p4028.pdf

Books: *Autism's False Prophets: Bad Science, Risky Medicine, and the Search for a Cure*, by Paul A. Offit
Unstrange Minds: Remapping the World of Autism, by Roy Richard Grinker, PhD

Section 8.02 *Infectious diseases (not sexually transmitted)/TB*

Overview

Infectious diseases are caused by agents that are infective and may originate from bacteria, fungus, viruses, or parasites.²⁶ Infectious diseases entail three major types: diseases that have existed for years, new or recently identified infectious diseases known as emerging infectious diseases and zoonotic infectious diseases (diseases that spread from animals to humans). Some commonly known infectious diseases include tuberculosis (TB), Salmonella and Rocky Mountain Spotted Fever (RMSF).

The National Center for Emerging and Zoonotic Infectious Diseases, a division of the Centers for Disease Control and Prevention (CDC), aims to prevent disease, disability, and death caused by a wide range of infectious diseases.²⁷ Each of the center's seven divisions works with partners to protect and improve the public's health in the United States and worldwide.

Non-sexually transmitted communicable diseases are reported at both the state and national levels. This list of reportable diseases is periodically revised. Officials at the state health departments and the CDC collaborate in determining which communicable diseases should be reportable nationally. Communicable disease reporting is mandated by legislation or regulation at both the state and local levels; however, state reporting to the CDC is voluntary.

Communicable diseases not only impact the morbidity of Durham County residents, but in some cases may also lead to death. Additionally, the individual's health and well-being are affected by lost time from work and school. The impact of communicable diseases, such as TB, can be felt throughout an entire community not only by creating the potential for large-scale outbreaks, but also by contributing to increasing health care expenses.

Healthy NC 2020 Objective

There are no Healthy NC 2020 objectives for non-sexually transmitted infectious diseases.

However, the Durham County Health Department's Communicable Disease Program created objectives based on the objectives of the Epidemiology and Communicable Disease Branch of the North Carolina Department of Public Health, which include:

1. To eliminate the occurrence and transmission of tuberculosis in the community.
2. To conduct thorough reporting and investigation of communicable diseases and prompt communicable disease control management to protect the health of the community.²⁸

Secondary Data: Major findings*Tuberculosis*

Figure 8.02(a) depicts 2009 U.S. TB case rates, based on 2009 CDC data. According to this data, there were 11,545 new cases of TB reported in the United States; the average TB case rate in North Carolina was less than 3.5 per 100,000, which was lower than the national average of 3.8 per 100,000 during this year.²⁹

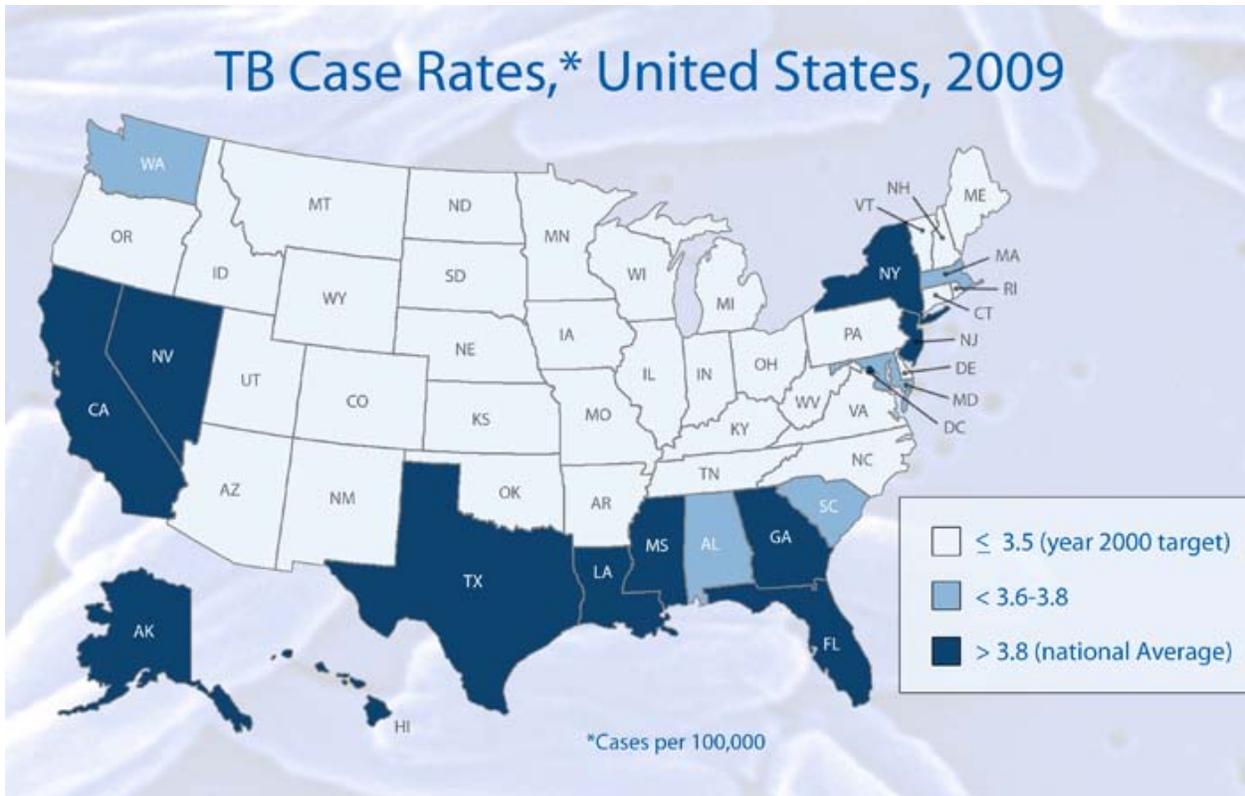


Figure 8.02(a) 2009 US TB Case Rates

Data from the North Carolina Department of Public Health Epidemiology and Communicable Disease Branch show that TB incidence in North Carolina has decreased 23% between 2002 and 2008; from 434 to 335 per 100,000.³⁰ Similarly, Durham County has also experienced a decrease in TB incidence over the past several years.

The rates of active TB decreased in 2010 to 4.6 per 100,000 from 5.2 per 100,000 in 2009. However, Durham County has yet to re-attain its lowest recent level of 3.2 per 100,000 in 2007 as depicted in Figure 8.02(b) below.³¹ Also, between 2009 and 2010, Durham County saw an 8% decrease in the proportion of active TB cases that are foreign-born, which accounted for 50% of all TB cases in 2010. Yet the proportion of HIV-positive persons co-infected with TB significantly increased between 2009 and 2010, from 8.3% to 28.6%, respectively.³²

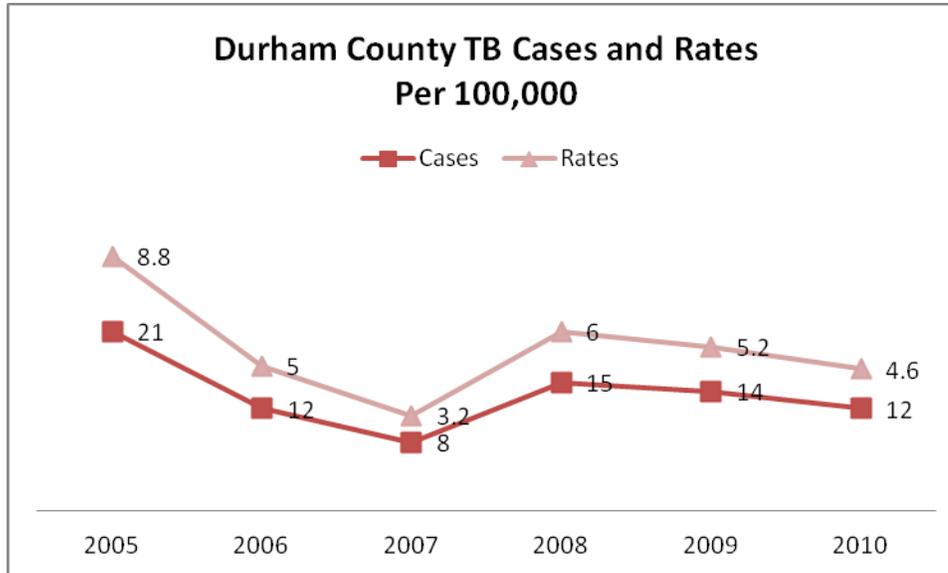


Figure 8.02(b) Durham TB Cases and Rates per 100,000³³

Other Communicable Diseases (excluding vaccine-preventable diseases, TB, and STDs)

Other communicable diseases may present in the community at any time. The Durham County Health Department's Communicable Disease Program must investigate reports in a timely manner in order for rapid initiation of required or needed control measures to be instituted. All reported suspected or confirmed cases are investigated and followed up. Communicable disease follow-up may affect individuals or large groups. All reported and investigated communicable diseases must be entered in the North Carolina Electronic Disease Surveillance System (NCEDSS). NCEDSS is a web-based surveillance and reporting system. NCEDSS is also part of the Public Health Information Network (PHIN).³⁴ The reportable diseases in North Carolina are shown in the Table 8.02(a) below.

Table 8.02(a) North Carolina Reportable Diseases

CHAPTER 41 – HEALTH: EPIDEMIOLOGY
SUBCHAPTER 41A – COMMUNICABLE DISEASE CONTROL
SECTION .0100 – REPORTING OF COMMUNICABLE DISEASES
10A NCAC 41A .0101 REPORTABLE DISEASES AND CONDITIONS

(a) The following named diseases and conditions are declared to be dangerous to the public health and are hereby made reportable within the time period specified after the disease or condition is reasonably suspected to exist:

- (1) Acquired Immune Deficiency Syndrome (AIDS) - 24 hours;
- (2) anthrax - immediately;
- (3) botulism - immediately;
- (4) brucellosis - 7 days;
- (5) campylobacter infection - 24 hours;
- (6) chancroid - 24 hours;
- (7) chlamydial infection (laboratory confirmed) - 7 days;

- (8) cholera - 24 hours;
- (9) Creutzfeldt-Jakob disease – 7 days;
- (10) cryptosporidiosis - 24 hours;
- (11) cyclosporiasis - 24 hours;
- (12) dengue - 7 days;
- (13) diphtheria - 24 hours;
- (14) Escherichia coli, shiga toxin-producing - 24 hours;
- (15) ehrlichiosis - 7 days;
- (16) encephalitis, arboviral - 7 days;
- (17) foodborne disease, including Clostridium perfringens, staphylococcal, Bacillus cereus, and other and unknown causes - 24 hours;
- (18) gonorrhea - 24 hours;
- (19) granuloma inguinale - 24 hours;
- (20) Haemophilus influenzae, invasive disease - 24 hours;
- (21) Hantavirus infection – 7 days;
- (22) Hemolytic-uremic syndrome – 24 hours;
- (23) Hemorrhagic fever virus infection –immediately;
- (24) hepatitis A - 24 hours;
- (25) hepatitis B - 24 hours;
- (26) hepatitis B carriage - 7 days;
- (27) hepatitis C, acute - 7 days;
- (28) human immunodeficiency virus (HIV) infection confirmed - 24 hours;
- (29) influenza virus infection causing death in persons less than 18 years of age – 24 hours;
- (30) legionellosis - 7 days;
- (31) leprosy – 7 days;
- (32) leptospirosis - 7 days;
- (33) listeriosis – 24 hours;
- (34) Lyme disease - 7 days;
- (35) lymphogranuloma venereum - 7 days;
- (36) malaria - 7 days;
- (37) measles (rubeola) - 24 hours;
- (38) meningitis, pneumococcal - 7 days;
- (39) meningococcal disease - 24 hours;
- (40) monkeypox – 24 hours;
- (41) mumps - 7 days;
- (42) nongonococcal urethritis - 7 days;
- (44) plague - immediately;
- (45) paralytic poliomyelitis - 24 hours;

Adapted from North Carolina Division of Public Health Communicable Disease Manual Public Management of Communicable Diseases and Conditions Updated March 23, 2011.

2007-2010 Trends for Non-Vaccine Preventable Communicable Diseases in Durham County³⁵

Figure 8.02(c) below depicts the three highest reported non-vaccine preventable communicable diseases in Durham County from 2007-2010, according to data provided by the NCEDSS. Salmonella, a food-borne illness, consistently ranks in the top three for all four years, while Campylobacter (another food-borne illness) remained in the top three between 2007 and 2009. Rocky Mountain Spotted Fever (RMSF), a vector-borne illness transmitted by ticks, ranked in the top three for both 2007 and 2008, and ultimately became the highest reported non-vaccine preventable communicable disease in 2010. In 2009, Streptococcus A, more commonly known as “Strep Throat,”³⁶ entered the top three highest reported diseases, accounting for 9.41% of all reported non-vaccine preventable communicable diseases. In 2010, Ehrlichia, HME, another vector-borne disease transmitted by ticks, joined Salmonella and RMSF in the top three accounting for 13.55% of all reported non-vaccine preventable communicable diseases.

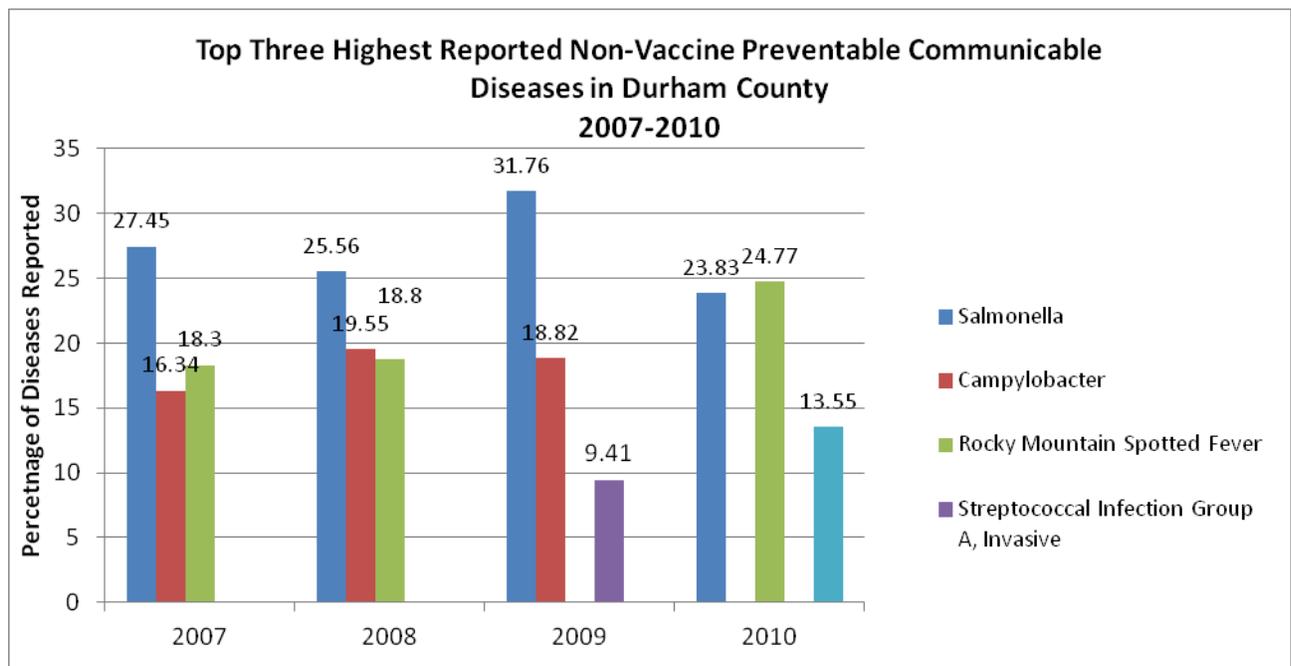


Figure 8.02(c) 2007-2010 Trends³⁷

Emerging Diseases

In Durham County, waterborne illnesses such as Cryptosporidium infection (Cryptosporidiosis) have been reported as emerging infectious diseases. Cryptosporidium is a gastrointestinal disease that causes diarrhea and has become one of the most common causes of recreational water illness in the United States; it is found in almost every part of the world.³⁸ *Vibrio vulnificus*, a kind of bacteria found in warm coastal waters in North Carolina, and vector-borne diseases (diseases transmitted via insect or arthropod) are also causes of some of these emerging infectious diseases.³⁹

Primary Data

In 2010, the Durham County Community Opinion Survey was conducted. Two-hundred and seven (207) randomly selected households participated in this survey. One question on the survey asked respondents to choose their top three health problems in Durham County from a list. Substance abuse and obesity were the top two selected issues. While some Durham residents are concerned with infectious diseases (non-sexually transmitted), it was not a top priority and was only selected by 8.4% of respondents.⁴⁰

Interpretations: *Disparities, gaps, emerging issues*

Disparities

The CDC states that although the number of reported TB cases is at an all time low in the U.S., the rates of TB in foreign-born persons from countries of high prevalence, as well as TB rates among U.S.-born racial/ethnic minorities, is excessively high.⁴¹ According to 2009 CDC data, the highest rate of TB for U.S.-born individuals was found among Black/ African Americans, accounting for 42% of the cases.⁴² Additionally, foreign-born Hispanics and Asians represented 80% of TB cases in foreign-born persons, and accounted for 48% of the national case total.⁴³

Gaps

Awareness and education of TB in the community is a gap. There is also a need for medical providers and health care organizations to be educated on the new reporting system for communicable diseases. There continues to be a lag in medical providers' timely reporting of communicable diseases to the health department. New arrivals to Durham County will also need to be informed of the preventative services available for communicable diseases in order to control the spread of these diseases.

Emerging Issues

Immigrants and refugees from countries with high endemic rates of infectious diseases such as TB and HIV are becoming residents of Durham County. This contributes to increased health care costs and public health workforce workloads. Imported communicable diseases puts further strain on the community's ability to control and prevent communicable diseases. Furthermore, complex care is required for managing co-infected TB/ HIV patients.

Recommended Strategies

Timely reporting and investigation of communicable diseases such as TB will ensure prompt communicable disease control in protecting the health of the community. The continued enforcement of North Carolina's communicable disease statutes and rules, and implementation of the required control measures will assist efforts to control and prevent the spread of communicable diseases. There must be ongoing efforts to address the disparities between U.S.-born and foreign-born persons, and between whites and minorities in the United States.⁴⁴

Provision of culturally-competent healthcare is vital to successful treatment and prevention of communicable diseases in the community. Continued education via websites and outreach activities will promote health care access, thus preventing the transmission of communicable diseases in the community.

Current Initiatives & Activities

▪ ***Durham County Health Department (DCHD) TB Control Program***

The DCHD provides a comprehensive Tuberculosis Control Program for early identification of persons with TB, their contacts, and positive reactors to PPD Mantoux tuberculin skin test. All individuals of Durham County who present with symptoms or are referred by a private physician, hospital, or another health care provider are eligible for services.

The TB Control Program at DCHD provides the following services to residents:

- TB testing for high risk individuals.
- TB evaluation for people with a history of a previous positive TB skin test but no active TB disease.
- Preventive treatment for people with inactive TB infection.
- Identification and treatment of individuals with active TB disease.
- TB education for health care workers and people at risk for TB infection.

Website: http://www.co.durham.nc.us/departments/phth/CDC_New_Information_.html

Phone: (919) 560-7600

▪ ***Durham County Health Department Communicable Disease Program***

The staff of the DCHD's Communicable Disease Program conduct thorough reporting and investigation of communicable diseases and prompt communicable disease control management to protect the health of the community. The program also provides enforcement of North Carolina's communicable disease statutes and rules through implementation of appropriate control measures.

Website: http://www.co.durham.nc.us/departments/phth/CDC_New_Information_.html

Phone:: (919) 560-7600

▪ ***North Carolina Department of Health and Human Services Public Health Division- Communicable Disease Control Branch Epidemiology Section***

The Communicable Disease Branch promptly investigates disease outbreaks and unusual situations, as well as implements control measures to minimize further transmission of disease. Additionally, this branch is in charge of monitoring disease reporting by physicians and laboratories in order to detect trends and to assess the public health impact of diseases, among other tasks.

Website: <http://www.epi.state.nc.us/epi/gcdc.html>

Phone : (919) 733-3419

- ***North Carolina Department of Health and Human Services Public Health Division
Tuberculosis Control Branch***

The state TB Control Branch provides access to information about TB disease and prevention in North Carolina. The Tuberculosis Control program, located in the Public Health Division of the NC Department of Health and Human Services, is the lead agency in combating tuberculosis in the state.

Website: <http://www.epi.state.nc.us/epi/tb/>
Phone : (919) 733-3419

Section 8.03 Sexually transmitted infections (STIs)

Overview

Sexually transmitted infections (STIs) have a significant health and economic impact on the people of North Carolina. These preventable infections lead to reduced quality of life as well as premature death and disability and can result in significant health care costs.⁴⁵ Data from the North Carolina Institute of Medicine show that chlamydia, gonorrhea, and syphilis are the three most common STIs in North Carolina; STI rates among North Carolinians are persistently above national averages and chlamydia is the most prevalent reportable STI in North Carolina, which can cause cervicitis, infertility and pelvic inflammatory disease (PID) in females.⁴⁶ In 2008, individuals under the age of 30 years accounted for approximately 85% of new chlamydia cases across the state.⁴⁷ Syphilis is another STI with high rates in North Carolina. Untreated syphilis can lead to long term complications such as organ damage, paralysis, or blindness, and infection in pregnant women can cause premature births or infant deaths.⁴⁸ North Carolinians also contract HIV at a rate greater than the national average. An estimated 35,000 North Carolinians have HIV/AIDS (including those who are unaware of their status). In addition HIV/AIDS was the seventh leading cause of death among 25- to 44-year-old Hispanics/Latinos in 2007.⁴⁹

Healthy NC 2020 Objective

Sexually Transmitted Diseases

Healthy NC 2020 Objective ⁵⁰	Current Durham	Current NC ⁵¹	2020 Target
1.Reduce the percentage of positive results among individuals aged 15 to 24 tested for chlamydia	n/a*	9.7% (2009)	8.7%
2. Reduce the rate of new HIV infection diagnoses (per 100,000 population).	32.7 (2009) ⁵²	24.7 (2008)	22.2

*In 2010, the total number of cases of chlamydia reported in Durham was 1,898. This reflects an increase from 2009 (1,471 cases).⁵³ In 2009, Durham County’s rate of new chlamydia infections was 559.9 per 100,000.⁵⁴ Data on percentage of positive results for individuals tested for chlamydia is not available for Durham County because Durham is not funded by the CDC’s Infertility Prevention Project.

Secondary Data: Major findings

HIV

Durham County has the 4th highest rate of HIV in North Carolina and 1,399 of its residents living with HIV.⁵⁵ More than 50% of living cases diagnosed in North Carolina were from seven counties: Mecklenburg (17.6%), Wake (10.4%), Guilford (7.4%), Durham (5.8%), Forsyth (4.9%), Cumberland (4.7%), and New Hanover (2.4%).⁵⁶ The principal risk for HIV is men

having sex with men, but heterosexual sex is also a significant mode of transmission.⁵⁷ This data is depicted in both Table 8.03(a) and Figure 8.03(a) below.

- HIV Rates: Peer Counties (Cumberland, Guilford & Wayne) and NC*

Durham ranks 4th highest in North Carolina, with an average rate of HIV disease well above the state rate. The three-year (2007-2009) average rate of diagnosed HIV disease in NC was 19.3 per 100,000 and Durham’s rate was 32.7 per 100,000.⁵⁸

Table 8.03(a)⁵⁹ **Durham, Peer Counties and North Carolina Three Year Trends for HIV Disease Rank Order***

Rank	County/State	2007 Cases	2008 Cases	2009 Cases	2007 Rate	2008 Rate	2009 Rate	AVG Rate
4	Durham	71	99	86	27.8	37.7	32.7	32.7
7	Guilford	151	144	123	32.5	30.5	26.0	29.7
8	Cumberland	91	82	80	29.5	26.2	25.6	27.1
35	Wayne	16	14	16	14.1	12.3	14.1	13.5
	NC	1807	1782	1710	20.0	19.3	18.5	19.3

*Rank based on three year average rate per 100,000

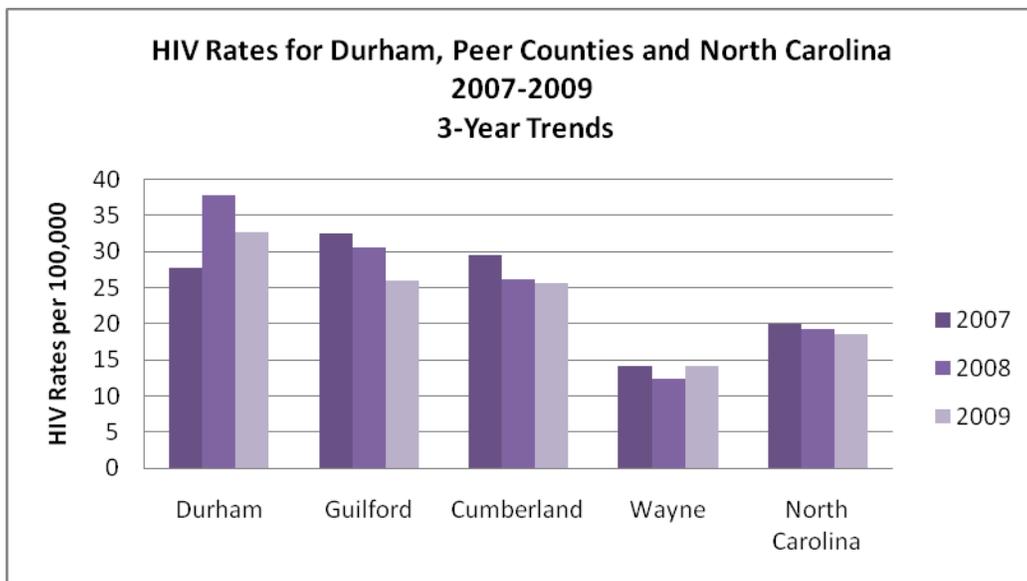


Figure 8.03(a) 2007-2009 HIV Rates

Chlamydia, Gonorrhea and Syphilis

Durham County ranks 6th highest in North Carolina for early syphilis cases (n=25), after Forsyth (195), Mecklenburg (174), Wake (115), Guilford (68), and Wayne (59).⁶⁰ This data is depicted in both Table 8.03(b) and Figure 8.03(b) below.

Table 8.03(b) Five year trends for Chlamydia, Gonorrhea & Syphilis* rates / 100,000 in Durham ⁶¹

	2005 Cases	2006 Cases	2007 Cases	2008 Cases	2009 Cases	2005 Rate	2006 Rate	2007 Rate	2008 Rate	2009 Rate
Chlamydia	1,479	1,331	1,218	1,460	1,471	607.3	534.8	477.0	555.7	559.9
Gonorrhea	743	769	810	728	561	305.1	309.0	317.2	277.1	213.5
Syphilis	12	16	31	24	25	4.9	6.4	12.1	9.1	9.5

*Primary and Secondary Syphilis

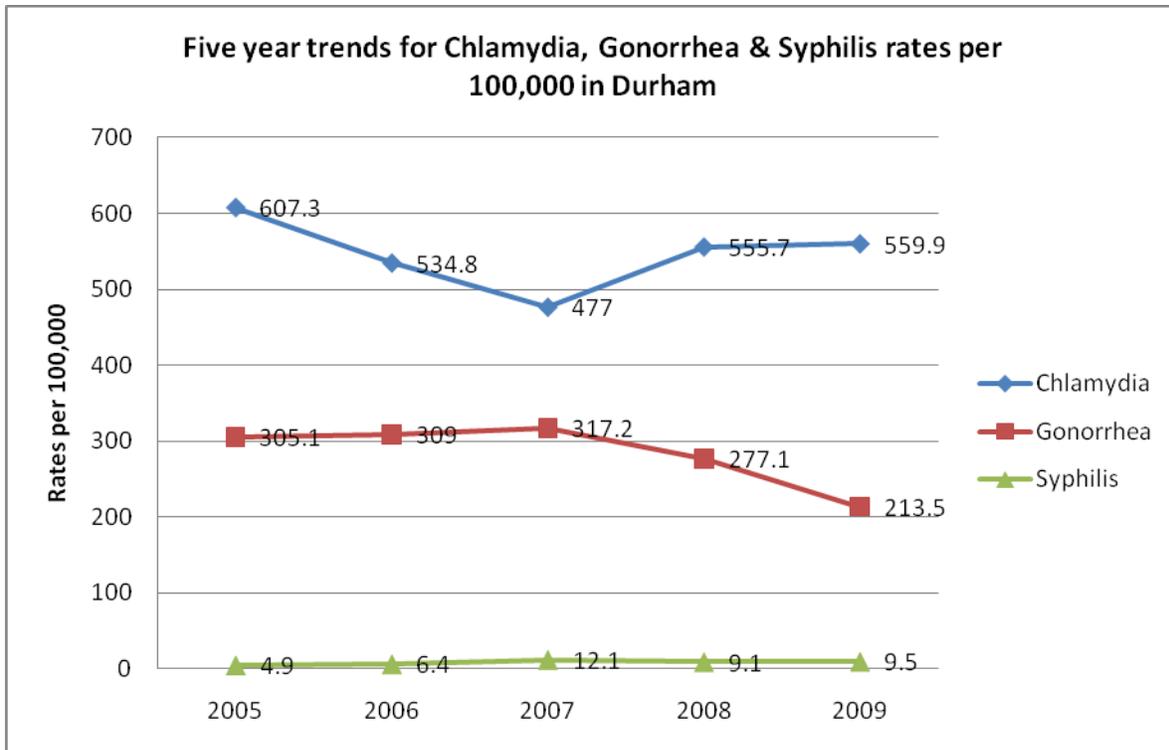


Figure 8.03(b) Five Year Trends

Durham Health Innovations (DHI) Data ⁶²

Geospatial mapping conducted by the HIV/STD/Hepatitis Team of Durham Health Innovations identified neighborhoods with the highest number of HIV, STIs and hepatitis cases. Temporal maps depict the dynamic spread of the HIV epidemic over the period from 2004-2008, predominantly into south-central and southwestern Durham.

Primary Data

Additional DHI Data ⁶³

Recent qualitative studies conducted by the HIV/STD/Hepatitis Team of Durham Health Innovations found that people avoid HIV testing because of fear they will be unable to cope with a positive diagnosis or fear of being stigmatized in ways that will affect their lives and relationships. Frequently mentioned barriers to seeking treatment were cost, transportation, and

low medical literacy. Other barriers to treatment stemmed from stigma and fear, such as fear of being ostracized or abandoned, and fear of living with a chronic illness and facing possible death. Mistrust of doctors and healthcare were also stated. Pastors stated concerns about their need to discuss the moral issues underlying risky behavior and the negative attitudes that many congregants associate with HIV diagnosis. Youth in the focus groups indicated embarrassment about others finding out that they may have an STI.

*2010 Durham County Community Health Opinion Survey*⁶⁴

Sexually transmitted infections are an area of concern for Durham parents as shown by the results of the 2010 Durham County Community Health Opinion Survey. Respondents with children were asked, “Do you think any of your children could use more information on any of the following risky behaviors I am about to read?,” and then were asked to respond “yes” or “no.” HIV/STDS was one of the more frequently cited health problems by respondents with children; almost 36% percent felt that their children could use more information about HIV/STDs. Results are depicted in figure 8.03(c) below.

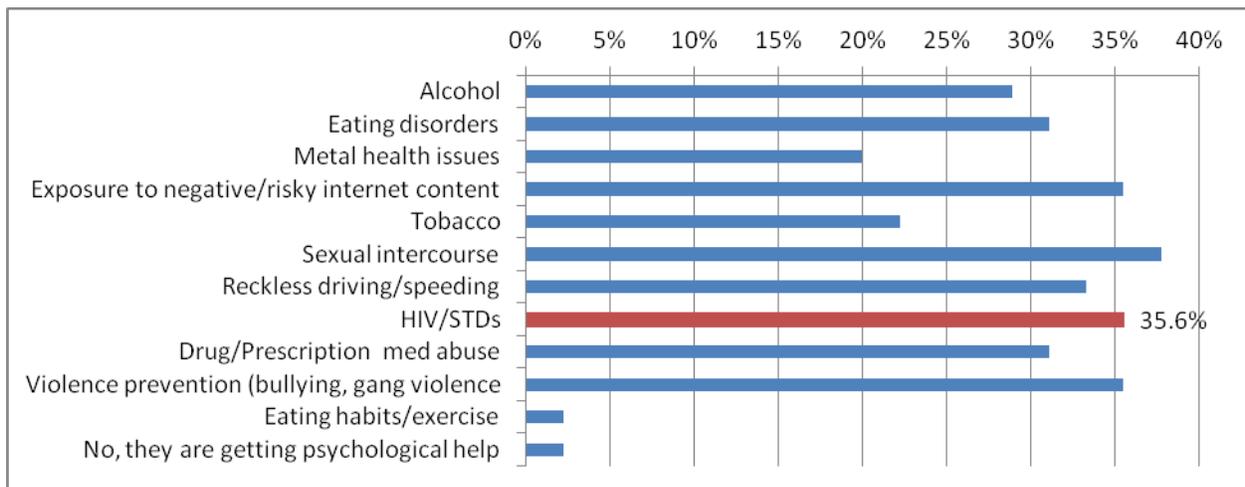


Figure 8.03(c) Results of the 2010 Durham County Community Health Opinion Survey

Interpretations: Disparities, gaps, emerging issues

The difference in health outcomes regarding HIV/AIDS between blacks and whites is of major concern. In Durham County, blacks comprise 35.3% of the population; however, they represent 47% of all reported cases of HIV.⁶⁵ Blacks have an HIV rate that is 9 times higher than the rate of whites.⁶⁶ In 2009, the highest rate of new HIV diagnoses was among black males. This rate was more than eight times greater than the rate for white males. In 2009, the rate of new HIV diagnoses for black females was more than 14 times higher than that of white females, constituting the largest observed health disparity.⁶⁷

Although a large HIV/AIDS disparity is found in blacks, Latinos are also disproportionately affected by HIV disease when compared to the whites. Five-year trend data spanning 2005-2009 show that North Carolina Latinos are 4 times more likely to acquire HIV than whites.⁶⁸ This trend data is depicted in Figure 8.03(d) below.

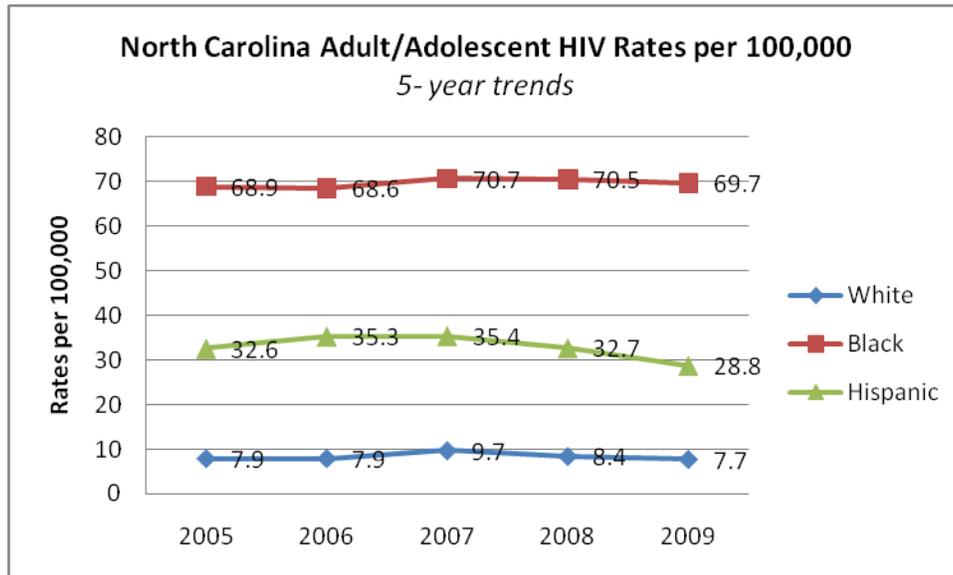


Figure 8.03(d) HIV Rates 5-Year Trends

Identified areas of need for persons living with HIV/AIDS include lack of affordable housing, lack of access to healthcare and treatments, and lack of supportive services to maintain health and wellness. The expansion of housing specifically for the use of people with HIV/AIDS has been slow, although the demand has more than tripled in the past few years. Additionally, this demand has shifted towards a greater housing need for families with children.

As primary healthcare becomes either unattainable or inaccessible, linkage to community-based services is necessary. Continuity or reestablishment of healthcare is particularly challenging for persons living with HIV/AIDS as they are released from prison and for those that have been lost to care after initial presentation for clinical treatment. Personnel that are available to assist individuals with this transition and to aid in navigating the healthcare system are important in order to reduce the amount of HIV in disadvantaged and disenfranchised communities. Bridge counselors are effective in providing the linkage of services for individuals newly diagnosed, recently released from prison, and lost to care. County employed Disease Intervention Specialists are also additional resources needed to address clients lost to follow up and partner notification of reportable sexually transmitted infections.

Although several HIV community awareness and testing events occur throughout the community that has led to most Durham County residents knowing about HIV, many do not apply prevention strategies or see themselves at risk. Stigma and fear continue to serve as catalysts that fuel the spread of the virus. As more problems materialize, it is imperative to concentrate on populations and subsets of populations at greater risk for contracting HIV and other STIs. Traditional outreach efforts and prevention messages targeting young men of color who have sex with men have proven outdated. Young men are linking up via the internet through social media networks (i.e. Facebook, Myspace, Adam 4 Adam, and Black Gay Chat). Effective cyber outreach programs are vital to reaching this population in order to disseminate culturally

appropriate materials and prevention messages. Moreover, the number of women incarcerated in the US continues to climb. Providing appropriate post-release services for HIV positive women is important as they rebuild their lives and reconnect with their children. Finally, there is also a need for structured activities and programs for young people age 13-18 that focus on esteem building, cultural values, bullying, cyber bullying, gang violence, sexual assault, and sexual health to help reduce the likelihood of young people engaging in behaviors that place them at risk for HIV and other STIs.

Recommended Strategies

Table 8.03(b) Evidence –Based and Promising Practices Resources⁶⁹

Category	Name	Description	Website	Matching 2010 Objective
School	Safer Choices	A two-year, HIV/STI and teen pregnancy prevention program with the primary goal of reducing unprotected sexual intercourse by encouraging abstinence among students who report having sex.	http://www.advocatesforyouth.org/storage/advfy/documents/sciencesuccess.pdf	STD/UP Objective 1, 2, & 3
Community	Adolescent Pregnancy Prevention Campaign of North Carolina	The state's leader in preventing teen pregnancy and promoting healthy adolescence through advocacy, collaboration and education. Empowering families, communities and educators to help teens become healthy, contributing adults is a surefire way to strengthen our future.	http://appnc.org/	STD/UP Objective 1, 2, & 3
Healthcare	Project Respect	The Enhanced Counseling intervention consisted of 4 sessions, a total of 200 minutes, and was completed in 3-4 weeks.	http://www.cd.cdc.gov/hiv/resources/reports/hiv_compendium/section1-11.htm	STD/UP Objective 3

Reduce Risky Sexual behavior (from the NC Prevention Action Plan):⁷⁰

1. Durham County needs a County Disease Intervention Specialist (DIS) who can conduct partner notification in both Spanish and English for gonorrhea and chlamydia as well as HIV and syphilis. Currently, the state's DIS are only able to assist with HIV and syphilis partner notification; we therefore rely on the patients to notify their own sexual partners that they may have been exposed to gonorrhea and/or chlamydia. This limitation makes

it more difficult to make a genuine impact regarding STI treatment and prevention efforts in Durham County, and to limit the transmission of STIs in the community.

2. New strategies should be developed to reach youth, especially young men of color who have sex with men, with effective prevention messages. In an effort to reach unmet populations in the community, we suggest an expansion of non-traditional testing for HIV and STIs, with community partners, AIDS service agencies and faith-based organizations. Additionally, we recommend the development of marketing initiatives to combat stigma, especially as it pertains to HIV through community-wide events such World AIDS Day and National HIV Testing Day.
3. Secondary preventive strategies for HIV should prioritize getting people living with HIV in care and keeping them in care. Durham County should sustain and expand Care Bridge Coordination (CBC) programs for people living with HIV in Durham. A major focus of the CBC program is ensuring early entry into treatment and care for those newly diagnosed, as well as reestablishing care for persons living with HIV/AIDS. Connecting individuals to healthcare is not only essential for supporting physical health, but it additionally allows for linkage to social support groups and services, mental health services and drug assistance programs.

Current Initiatives & Activities

Testing continues to increase across Durham and North Carolina. There has been an increase in HIV testing availability with an expansion of rapid HIV testing initiatives to community health centers, emergency departments and community based organizations. Community agencies such as Alliance of AIDS Service – Carolina, the Durham County Health Department, El Centro Hispano, Planned Parenthood, CAARE, Inc. and the Lincoln Community Health Center (LCHC) and the LCHC Early Intervention Clinic, in addition to local hospitals and some private health care providers, offer HIV and STI testing in Durham. Several agencies offer HIV/STI screening and testing at no cost to the client. Testing has increased since 2006 when the Centers for Disease Control and Prevention (CDC) recommended that HIV testing become a part of routine health screening, and that testing throughout prenatal care and up to delivery should be increased.⁷¹ In addition, these groups and others are actively involved in providing prevention education, including evidence based interventions, as well as community education and testing events.

Since 2002, all HIV tests processed through the North Carolina State Lab of Public Health have included the addition of PCR/RNA testing. This test has the potential to detect early or acute HIV infection, before the sufficient production of antibodies necessary for detection on the standard EIA antibody test. Early detection and notification are essential goals in prevention, as clients who know their positive HIV status will potentially adopt safer sex practices.

Durham County has participated in the CDC Syphilis Elimination Effort (SEE) since 1999. The Durham County Health Department was recently recognized by the Adolescent Pregnancy Prevention Campaign of North Carolina and received the Science Matters award for the

implementation of science-based programming by coordinating with Durham County Public Schools to have most health educators trained to implement Making Proud Choices curricula (an evidence based intervention) in health education classes. The DCHD Division of Education consistently uses evidence based interventions for reproductive health education programs.

- ***Partnership for a Healthy Durham HIV/STI Committee***

The HIV/STI Advisory Council brings together community members and agencies to focus on strategies to prevent the spread of syphilis and HIV/AIDS, which disproportionately impacts the minority community.

Website: http://www.healthydurham.org/index.php?page=committees_std
Phone Number: (919) 560-7833

- ***Alliance of AIDS Services – Carolinas (AAS-C)***

The mission of AAS-C is to serve people living with HIV/AIDS, their loved ones, caregivers and communities at large, through compassionate and non-judgmental care, prevention, education and advocacy.

Website: <http://www.aas-c.org/>
Phone Number: (919) 834-2437

- ***El Centro Hispano***

El Centro Hispano is a grassroots community based organization dedicated to strengthening the Latino community and improving the quality of life of Latino residents in Durham, Chapel Hill, Carrboro and the surrounding area.

Website: <http://www.elcentronc.org/ElCentroHispano/Main.html>
Phone Number: (919) 687-4635

- ***CAARE, Inc.***

Healing with CAARE, Inc. a nonprofit community-based organization has helped decrease a broad range of health disparities that are affecting global health. The top five health disparities - cancer, cardiovascular disease, diabetes, obesity, and HIV/AIDS are CAARE's primary focus areas.

Website: <http://caare-inc.org/>
Phone Number: (919) 683-5300

- ***Duke AIDS Research and Treatment Center***

The Duke University AIDS Research and Treatment (DART) Center provides outstanding HIV/AIDS patient care, fosters innovative but responsible clinical research, and trains medical practitioners in HIV/AIDS clinical care.

Website: <http://www.dukehealth.org/services/dart/about>
Phone Number: (919) 681-6261

- ***Planned Parenthood***

Planned Parenthood is the nation’s leading sexual and reproductive health care provider and advocate. Planned Parenthood also works with partner organizations worldwide to improve the sexual health and well-being of individuals and families everywhere.

Website: <http://www.plannedparenthood.org/health-center/centerDetails.asp?f=2196&a=90840&v=details>
Phone Number: (919) 286-2872

- ***Durham Health Innovations***

Durham Health Innovations, a unique partnership between Duke Medicine and Durham County, funded 10 teams to work collaboratively to develop ways to reduce death or disability from specific diseases or disorders prevalent in the community. The team projects have focused on improved measurable health status, incorporated multidisciplinary partnerships among representatives from Durham and Duke, and used information technology to facilitate the coordination of care.

Website: <https://www.dtmi.duke.edu/about-us/organization/duke-center-for-community-research/about-us>

- ***Lincoln Community Health Center – Early Intervention Clinic***

The mission of Lincoln Community Health Center is to provide comprehensive primary and preventive health care in a courteous, professional and personalized manner. The early Intervention clinic provides medical treatment and social work services to people with HIV/AIDS in any stage of the disease.

Website: <http://www.lincolnchc.org>
Phone Number: (919) 560-7726

- ***Durham County Health Department***

The mission of the Durham County Health Department (DCHD) is to preserve, protect and enhance the general health and environment of the community. The DCHD provides confidential HIV Testing and Counseling, STD Screening, HIV/STD education and testing in the community and in the county jail.

Website: http://www.co.durham.nc.us/departments/phth/Communicable_Disease.html
Phone Number: (919) 560-7600

Section 8.04 *Outbreaks*

Overview

The American Public Health Association defines a communicable disease as an illness due to an infectious agent or its toxic products that is transmitted from an infected person, animal or inanimate source to a susceptible host (person or animal not possessing sufficient resistance to that particular infectious agent to prevent from contracting the illness after an exposure).⁷² In North Carolina, there are over 70 specific diseases or conditions that are reportable to public health officials under communicable disease laws.⁷³ In addition, outbreaks of illnesses are also reportable, which are defined as an increase above the expected number of persons with a communicable disease (ex: number of children in a daycare with diarrheal illnesses). This section will focus on influenza, foodborne illnesses, and acute Hepatitis B.

Influenza, also known as the flu, is a contagious respiratory disease caused by viruses. There are two main types of influenza (A and B) and several different strains of that can circulate each year. In 2009, the world experienced a pandemic of novel influenza A from a new strain not previously seen before (H1N1) that caused more deaths in children and young adults than seasonal flu. Influenza is a preventable illness due to the availability of vaccines for circulating strains; however, clusters of illnesses or outbreaks of the flu can still occur especially in the setting of a new strain like the pandemic flu of 2009.

Foodborne diseases, including food-borne intoxications (ex: heavy metals) and food-borne infections, are acquired through consumption of contaminated food or water. Many bacterial, viral or parasitic organisms can cause foodborne diseases, which can range from self-limited illnesses, mild gastrointestinal symptoms to more severe infections from bloodstream involvement. Foodborne disease may be one of the most common causes of acute illness; however, many cases and outbreaks are unrecognized and unreported.

Hepatitis B is a contagious liver disease that results from infection with the Hepatitis B virus. Hepatitis B is usually spread when blood or other body fluids from an infected person enter the body of someone who is not infected through direct contact, sexual activity, or shared needles or other injection drug equipment. Hepatitis B can also be passed from an infected mother to her baby at birth. When first infected, a person can develop an “acute” infection, which can range from a very mild illness with nausea or appetite loss to a more serious condition with fever or jaundice (yellow coloring of the skin). Some people are able to fight the infection and clear the virus, but others can develop a “chronic” or lifelong illness from liver damage or liver cancer.

Healthy NC 2020 Objective

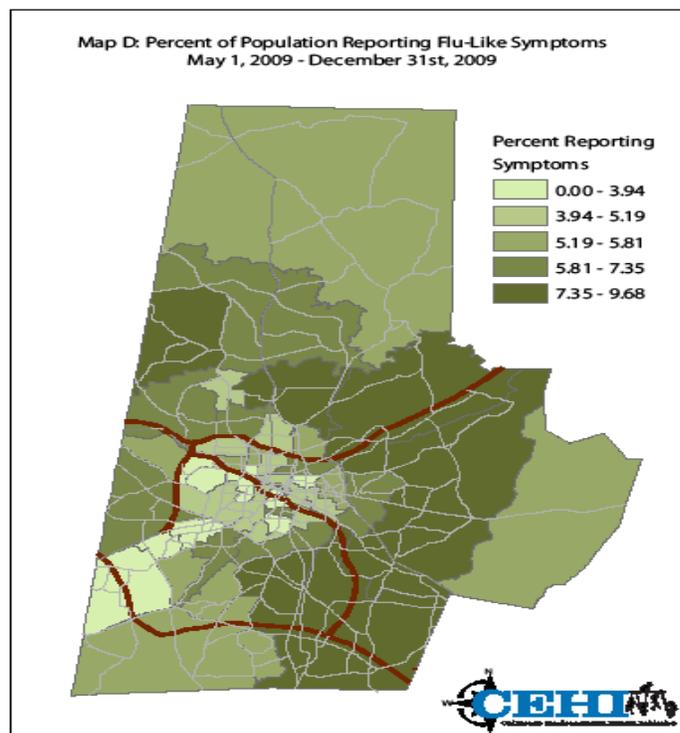
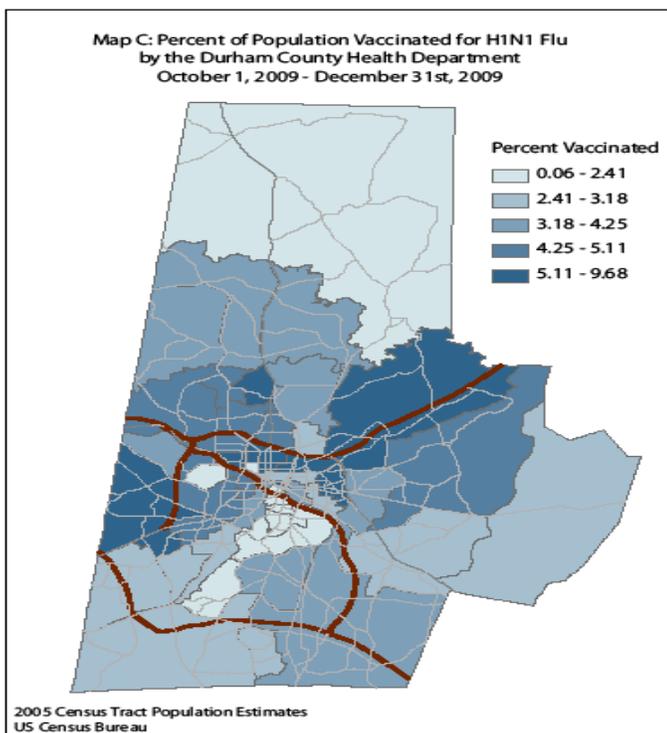
Infectious Disease and Foodborne Illness

Healthy NC 2020 Objective ⁷⁴	Current Durham	Current NC ⁷⁵	2020 Target
1. Reduce the pneumonia and influenza mortality rate (per 100,000) population	18.9 (2008)	19.5 (2008)	13.5
2. Decrease the average number of critical violations per restaurant/food stand	6.8 (2009)	6.1 (2009)	5.5

Secondary Data: Major findings

Influenza:

Seasonal influenza is not a reportable disease, but novel strains of influenza are reportable because they constitute a greater public health threat. Prior to 2009, only seasonal influenza deaths in children were captured along with influenza-like illnesses (ILI) at ILI surveillance sites in North Carolina; with the 2009 pandemic, all cases were initially reported from the novel strain. However, this was subsequently changed to deaths from the H1N1 virus as more people became infected and less specific testing for the H1N1 infection was considered necessary as the pandemic spread throughout the community. From May 2009-May 2010, Durham County had four deaths reported from the H1N1 influenza virus. The first confirmed case of H1N1 in Durham County was reported on 05/22/2009 followed by 40 additional confirmed cases through 09/22/2009. Many more residents presented with ILI, with the proportion of residents who presented to Duke University Health Systems (DUHS) with ILI varying among census tracts throughout the county (Map D). Map C illustrates the large percentage of the population that was vaccinated for H1N1 Flu just by the Health Department.



Durham County experienced two large outbreaks of H1N1 – the first occurred among Duke University summer camp attendees in July 2009, and the second was a cluster of four cases of oseltamivir-resistant H1N1 (the antiviral treatment for the flu) among hospitalized patients at DUHS between October-November 2009.

The Durham County Health Department (DCHD) launched a pandemic influenza vaccination campaign in October 2009 which continued until June 2010 with a total of 32,837 doses of H1N1 vaccine being administered in Durham County. The DCHD administered 14,163 doses providing over 4,900 doses at 3 mass vaccination clinics held at the National Guard Armory. Vaccination Clinics were also held at 3 local High Schools providing 1,154 doses in one day. H1N1 vaccine and supplies were dispersed through the Durham County Health Department to the hospitals, private providers (including pediatric practices) and to many other facilities in the community.

Foodborne Illnesses:

The most common foodborne illnesses reported in Durham County are salmonellosis, campylobacter, shigellosis, hepatitis A, cryptosporidium and *Escherichia coli* infections.⁷⁶ Since 2005, the number of cases of foodborne illnesses has remained steady or decreased overall, with an increase in salmonellosis and campylobacter infections in 2010 (Figure 8.04(a) below). Norovirus can also cause diarrhea, vomiting, and abdominal pain, but is not a reportable illness. However, norovirus is the number one cause of domestically acquired foodborne diseases in the country,⁷⁷ and is also a frequent cause of diarrheal outbreaks in long-term care facilities.

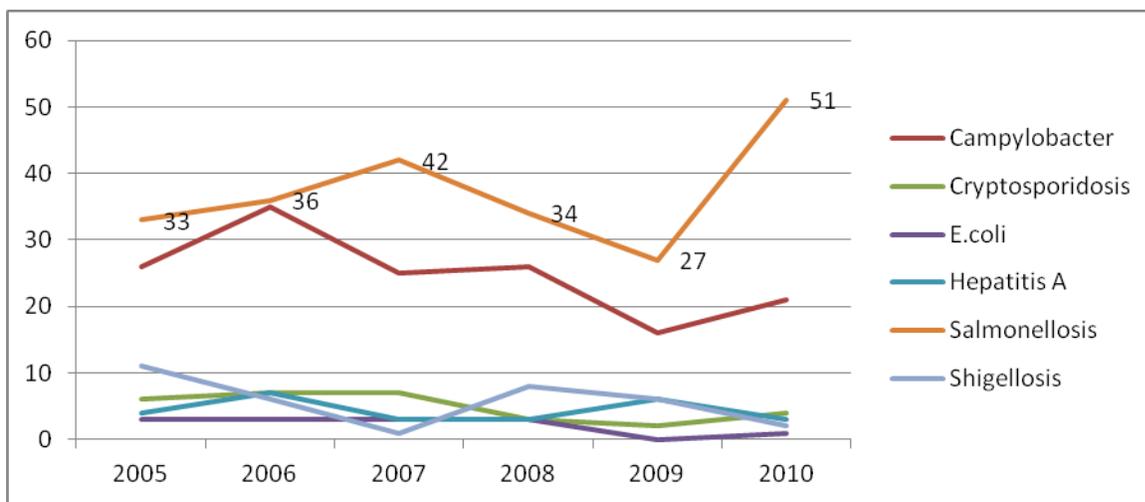


Figure 8.04(a): Number of cases of common foodborne illnesses in Durham County, 2005-2010.

The Durham County Health Department (DCHD) received several reports of illnesses that could have been foodborne-related between 2005-2010. Two notable events were an outbreak of norovirus in 2008 associated with a local diner and an outbreak of *Salmonella enteritidis* in 2010 associated with an egg-based product served at a local restaurant.

On March 27, 2008, DCHD initiated a formal investigation of a gastrointestinal illness outbreak affecting persons who ate at catered events from a local diner. Over 130 exposed persons from 22 individual catered events were reported with illness. The etiologic cause was subsequently identified to be norovirus genogroup I from the stool specimens of ill persons residing in different counties following the exposure, and which was noted to be distinct from other norovirus outbreaks occurring in the community due to genogroup II.

On April 23, 2010, DCHD Environmental Health staff received information regarding employees who had become ill after eating food catered from a local restaurant. A press release was issued to notify patrons who ate food from the restaurant, and a hotline was established to receive calls from the public regarding other ill persons. Over 60 persons were identified with gastrointestinal illness from the outbreak, and 22 were confirmed with *Salmonella enteritides* infection. The investigation involved the N.C. Division of Public Health Communicable Disease Branch, the NC Division of Environmental Health, the NC Department of Agriculture and Consumer Services.

Other reports of potential foodborne infections were not associated with clusters of illnesses and were not investigated as foodborne outbreaks. These cases could have been limited to single incidents associated with food from a domestic kitchen or a food service establishment.

Acute Hepatitis B:

Durham County experienced outbreaks of acute hepatitis B infections in two long term care facilities (LTCFs) between 2009 and 2010. DCHD was initially notified in July 2009 of a symptomatic case of acute hepatitis B in an elderly resident of a LTCF. Three additional cases were reported from the same LTCF within 5 months of the initial case report. In May 2010, DCHD was notified of another acute hepatitis B result on a resident in a second LTCF. Testing of residents and active surveillance for additional cases in both facilities led to the identification of 7 acute hepatitis B cases in each LTCF. The investigations required the assistance of the N.C. Division of Public Health Communicable Disease Branch, the Public Health Regional Surveillance Team IV, and the Centers for Disease Control and Prevention. Although the data analysis are still ongoing, no definitive source of transmission for these outbreaks have been identified (i.e. glucose monitoring devices, injections, sexual transmission) from clinical observation or chart reviews.

The DCHD Communicable Disease staff coordinated a vaccination administration program at each LTCF. All patients were offered Twinrix, which is a hepatitis A and B combination vaccine, which was supplied by the N. C. Immunization Program. The series was given over a 7 month period to each resident by LTCF nursing personnel.

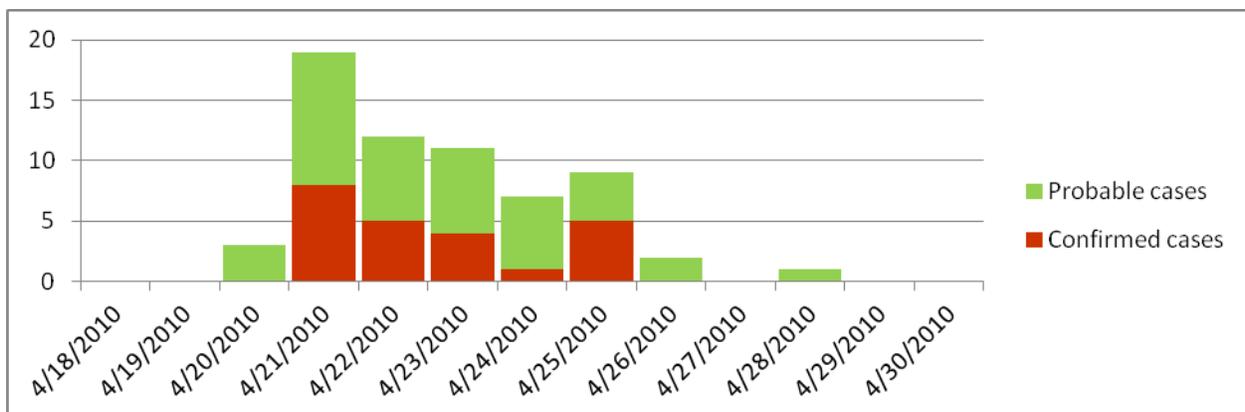
Primary Data

Foodborne Illnesses:

During the norovirus outbreak in 2008, questionnaires were administered and collected from approximately 100 affected individuals. The information assisted in the development of the case definition of nausea, abdominal pain, vomiting and/or diarrhea approximately 24 hours from eating at catered events from the local diner. Based on the epidemiological data regarding the onset of symptoms and the timing of the exposure among different groups of ill persons, the outbreak investigation concluded that norovirus was presumably transmitted from ill food handlers with subsequent contamination of food items.

During the Salmonella outbreak in 2010, DCHD Communicable Disease staff interviewed all reported cases with suspected salmonellosis to obtain food histories and correlate with specimen testing. Initial analysis of the ill employees who ate from a catered event showed that those who consumed banana pudding were 2.6 times more likely to become ill than those not consuming banana pudding. No other food items produced such a strong association.

More interviews were conducted from patrons who ate at the restaurant and from callers to the hotline including the ill and non-ill, and a case-control analysis was performed. Probable cases were defined as individuals who reported been ill with vomiting or diarrhea within seven days of consuming food from the restaurant. Confirmed cases were similarly defined but had laboratory testing that was positive for *Salmonella enteritides*. Controls were defined as individuals who ate food from the restaurant during the exposure period but did not develop illness. Figure 8.04(b) represents an epidemiological curve that exhibits the number of cases that occurred during the time period of exposure. The sudden rise in the number of cases that started on 4/20/2011 suggested an exposure to a common source.



8.04(b) Salmonella Probable and Confirmed Cases in April 2010

Acute Hepatitis B:

DCHD and NC Communicable Disease Branch staff initially conducted site visits to the long term care facilities (LTCFs) to identify potential infection control issues and review medical records of all cases to identify any shared exposures. A staff survey was also administered to

staff at facility 1, from which there were 30 respondents. In general, staff reported appropriate infection control practices including use of gloves, handwashing, and disinfection of glucometers between patients. Staff and administrators denied additional risk factors for hepatitis B including sexual activity or drug use among residents of the facility. Case interviews were limited due to underlying medical conditions including dementia among residents of the LTCFs.

Interpretations: Disparities, gaps, emerging issues

Influenza:

During the influenza pandemic in 2009, national data indicated that 35% of people hospitalized were non-Hispanic blacks, although only 16% of the population in the areas studied were blacks.⁷⁸ Disparities in underlying medical conditions, such as asthma and diabetes, were thought to contribute to the impact of H1N1 on black communities.⁷⁹ Based on our experience with pandemic influenza, blacks in Durham County were also less likely to present for H1N1 vaccinations. A review of 14,038 records of H1N1 influenza vaccines administered by DCHD revealed that only 28% were administered to black clients compared to 58% to whites. When analyzed by gender, 56% of these vaccines were administered to female clients versus 44% for males. The CDC hypothesizes that black communities' historical experiences with healthcare and public health may have impacted their perceptions of the safety and utility of vaccination.⁸⁰

Foodborne Illnesses:

Investigations of foodborne outbreaks can be extensive and require multidisciplinary teams, including communicable disease and environmental health specialists. Prevention and early disease recognition is important to promote among the public, restaurant owners and food-handlers. Assistance from agencies including the N.C. Communicable Disease Branch is also crucial, especially in large outbreaks requiring data collection from multiple sources and prompt analysis in order to determine potential sources of transmission.

Acute Hepatitis B:

Acute hepatitis B among the elderly in a long term care facility (LTCF) is a sentinel event of rare occurrence. Reports of acute hepatitis B in LTCFs warrant an immediate investigation and response. Careful considerations must be given to this vulnerable population who are elderly and may already be compromised with several other chronic medical conditions.

Recommended Strategies

Influenza:

- Enhance promotion of seasonal influenza vaccination and disease recognition among the public, especially among black residents.
- Engage stakeholders in the black community to more effectively address community concerns about vaccinations.

- Continue to maintain a ready public health workforce that can be activated in the event of another pandemic.
- Adopt best practices to facilitate effective vaccination services and increase opportunities for vaccination at schools, pharmacies and stores, workplaces, and other nonmedical sites.

Foodborne Illnesses:

- Improve food safety education for consumers and the public. Proper food handling techniques in the home are as important as those in commercial establishments.
- Food service operators should increase training for employees about food safety and sanitation measures, proper hand-washing procedures, and the importance of exclusion of sick food handlers from the work place. Durham County Environmental Health provides biannual manager food safety certification through the ServSafe training classes. ServSafe training is also offered through private vendors.
- Training for additional public health staff in outbreak investigations and data analysis.

Acute Hepatitis B:

- Continue surveillance for acute hepatitis B among elderly persons in residential settings.
- Provide more education for LTCF staff regarding communicable disease control and preventive measures.
- Emphasize the importance of quality infection control programs in LTCFs to decrease the potential transmission of communicable diseases that can lead to outbreaks.

Current Initiatives & Activities

- ***North Carolina Electronic Disease Surveillance System (NC EDSS)*** – NC EDSS is a component of the Centers for Disease Control and Prevention (CDC) initiative to move states to web-based surveillance and reporting systems. NC EDSS is also part of the Public Health Information Network (PHIN). NC Division of Public Health (DPH) is customizing a system developed by Consilience Software Inc. NC EDSS represents a major change in the way local health departments and the Division of Public Health (DPH) exchange and report data. NC EDSS will be used by DPH, 86 local health departments (LHDs), 8 HIV/STD Regional Offices, and the Department of Environment Health and Natural Resources (DENR).

Website: www.epi.state.nc.us/epi/gcdc/manual/ncedss/NCEDSS.pdf

Phone Number: (919) 733-3419

- ***North Carolina Division of Public Health Communicable Disease Control Branch*** - The Branch has four main objectives:
 - To promptly investigate disease outbreaks and unusual situations and to implement control measures to minimize further transmission of disease
 - To monitor disease-reporting by physicians and laboratories in order to detect trends and to assess the public health impact of diseases

- To provide a channel of communication between public health agencies, private physicians, and hospital and occupational infection control personnel, as an essential part of disease control efforts
- To explain public health interventions and disseminate health education messages to the community and the media in order to enhance disease control efforts

Website: <http://www.epi.state.nc.us/epi/gcdc.html>

Phone Number: (919) 733-3419

▪ ***The Centers for Disease Control and Prevention (CDC)***

For over 60 years, CDC has been dedicated to protecting health and promoting quality of life through the prevention and control of disease, injury, and disability. The CDC is committed to programs that reduce the health and economic consequences of the leading causes of death and disability, thereby ensuring a long, productive, healthy life for all people.

Website: <http://www.cdc.gov/>

Phone Number: 800-CDC-INFO (800-232-4636)

Contributors

#	Name of Section	Name, Credentials	Affiliation
8.01	Vaccines and vaccine –preventable diseases	Diana Coates, RN, BSN	Durham County Health Department
8.02	Infectious diseases (not sexually transmitted)/TB	Hattie Wood, RN, MSN, MHA	Durham County Health Department
8.02	Infectious diseases (not sexually transmitted)/TB	Amanda Mata, MPH	Partnership for a Health Durham, Community Health Assessment Project Assistant
8.03	Sexually transmitted Infections	Mary DeCoster, MPH	Durham County Health Department
8.03	Sexually Transmitted infections	Marc Kolman, MSPH	Duke Medicine, Durham Health Innovations
8.03	Sexually transmitted infections	Caressa White, MS	UNC- Chapel Hill
8.03	Sexually transmitted infections	Sandra Gomez, RN	Lincoln Community Health Center
8.03	Sexually transmitted infections	Cedar Eagle	Durham County Health Department
8.03	Sexually transmitted infections	Karen Hicks, RN, FNP	Durham County Health Department
8.03	Sexually transmitted infections	Colleen Blue, MPH	El Centro Hispano
8.03	Sexually transmitted infections	Arlene Sena, MD, MPH	Durham County Health Department, Medical Director; UNC Infectious Diseases, Associate Professor
8.04	Outbreaks	Robert M. Brown, LSS REHS	Durham County Health Department
8.04	Outbreaks	Arlene Sena, MD, MPH	Durham County Health Department, Medical Director; UNC Division of Infectious Diseases, Associate Professor

Data Sources

- ¹ North Carolina Institute of Medicine Task Force on Prevention. *Prevention for the Health of North Carolina: Prevention Action Plan*. Morrisville, NC: North Carolina Institute of Medicine; 2009. <http://www.nciom.org/wp-content/uploads/NCIOM/projects/prevention/finalreport/PreventionReport-July2010.pdf>. Accessed August 5, 2011.
- ² Ibid.
- ³ The National Institute of Allergy and Infectious Diseases (NIAID). Community Immunity: “Herd Immunity.” Vaccines.gov website. <http://www.vaccines.gov/basics/protection/index.html>. Accessed May 5, 2011.
- ⁴ North Carolina Institute of Medicine. *Healthy North Carolina 2020: A Better State of Health*. Morrisville, NC: North Carolina Institute of Medicine; 2011. <http://publichealth.nc.gov/hnc2020/docs/HNC2020-FINAL-March-revised.pdf>. Accessed September 15, 2011.
- ⁵ Ibid.
- ⁶ Centers for Disease Control and Prevention, US Department of Health and Human Services. Decline in vaccine-preventable diseases called one of the decade's great U.S. public health achievements. *MMWR*. 2011; 60(19):619-623. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6019a5.html>. Accessed May 5, 2011.
- ⁷ North Carolina Department of Health and Human Services (NCDHHS) Women and Children’s Health. North Carolina Immunization Program. NCDHHS Women and Children’s Health website. <http://www.immunize.nc.gov/>. Accessed August 16, 2011.
- ⁸ North Carolina State Center for Health Statistics. *Health Profile of North Carolinians: 2009 Update*. Raleigh, NC: North Carolina Department of Health and Human Services; 2008. <http://www.epi.state.nc.us/SCHS/pdf/HealthProfile2009.pdf>. Accessed August 30, 2011.
- ⁹ North Carolina Department of Health and Human Services (NCDHHS) Women and Children’s Health. North Carolina Immunization Program. NCDHHS Women and Children’s Health website. <http://www.immunize.nc.gov/>. Accessed August 16, 2011.
- ¹⁰ Centers for Disease Control and Prevention (CDC). Teen vaccination rates increasing across US. CDC website. <http://www.cdc.gov/media/pressrel/2010/r100819b.htm>. Accessed August 19, 2011.
- ¹¹ Centers for Disease Control and Prevention (CDC). College freshman. CDC website. <http://www.cdc.gov/meningitis/high-risk/college.html>. Accessed August 16, 2011. Updated June 2009.
- ¹² Duke University. Immunization requirements and forms for new students. Duke University Student Affairs website. <http://www.studentaffairs.duke.edu/studenthealth/resources/immunizationrequirements>. Accessed August 16, 2011.
- ¹³ North Carolina Central University. *North Carolina Central University Admissions: Medical History*. Durham, NC: North Carolina Central University; 2008. <http://web.nccu.edu/law/admissions/pdf/medicalhistory1.pdf>. Accessed August 16, 2011.
- ¹⁴ Durham County Health Department. Durham County Immunization Program. *Internal Records*.
- ¹⁵ Centers for Disease Control and Prevention (CDC). Flu symptoms and severity: influenza symptoms. CDC website. <http://www.cdc.gov/flu/about/disease/symptoms.htm>. Accessed August 16, 2011. Updated June 2011.
- ¹⁶ North Carolina State Center for Health Statistics, North Carolina Department of Health and Human Services website. North Carolina Vital Statistics Volume II: Leading Causes of Death 2009. www.schs.state.nc.us/SCHS/deaths/lcd/2009. Accessed August 16, 2011.
- ¹⁷ 2010 Durham County Community Health Opinion Survey. Partnership for a Healthy Durham website. http://www.healthydurham.org/index.php?page=health_recent. Accessed September 15, 2011.
- ¹⁸ North Carolina State Center for Health Statistics. Behavioral Risk Factor Surveillance System.. 2010 BRFSS topics for Durham County. North Carolina Department of Health and Human Services website. <http://www.schs.state.nc.us/SCHS/brfss/2010/durh/topics.html#pcs>. Accessed August 30, 2011.
- ¹⁹ Durham County Health Department. Durham County Immunization Program. *Internal Records*.
- ²⁰ Centers for Disease Control and Prevention, US Department of Health and Human Services. National, State, and Local Area Vaccination Coverage Among Children Aged 19-35 Months- U.S., 2009. *MMWR*. 2010; 59(36):1171-1177.
- ²¹ Ibid.
- ²² North Carolina State Center for Health Statistics, Behavioral Risk Factor Surveillance System. 2010 BRFSS topics for Durham County. North Carolina Department of Health and Human Services website. <http://www.schs.state.nc.us/SCHS/brfss/2010/durh/topics.html#pcs>. Accessed August 30, 2011.

- ²³ North Carolina Department of Health and Human Services (NCDHHS) Women and Children's Health. North Carolina Immunization Program. NCDHHS Women and Children's Health website. <http://www.immunize.nc.gov/>. Accessed August 16, 2011.
- ²⁴ North Carolina State Center for Health Statistics. *Health Profile of North Carolinians: 2009 Update*. Raleigh, NC: North Carolina Department of Health and Human Services; 2008. <http://www.epi.state.nc.us/SCHS/pdf/HealthProfile2009.pdf>. Accessed August 30, 2011.
- ²⁵ Centers for Disease Control and Prevention, US Department of Health and Human Services. National, State, and Local Area Vaccination Coverage Among Children Aged 19-35 Months- U.S., 2009. MMWR. 2010; 59(36);1171-1177
- ²⁶ Mayo Clinic. Infectious Diseases. Mayo Clinic website. <http://www.mayoclinic.com/health/infectious-diseases/DS01145>. Accessed August 30, 2011.
- ²⁷ Centers for Disease Control and Prevention (CDC). National Center for Emerging and Zoonotic Infectious Diseases. CDC website. <http://www.cdc.gov/ncezid/>. Accessed August 30, 2011.
- ²⁸ Durham County Health Department Communicable Disease Program.
Durham County Health Department (DCHD) Communicable Disease Policies and Procedure. Please contact the DCHD Communicable Disease Program for more information at (919) 560-7608.
- ²⁹ Centers for Disease Control and Prevention (CDC). Reported Tuberculosis in the U.S., 2009. CDC website. <http://www.cdc.gov/Features/dsTB2009Data/>. Accessed August 13, 2011. Updated November 2010.
- ³⁰ This information comes from the NC Electronic Disease Surveillance System, a secure database that is available to healthcare workers with a log-in. For additional data, please contact an author of this section.
- ³¹ Ibid.
- ³² Ibid.
- ³³ Ibid.
- ³⁴ Ibid.
- ³⁵ Ibid.
- ³⁶ Centers for Disease Control (CDC). Group A Streptococcal (GAS) Disease. CDC website. http://www.cdc.gov/ncidod/dbmd/diseaseinfo/groupastreptococcal_g.htm. Accessed August 13, 2011.
- ³⁷ This information comes from the NC Electronic Disease Surveillance System, a secure database that is available to healthcare workers with a log-in. For additional data, please contact an author of this section.
- ³⁸ North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. Communicable Disease Control. NCDHSS, Epidemiology Branch website. <http://www.epi.state.nc.us/epi/gcdc/crypto.html>. Accessed August 13, 2011. Updated May 2011.
- ³⁹ North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. . Communicable Disease: Vibrio Vulnificus: The Facts. North Carolina Department of Health and Human Services (NCDHHS), Epidemiology Branch website. <http://www.epi.state.nc.us/epi/gcdc/vibfacts.html>. Accessed August 13, 2011. Updated April 2011.
- ⁴⁰ 2010 Durham County Community Health Opinion Survey. Partnership for a Healthy Durham website. http://www.healthydurham.org/index.php?page=health_recent. Accessed September 15, 2011.
- ⁴¹ Centers for Disease Control and Prevention (CDC). Reported Tuberculosis in the U.S., 2009. CDC website. <http://www.cdc.gov/Features/dsTB2009Data/>. Accessed August 13, 2011. Updated November 2010.
- ⁴² Ibid.
- ⁴³ Ibid.
- ⁴⁴ Ibid.
- ⁴⁵ North Carolina Institute of Medicine. *Healthy North Carolina 2020: A Better State of Health*. Morrisville, NC: North Carolina Institute of Medicine; 2011. <http://publichealth.nc.gov/hnc2020/docs/HNC2020-FINAL-March-revised.pdf>. Accessed September 15, 2011.
- ⁴⁶ North Carolina Institute of Medicine Task Force on Prevention. *Prevention for the Health of North Carolina: Prevention Action Plan*. Morrisville, NC: North Carolina Institute of Medicine; 2009. <http://www.nciom.org/wp-content/uploads/NCIOM/projects/prevention/finalreport/PreventionReport-July2010.pdf>. Accessed August 5, 2011.
- ⁴⁷ Ibid.
- ⁴⁸ Ibid.
- ⁴⁹ North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. . North Carolina epidemiologic profile for HIV/STD prevention and care planning, December 2009. North Carolina

Department of Health and Human Services (NCDHHS), Epidemiology Branch website.

<http://www.epi.state.nc.us/epi/hiv/epiprofile1209.html> . Accessed May 15, 2011.

⁵⁰ North Carolina Institute of Medicine. *Healthy North Carolina 2020: A Better State of Health*. Morrisville, NC: North Carolina Institute of Medicine; 2011. <http://publichealth.nc.gov/hnc2020/docs/HNC2020-FINAL-March-revised.pdf>. Accessed September 15, 2011.

⁵¹ Ibid.

⁵² North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. . North Carolina epidemiologic profile for HIV/STD prevention and care planning. December 2010. Appendix D: Tables. http://www.epi.state.nc.us/epi/hiv/epiprofile1210/Appx_D_Tables.pdf. Accessed May 15, 2011.

⁵³ North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. *North Carolina HIV/STD Quarterly Surveillance Report Vol. 2010, No. 4*. Raleigh, NC: North Carolina Department of Health and Human Services; 2010. <http://www.epi.state.nc.us/epi/hiv/pdf/vol10no4.pdf>. Accessed May 21, 2011.

⁵⁴ North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. *2009 HIV/STD Surveillance Report*. Raleigh, NC: North Carolina Department of Health and Human Services; 2010. <http://www.epi.state.nc.us/epi/hiv/pdf/std09rpt.pdf> . Accessed May 21, 2011.

⁵⁵ Ibid.

⁵⁶ Ibid.

⁵⁷ Ibid.

⁵⁸ North Carolina Department of Health and Human Services (NCDHHS), Epidemiology Branch. North Carolina epidemiologic profile for HIV/STD prevention and care planning. December 2010. Appendix D: Table, B. http://www.epi.state.nc.us/epi/hiv/epiprofile1210/Appx_D_Tables.pdf. Accessed May 15, 2011.

⁵⁹ Ibid.

⁶⁰ North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. *2009 HIV/STD Surveillance Report*. Raleigh, NC: North Carolina Department of Health and Human Services; 2010. <http://www.epi.state.nc.us/epi/hiv/pdf/std09rpt.pdf> . Accessed May 21, 2011.

⁶¹ Ibid.

⁶² Durham Health Innovations, HIV/STD/Hepatitis Team (2009) *DHI Report*. Unpublished.

⁶³ Ibid.

⁶⁴ 2010 Durham County Community Health Opinion Survey. Partnership for a Healthy Durham website. http://www.healthydurham.org/index.php?page=health_recent. Accessed September 15, 2011.

⁶⁵ Durham Health Innovations, HIV/STD/Hepatitis Team (2009) *DHI Report*. Unpublished.

⁶⁶ Ibid.

⁶⁷ Ibid.

⁶⁸ North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. North Carolina epidemiologic profile for HIV/STD prevention and care planning. December 2010. Appendix D: Table, B. http://www.epi.state.nc.us/epi/hiv/epiprofile1210/Appx_D_Tables.pdf. Accessed May 15, 2011.

⁶⁹ Office of Healthy Carolinians and Health Education. Evidence-based Resources and Promising Practices-Office of Healthy Carolinians and Health Education, NC DPH; Updated 4/2011

⁷⁰ North Carolina Institute of Medicine Task Force on Prevention. *Prevention for the Health of North Carolina: Prevention Action Plan*. Morrisville, NC: North Carolina Institute of Medicine; 2009. <http://www.nciom.org/wp-content/uploads/NCIOM/projects/prevention/finalreport/PreventionReport-July2010.pdf>. Accessed August 5, 2011.

⁷¹ Centers for Disease Control and Prevention (CDC). Revised Recommendations for HIV Testing of Adults, Adolescents, and Pregnant Women in Health-Care Settings. September 2006. CDC website. <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5514a1.htm>. Accessed August 3, 2011.

⁷² American Public Health Association. *Control of Communicable Diseases Manual, 19th Edition*. Washington, DC: American Public Health Association; 2008.

⁷³ North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. 2010 North Carolina Division of Public Health Communicable Disease Manual. North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch website. <http://www.epi.state.nc.us/epi/gcdc.html>. Accessed August 31, 2011.

⁷⁴ North Carolina Institute of Medicine. *Healthy North Carolina 2020: A Better State of Health*. Morrisville, NC: North Carolina Institute of Medicine; 2011. <http://publichealth.nc.gov/hnc2020/docs/HNC2020-FINAL-March-revised.pdf>. Accessed September 15, 2011.

⁷⁵ Ibid.

⁷⁶ North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch. North Carolina Communicable Disease Information. North Carolina Department of Health and Human Services (NCDHHS), Communicable Disease Branch website. <http://www.epi.state.nc.us/epi/gcdc.html>. Accessed August 31, 2011.

⁷⁷ Centers for Disease Control and Prevention (CDC). Estimates of Foodborne Illnesses in the United States. CDC website. <http://www.cdc.gov/foodborneburden/2011-foodborne-estimates.html>. Accessed August 31, 2011.

⁷⁸ Centers for Disease Control and Prevention (CDC). *Emerging Infections Program*. Unpublished.

⁷⁹ Centers for Disease Control and Prevention (CDC). 2009 H1N1 and Seasonal Flu and African American Communities: Questions and Answers. CDC website. http://www.cdc.gov/h1n1flu/african_americans_qa.htm. Accessed August 31, 2011.

⁸⁰ Ibid.