New York City Department of Health and Mental Hygiene
Bureau of Communicable Disease

and

New York City Department of Environmental Protection
Bureau of Water Supply

Waterborne Disease Risk Assessment Program

2006 Annual Report

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EXECUTIVE SUMMARY

New York City's Waterborne Disease Risk Assessment Program was established to: (a) obtain data on the rates of giardiasis and cryptosporidiosis, along with demographic and risk factor information on case-patients; (b) provide a system to track diarrheal illness to assure rapid detection of any outbreaks; and (c) attempt to determine the contribution (if any) of tap water consumption to gastrointestinal disease. The program, jointly administered by the Departments of Health and Mental Hygiene and Environmental Protection, began in 1993. This report provides an overview of program progress, and data collected, during 2006.

ACTIVE DISEASE SURVEILLANCE

Active disease surveillance for giardiasis and cryptosporidiosis began in July 1993 and November 1994, respectively, and continued through 2006. This report presents the number of cases and case rates for both diseases for 2006 (and for past years for comparison). Also, demographic information for cases of giardiasis and cryptosporidiosis was gathered and is summarized in this report. Telephone interviews of cryptosporidiosis case-patients to gather potential risk exposure information continued, and selected results are presented. This report includes a summary of an investigation of a probable foodborne outbreak of giardiasis, involving six confirmed and three probable cases. The outbreak was likely due to contaminated food, served at a lunch, that was shared among cases.

SYNDROMIC SURVEILLANCE / OUTBREAK DETECTION

The tracking of sentinel populations or surrogate indicators of disease can be useful in assessing gastrointestinal (GI) disease trends in the general population. Such tracking programs provide greater assurance against the possibility that a citywide outbreak would remain undetected. In addition, such programs can play a role in limiting the extent of an outbreak by providing an early indication of a problem so that control measures may be rapidly implemented. The City maintains a number of distinct and complementary outbreak detection systems. One system monitors and assists in the investigation of GI outbreaks in sentinel nursing homes. Another system tracks the number of stool specimens submitted to two clinical laboratories for microbiological testing. A third system utilizes hospital Emergency Department chief complaint logs to monitor for outbreaks. The City also utilizes three separate systems for monitoring sales of anti-diarrheal medication: one tracks the weekly volume of sales of non-prescription anti-diarrheal medications at a major NYC drug store chain; an additional pharmacy system tracks daily sales of non-prescription anti-diarrheal medications at another drug store chain; and a third system tracks retail pharmacy data obtained from the National Retail Data Monitor. In 2006, there was a brief interruption in the Emergency Department syndromic surveillance system, and an extended interruption in one of the systems that track sales of anti-diarrheal medications. During these periods, the City's other syndromic and disease surveillance systems remained in operation. A summary of syndromic surveillance findings for 2006 pertaining to GI illness is presented, indicating that there was signaling of multiple syndromic systems from January through March and again in November and December, consistent with annual gastrointestinal viral trends. There was no evidence of a drinking water-related outbreak in New York City.

INFORMATION SHARING AND PUBLIC EDUCATION

Information on *Cryptosporidium* and *Giardia* continues to be available on New York City Department of Environmental Protection's and New York City Department of Health and Mental Hygiene's websites, including annual reports on program activities, fact sheets on giardiasis and cryptosporidiosis, and results from the Department of Environmental Protection's source water protozoa monitoring program.

INTRODUCTION

New York City's Waterborne Disease Risk Assessment Program (WDRAP) was developed and implemented to:

- obtain data on the rates of giardiasis and cryptosporidiosis, along with demographic and risk factor information on case-patients;
- provide a system to track diarrheal illness to assure rapid detection of any outbreaks; and
- attempt to determine the contribution (if any) of tap water consumption to gastrointestinal disease.

Two City agencies are involved in this effort: the Department of Environmental Protection (DEP) and the Department of Health and Mental Hygiene (DOHMH). In addition to participation by staff from both agencies, a special interagency unit, the Parasitic Disease Surveillance Unit, was established to implement major components of this program. In the year 2001, the staff of the Parasitic Disease Surveillance Unit was merged with staff from the DOHMH Bureau of Communicable Disease. Staff members employed by DEP and DOHMH now jointly work on Parasitic Disease Surveillance Program activities as well as on other communicable disease activities. This merger increases the efficiency of the office but does not affect the Parasitic Disease Surveillance Program operations.

Following below is a summary of program highlights and data for the year 2006. Variations in data between this report and previous reports may be due to several factors, including disease reporting delays, correction of errors, and refinements in data processing (for example, the removal of duplicate disease reports). For this report, for calculation of rates, the base population figures used (i.e., denominators) were obtained from year 2000 U.S. Census data. In addition, case rates from prior years have been adjusted in this report to reflect 2000 U.S. Census data, utilizing intercensal population estimates for years 1994 -1999. All rates are annual case rates. Caution must be exercised when interpreting rates based on very small case numbers.

In this annual report, for the geographic breakdown of data, United Hospital Fund (UHF) neighborhood of case-patient residence was used. New York City is divided on the basis of zip code into 42 UHF neighborhoods. Maps illustrating annual rates by UHF neighborhood are included in this report.

Year 2000 U.S. Census data include two race/ethnicity categories that are not included in this report. These race/ethnicity categories are: "Non-Hispanic of Single Race, other than White, Black/African American, Asian, Pacific Islander, American Indian and Alaskan Native" and "Non-Hispanic of Two or More Races." In this report, race/ethnicity-specific case rates are based upon year 2000 Census data for the proportion of New York City residents who were categorized into one of the remaining four racial/ethnic groups (7,724,354 of 8,008,278 total population, or 96.5%). Because disease surveillance data categorizes all case-patients with a known race and ethnicity into one of four race/ethnicity categories, only four of six U.S. census race/ethnicity denominator categories were used to calculate race/ethnicity-specific rates.

Race/ethnicity-specific case rates presented may therefore be somewhat elevated above the true rates.

PART I: ACTIVE DISEASE SURVEILLANCE

Giardiasis

New York City implemented a program of active surveillance for giardiasis in July 1993 to ensure complete reporting of all laboratory-diagnosed cases. Active laboratory surveillance (regular site visits or telephone contact with laboratories) continued in 2006. Also, mailings or telephone calls continued to be made to health care providers and laboratories to obtain basic demographic information missing from case reports. Case rates and basic demographic findings were compiled and reported on a quarterly basis through July 2002. Beginning January 2003, rates and demographic findings have been compiled on a semi-annual basis.

During 2006, a total of 938 cases of giardiasis were reported to DOHMH and the annual case rate was 11.7 per 100,000. Annual case numbers increased 7.2% from 2005 to 2006. However, from 1994 to 2006 annual case numbers decreased 62.7% (see Table 1 below, and Figure 1).

Table 1: Number of Cases and Case Rates* for Giardiasis, Active Disease Surveillance, New York City, 1994 - 2006.

Year	*Number of Cases*	*Case Rate per 100,000*
1994	2,514	33.1
1995	2,523	32.9
1996	2,288	29.6
1997	1,788	22.9
1998	1,961	24.9
1999	1,897	23.9
2000	1,771	22.1
2001	1,530	19.1
2002	1,423	17.8
2003	1,214	15.2
2004	1,088	13.6
2005	875	10.9
2006	938	11.7

* For 1994-1999, rates were calculated using intercensal population estimates. For 2000-2006, 2000 Census data were used.

As was noted in the WDRAP 2005 Annual Report, the overall decrease in NYC giardiasis cases reported since 1994 has occurred in both sexes and across age groups, and therefore does not appear to be related to the use of highly active antiretroviral therapy (HAART) for treating persons living with HIV. It is unclear why overall rates have declined.

The following provides some highlights from the active surveillance data for giardiasis among New York City residents from January 1 through December 31, 2006. Additional data are presented in the tables that appear later in this report.

Location of case-patient residence

Location of case-patient residence was known for all 938 giardiasis case-patients who resided in New York City. In addition, there were 31 giardiasis case-patients for whom city of residence was unknown, and these case-patients are not included in this report. Manhattan had the highest borough-specific annual case rate (25.9 cases per 100,000 population) (Table 2). The highest UHF neighborhood-specific case rate was found in the Chelsea-Clinton neighborhood in Manhattan (72.4 cases per 100,000) (Map 1 and Table 3).

Sex

Information regarding sex was available for 937 of 938 cases (99.9%). The number and rate of giardiasis cases were higher in males than females, with 646 males (17.0 cases per 100,000) and 291 females (6.9 cases per 100,000) reported. The highest sex- and borough-specific case rate was observed among males residing in Manhattan (41.0 cases per 100,000) (Table 2).

Age

Information regarding age was available for 935 of 938 cases (99.7%). The highest age group-specific annual case rates were among children less than 5 years old (26.1 cases per 100,000) and children 5 – 9 years old (18.5 cases per 100,000) (Table 4). The highest age group- and sex-specific case rates were among males less than 5 years old (30.0 cases per 100,000) and females less than 5 years old (21.9 cases per 100,000). The highest age group- and borough-specific case rates were among children less than 5 years old in Manhattan (46.0 cases per 100, 000) and adults 45-59 years old in Manhattan (34.9 cases per 100,000) (Table 5).

Race/Ethnicity

Information regarding race/ethnicity was available for 372 of 938 cases (39.7%). Ascertainment of race/ethnicity status for giardiasis cases was poor, despite mailings to health care providers for this information whenever it was missing from the original report. Giardiasis case-patients are not routinely interviewed unless they are in occupations or settings that put them at increased risk for secondary transmission (e.g., food handler, health care worker, child attending day care, or day care worker). For the majority of giardiasis cases, race/ethnicity information, when provided, is not based upon self-report, but rather upon the impressions of health care providers, which may be inaccurate. For this reason, and because race/ethnicity information was missing from most giardiasis disease reports, race/ethnicity findings pertaining to giardiasis cases diagnosed in 2006 are not presented in this report.

Probable Foodborne Giardiasis Outbreak, October 2006

On November 28, 2006, the DOHMH Bureau of Communicable Disease (BCD) investigated a case of giardiasis that was mistakenly reported as having occurred in a day care worker. The case-patient was found to be a librarian in a NYC high school. The librarian reported that approximately four other faculty members at the high school had "the same" diarrheal illness. The case-patient denied travel out of the country or other known risk factors for giardiasis during the month before illness onset. BCD contacted all four of the other faculty members and confirmed the diagnoses of giardiasis. A database with the names of all students and faculty was cross-matched with the names of all case-patients diagnosed with giardiasis and reported to DOHMH. No additional confirmed cases were identified. Letters were distributed to all faculty, staff and students to determine if there had been any other symptomatic persons at the school who may not have been diagnosed. Three additional staff members were identified with symptoms consistent with giardiasis who had not had diagnostic tests when they were symptomatic. These staff members were considered to have had probable cases of giardiasis. No confirmed or probable cases were identified among the students. All confirmed and probable case-patients reported illness onset between October 2 and October 17. A hypothesis-generating questionnaire was developed and administered to all confirmed and probable case-patients. Several of the persons interviewed reported eating food from a lunch meeting with delegates from European country A on September 18. There were no other common exposures among confirmed or probable cases at the high school.

The Consulate from country A had arranged for the food service for the delegation meeting. They purchased sandwiches and other foods from Deli X; itemized receipts were not available. No records of what was purchased or served were available from Deli X. Consulate A stated that eight foreign delegates were at the meeting, one of whom works at Embassy A in Washington DC. The Consulate agreed to contact the Washington DC meeting attendee. She confirmed that she became ill on October 4, and that she had a positive stool test for *Giardia* a few weeks after becoming ill. She had no other risk factors for giardiasis, and the lunch meeting was her only exposure to the high school. Sixteen people attended the luncheon. Two of the attendees (one from the Embassy and one from the school) had confirmed cases of giardiasis. Three of the other four patients with confirmed giardiasis recalled eating food left in the faculty lounge after the event. The fourth one stated he occasionally eats food in the lounge, but could not recall that day specifically. The three patients with probable giardiasis reported eating food left in the faculty lounge after the luncheon on September 18.

From the period of October 2 through October 17, there were six patients with confirmed giardiasis, and three patients with symptoms consistent with probable giardiasis infection, associated with this cluster. Five of the confirmed and the three probable case-patients were faculty or staff at the same NYC high school, and the sixth confirmed case-patient shared a meal with school faculty and staff on September 18. It appears most likely that the source of infection among the faculty was exposure to contaminated foods served at the luncheon with Consulate A and left out in the faculty lounge after the luncheon. Food recall among persons who attended the meeting and among faculty who ate leftovers was very poor since interviews were conducted 2.5 months after the event. Therefore it was not possible to determine which foods were implicated, nor were foods available for testing. The worker who prepared the foods denied any illness during September 2006, and his stool specimens were negative for *Giardia*. It is not clear where or how the foods might have become contaminated. There was no evidence of giardiasis among the students, or of a geographic clustering in the neighborhoods around Deli X or the high school, or of a citywide increase in giardiasis during this time.

Cryptosporidiosis

Cryptosporidiosis was added to the list of reportable diseases in the New York City Health Code, effective January 1994. Active disease surveillance for cryptosporidiosis began in November 1994 and continued during 2006. Case interviews for demographic and risk factor data were initiated in January 1995 and are ongoing. Case rates and basic demographic findings were compiled and reported on a quarterly basis through July 2002. Beginning January 2003, rates and demographic findings have been compiled on a semi-annual basis.

During 2006, a total of 155 cases of cryptosporidiosis were reported to DOHMH and the annual case rate was 1.9 per 100,000. Though 7 more cases were reported in 2006 as compared to 2005 (4.7% increase), the number of cases reported was within the range of annual number of cases reported since year 2000, and lower than annual numbers reported from 1995 to 1999. Annual case numbers have declined 67.2% from 1995 to 2006 (see Table 6 below, and Figures 2 and 3).

Table 6: Number of Cases and Case Rates* for Cryptosporidiosis, Active Disease Surveillance, New York City, 1994 - 2006.

Year	*Number of Cases*	*Case Rate per 100,000*
1994	297**	3.9**
1995	472	6.2
1996	334	4.3
1997	172	2.2
1998	208	2.6
1999	261	3.3
2000	172	2.1
2001	122	1.5
2002	148	1.8
2003	126	1.6
2004	138	1.7
2005	148	1.8
2006	155	1.9

* For 1994-1999, rates were calculated using intercensal population estimates. For 2000-2006, 2000 Census data were used.
** Active disease surveillance began in November 1994.

The following provides some highlights from the active surveillance data for cryptosporidiosis among New York City residents from January 1 through December 31, 2006. Additional data are presented in the tables that appear later in this report.

Location of case-patient residence

Information on location of residence was available for all cases of cryptosporidiosis. Manhattan had the highest borough-specific annual case rate (4.6 cases per 100,000) (Table 7). The highest UHF neighborhood-specific case rate was found in the Chelsea-Clinton neighborhood in Manhattan (11.4 cases per 100,000) (Map 2 and Table 8).

Sex

Information regarding sex was available for all cases. The number and rate of cryptosporidiosis cases were higher in males than females, with 100 males (2.6 cases per 100,000) and 55 females (1.3 cases per 100,000) reported. The borough- and sex-specific case rate was highest for males in Manhattan (7.5 cases per 100,000) (Table 7).

Age

Information regarding age was available for all cases. The highest age group-specific case rates were observed in children less than 5 years old (3.1 cases per 100,000), adults 20-44 years old (2.4 cases per 100,000) and adults 45-59 years old (2.3 cases per 100,000) (Table 9). The highest age group- and sex-specific case rates occurred among females less than 5 years old (3.8 cases per 100,000), males 20-44 years old (3.8 cases per 100,000) and males 45-59 years old (3.5 cases per 100,000). The highest age group and borough-specific case rates were among children less than 5 years old in the Bronx (7.3 cases per 100,000), adults 45-59 years old in Manhattan (6.7 cases per 100,000) and 20-44 years old in Manhattan (5.5 cases per 100,000) (Table 10).

Race/Ethnicity

Race/ethnicity information was available for 139 of 155 cases (89.7%). The racial/ethnic group-specific case rate was highest among Black non-Hispanics (2.5 cases per 100,000) and Hispanics (2.1 cases per 100,000) (Table 11). Non-Hispanic Blacks in Manhattan had the highest race/ethnicity- and borough-specific case rate (9.4 cases per 100,000). The highest age group- and race/ethnicity-specific case rates occurred among Hispanic children less than 5 years old (5.9 cases per 100,000) and among 20-44 year old Black non-Hispanics (4.7 cases per 100,000) (Table 12).

Cryptosporidiosis and Immune Status

Trends observed over the years in reported number of cryptosporidiosis cases have differed between persons living with HIV/AIDS and those who are immunocompetent. Reported cryptosporidiosis cases among persons living with HIV/AIDS decreased considerably, from 392 in 1995 to 69 in 2006, thus causing a decline in the overall number of cryptosporidiosis cases in New York City (see Table 13 below, and Figures 4 and 5).

Table 13: **Number of Cases of Cryptosporidiosis by Year and Immune Status, New York City, 1995-2006**.

Immune Status	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Persons with HIV/AIDS	392	244	80	79	118	91	65	94	76	95	67	69
Immunocompetent	71	83	83	122	139	79	54	47	48	38	72	71
Immunocompromised Other Than HIV/AIDS	4	3	7	2	3	2	2	7	2	5	9	14
Unknown Immune Status	5	4	2	5	1	0	1	0	0	0	0	1
Total	472	334	172	208	261	172	122	148	126	138	148	155

In 2006, 14 cases of cryptosporidiosis (9.0%) were diagnosed among persons who had an immunocompromising medical condition other than HIV/AIDS. This was the highest yearly number and proportion of non-HIV infected immunocompromised persons diagnosed with cryptosporidiosis since 1995, the first full year of active surveillance. The non-HIV/AIDS, immunocompromising conditions were: kidney transplant (5 cases), cancer with chemotherapy or radiation treatment (5 cases), pulmonary disease treated with corticosteroids (2 cases), and non-cancerous medical conditions treated with immunosuppressing medication (2 cases). The number of cases of cryptosporidiosis among persons who are immunocompromised for reasons other than HIV/AIDS remained too small to determine whether the increase in 2006 indicates a trend. The incidence of cryptosporidiosis in this population will continue to be evaluated.

An analysis of trends using a Poisson regression model demonstrates a significant decline in rates of cryptosporidiosis, from 1995-1997, among patients who are immunocompromised due to HIV/AIDS and other immunocompromising conditions ($P<.01$). This decline is generally thought to be due to HAART which was introduced from 1996-1997 for persons living with HIV/AIDS. The Poisson model showed no significant decline since 1997 among immunocompromised patients ($P=.06$) suggesting that the effect of HAART has plateaued. When Poisson regression was used to compare the number of cases of cryptosporidiosis among immunocompromised patients to the number of cases among the immunocompetent, results indicated that the overall decline from 1995 to 2006 was significantly greater in patients who were immunocompromised than in those who were not ($P<.01$).

Cryptosporidiosis and Potential Risk Exposures

Of the 155 cryptosporidiosis cases diagnosed among NYC residents in 2006, questionnaires concerning potential exposures were completed in 106 (68.4%) cases. Reasons for non-completion of questionnaires were: unable to locate case-patient (40 cases, 25.8%), refused (4 cases, 2.6%), pending completion (4, 2.6%), and unable to interview due to incapacitating illness (1 case, 0.6%). Of the immunocompetent case-patients, interviews were completed for 50 (70.4%) case-patients. Among persons with HIV/AIDS, interviews were completed for 45 (65.2%) case-patients. Summary data for 1995 through 2006 on commonly reported potential risk exposures, obtained from case-patient interviews of persons who are immunocompetent and from interviews of persons with HIV/AIDS, are presented in Table 14. Information has also been collected and presented regarding type of tap water consumption (Table 15). It must be noted that the significance of risk exposures reported by cryptosporidiosis case-patients cannot be determined without reference to a suitable control population (i.e., non-*Cryptosporidium*-infected controls). Though we do not collect information from control patients, data can be compared between patients who are immunocompromised due to HIV/AIDS and patients who are immunocompetent. Looking at four main risk categories using the chi-square test for comparison of data since 2001, patients who were immunocompetent were significantly more likely to report international travel in all years ($P< .01$) and recreational water use in all years except 2003 and 2006 (2001-2002, $P<.01$; 2003, $P=.17$; 2004, $P<.05$; 2005, $P<.01$; 2006, P=.24). There was no statistically significant difference between these two groups in the proportion of cases reporting animal contact in 2001 to 2006, or reporting high-risk sex in 2001 to 2005. However, in 2006, the proportion of cases reporting high-risk sex was significantly higher among persons with HIV/AIDS than among immunocompetent persons ($P<.01$). It should be noted that high-risk sex in this context refers to having a penis, finger or tongue in a partner's anus. Information about sexual practices is gathered via phone interview and may not be reliable. These data indicate that immunocompetent case-patients are more likely to travel internationally, which may be a risk factor for the acquisition of cryptosporidiosis in this group. However, as noted above, the significance of this risk cannot be determined without comparison to a control population.

PART II: SYNDROMIC SURVEILLANCE / OUTBREAK DETECTION

Introduction

The tracking of sentinel populations or surrogate indicators of disease ("syndromic surveillance") can be useful in assessing gastrointestinal (GI) disease trends in the general population. Such tracking programs provide greater assurance against the possibility that a citywide outbreak would remain undetected. In addition, such programs can play a role in limiting the extent of an outbreak by providing an early indication of a problem so that control measures may be rapidly implemented. Over the past several years, the City has established and maintained a number of distinct and complementary outbreak detection systems. One system monitors and assists in the investigation of GI outbreaks in sentinel nursing homes. Another monitors the number of stool specimens submitted to clinical laboratories for microbiological testing, and a third system utilizes hospital Emergency Department chief complaint logs to monitor for outbreaks. The City also utilizes three separate systems for monitoring sales of anti-diarrheal medication. One tracks the weekly volume of sales of non-prescription anti-diarrheal medication at a major NYC drug store chain (referred to as the ADM system). An additional pharmacy system tracks daily sales of over-the-counter anti-diarrheal medications at another drug store chain (referred to as the OTC system). A third system tracks retail pharmacy data obtained from the National Retail Data Monitor (referred to as the NRDM system). All systems rely upon the voluntary participation of the institutions providing the syndromic data. A summary of syndromic surveillance findings pertaining to GI illness for 2006 is provided below.

Nursing Home Sentinel Surveillance

The nursing home surveillance system began in March of 1997 and was significantly restructured in August of 2002. Under the current system, when a participating nursing home notes an outbreak of gastrointestinal illness that is legally reportable to the New York State Department of Health (NYSDOH), the nursing home also notifies DOHMH. Such an outbreak is defined as onset of diarrhea and/or vomiting involving 3 or more patients on a single ward/unit within a 7-day period, or more than the expected (baseline) number of cases within a single facility. All participating nursing homes have been provided with stool collection kits in advance. When such an outbreak is noted, specimens are to be collected for bacterial culture and sensitivity, ova and parasites, *Cryptosporidium* and viruses. DOHMH BCD staff facilitates transportation of the specimens to the City's Public Health Laboratory. Testing for culture and sensitivity, ova and parasites, and *Cryptosporidium* occurs at the Public Health Laboratory. If preliminary tests for bacteria and parasites are negative, specimens are sent to the NYSDOH laboratories for viral testing. Participating nursing homes are provided with copies of Waterborne Disease Risk Assessment Program semi-annual and annual reports as feedback concerning Nursing Home Sentinel Surveillance.

During the second half of 2006, staff members from DOHMH BCD made site visits to eight of the nine nursing homes participating in Nursing Home Sentinel Surveillance. During the site visits, DOHMH staff reviewed with nursing administration or infection control staff the rationale for the program and program protocol. In addition, DOHMH staff members ensured that the nursing homes had adequate stool collection supplies on hand. A ninth nursing home that had previously participated in nursing home sentinel surveillance did not respond to requests for a site visit or for continued participation in sentinel surveillance. Therefore, there are currently eight nursing homes participating in the program. Three are in Manhattan, two are in the Bronx, two are in Queens, and one is in Brooklyn.

Clinical Laboratory Monitoring

The number of stool specimens submitted to clinical laboratories for bacterial and parasitic testing also provides information on gastrointestinal illness trends in the population. Participating laboratories transmit data by fax or by telephone report to DOHMH's Bureau of Communicable Disease indicating the number of stool specimens examined per day for: (a) bacterial culture and sensitivity, (b) ova and parasites, and (c) *Cryptosporidium.* Participation of two clinical laboratories (Laboratory A and Laboratory B) continued during 2006. Data is transmitted by participating laboratories at a frequency of one to three times per week.

Clinical Laboratory Monitoring results are reviewed upon receipt. Beginning in August 2004, DOHMH started implementation of a computer model to establish statistical cut-offs for significant increases in clinical laboratory submissions. The model uses the entire historical dataset, that is, since November 1995 for Laboratory A and since January 1997 for Laboratory B. Sundays and holidays are removed because the laboratories do not test specimens on those days. Linear regression is used to adjust for average day-of-week and day-after-holiday effects as certain days routinely have higher volumes than other days. The cumulative sums (CUSUM) method is applied to a two-week baseline to identify statistically significant aberrations (or "signals") in submissions for ova and parasites and for bacterial culture and sensitivity. CUSUM is a quality control method that has been adapted for aberration-detection in public health surveillance. (CUSUM is described further in: Hutwagner L, Maloney E, Bean N, Slutsker L, Martin S. Using Laboratory-Based Surveillance Data for Prevention: An Algorithm for Detecting *Salmonella* Outbreaks. *Emerging Infectious Diseases*. 1997; 3[3]: 395-400.)

Anti-Diarrheal Medication Monitoring

The tracking of sales of anti-diarrheal medications is a useful source of information about the level of diarrheal illness in the community. NYC began tracking anti-diarrheal drug sales as a public health indicator in 1995.* Modifications to NYC's anti-diarrheal surveillance program have been made over the years, and over the past four years, NYC's program has been enhanced considerably by the addition of two new drug-tracking systems. Currently NYC utilizes three separate systems to monitor sales of anti-diarrheal medications.

The ADM System

In 1996, NYC's ADM system was established, utilizing volume-of-sales information of non-prescription anti-diarrheal medications obtained weekly from a major drug store chain. Weekly sales volume data (i.e., electronic point-of-sale data for loperamide and non-loperamide anti-diarrheal medications) is entered into a database, sorted into drug formulation category, and is graphed and visually compared to historic data. Information is also obtained on the chain's promotional sales, and this information is considered in interpreting the sales volume data. Sales volume data is examined citywide, by borough, and by drug formulation category. Throughout 2006 this system, operated by DEP, remained in operation.

The OTC System

In August 2002, a new more comprehensive system for monitoring drugstore sales of anti-diarrheal medications was established with a second large pharmacy chain. This system is referred to as the OTC (over-the-counter) system. The goal was to develop a system that would provide more timely and detailed data than the existing ADM tracking system. The OTC system better serves bioterrorism surveillance since it also collects data on other medicines, including fever and allergy medications. Each daily electronic file contains on average data for 32,000 non-prescription medication sales, as well as 6,000 prescription sales. However, the prescription medications have not been found to be useful in the OTC system for monitoring diarrheal illness. Routine daily analyses began in mid-December 2002. Drugs are categorized into key syndromes, and trends are analyzed for citywide increases in sales of non-prescription anti-diarrheal medications. The gastrointestinal category includes generic and brand name loperamide-containing agents and bismuth subsalicylate agents.

Starting on September 9, 2006 a change in data processing at the pharmacy chain participating in the OTC system resulted in a significant drop in daily anti-diarrheal sales

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* The first NYC anti-diarrheal medication tracking system, involving data from a regional distributor serving independent pharmacies, was implemented in 1995. This system was discontinued in 2000 due to a diminishing data stream. This summary of NYC anti-diarrheal medication monitoring programs therefore begins with discussion of the ADM system which was implemented in 1996 and is ongoing.

reported through the OTC system. DOHMH contacted the pharmacy about the situation, while continuing to monitor sales at the lower volume. The problem was eventually rectified by the pharmacy, and reported sales volume returned to previous levels beginning December 27. As reported sales were significantly (42%) lower than normal during the period September 9 through December 26, DOHMH staff determined that the results of any trend or signal analysis during this period would be unreliable. Following the correction in reports beginning December 27, and after two weeks passed to re-establish a baseline, normal OTC operations resumed on January 10, 2007. Notification of the system interruption was made to USEPA and NYSDOH on January 9, 2007. DOHMH has requested that the pharmacy provide the missing data for September 9 through December 26. However, as of May 2007 the data for this period have not been received. The participation of the pharmacy in the OTC system is voluntary. Therefore the need to obtain historic data must be balanced against the need to maintain working relations with the pharmacy so that on-going data can be assured.

Surveillance systems are vulnerable to system interruptions; however, since NYC maintains multiple parallel syndromic systems, monitoring can continue despite an interruption in any individual system. While some system interruptions may be unavoidable, in the case above, notification to USEPA and NYSDOH should have been made more quickly. On February 5, 2007, WDRAP team members from DOHMH and DEP established a protocol for notification of DEP whenever there is disruption in any of the syndromic surveillance systems. Regarding the OTC system, the protocol states that DOHMH is to notify DEP of any sustained interruptions within 72 hours. DEP will then promptly notify USEPA and NYSDOH.

The NRDM System

In May 2003, DOHMH began receiving daily data from a third tracking program, the National Retail Data Monitor (NRDM). This system, based at the University of Pittsburgh, gathers retail pharmacy data from national chains for use in public health surveillance. The NRDM provides a daily file containing over-the-counter "stomach remedies" (bismuth subsalicylate, attapulgite, and loperamide) and electrolyte sales data from retail stores located in New York City. Electrolytes represent oral rehydration products that have shown the most utility in tracking citywide diarrheal illness affecting young children. Citywide counts are adjusted for day-of-week variability and analyzed using the CUSUM method with a two-week baseline.

Hospital Emergency Department Monitoring

DOHMH currently receives electronic data from 48 of New York City’s 62 emergency departments (EDs), reporting 9,000 visits per day, roughly 90% of ED visits citywide. Hospitals transmit electronic files each morning containing chief complaint and demographic information for patient visits during the previous 24 hours. Patients are classified into syndrome categories, and daily analyses are conducted to detect any unusual patterns, or signals. The two syndromes used to track gastrointestinal illness are vomiting syndrome and diarrhea syndrome. Temporal (“citywide”) analyses assess whether the frequency of ED visits for the syndrome has increased in the last one, two or three days compared to the previous fourteen days. Spatial analyses scan the data for geographic clustering in syndrome visits on the most recent day compared to the previous 14 days. Clustering is examined by both hospital location and residential zip code. Statistical significance is based on Monte Carlo probability estimates that adjust for the multiple comparisons inherent in examining many candidate clusters each day. Until March of 2005, the threshold of significance for citywide and spatial signals was set at $P<.01$, indicating that fewer than 1 out of every 100 analyses would generate a cluster due to chance alone. To reduce the number of false positive spatial signals, beginning March 11, 2005, the threshold of significance for spatial signals was changed to $P<.005$. (The system is described further in: Hefferman R, Mostashari F, Das D, Karpati A, Kulldorf M, Weiss D. Syndromic Surveillance in Public Health Practice, New York City. *Emerging Infectious Diseases*. 2004; 10[5]: 858-864.)

There was an interruption in the ED syndromic surveillance system from May 19 to May 23. Beginning on Friday, May 19, DOHMH began having difficulty receiving ED syndromic surveillance files. DOHMH receives the data from most hospitals in a secure fashion via the Centers for Disease Control and Prevention's (CDC's) Public Health Information Network Messaging System (PHIN-MS). An encryption certificate embedded in the data transmission software by CDC expired during the night of May 18, which caused the problem. DOHMH technical staff immediately contacted the CDC. A few hours later, CDC provided patches to address the problem. However, it was too late on Friday evening to find Information Technology staff at the participating EDs to properly test the system. On Monday morning, May 22, DOHMH started testing and found that the applied patches provided by the CDC addressed the expired certificate issue, but created other problems with the secure authentication on the DOHMH network. CDC mobilized several of the original PHIN-MS developers and by mid-day on May 23 the problem was found in the original CDC code and was fixed. DOHMH emailed the fixes with installation instructions to all participating EDs on May 23 and by the afternoon of May 24 most facilities were able to transmit data. The data for the period May 19 to May 23 was then received, indicating that there had been no citywide signals for the diarrhea or vomiting syndromes. DOHMH's other syndromic and traditional surveillance systems continued uninterrupted during this time.

Summary of Syndromic Surveillance Signals

Syndromic surveillance signals do not establish etiologic diagnoses. Also, experience has shown that most signals, especially localized spatial signals in the emergency department system or signals in the laboratory or OTC systems, may be statistical aberrations and not related to health events. The systems are therefore used in concert. A signal in one system is compared to other systems to see whether or not there are concurrent signals. Since September 2001, when the ED system was initiated, NYC syndromic surveillance data show annual, citywide increases in the vomiting and diarrheal signals consistent with seasonal trends in norovirus and other enteric viruses.

In this report we present the signals from five of our syndromic surveillance systems together in four figures (Figures 6-9). Figures 6 and 7 summarize ED system trends for 2006. Figure 6 shows a graphic representation of the ratio of daily ED visits for the vomiting syndrome to all daily ED visits not tracked by ED syndromic surveillance ("other visits") from January 1 to December 31, 2006. The graph also includes an indication of citywide signals and of the spatial residential zipcode and hospital signals. Figure 7 is the same graph for the syndrome of diarrhea. These graphs indicate that citywide signaling for the vomiting syndrome occurred in late January to early February, and signaling for diarrhea occurred primarily in the period between late February to late March. Signaling for the vomiting syndrome next occurred primarily in

November and December, and signaling for diarrhea recurred in December. This coincides with our historical experience of seasonal viral outbreaks of norovirus and rotavirus. No spatial signal was sustained in the same geographic location for more than one day.

Figures 8 and 9 are time-series plots of signals from five syndromic surveillance systems for the gastrointestinal syndrome covering the period January 1 to December 31, 2006. The systems included are: the emergency department system, the clinical laboratory monitoring system, the OTC antidiarrheal medication system, the NRDM system for electrolytes sales, and the nursing home sentinel surveillance system. (The ADM system results are summarized separately below.) For the ED system, only citywide signals have been included. As discussed above, the ED system signaled from late January through March and again from November through December, most likely representing annual viral trends. The other systems did not signal as consistently. There was some signaling of the laboratory system in January and March and in the NRDM electrolyte system in January and February. There was also increased signaling in the NRDM electrolyte system in late October, late November, and mid-December, which is consistent with signals that occurred in the ED system. However, there was some sporadic signaling in the NRDM electrolyte system in July, August and September. The laboratory system signaled sporadically in April, May, July, August and late November. There was sporadic signaling in the OTC system in June, and there was one non-sustained OTC signal in late July. However, as was previously mentioned, there was an interruption in the OTC system from September 9 through December.

There were two GI outbreaks in sentinel nursing homes in 2006 which were not reported at the time of the outbreak as per the protocol. In both cases, DOHMH became aware of the outbreaks after the outbreaks had resolved, while auditing GI outbreak reports submitted to NYSDOH by NYC nursing homes. For both instances, DOHMH BCD staff reviewed the protocol with the Director of Infection Control, and requested that, in future, DOHMH be notified of GI outbreaks at the time of initial occurrence. The first GI outbreak began on March 5, and affected eight residents. Stool specimens collected for parasitic, bacterial and viral pathogens were found to be negative. A causative agent was not confirmed, but was suspected to have been viral. The second GI outbreak began on August 19 and affected five nursing home residents. The causative agent was determined to have been *Clostridium difficile*. *C. difficile* is a bacteria that is normally found in the intestine, but which can become pathogenic when overgrowth is induced by antibiotic therapy.

With regard to the ADM system, there were two weeks in 2006 during which total city-wide ADM sales appeared to be above the preceding weeks: the week ending August 19, and the week ending July 8 (for the July 8 week, sales were only slightly above preceding weeks). In both cases, ADM sales returned to baseline the following week. The August increase coincided with reported ADM product promotions; the July increase did not. Neither of the two increases coincided with a pattern of signals in the other GI syndromic systems.

In summary, for the period January through December 2006 there was signaling of multiple syndromic systems from January through March and again in November and December, consistent with annual gastrointestinal viral trends. There were some clinical laboratory signals throughout the year which may represent underlying noise in that system. There was no evidence of a drinking water-related outbreak in New York City.

PART III: INFORMATION SHARING AND PUBLIC EDUCATION

Information pertaining to New York City's Waterborne Disease Risk Assessment Program and related issues continues to be available on both the DEP and DOHMH websites, including results from the City's source water protozoa monitoring program. Documents on the websites include:

DOHMH Webpages:

- *Giardiasis fact sheet*
  http://www.nyc.gov/html/doh/html/cd/cdgia.shtml

- *Cryptosporidiosis fact sheet*
  http://www.nyc.gov/html/doh/html/cd/cdcry.shtml

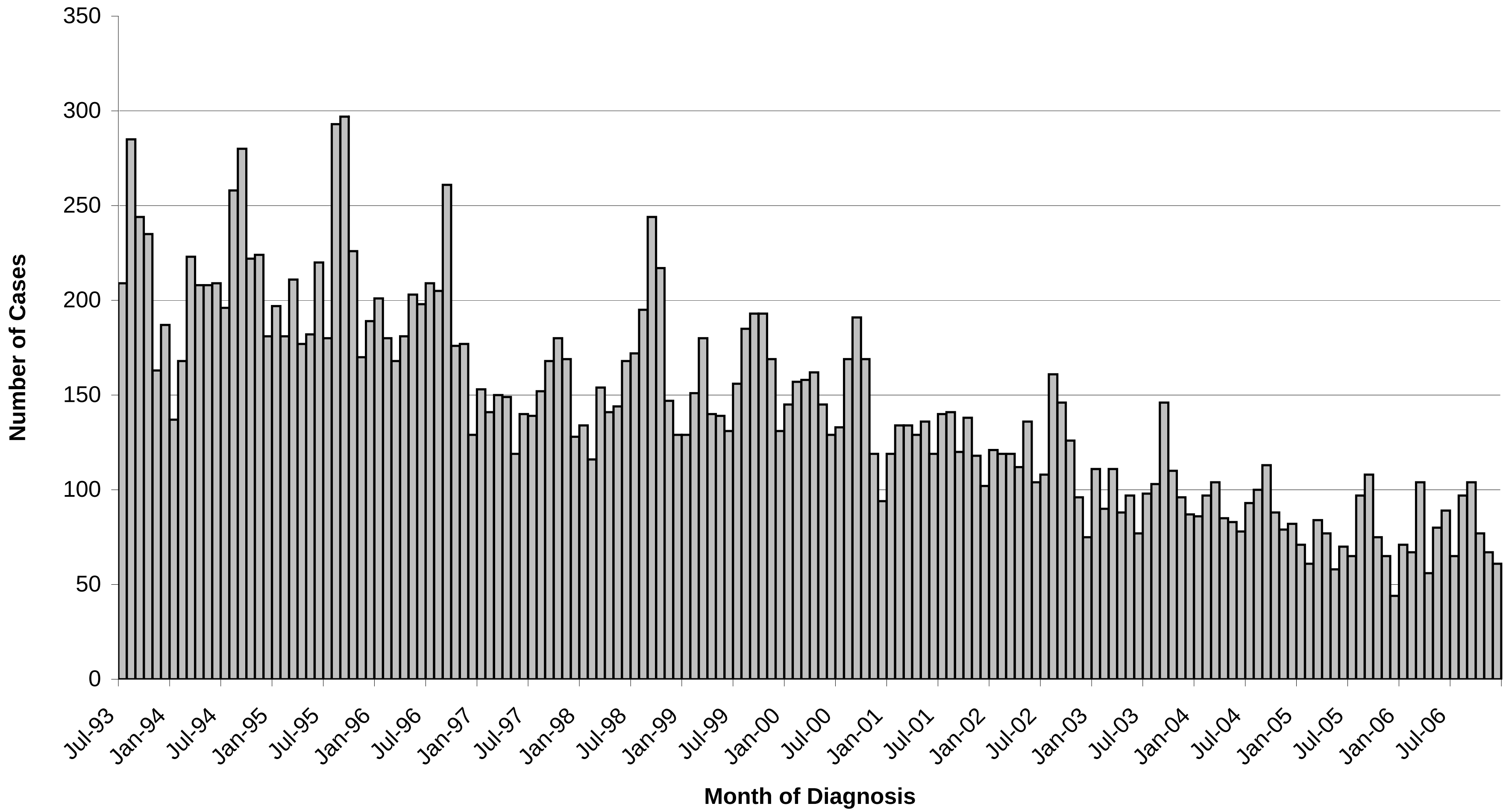
DEP Webpages:

- *DEP Water Supply Testing Results for Giardia and Cryptosporidium (Data is collected and entered on the website each week. Historical data is also included)*
  http://www.nyc.gov/html/dep/html/pathogen.html

- *1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005 and 2006 Waterborne Disease Risk Assessment Program's Annual Reports*
  http://www.nyc.gov/html/dep/html/wdrap.html

- *1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005 and 2006 New York City Drinking Water Supply and Quality Statement*
  http://www.nyc.gov/html/dep/html/wsstate.html

Figure 1: Number of Cases by Month of Diagnosis, Active Surveillance for Giardiasis, New York City, July 1993 - December 2006



<u>TABLE 2</u>: Number of cases and annual case rate per 100,000 population by sex and borough of residence - Active surveillance for **giardiasis** in New York City (2006)

	Borough of residence					
Sex	Citywide number (rate)	Manhattan number (rate)	Bronx number (rate)	Brooklyn number (rate)	Queens number (rate)	Stat Is number (rate)
Male	646 (17.0)	299 (41.0)	92 (14.8)	127 (11.0)	115 (10.7)	13 (6.1)
Female	291 (6.9)	99 (12.3)	54 (7.6)	74 (5.7)	56 (4.8)	8 (3.5)
Unknown	1	0	1	0	0	0
Total	938 (11.7)	398 (25.9)	147 (11.0)	201 (8.2)	171 (7.7)	21 (4.7)

Map 1

Giardiasis annual case rate per 100,000 population by UHF neighborhood - Active surveillance data for New York City (2006)

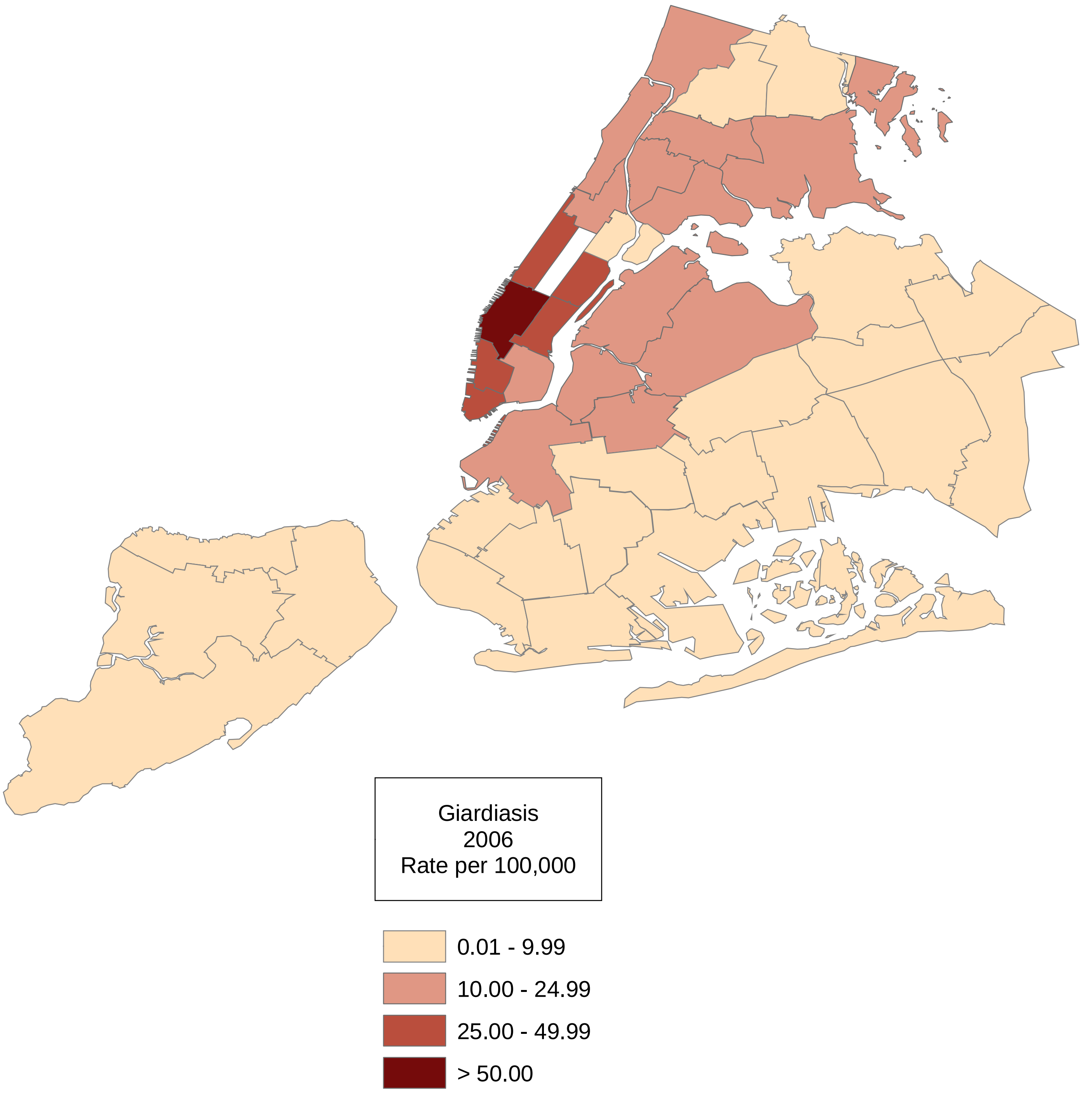


Table 3: Number of cases and annual case rate per 100,000 by UHF neighborhood of residence - Active surveillance for **giardiasis** in New York City (2006)

UHF Neighborhood	Borough	Number	Population	Rate
Chelsea-Clinton	Manhattan	89	122998	72.4
Greenwich Village-Soho	Manhattan	39	83709	46.6
Gramercy Park-Murray Hill	Manhattan	37	124468	29.7
Upper East Side	Manhattan	61	216441	28.2
Lower Manhattan	Manhattan	8	29266	27.3
Upper West Side	Manhattan	57	220706	25.8
High Bridge-Morrisania	Bronx	38	189755	20.0
Union Sq-Lower East Side	Manhattan	36	197138	18.3
Washington Heights-Inwood	Manhattan	44	270677	16.3
Greenpoint	Brooklyn	20	124449	16.1
Long Island City-Astoria	Queens	34	220960	15.4
Downtown-Heights-Slope	Brooklyn	31	214696	14.4
Kingsbridge-Riverdale	Bronx	12	88989	13.5
Hunts Point-Mott Haven	Bronx	16	122875	13.0
West Queens	Queens	59	477516	12.4
Williamsburg-Bushwick	Brooklyn	24	194305	12.4
Pelham-Throgs Neck	Bronx	35	290052	12.1
C Harlem-Morningside Hgts	Manhattan	17	151113	11.2
Crotona-Tremont	Bronx	20	199530	10.0
Ridgewood-Forest Hills	Queens	24	240901	10.0
East Harlem	Manhattan	10	108092	9.3
Borough Park	Brooklyn	26	324411	8.0
Fordham-Bronx Park	Bronx	20	250491	8.0
Bayside-Littleneck	Queens	7	88164	7.9
Bensonhurst-Bay Ridge	Brooklyn	15	194558	7.7
Bed Stuyvesant-Crown Hgts	Brooklyn	24	317296	7.6
Sunset Park	Brooklyn	8	120441	6.6
Fresh Meadows	Queens	6	93148	6.4
East New York	Brooklyn	11	173716	6.3
Stapleton-St. George	Stat Is	7	116227	6.0
Coney Island-Sheepshead Bay	Brooklyn	17	286901	5.9
Willowbrook	Stat Is	5	84821	5.9
Southwest Queens	Queens	14	269952	5.2
East Flatbush-Flatbush	Brooklyn	16	316734	5.1
Flushing-Clearview	Queens	12	255542	4.7
Canarsie-Flatlands	Brooklyn	9	197819	4.5
South Beach-Tottenville	Stat Is	8	179892	4.4
Rockaway	Queens	4	106738	3.7
Northeast Bronx	Bronx	6	185998	3.2
Jamaica	Queens	9	285339	3.2
Port Richmond	Stat Is	1	62788	1.6
Southeast Queens	Queens	2	198846	1.0

TABLE 4: Number of cases and annual case rate per 100,000 population by age group and sex - Active surveillance for **giardiasis** in New York City (2006)

	Sex			
Age group	Male number (rate)	Female number (rate)	Unknown	Total number (rate)
<5 years	83 (30.0)	58 (21.9)	0	141 (26.1)
5-9 years	50 (17.5)	54 (19.6)	0	104 (18.5)
10-19 years	54 (10.1)	29 (5.6)	1	84 (8.0)
20-44 years	298 (19.1)	86 (5.2)	0	384 (11.9)
45-59 years	121 (19.0)	37 (5.0)	0	158 (11.4)
≥ 60 years	37 (7.4)	27 (3.6)	0	64 (5.1)
Unknown	3	0	0	3
Total	646 (17.0)	291 (6.9)	1	938 (11.7)

TABLE 5: Number of cases and annual case rate per 100,000 population by age group and borough of residence - Active surveillance for **giardiasis** in New York City (2006)

	Borough of residence					
Age group	Citywide number (rate)	Manhattan number (rate)	Bronx number (rate)	Brooklyn number (rate)	Queens number (rate)	Stat Is number (rate)
<5 years	141 (26.1)	35 (46.0)	29 (26.4)	44 (24.1)	30 (21.0)	3 (10.1)
5-9 years	104 (18.5)	16 (21.8)	32 (26.7)	27 (14.2)	26 (17.9)	3 (9.1)
10-19 years	84 (8.0)	18 (12.5)	27 (12.9)	20 (5.6)	16 (5.8)	3 (4.9)
20-44 years	384 (11.9)	202 (28.5)	35 (6.9)	76 (8.1)	64 (7.1)	7 (4.3)
45-59 years	158 (11.4)	99 (34.9)	14 (6.8)	20 (4.8)	21 (5.3)	4 (4.6)
≥ 60 years	64 (5.1)	27 (10.8)	9 (5.0)	13 (3.4)	14 (3.7)	1 (1.5)
Unknown	3	1	1	1	0	0
Total	938 (11.7)	398 (25.9)	147 (11.0)	201 (8.2)	171 (7.7)	21 (4.7)

Figure 2: Number of Cases by Month of Diagnosis, Active Surveillance for Cryptosporidiosis, New York City, November 1994 - December 2006

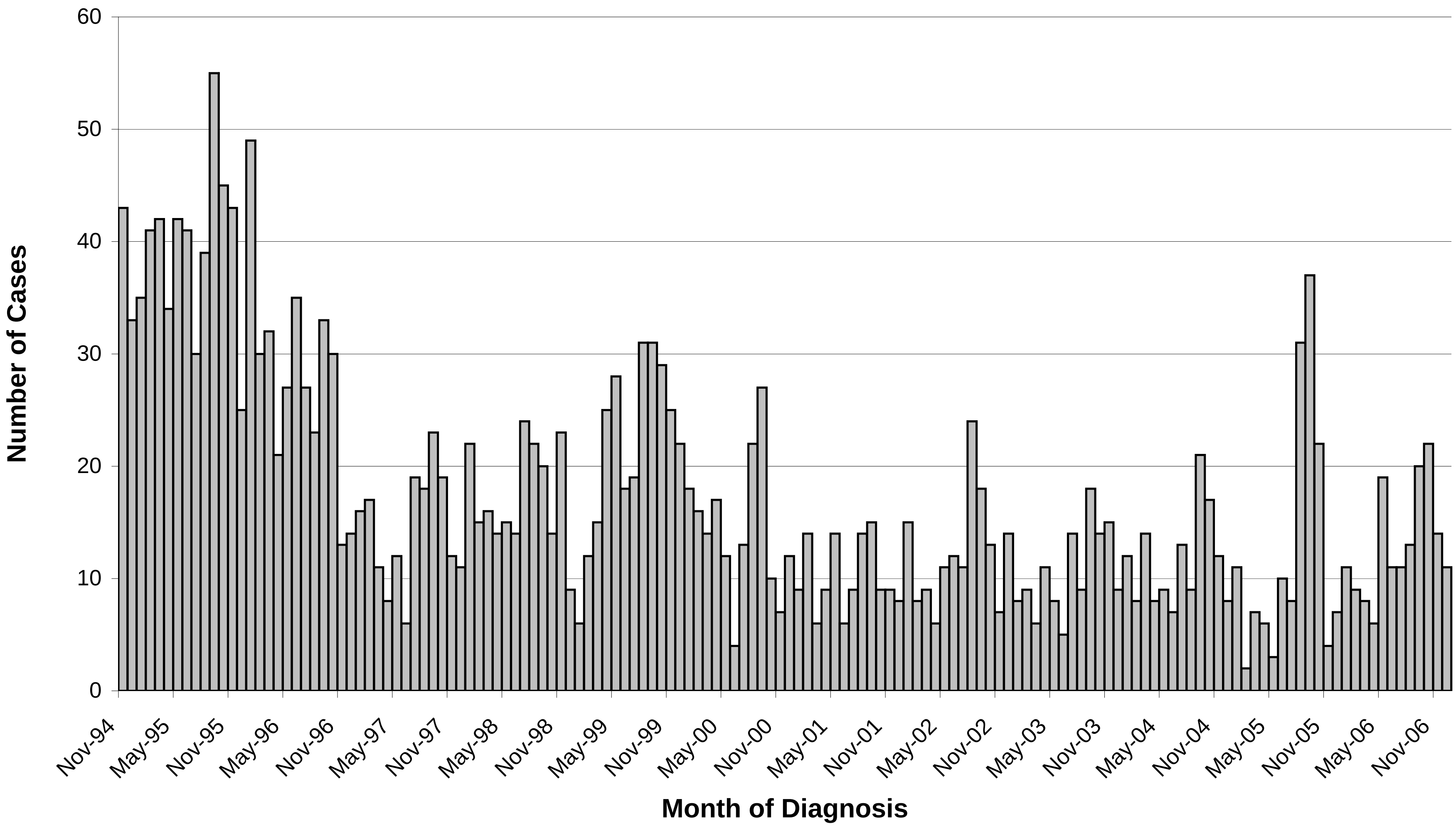
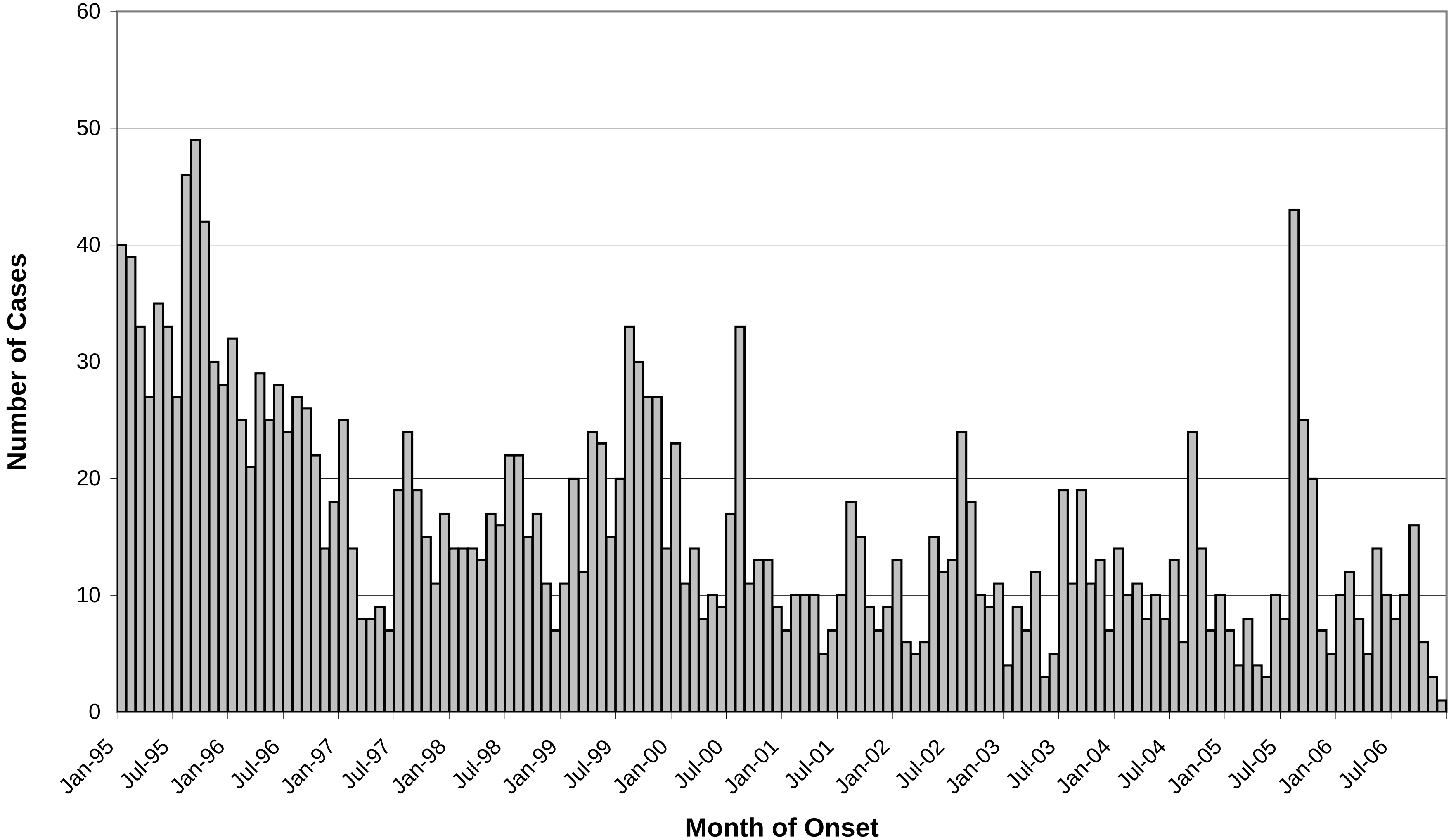


Figure 3: Number of Cases by Month of Onset, Active Surveillance for Cryptosporidiosis in New York City, January 1995 - December 2006* (2006 Data is Preliminary)



* Chart does not include cases in which an onset date was unavailable.

TABLE 7: Number of cases and annual case rate per 100,000 population by sex and borough of residence - Active surveillance for **cryptosporidiosis** in New York City (2006)

	Borough of residence					
Sex	Citywide number (rate)	Manhattan number (rate)	Bronx number (rate)	Brooklyn number (rate)	Queens number (rate)	Stat Is number (rate)
Male	100 (2.6)	55 (7.5)	15 (2.4)	18 (1.6)	12 (1.1)	0
Female	55 (1.3)	16 (2.0)	18 (2.5)	14 (1.1)	6 (0.5)	1 (0.4)
Total	155 (1.9)	71 (4.6)	33 (2.5)	32 (1.3)	18 (0.8)	1 (0.2)

Map 2

Cryptosporidiosis annual case rate per 100,000 population by UHF neighborhood - Active surveillance data for New York City (2006)

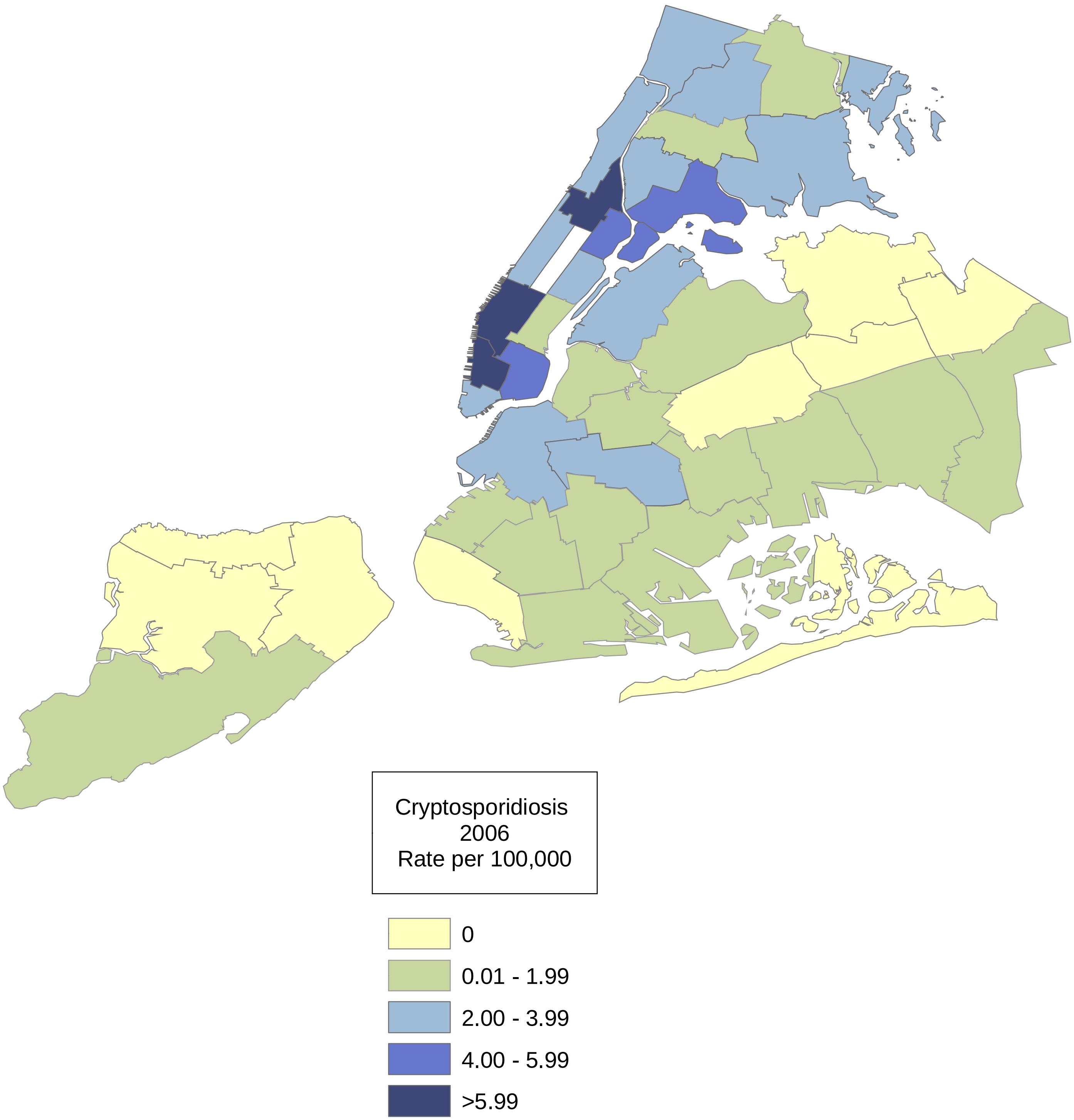


TABLE 8: Number of cases and annual case rate per 100,000 population by UHF neighborhood of residence - Active surveillance data for **cryptosporidiosis** in New York (2006)

UHF Neighborhood	Borough	Number	Population	Rate
Chelsea-Clinton	Manhattan	14	122998	11.4
C Harlem-Morningside Hgts	Manhattan	13	151113	8.6
Greenwich Village-Soho	Manhattan	6	83709	7.2
Hunts Point-Mott Haven	Bronx	6	122875	4.9
East Harlem	Manhattan	5	108092	4.6
Union Sq-Lower East Side	Manhattan	8	197138	4.1
Washington Heights-Inwood	Manhattan	10	270677	3.7
Lower Manhattan	Manhattan	1	29266	3.4
Bed Stuyvesant-Crown Hgts	Brooklyn	9	317296	2.8
Fordham-Bronx Park	Bronx	7	250491	2.8
Upper East Side	Manhattan	6	216441	2.8
Upper West Side	Manhattan	6	220706	2.7
High Bridge-Morrisania	Bronx	5	189755	2.6
Pelham-Throgs Neck	Bronx	7	290052	2.4
Downtown-Heights-Slope	Brooklyn	5	214696	2.3
Long Island City-Astoria	Queens	5	220960	2.3
Kingsbridge-Riverdale	Bronx	2	88989	2.2
Coney Island-Sheepshead Bay	Brooklyn	5	286901	1.7
Sunset Park	Brooklyn	2	120441	1.7
Northeast Bronx	Bronx	3	185998	1.6
Greenpoint	Brooklyn	2	124449	1.6
Gramercy Park-Murray Hill	Manhattan	2	124468	1.6
Southeast Queens	Queens	3	198846	1.5
Crotona-Tremont	Bronx	3	199530	1.5
Jamaica	Queens	3	285339	1.1
West Queens	Queens	5	477516	1.0
Williamsburg-Bushwick	Brooklyn	2	194305	1.0
Canarsie-Flatlands	Brooklyn	2	197819	1.0
Southwest Queens	Queens	2	269952	0.7
East Flatbush-Flatbush	Brooklyn	2	316734	0.6
Borough Park	Brooklyn	2	324411	0.6
East New York	Brooklyn	1	173716	0.6
South Beach-Tottenville	Stat Is	1	179892	0.6

<u>TABLE 9:</u> Number of cases and annual case rate per 100,000 population by age group and sex - Active surveillance for **cryptosporidiosis** in New York City (2006)

	Sex		
Age group	Male number (rate)	Female number (rate)	Total number (rate)
<5 years	7 (2.5)	10 (3.8)	17 (3.1)
5-9 years	1 (0.3)	4 (1.5)	5 (0.9)
10-19 years	3 (0.6)	5 (1.0)	8 (0.8)
20-44 years	60 (3.8)	18 (1.1)	78 (2.4)
45-59 years	22 (3.5)	10 (1.3)	32 (2.3)
≥ 60 years	7 (1.4)	8 (1.1)	15 (1.2)
Total	100 (2.6)	55 (1.3)	155 (1.9)

<u>TABLE 10</u>: Number of cases and annual case rate per 100,000 population by age group and borough – Active surveillance for **cryptosporidiosis** in New York City (2006)

	Borough of residence					
Age group	Citywide number (rate)	Manhattan number (rate)	Bronx number (rate)	Brooklyn number (rate)	Queens number (rate)	Stat Is number (rate)
<5 years	17 (3.1)	3 (3.9)	8 (7.3)	3 (1.6)	3 (2.1)	0
5-9 years	5 (0.9)	2 (2.7)	2 (1.7)	1 (0.5)	0	0
10-19 years	8 (0.8)	3 (2.1)	2 (1.0)	2 (0.6)	1 (0.4)	0
20-44 years	78 (2.4)	39 (5.5)	13 (2.6)	17 (1.8)	9 (1.0)	0
45-59 years	32 (2.3)	19 (6.7)	7 (3.4)	2 (0.5)	4 (1.0)	0
≥ 60 years	15 (1.2)	5 (2.0)	1 (0.6)	7 (1.9)	1 (0.3)	1 (1.5)
Total	155 (1.9)	71 (4.6)	33 (2.5)	32 (1.3)	18 (0.8)	1 (0.2)

TABLE 11: Number of cases and annual case rate per 100,000 population by race/ethnicity and borough of residence - Active surveillance for **cryptosporidiosis** in New York City (2006)*

	Borough of residence					
Race/Ethnicity	Citywide number (rate)	Manhattan number (rate)	Bronx number (rate)	Brooklyn number (rate)	Queens number (rate)	Stat Is number (rate)
Hispanic	46 (2.1)	15 (3.6)	14 (2.2)	8 (1.6)	9 (1.6)	0
White non-Hispanic	37 (1.3)	25 (3.6)	1 (0.5)	7 (0.8)	3 (0.4)	1 (0.3)
Black non-Hispanic	49 (2.5)	22 (9.4)	11 (2.6)	14 (1.6)	2 (0.5)	0
Asian, Pac Islander, Amer Indian, Alaska Native	7 (0.9)	1 (0.7)	3 (7.1)	2 (1.1)	1 (0.3)	0
Unknown	16	8	4	1	3	0
Total	155 (1.9)	71 (4.6)	33 (2.5)	32 (1.3)	18 (0.8)	1 (0.2)

* Because year 2000 U.S. Census data include race/ethnicity categories not included in disease surveillance data, 3.5% of the total population was not included in the denominator used to calculate rates by race/ethnicity. Rates pertaining to race/ethnicity may therefore be inflated.

<u>TABLE 12</u>: Number of cases and annual case rate per 100,000 population by race/ethnicity and age group - Active surveillance for **cryptosporidiosis** in New York City (2006)

	Age group						
Race /ethnicity	< 5 years number (rate)	5-9 years number (rate)	10-19 years number (rate)	20-44 years number (rate)	45-59 years number (rate)	≥ 60 years number (rate)	Total number (rate)
Hispanic	11 (5.9)	3 (1.5)	6 (1.7)	15 (1.7)	6 (1.9)	5 (2.4)	46 (2.1)
White non-Hispanic	1 (0.7)	1 (0.8)	1 (0.4)	17 (1.6)	9 (1.6)	8 (1.2)	37 (1.3)
Black non-Hispanic	0	1 (0.6)	0	35 (4.7)	11 (3.3)	2 (0.8)	49 (2.5)
Asian, Pac Islander, Amer. Indian, Alaska Native	2 (4.0)	0	1 (1.0)	3 (0.8)	1 (0.7)	0	7 (0.9)
Unknown	3	0	0	8	5	0	16
Total	17 (3.1)	5 (0.9)	8 (0.8)	78 (2.4)	32 (2.3)	15 (1.2)	155 (1.9)

* Because year 2000 U.S. Census data include race/ethnicity categories not included in disease surveillance data, 3.5% of the total population was not included in the denominator used to calculate rates by race/ethnicity. Rates pertaining to race/ethnicity may therefore be inflated.

Figure 4: Number of Cases of Cryptosporidiosis Among Persons Living with HIV/AIDS by Month of Diagnosis, New York City, January 1995-December 2006

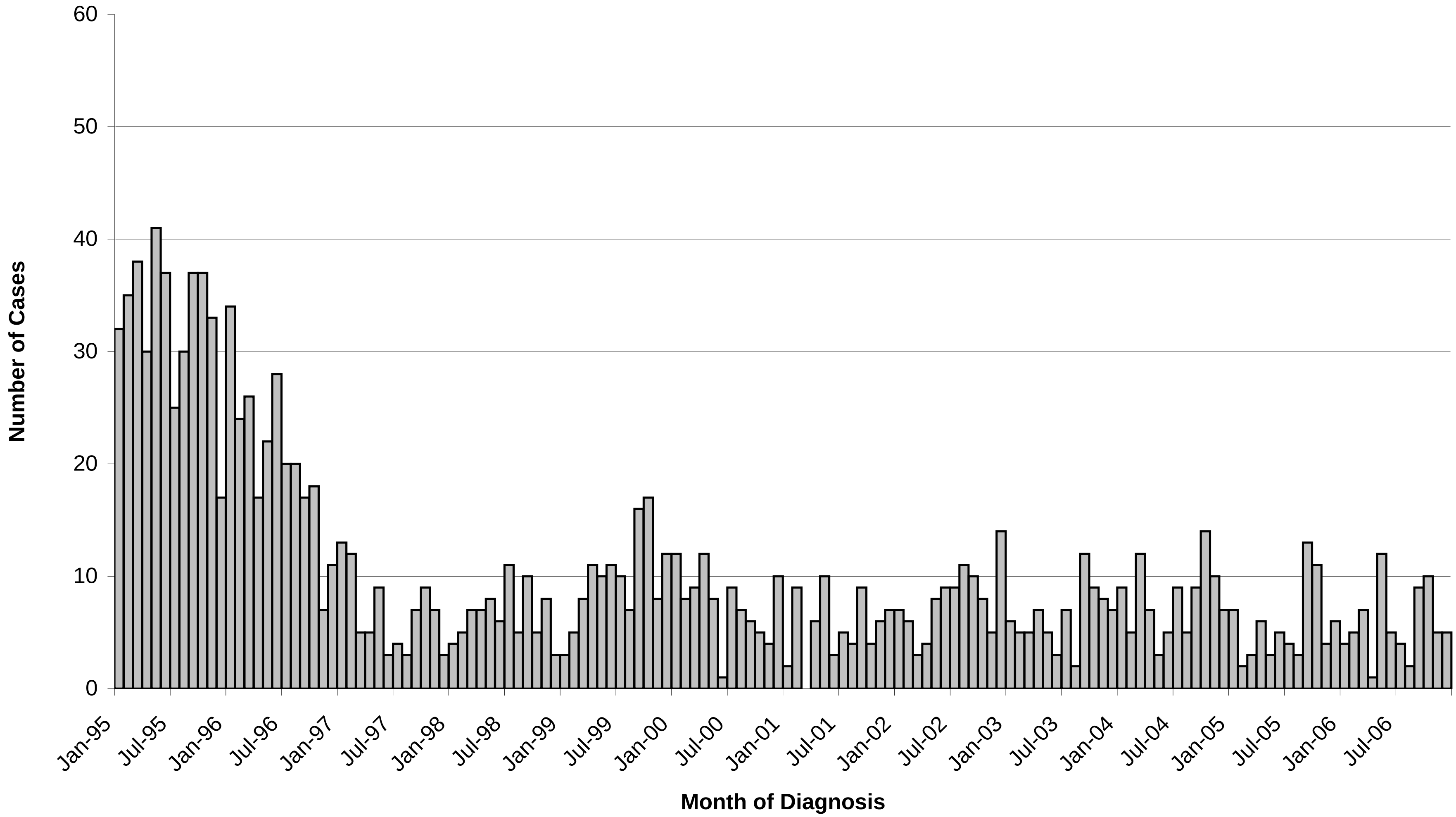
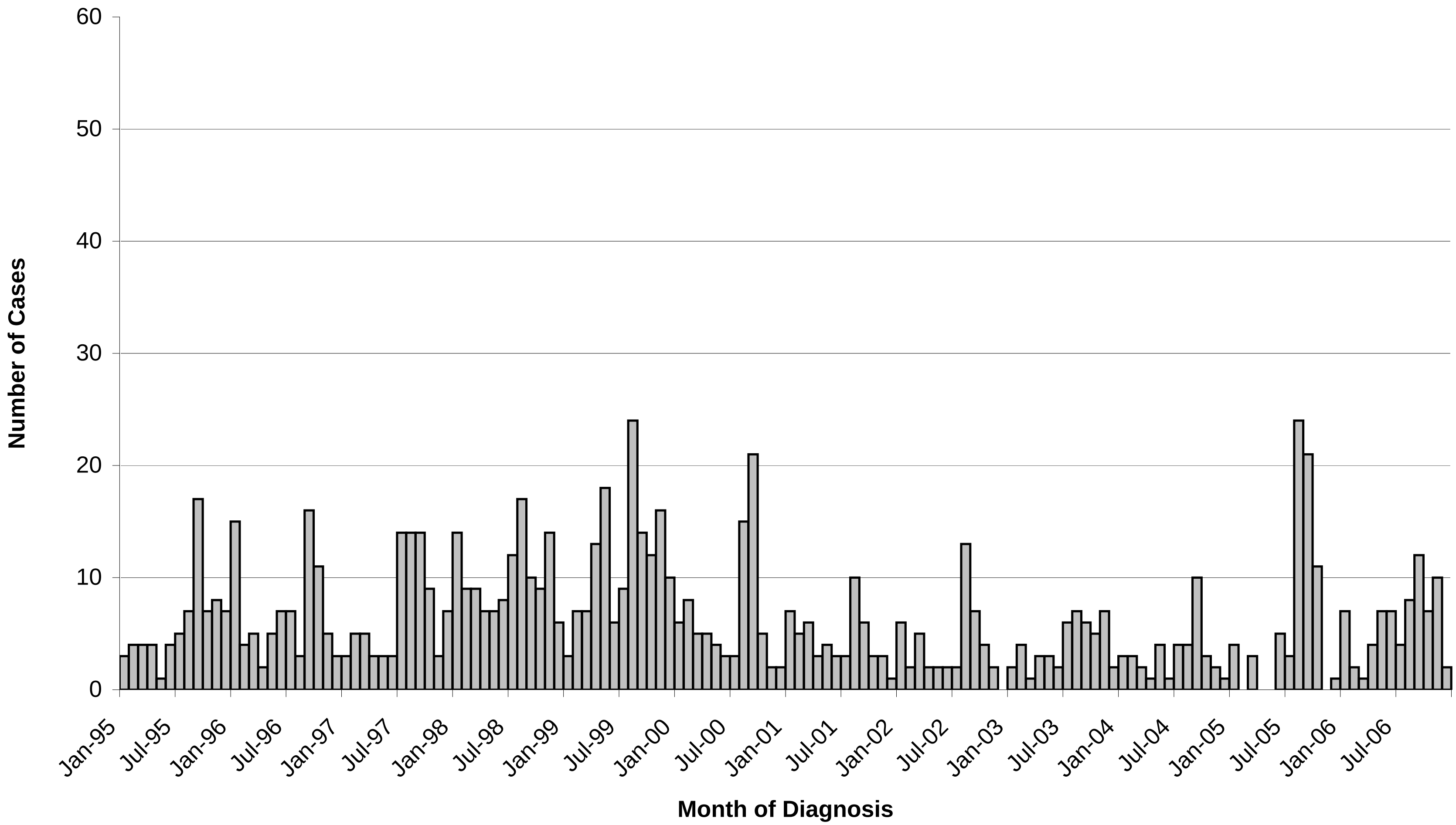


Figure 5: Number of Cases of Cryptosporidiosis Among Immunocompetent Persons by Month of Diagnosis, New York City, January 1995-December 2006



<u>Table 14:</u> Percentage of Interviewed **Cryptosporidiosis** Case-Patients Reporting Selected Potential Risk Exposures in the Month Before Disease Onset, by Immune Status, New York City, 1995-2006.

Exposure Type	HIV/AIDS												Immunocompetent											
	1995	1996	1997	1998	1999	2000*	2001	2002	2003	2004	2005	2006	1995	1996	1997	1998	1999	2000*	2001	2002	2003	2004	2005	2006
Contact with an Animal[a]	35%	35%	33%	36%	35%	43%	24%	42%	40%	31%	33%	38%	42%	41%	41%	32%	35%	26%	37%	35%	23%	34%	36%	36%
High-risk Sexual Activity[b] (> 18 years old)	22%	22%	9%	15%	20%	25%	16%	23%	24%	34%	27%	31%	16%	25%	12%	10%	12%	23%	15%	30%	13%	31%	17%	3%
International Travel[c]	9%	9%	9%	13%	18%	14%	10%	11%	13%	15%	17%	9%	30%	29%	26%	28%	28%	40%	47%	33%	45%	47%	45%	40%
Recreational Water Contact[d]	16%	8%	16%	12%	16%	15%	8%	10%	21%	13%	5%	18%	21%	27%	40%	24%	22%	32%	35%	35%	34%	33%	52%	28%

Note: • The significance of risk exposures reported by cryptosporidiosis case-patients cannot be determined without reference to a suitable control population (i.e., non-*Cryptosporidium*-infected controls).
• Format of case interview form changed on 1/1/1997, 5/11/2001 and 8/21/2002. Details on Exposure Types and changes from 1995-2006 are noted below.

[a] Contact with an Animal - Includes having a pet, or visiting a farm or petting zoo (1995-1996); expanded to include: or visiting a pet store or veterinarian office (1997-2006).

[b] High-risk Sexual Activity - Includes having a penis, finger or tongue in sexual partner's anus (1995-2006).

[c] International Travel - Travel outside the United States (1995-2006).

[d] Recreational Water Contact - Includes swimming in a pool, or swimming in or drinking from a stream, lake, river or spring (1995-1996); expanded to include: or swimming in the ocean, or visiting a recreational water park (1997-2006).

* Year 2000 percentage of interviewed cryptosporidiosis cases does not include 14 cases associated with a point source exposure at a swimming pool in Florida.

Table 15: Percentage of Interviewed **Cryptosporidiosis** Case-Patients by Type of Tap Water Exposure Reported in the Month Before Disease Onset, by Immune Status, New York City, 1995-2006.

Year	HIV/AIDS					Immunocompetent				
	Plain Tap[a]	Filtered Tap[b]	Boiled Tap[c]	Incidental Plain Tap Only[d]	No Tap[e]	Plain Tap[a]	Filtered Tap[b]	Boiled Tap[c]	Incidental Plain Tap Only[d]	No Tap[e]
1995	69%	12%	7%	11%	3%	58%	18%	11%	7%	2%
1996	70%	9%	7%	15%	2%	63%	17%	10%	9%	4%
1997	71%	10%	3%	16%	2%	58%	21%	8%	12%	4%
1998	64%	18%	5%	15%	0%	67%	21%	3%	8%	3%
1999	66%	20%	3%	8%	5%	56%	25%	4%	11%	7%
2000*	63%	20%	6%	12%	4%	56%	17%	2%	8%	17%
2001	55%	14%	6%	16%	6%	43%	31%	4%	16%	6%
2002	54%	22%	0%	19%	4%	33%	44%	0%	21%	2%
2003	77%	13%	4%	4%	2%	36%	36%	2%	16%	9%
2004	49%	21%	6%	15%	5%	27%	30%	7%	13%	21%
2005	76%	7%	5%	10%	2%	30%	25%	5%	25%	14%
2006	67%	18%	7%	4%	2%	30%	20%	8%	28%	14%

Note: The significance of risk exposures reported by cryptosporidiosis case-patients cannot be determined without reference to a suitable control population (i.e., non-*Cryptosporidium*-infected controls).

• Format of case interview form changed on 1/1/1997, 5/11/2001, and 8/21/2002. Details on Tap Water Exposure and changes from 1995-2006 are noted below.

[a] Plain Tap - Drank unboiled/unfiltered NYC tap water (1995-5/10/2001); or drank greater than 0 cups of unboiled/unfiltered NYC tap water (5/11/2001-12/31/2006).

[b] Filtered Tap - Drank filtered NYC tap water (1995-5/10/2001); or drank greater than 0 cups of filtered NYC tap water, and 0 or more cups of boiled NYC tap water, and no unboiled /unfiltered NYC tap water (5/11/2001-12/31/2006).

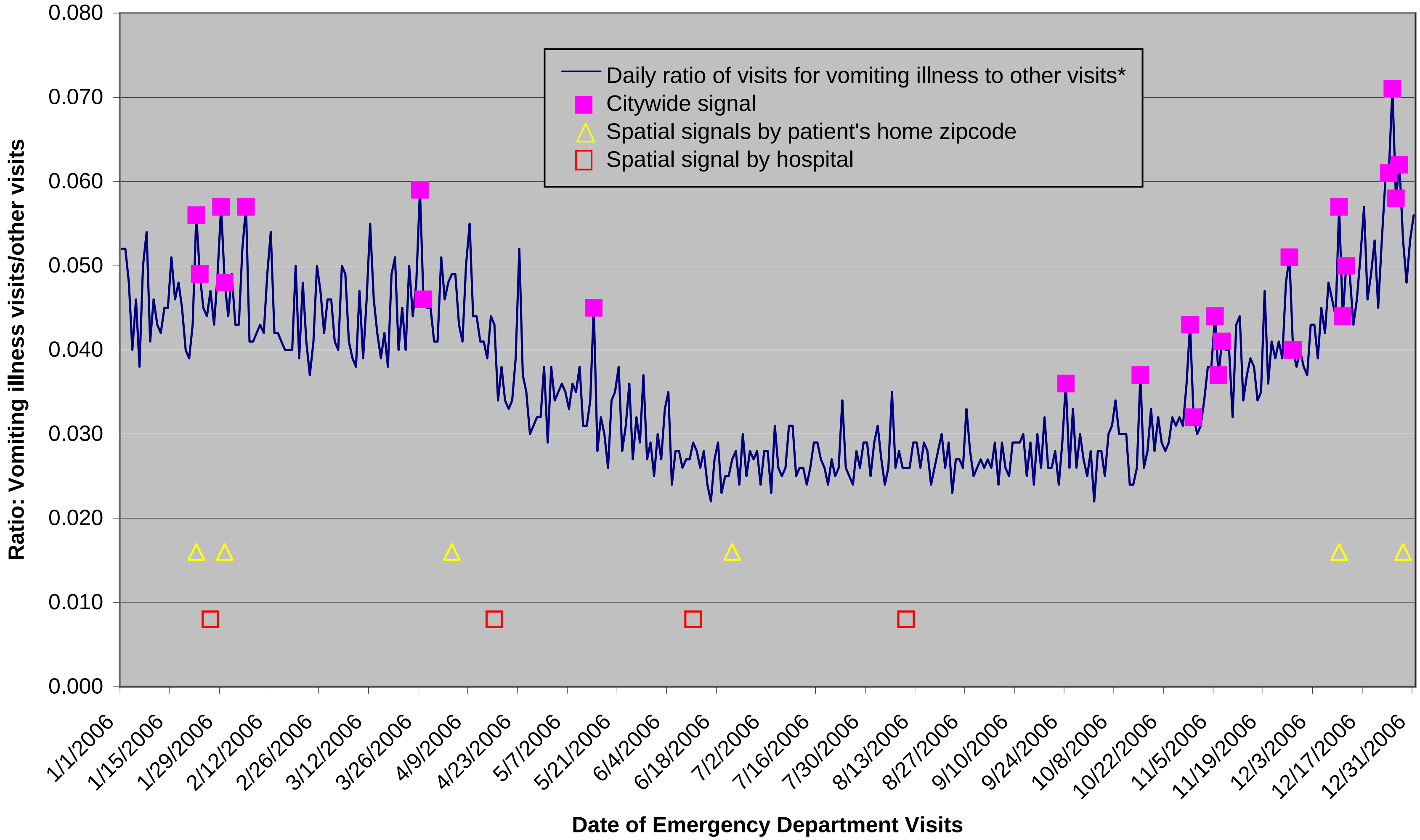
[c] Boiled Tap - Drank boiled NYC tap water (1995-5/10/2001); or drank greater than 0 cups of boiled NYC tap water, and no unboiled /unfiltered NYC tap water, and no filtered NYC tap water (5/11/2001-12/31/2006).

[d] Incidental Plain Tap Only - Did not drink any NYC tap water but did use unboiled/unfiltered NYC tap water to brush teeth, or to wash vegetables/fruits, or to make ice (1995-1996); expanded to include: or to make juice from concentrate (1997-2006)

[e] No Tap - Did not drink any NYC tap water and did not use unboiled/unfiltered NYC tap water to brush teeth, or to wash vegetables/fruits, or to make ice (1995-1996); expanded to include: or to make juice from concentrate (1997-2006).

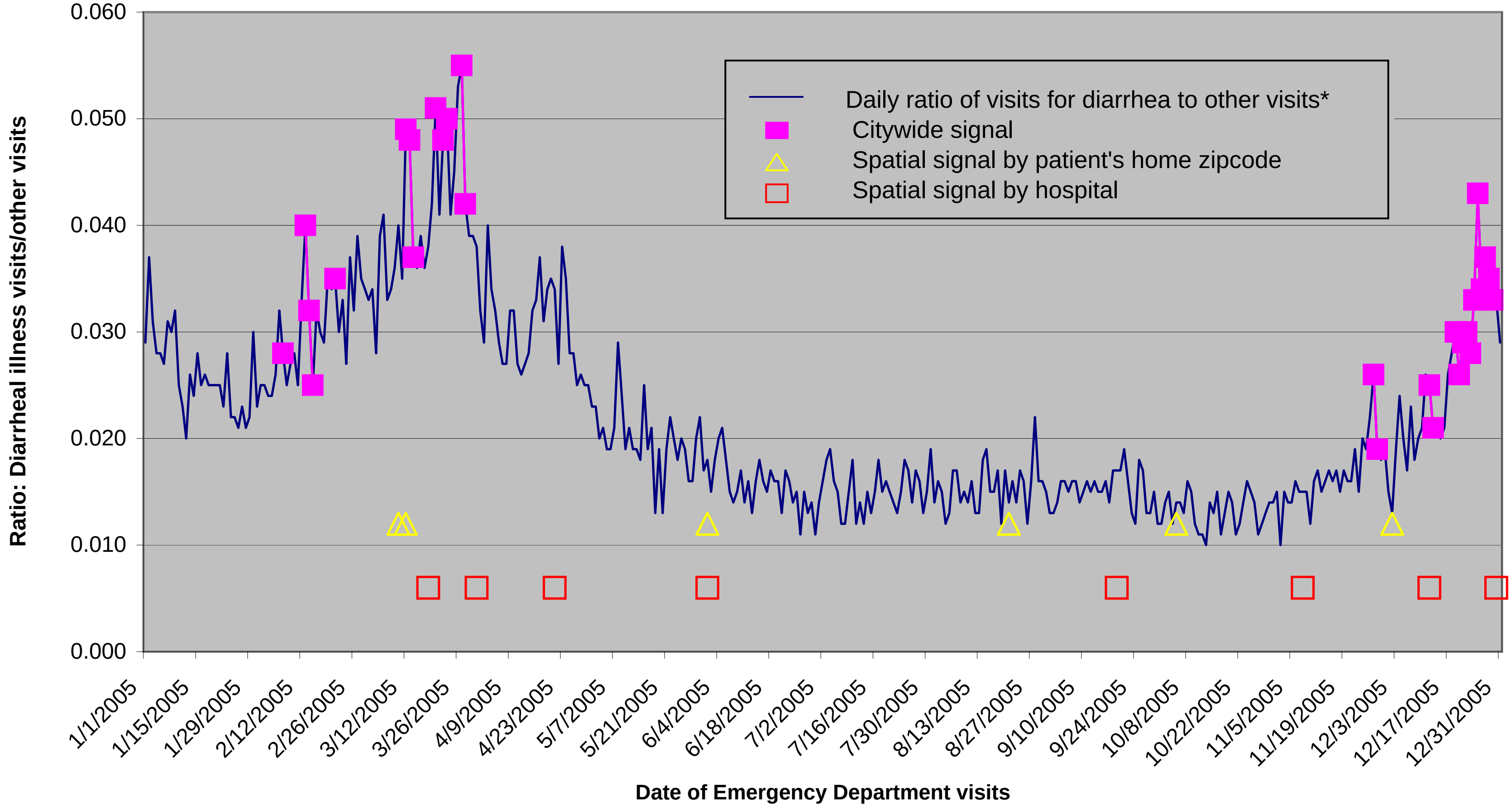
* Year 2000 percentage of interviewed cryptosporidiosis cases does not include 14 cases associated with a point source exposure at a swimming pool in Florida.

Figure 6: Emergency Department Syndromic Surveillance, Trends in visits for the vomiting syndrome, New York City, January 1, 2006 - December 31, 2006



*Other visits= visits to participating ED for conditions that do not fit in to one of the eight tracked syndromes (diarrhea, vomiting, respiratory, fever/influenza, asthma, sepsis, cold, rash).

Figure 7: Emergency Department Syndromic Surveillance, Trends in visits for the diarrhea syndrome, New York City, January 1, 2005 - December 31, 2005



*Other visits=visits to participating ED for conditions that do not fit in to one of the eight tracked syndromes (diarrhea, vomiting, respiratory, fever/influenza, asthma,sepsis, cold, rash).

Figure 8: Signals for Gastrointestinal Illness, Department of Health and Mental Hygiene, Syndromic Surveillance Systems, New York City, January 1, 2006 - June 30, 2006

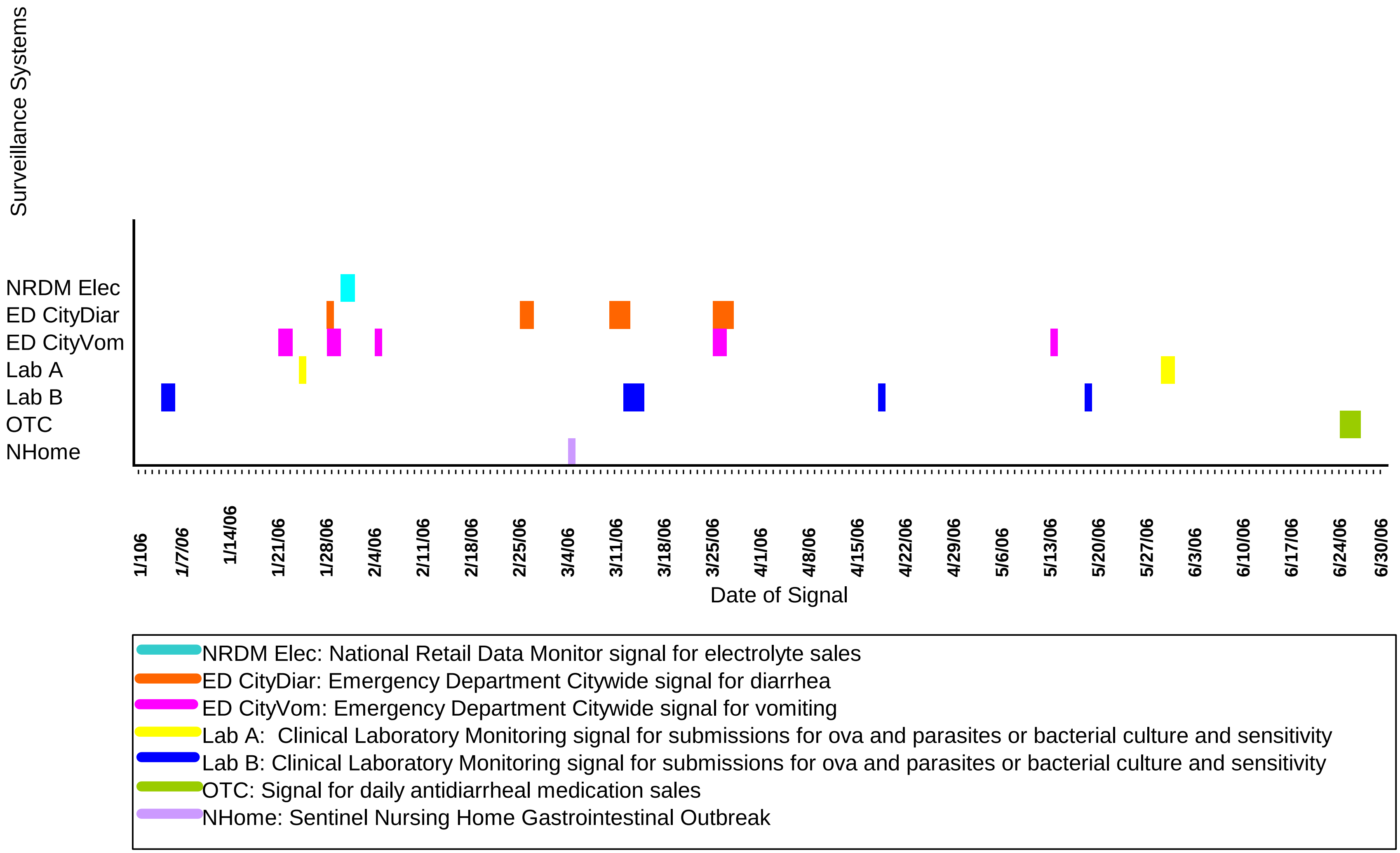


Figure 9: Signals for Gastrointestinal Illness, Department of Health and Mental Hygiene, Syndromic Surveillance Systems, New York City, July 1, 2006 - December 31, 2006