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

2005 Annual Report

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The New York City Waterborne Disease Risk Assessment Program was developed and implemented 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 2005 program achievements and results are presented.

Prepared by: The Waterborne Disease Risk Assessment Program Team

The Waterborne Disease Risk Assessment Program is an interagency program involving the New York City Departments of Environmental Protection and Health and Mental Hygiene. The 2005 Annual Report was prepared by: Lisa Alleyne[2], Dr. Sharon Balter[2], Daniel Cimini[2], Debjani Das[2], Rick Hefferman[2], Deborah Kapell[2], Emily Lumeng[2], Anne Seeley[1], and Alice Yeung[2].

Additional copies of this report and of semi-annual and quarterly reports are available from Anne Seeley at the address listed below[1], by phone (718-595-5346) or E-mail: aseeley@dep.nyc.gov

Copies of the questionnaires used for disease surveillance are available from Daniel Cimini at the address listed below[2], by phone (212-788-4233) or E-mail: dcimini@health.nyc.gov

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THE WATERBORNE DISEASE RISK ASSESSMENT PROGRAM TEAM

Asha Abdool[2], Public Health Epidemiologist
Catherine Addei-Maanu[2] Public Health Epidemiologist
Lisa Alleyne[2], Public Health Epidemiologist
Erlinda Amoroso[2], Public Health Epidemiologist
Michael Antwi[2], Public Health Epidemiologist
Sharon Balter[2], M.D., Medical Director
Daniel Cimini[2], R.N., M.P.H., City Research Scientist
Awilda Colon-Serrant[2], Public Health Epidemiologist
Solomon Dada[2], Public Health Epidemiologist
Rafael Fernandez[2], Public Health Epidemiologist
Mohammad Haroon[2], Public Health Epidemiologist
Muhammad Iftekharuddin[2], Public Health Epidemiologist
Marcelle Layton[2], M.D., Assistant Commissioner
David Lipsky[1], Ph.D., First Deputy Chief, Drinking Water Quality Control
Emily Lumeng [2], Public Health Epidemiologist
Ann Murray[2], Public Health Epidemiologist
Jose Poy[2], Public Health Epidemiologist
Carmen Roman[2], Public Health Epidemiologist
Anne Seeley[1], M.P.H., Section Chief, Drinking Water Quality Planning
Alaina Stoute[2], Public Health Epidemiologist
Don Weiss[2], M.D., M.P.H., Medical Director, Surveillance and Data Analysis Unit

[1] *Bureau of Water Supply, New York City Department of Environmental Protection, 59-17 Junction Blvd., 20th Floor, Flushing, NY 11373-5108.*
[2] *Bureau of Communicable Disease, New York City Department of Health and Mental Hygiene, 125 Worth Street, CN-22A, New York, NY 10013.*

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EXECUTIVE SUMMARY

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ACTIVE DISEASE SURVEILLANCE

Active disease surveillance for giardiasis and cryptosporidiosis began in July 1993 and November 1994, respectively. Between 2004 and 2005, the number of giardiasis cases decreased from 1,088 to 875, and the number of cases of cryptosporidiosis increased from 138 to 148. 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.

SYNDROMIC SURVEILLANCE / OUTBREAK DETECTION

Gastrointestinal (GI) disease trends in the general population can be monitored via tracking of sentinel populations or surrogate indicators of disease. 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 system, the Clinical Laboratory Monitoring System, tracks the number of stool specimens submitted to clinical laboratories for microbiological testing. A third system utilizes hospital Emergency Department chief complaint logs to monitor for outbreaks. NYC 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. Year 2005 findings for these systems pertaining to gastrointestinal illness are summarized.

WATER QUALITY EVENTS

Tubidity events occurred in upstate reservoirs in April and June. In addition, in October, source water pathogen monitoring at a sampling site in the Kensico Reservoir detected a one-day elevation in *Cryptosporidium* oocyst concentrations, necessitating activation of the Cryptosporidium Action Plan. These events, and actions taken in response, are described.

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 (PDSP) 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 2005. 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 additional race/ethnicity categories that have not been used in the collection of City disease surveillance data for giardiasis and cryptosporidiosis. 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 2005. Also, mailings or telephone calls continued to be made to health care providers, laboratories, or patients 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 2005, a total of 875 cases of giardiasis were reported to DOHMH and the annual case rate was 10.9 per 100,000. Annual case numbers decreased 65% from 1994 to 2005 (see Table 1 below, and Figure 1).

Table 1: Number of Cases and Case Rates* for Giardiasis, Active Disease Surveillance, New York City, 1994 - 2005.

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

* For 1994-1999, rates were calculated using intercensal population estimates. For 2000-2005, 2000 Census data were used.

Poisson regression analysis showed an overall decline in cases of giardiasis from 1994 to 2005. Additional analyses showed the decline was significant in males ($P<.01$) and females ($P<.01$) and was also significant in all age groups ($P<.01$). The decline in both sexes and across age groups suggests that it is not related to the use of highly active antiretroviral therapy (HAART) for treating persons living with HIV. Although it is unclear why the rates have declined, this decline has been seen nationally. (See: Hlavsa MC, Watson JC, Beach MJ. Giardiasis surveillance - United States, 1998 - 2002. In: Surveillance Summaries, January 28, 2005. *MMWR* 2005; 54 [No.SS-1]: 9-16.) The decline in cases does not appear to have to do with the water supply since testing for *Giardia* at the source water supply keypoints for New York City has revealed quite stable results over the same time period.

The following provides some highlights from the active surveillance data for giardiasis among New York City residents from January 1 through December 31, 2005. Additional data is presented in the tables that appear later in this report.

Location of case-patient residence

Location of case-patient residence was known for all 875 giardiasis case-patients who resided in New York City. In addition, there were 20 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 (25.8 cases per 100,000 population) (Table 2). The highest UHF neighborhood-specific case rate was found in the Chelsea-Clinton neighborhood in Manhattan (61.8 cases per 100,000) (Map 1 and Table 3).

Sex

Information regarding sex was available for 873 of 875 cases (99.8%). The number and rate of giardiasis cases were higher in males than females, with 576 males (15.2 cases per 100,000) and 297 females (7.0 cases per 100,000) reported. The highest sex- and borough-specific case rate was observed among males residing in Manhattan (38.0 cases per 100,000) (Table 2).

Age

Information regarding age was available for 864 of 875 cases (98.7%). The highest age group-specific annual case rates were among children 5-9 years old (23.0 cases per 100,000) and children less than 5 years old (22.0 cases per 100,000) (Table 4). The highest age group- and sex-specific case rates were among males 5-9 years old (24.5 cases per 100,000) and males under 5 years old (23.5 cases per 100,000). The highest age group- and borough-specific case rates were among children 5-9 in Manhattan (42.3 cases per 100, 000) and children less than 5 years old in Manhattan (42.1 cases per 100,000) (Table 5).

Race/Ethnicity

Information regarding race/ethnicity was available for 551 of 875 cases (63.0%). The racial/ethnic group-specific case rate was highest among White non-Hispanics (11.1 cases per 100,000) (Table 6). The highest borough- and racial/ethnic group-specific case rate occurred among non-Hispanic Whites in Manhattan (27.3 cases per 100,000). The highest age group- and race/ethnicity-specific case rates were among children 5-9 years old in the grouping that includes Asian/Pacific Islanders and American Indian/Alaskan Natives (26.2 cases per 100,000) and children less than 5 years old in this racial/ethnic grouping (25.9 cases per 100,000) (Table 7).

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 2005. 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 2005, a total of 148 cases of cryptosporidiosis were reported to DOHMH and the annual case rate was 1.8 per 100,000. Though 10 more cases were diagnosed in 2005 as compared to 2004, annual case numbers have declined 69% from 1995 to 2005 (See Table 8 below, and Figure 2).

Table 8: Number of Cases and Case Rates* for Cryptosporidiosis, Active Disease Surveillance, New York City, 1994 - 2005.

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	123	1.5
2002	148	1.8
2003	126	1.6
2004	138	1.7
2005	148	1.8

* For 1994-1999, rates were calculated using intercensal population estimates. For 2000-2005, 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, 2005. Additional data is 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 (3.6 cases per 100,000) (Table 9).

The highest UHF neighborhood-specific case rate was found in the Chelsea-Clinton neighborhood in Manhattan (8.1 cases per 100,000) (Map 2 and Table 10).

Sex

Information regarding sex was available for all cases. The number and rate of cryptosporidiosis cases were higher in males than females, with 98 males (2.6 cases per 100,000) and 50 females (1.2 cases per 100,000) reported. The borough- and sex-specific case rate was highest for males in Manhattan (4.8 cases per 100,000) (Table 9).

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 (2.8 cases per 100,000) and children 5-9 years old (2.7 cases per 100,000) (Table 11). The highest age group- and sex-specific case rates occurred among males less than 5 years old (3.6 cases per 100,000) and males 5-9 years old (3.5 cases per 100,000). The highest age group and borough-specific case rates were among children 5-9 years old in Manhattan (6.8 cases per 100,000) and children less than 5 years old in Manhattan (6.6 cases per 100,000) (Table 12).

Race/Ethnicity

Race/ethnicity information was available for 144 of 146 cases (97.3%). The racial/ethnic group-specific case rate was highest among Black non-Hispanics (2.4 cases per 100,000) (Table 13). Non-Hispanic Blacks in Manhattan had the highest race/ethnicity- and borough-specific case rates (6.8 cases per 100,000). The highest age group- and race/ethnicity-specific case rates occurred among children less than 5 years old in the grouping that includes Asian/Pacific Islanders and American Indian/Alaskan Natives and children 5-9 years old in this racial/ethnic grouping (6.0 cases per 100,000 in both age groups) (Table 14). However, these rates only represent 3 cases in each age group and racial/ethnic category. The next highest age group- and race/ethnicity-specific case rate occurred among 20-44 year old Black non-Hispanics (35 cases, 4.7 cases per 100,000).

Increase in cryptosporidiosis cases in August 2005

This year, DOHMH received reports of 43 case-patients with cryptosporidiosis whose illness onset occurred in August (see Figure 3). Analysis of seasonal trends in cryptosporidiosis incidence in NYC demonstrates that cases of cryptosporidiosis are generally higher in late summer and early fall. This year's increase in August represented between 10 and 35 excess case-patients compared to the same period in the last 5 years. Comparing August 2005 cases to cases in prior months of 2005, analysis of the data revealed that the increase was seen in all age groups; the only statistically significant increases occurred in the 5-9 year old age group (P=.01) and the 20-44 year old age group (P<.01). The increase was seen equally in males and females. Reviewing risk factors for illness, such as having an immunocompromising condition, case-patients with onset in August 2005 were significantly more likely to be immunocompetent when compared to patients with onset from January-July 2005 (P<.0001) and were more likely to report recreational water use (P<.0001). Case-patients reported recreational water use more often in August 2005 when compared to August of previous years. Among immunocompetent case-patients, there was a six-fold increase in recreational water use compared to the rest of the year. This was the second highest increase seen since 2000 when there was a seven-fold increase in recreational water use in August. Of the 17 immunocompetent case-patients with illness onset in August 2005 who reported use of a swimming pool or recreational water park, 12 reported this exposure outside of NYC. For the remaining five case-patients, the location of the exposure was either in NYC (3 cases) or not identified (2 cases).

The time period of the increase coincided with a large outbreak of cryptosporidiosis in upstate New York related to recreational water exposure at a spray park. While there was only one laboratory-confirmed case in a New York City resident associated with the upstate outbreak, there was widespread publicity concerning the outbreak, and health care providers were urged to order testing for *Cryptosporidium,* which may have lead to a surveillance bias in that more people were being tested for cryptosporidiosis than in other years. Clinical laboratory surveillance reflected increased testing for *Cryptosporidium* at that time. The number of cases of cryptosporidiosis by onset date returned to expected levels in September.

There were no citywide gastrointestinal signals in the ED syndromic surveillance system during this time period. Also, no sentinel nursing home gastrointestinal outbreaks were reported during this time period.

Had the NYC drinking water supply been a source of infection we would have expected to see more widespread illness, and in particular, we would have expected to see an increase in illness among immunocompromised patients as well as among immunocompetent patients, which did not happen. It appears that the August 2005 increase in NYC cases was due to a surveillance bias caused by publicity around an outbreak elsewhere in the state at a time of year when cryptosporidiosis is already somewhat elevated most likely due to recreational water use.

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 67 in 2005, thus causing a decline in the overall number of cryptosporidiosis cases in New York City (see Table 15 below, and Figures 4 and 5).

Table 15: Number of Cases of Cryptosporidiosis by Year and Immune Status, New York City, 1995-2005.

Immune Status	YEAR										
	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Persons with HIV/AIDS	392	244	80	79	118	91	66	94	76	95	67
Immunocompetent	71	83	83	122	139	79	54	47	48	38	72
Immunocompromised Other Than HIV/AIDS	4	3	7	2	3	2	2	7	2	5	9
Unknown Immune Status	5	4	2	5	1	0	1	0	0	0	0
Total	472	334	172	208	261	172	123	148	126	138	148

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*=.21) 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 2005 was significantly greater in patients who were immunocompromised than in those who were not (*P*<.01).

Cryptosporidiosis and Potential Risk Exposures

Summary data for 1995 through 2005 on commonly reported potential risk exposures, obtained from case-patient interviews, are presented in Table 16. Information has also been collected and presented regarding type of tap water consumption (Table 17). 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 most years (2001-2002, *P*<.01; 2003, *P*=.17; 2004, *P*<.05; 2005, *P*=<.01). There was no statistically-significant difference between these two groups in the proportion of cases reporting animal contact or high-risk sex. 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. It does appear, based on these data, that immunocompetent patients are more likely to acquire the illness when traveling to endemic areas than are patients who are immunocompromised due to HIV/AIDS. Based on these data we cannot comment on whether or not either group of patients was more likely to acquire illness due to sexual practices.

PART II: SYNDROMIC SURVEILLANCE / OUTBREAK DETECTION

Introduction

Gastrointestinal (GI) disease trends in the general population can be monitored via tracking of sentinel populations or surrogate indicators of disease. 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. NYC 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 2005 is provided below.

Nursing Home Sentinel Surveillance

The nursing home surveillance system began in March of 1997 and was significantly modified in August of 2002, at which time nine New York City nursing homes were participating. 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 Bureau of Communicable Disease 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. All nine nursing homes are participating in the current system. As feedback, nursing homes are provided with copies of Waterborne Disease Risk Assessment Program semi-annual and annual reports.

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 2005.

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 three 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.

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 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. As was reported in WDRAP Semi-Annual Report #6 (for January –June 2005), there was a period during the first half of 2005 in which this program was not in full

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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.

operation. The program was brought back in operation by the second half of 2005. As of the time of this writing, work is nearly completed in the re-entering of data for the problem period.

In 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 system (for over-the-counter anti-diarrheal medications). The goal was to develop a system that would provide more timely and detailed data than the existing ADM tracking system. The new OTC system better serves bioterrorism surveillance since it also collects data on other medicines, especially for fever and flu. In August 2002 daily electronic transmission began. Each daily file contains data on an average of 6,000 prescription and 32,000 non-prescription medication sales. Routine daily analyses began in mid-December 2002. Drugs are categorized into key syndromes, and trends are analyzed for citywide increases in sales of anti-diarrhea (and cold) medications. The gastrointestinal category contains only non-prescription medications and includes generic and brand name loperamide-containing agents and bismuth subsalicylate agents.

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.)

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 2005. 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, 2005. 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. Both graphs indicate that citywide signaling for the vomiting and diarrhea syndromes began in February and continued through March. Another peak occurred in late November and continued through the end of the year. These signals coincide with our historical experience of seasonal viral outbreaks of norovirus and rotavirus. No ED citywide signals were noted in August 2005 when there was an increase in the number of reported cases of cryptosporidiosis (see page 5). Spatial signals were distributed evenly throughout the year with no distinct clustering and most likely represent statistical aberrations. No spatial signal was sustained 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, 2005. 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 February through March and again from late November through December, most likely representing annual viral trends. The other systems did not signal as consistently although there was sporadic signaling of the laboratory, OTC and NRDM electrolyte systems from February through March and again in the late fall and early winter when the ED systems were signaling. There were some laboratory signals throughout the year which may represent baseline signaling noise in that system as they are not reflected in the other systems.

There were three GI outbreaks reported in sentinel nursing homes during this time period. The first began in late April. Stool specimens from five of six affected nursing home residents were found to be positive for *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. The second sentinel nursing home GI outbreak began in late September. Specimens tested for ova and parasites and *Cryptosporidium* were negative. The outbreak involved 10 residents with symptoms of both vomiting and diarrhea, although the predominant symptom was vomiting, which is most consistent with a viral etiology. The third outbreak began in late November. The etiologic cause of the outbreak was determined to be *C. difficile.*

In terms of trends from the ADM system, program difficulties were encountered in the first half of the year (as described above) and, as a result, a full analysis of trends measured by this system for 2005 is not possible at this time. For the period of presently-available digital records during 2005 (May through December), no citywide increases in overall ADM weekly sales volume were observed above normal background variation. A single-week increase was observed in sales of loperamide products in the week ending November 19; however the increase was not apparent in total ADM sales (loperamide plus non-loperamide products). The increase in loperamide products appeared to coincide with a sales promotion of certain loperamide formulations.

In summary, for the period January through December 2005 there was signaling of multiple syndromic systems from February through March and again in late November and in 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: WATER QUALITY EVENTS

<u>Turbidity Event – April 2005</u>

On April 4, DOHMH was notified of high levels of turbidity in some of the upstate reservoirs, particularly within the Catskill region, following heavy rains on April 2-3. Through daily conference calls, DOHMH worked closely with DEP, NYSDOH, the Environmental Protection Agency (EPA), and the Westchester County Department of Health (WCDOH) to assess the situation. DEP was able to treat the water with alum, and the turbidity at the Kensico Reservoir peaked at 5 NTU briefly on the weekend of April 10-11. Upstate source water pathogen levels remained low and it was decided by all Agencies at the time that a drinking water advisory to vulnerable populations was not necessary. On April 19 and 20, staff members at DOHMH contacted all nine nursing homes in the sentinel surveillance system to determine whether any had experienced outbreaks of GI illness and to ensure that nursing home staff members were aware of sentinel surveillance protocol and had DOHMH stool collection supplies on hand in the event of an outbreak. None of the nursing homes reported an outbreak. No increase in GI illness was noted in other syndromic surveillance systems at that time. Also, active surveillance findings were reviewed, and no increase in diagnosed cases of cryptosporidiosis or giardiasis was noted after the incubation periods for these infections (that is, approximately 7 days for cryptosporidiosis, and 7 to 10 days for giardiasis).

<u>Turbidity Event – June 2005</u>

Following intense rainstorms on June 29, soil erosion into the Kensico Reservoir lead to a brief increase in turbidity in the City's drinking water. Following consultation with NYSDOH, EPA and DEP, on June 30, DOHMH issued a water advisory recommending that, as a precaution, vulnerable populations use either boiled water or water that is appropriately filtered or bottled. In addition, a Health Alert was sent to hospitals and medical providers regarding the advisory, and requesting that they increase testing for *Giardia* and *Cryptosporidium* among persons with gastrointestinal symptoms. The water advisory was lifted the next day, July 1. (See copies of DOHMH Health Alerts, included as Attachments 1 and 2.) On July 1, there was a one-day signal in the OTC syndromic surveillance system for anti-diarrheal medication sales, which may have been due to publicity surrounding the event. Following this event, there were no citywide increases in complaints of vomiting or diarrhea at emergency departments participating in syndromic surveillance, and no sustained localized signals for vomiting or diarrhea among participating EDs. Other syndromic systems did not indicate an increase in GI illness at this time. Active surveillance was heightened by expediting visits to high volume laboratories, and no increase in diagnosed cases of cryptosporidiosis or giardiasis was noted throughout the month of July.

Activation of Provisional Level 1 of the Cryptosporidium Action Plan – October 2005

Due to heavy rainfall on October 7 through October 9 with resultant run-off, turbidity levels in some upstate reservoirs became elevated. In response to this, and other source water quality findings, sample collection for source water pathogen monitoring at the two Kensico Reservoir effluent sampling sites was increased to daily monitoring (monitoring at these sites is routinely done on a weekly basis). On October 11, pathogen testing at each of these two Kensico effluent sites found *Cryptosporidium* concentrations of 1 oocyst per 50 liters of water sample. However, on October 12, the *Cryptosporidium* concentration at the Delaware Aqueduct outflow of Kensico Reservoir (Shaft 18) was 4 oocysts per 50 liter sample. At the same time, the concentration at the Catskill Aqueduct outflow was 3 oocysts per 50 liter sample. These results were finalized and reported on October 14. A finding of 4 to 6 oocysts per 50 liter sample from any of the source water keypoints triggers Provisional Action Level 1 of the NYC Cryptosporidium Action Plan. To reduce turbidity, DEP added alum to the water, and the dosing rate for chlorine was increased. In addition, DEP increased monitoring of key water quality parameters throughout the water supply system, including continued daily source water pathogen monitoring. To assess this situation, conference calls were held on a daily basis from October 14 through October 17 to provide participants (staff members from DEP, DOHMH, NYSDOH, WCDOH and EPA) with an opportunity to review the latest data and agree upon additional actions. Throughout this time, daily source water *Cryptosporidium* concentrations at the Kensico Reservoir keypoints ranged from 0 to 3 oocysts per 50 liter sample, and water quality parameters within the City water distribution system were within acceptable levels. It was therefore decided that a drinking water advisory to vulnerable populations was not necessary. Daily collection of samples for source water pathogen monitoring at the Kensico Reservoir effluent sites continued through October 26, and *Cryptosporidium* concentrations ranged from 0 to 3 oocysts per 50 liter sample. No increase in diarrheal illness was noted in syndromic surveillance systems during this time. Also, active surveillance findings were reviewed throughout this period and no increase in diagnosed cases of cryptosporidiosis was noted from the start of the event through the disease incubation period. For the remainder of 2005, source water *Cryptosporidium* concentrations ranged from 0 to 2 oocysts per 50 liter sample.

PART IV: 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 and 2005 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 and 2005 New York City Drinking Water Supply and Quality Statement*
  http://www.nyc.gov/html/dep/html/wsstate.html

Figure 1: Giardiasis by Month of Diagnosis, New York City, July 1993-December 2005

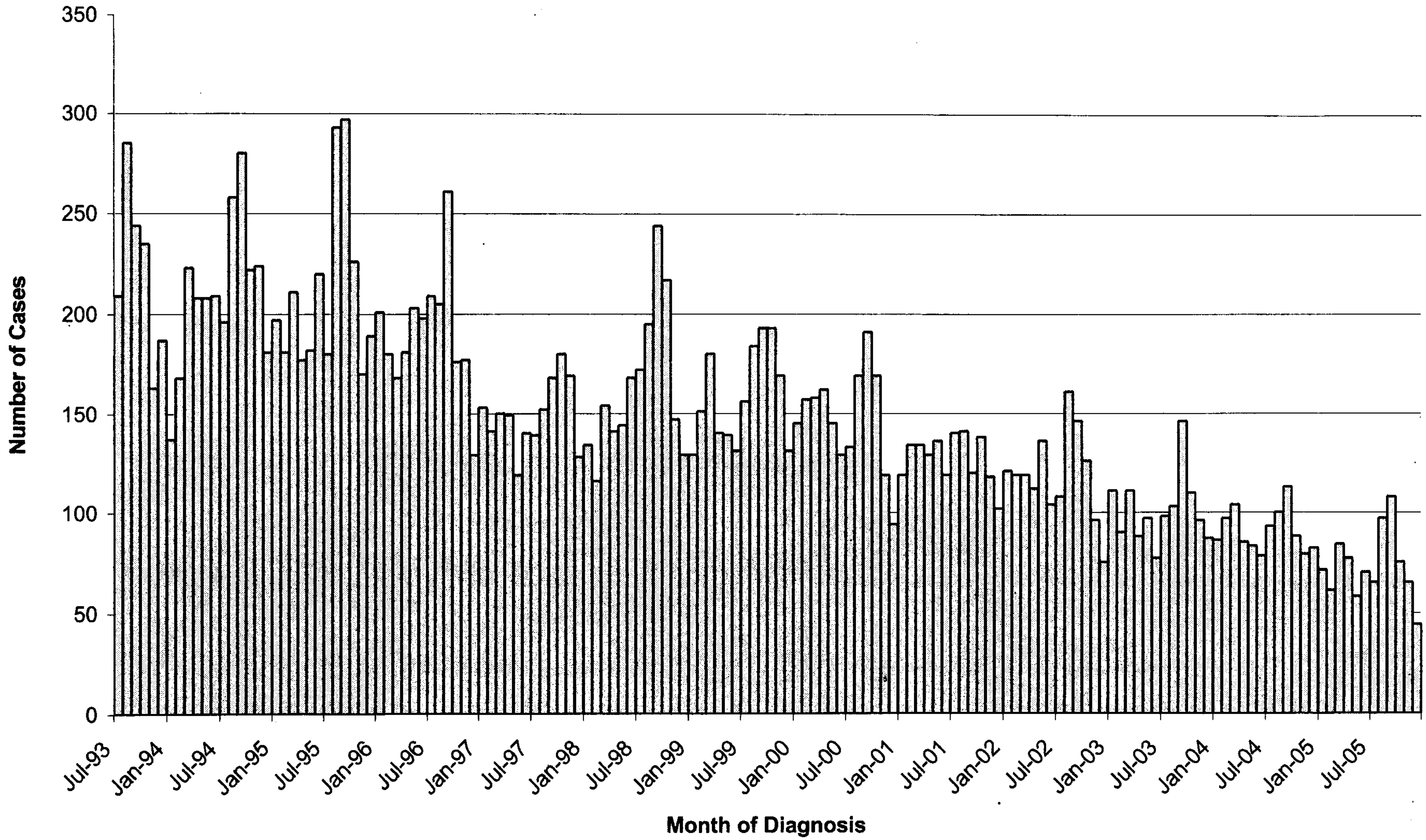


TABLE 2: Number of cases and annual case rate per 100,000 population by sex and borough of residence - Active surveillance for **giardiasis** in New York City (2005)

	Borough of residence					
Sex	Citywide number (rate)	Manhattan number (rate)	Bronx number (rate)	Brooklyn number (rate)	Queens number (rate)	Stat Is number (rate)
Male	576 (15.2)	277 (38.0)	71 (11.4)	131 (11.3)	87 (8.1)	10 (4.7)
Female	297 (7.0)	119 (14.7)	80 (11.2)	48 (3.7)	46 (4.0)	4 (1.7)
Unknown	2	0	0	2	0	0
Total	875 (10.9)	396 (25.8)	151 (11.3)	181 (7.3)	133 (6.0)	14 (3.2)

Map 1

Giardiasis annual case rate per 100,000 population by UHF neighborhood - Active surveillance data for New York City (2005)

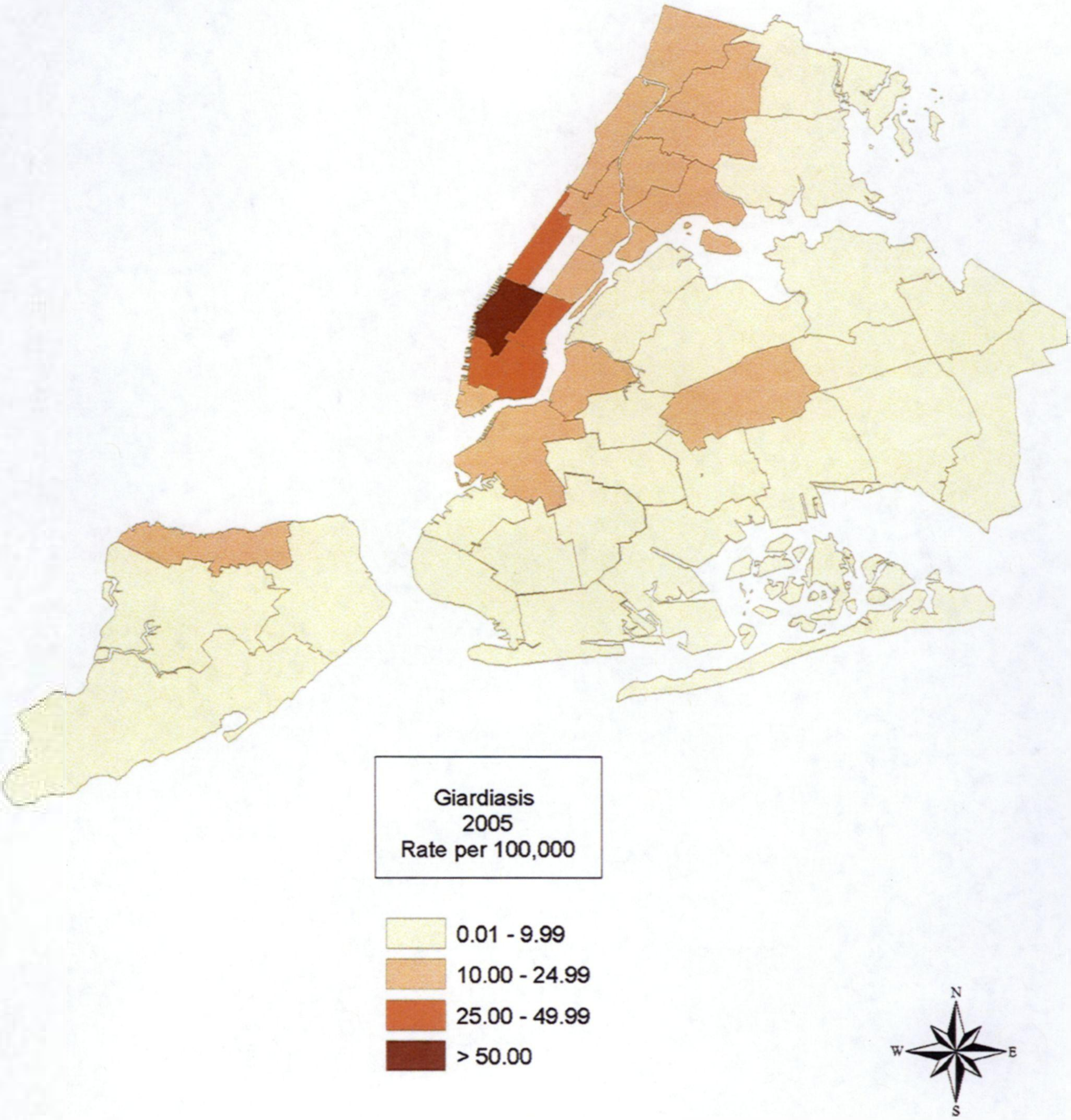


Table 3: Number of cases and annual case rate per 100,000 by UHF neighborhood of residence - Active surveillance for **giardiasis** in New York City (2005)

UHF Neighborhood	Borough	Number	Population	Rate
Chelsea-Clinton	Manhattan	76	122998	61.8
Greenwich Village-Soho	Manhattan	32	83709	38.2
Upper West Side	Manhattan	68	220706	30.8
Gramercy Park-Murray Hill	Manhattan	32	124468	25.7
Union Sq-Lower East Side	Manhattan	50	197138	25.4
Upper East Side	Manhattan	53	216441	24.5
Downtown-Heights-Slope	Brooklyn	43	214696	20.0
High Bridge-Morrisania	Bronx	34	189755	17.9
Greenpoint	Brooklyn	22	124449	17.7
Lower Manhattan	Manhattan	5	29266	17.1
Washington Heights-Inwood	Manhattan	46	270677	17.0
Kingsbridge-Riverdale	Bronx	13	88989	14.6
Crotona-Tremont	Bronx	27	199530	13.5
C Harlem-Morningside Hgts	Manhattan	20	151113	13.2
East Harlem	Manhattan	14	108092	13.0
Hunts Point-Mott Haven	Bronx	14	122875	11.4
Port Richmond	Stat Is	7	62788	11.1
Fordham-Bronx Park	Bronx	27	250491	10.8
Ridgewood-Forest Hills	Queens	25	240901	10.4
Pelham-Throgs Neck	Bronx	28	290052	9.7
Long Island City-Astoria	Queens	19	220960	8.6
Williamsburg-Bushwick	Brooklyn	16	194305	8.2
Bensonhurst-Bay Ridge	Brooklyn	14	194558	7.2
West Queens	Queens	34	477516	7.1
Southwest Queens	Queens	19	269952	7.0
Bed Stuyvesant-Crown Hgts	Brooklyn	22	317296	6.9
Borough Park	Brooklyn	19	324411	5.9
Sunset Park	Brooklyn	7	120441	5.8
East Flatbush-Flatbush	Brooklyn	18	316734	5.7
Bayside-Littleneck	Queens	4	88164	4.5
Flushing-Clearview	Queens	11	255542	4.3
Northeast Bronx	Bronx	8	185998	4.3
Fresh Meadows	Queens	4	93148	4.3
Coney Island-Sheepshead Bay	Brooklyn	12	286901	4.2
Jamaica	Queens	10	285339	3.5
Rockaway	Queens	3	106738	2.8
Stapleton-St. George	Stat Is	3	116227	2.6
Canarsie-Flatlands	Brooklyn	5	197819	2.5
Southeast Queens	Queens	4	198846	2.0
East New York	Brooklyn	3	173716	1.7
South Beach-Tottenville	Stat Is	3	179892	1.7
Willowbrook	Stat Is	1	84821	1.2

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 (2005)

	Sex			
Age group	Male number (rate)	Female number (rate)	Unknown	Total number (rate)
<5 years	65 (23.5)	54 (20.4)	0	119 (22.0)
5-9 years	70 (24.5)	57 (20.7)	2	129 (23.0)
10-19 years	39 (7.3)	36 (7.0)	0	75 (7.1)
20-44 years	268 (17.2)	81 (4.9)	0	349 (10.8)
45-59 years	95 (14.9)	39 (5.2)	0	134 (9.7)
≥ 60 years	33 (6.6)	25 (3.3)	0	58 (4.6)
Unknown	6	5	0	11
Total	576 (15.2)	297 (7.0)	0	875 (10.9)

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 (2005)

	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	119 (22.0)	32 (42.1)	32 (29.2)	32 (17.5)	19 (13.3)	4 (13.4)
5-9 years	129 (23.0)	31 (42.3)	36 (30.1)	34 (17.9)	26 (17.9)	2 (6.1)
10-19 years	75 (7.1)	12 (8.3)	30 (14.4)	10 (2.8)	21 (7.6)	2 (3.3)
20-44 years	349 (10.8)	197 (27.8)	34 (6.7)	71 (7.5)	43 (4.8)	4 (2.4)
45-59 years	134 (9.7)	82 (28.9)	10 (4.9)	26 (6.3)	15 (3.8)	1 (1.2)
≥60 years	58 (4.6)	40 (16)	8 (4.4)	4 (1.1)	5 (1.3)	1 (1.5)
Unknown	11	2	1	4	4	0
Total	875 (10.9)	396 (25.8)	151 (11.3)	181 (7.3)	133 (6.0)	14 (3.2)

TABLE 6: Number of cases and annual case rate per 100,000 population by race/ethnicity and borough of residence - Active surveillance for **giardiasis** in New York City (2005)*

	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	135 (6.2)	39 (9.3)	56 (8.7)	17 (3.5)	22 (4.0)	1 (1.9)
White non-Hispanic	310 (11.1)	192 (27.3)	11 (5.7)	68 (8.0)	33 (4.5)	6 (1.9)
Black non-Hispanic	57 (2.9)	22 (9.4)	17 (4.1)	13 (1.5)	4 (0.9)	1 (2.5)
Asian, Pac Islander, Amer Indian, Alaska Native	49 (6.1)	16 (10.9)	6 (14.1)	14 (7.4)	13 (3.3)	0
Unknown	324	127	61	69	61	6
Total	875 (10.9)	396 (25.8)	151 (11.3)	181 (7.3)	133 (6.0)	14 (3.2)

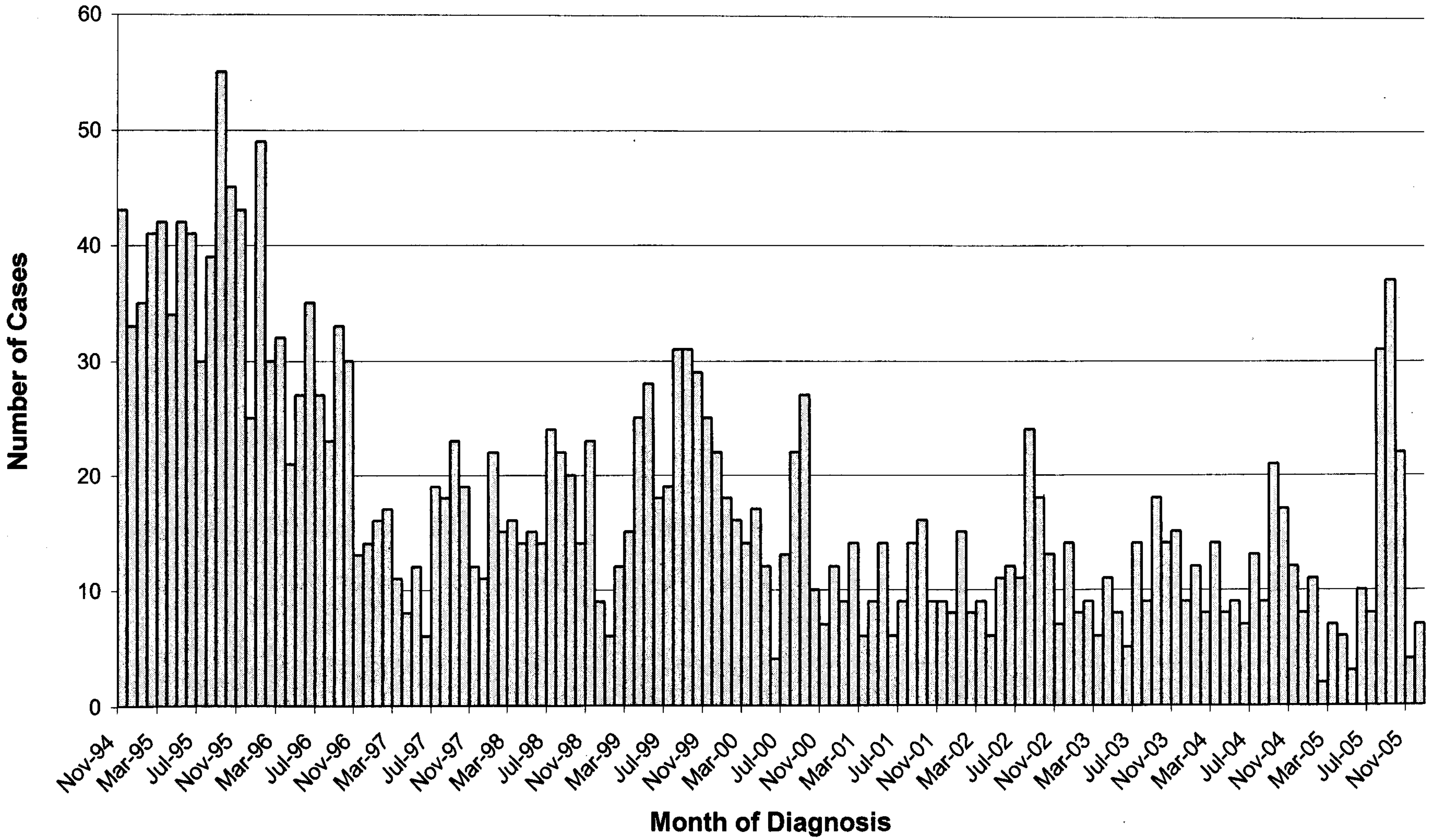
* Because year 2000 U.S. Census data include race/ethnicity categories not included in disease surveillance data, 3.5% of the total population was not included in the denominator used to calculate rates by race/ethnicity. Rates pertaining to race/ethnicity may therefore be inflated.

TABLE 7: Number of cases and annual case rate per 100,000 population by race/ethnicity and age group - Active surveillance for **giardiasis** in New York City (2005)*

	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)	Unk.	Total number (rate)
Hispanic	24 (12.9)	31 (15.8)	25 (7.1)	31 (3.4)	20 (6.3)	3 (1.5)	1	135 (6.2)
White non-Hispanic	30 (22.3)	22 (17.5)	8 (3.2)	152 (14.2)	63 (11.4)	33 (4.9)	2	310 (11.1)
Black non-Hispanic	7 (4.8)	10 (6.0)	6 (1.9)	26 (3.5)	4 (1.2)	4 (1.5)	0	57 (2.9)
Asian, Pac. Is., Amer. Indian, Alaska Native	13 (25.9)	13 (26.2)	5 (5.2)	13 (3.5)	3 (2.1)	1 (1.1)	1	49 (6.1)
Unknown	45	53	31	127	44	17	7	324
Total	119 (22.0)	129 (23.0)	75 (7.1)	349 (10.8)	134 (9.7)	58 (4.6)	11	875 (10.9)

* 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 2: Cryptosporidiosis by Month of Diagnosis, New York City, November 1994-December 2005



<u>TABLE 9</u>: 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 (2005)

	Borough of residence					
Sex	Citywide number (rate)	Manhattan number (rate)	Bronx number (rate)	Brooklyn number (rate)	Queens number (rate)	Stat Is number (rate)
Male	98 (2.6)	35 (4.8)	27 (4.4)	24 (2.1)	9 (0.8)	3 (1.4)
Female	50 (1.2)	21 (2.6)	14 (2.0)	9 (0.7)	6 (0.5)	0
Total	148 (1.8)	56 (3.6)	41 (3.1)	33 (1.3)	15 (0.7)	3 (0.7)

Map 2

Cryptosporidiosis annual case rate per 100,000 population by UHF neighborhood - Active surveillance data for New York City (2005)

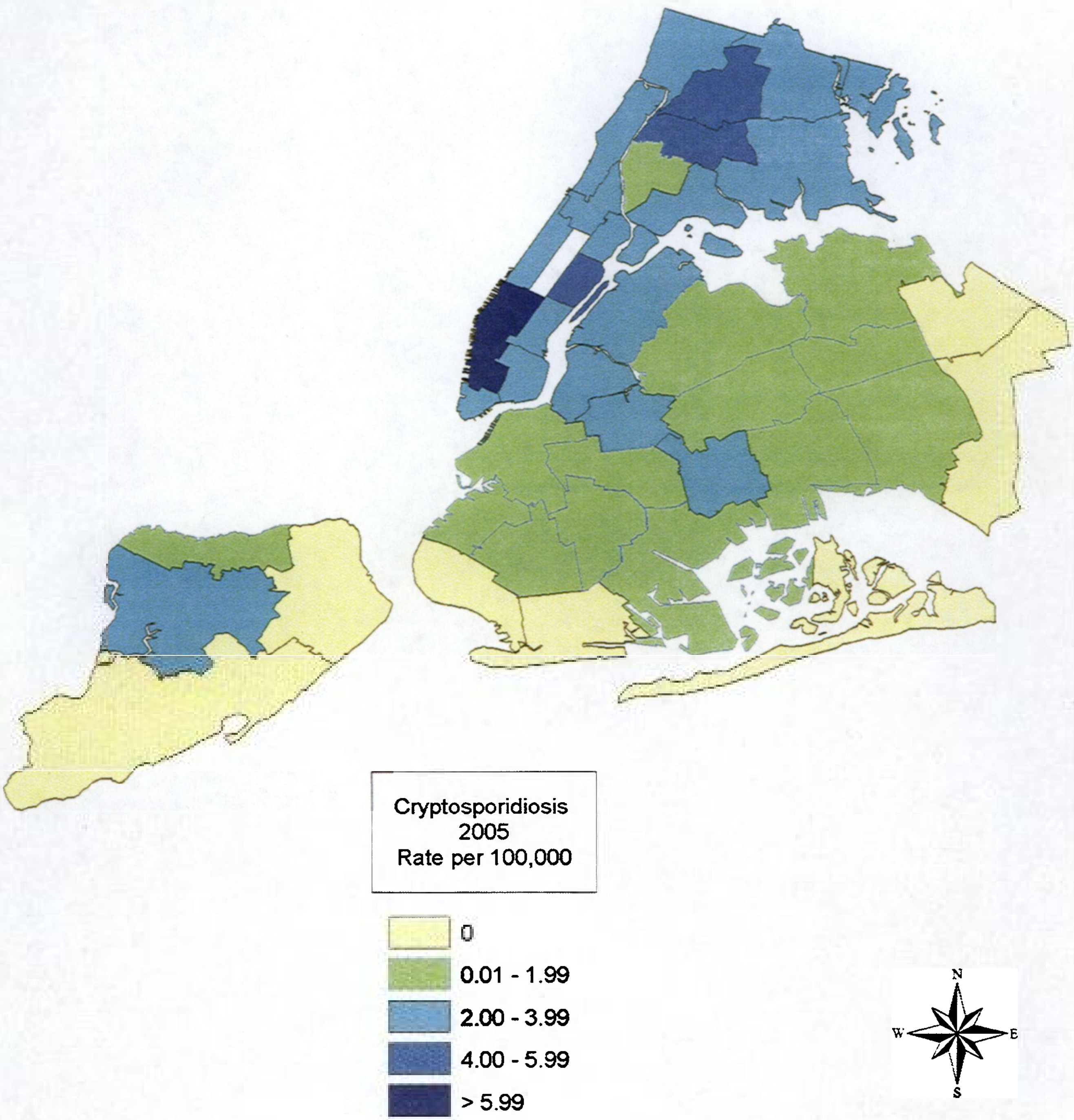


TABLE 10: Number of cases and annual case rate per 100,000 population by UHF neighborhood of residence - Active surveillance data for **cryptosporidiosis** in New York (2005)

UHF Neighborhood	Borough	Number	Population	Rate
Chelsea-Clinton	Manhattan	10	122998	8.1
Greenwich Village-Soho	Manhattan	6	83709	7.2
Upper East Side	Manhattan	9	216441	4.2
Crotona-Tremont	Bronx	8	199530	4.0
Fordham-Bronx Park	Bronx	10	250491	4.0
C Harlem-Morningside Hgts	Manhattan	6	151113	4.0
Northeast Bronx	Bronx	7	185998	3.8
Lower Manhattan	Manhattan	1	29266	3.4
Hunts Point-Mott Haven	Bronx	4	122875	3.3
Greenpoint	Brooklyn	4	124449	3.2
Williamsburg-Bushwick	Brooklyn	6	194305	3.1
Union Sq-Lower East Side	Manhattan	6	197138	3.0
East New York	Brooklyn	5	173716	2.9
East Harlem	Manhattan	3	108092	2.8
Washington Heights-Inwood	Manhattan	7	270677	2.6
Pelham-Throgs Neck	Bronx	7	290052	2.4
Gramercy Park-Murray Hill	Manhattan	3	124468	2.4
Willowbrook	Stat Is	2	84821	2.4
Upper West Side	Manhattan	5	220706	2.3
Long Island City-Astoria	Queens	5	220960	2.3
Kingsbridge-Riverdale	Bronx	2	88989	2.2
Port Richmond	Stat Is	1	62788	1.6
High Bridge-Morrisania	Bronx	3	189755	1.6
East Flatbush-Flatbush	Brooklyn	5	316734	1.6
Canarsie-Flatlands	Brooklyn	3	197819	1.5
Bed Stuyvesant-Crown Hgts	Brooklyn	4	317296	1.3
Ridgewood-Forest Hills	Queens	3	240901	1.2
Fresh Meadows	Queens	1	93148	1.1
Downtown-Heights-Slope	Brooklyn	2	214696	0.9
Borough Park	Brooklyn	3	324411	0.9
Sunset Park	Brooklyn	1	120441	0.8
Flushing-Clearview	Queens	2	255542	0.8
West Queens	Queens	2	477516	0.4
Southwest Queens	Queens	1	269952	0.4
Jamaica	Queens	1	285339	0.4

TABLE 11: Number of cases and annual case rate per 100,000 population by age group and sex - Active surveillance for **cryptosporidiosis** in New York City (2005)

	Sex		
Age group	Male number (rate)	Female number (rate)	Total number (rate)
<5 years	10 (3.6)	5 (1.9)	15 (2.8)
5-9 years	10 (3.5)	5 (1.8)	15 (2.7)
10-19 years	7 (1.3)	8 (1.6)	15 (1.4)
20-44 years	50 (3.2)	21 (1.3)	71 (2.2)
45-59 years	18 (2.8)	9 (1.2)	27 (2.0)
≥ 60 years	3 (0.6)	2 (0.3)	5 (0.4)
Total	98 (2.6)	50 (1.2)	148 (1.8)

TABLE 12: Number of cases and annual case rate per 100,000 population by age group and borough – Active surveillance for **cryptosporidiosis** in New York City (2005)

	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	15	5	5	2	3	0
years	(2.8)	(6.6)	(4.6)	(1.1)	(2.1)	
5-9	15	5	3	4	3	0
years	(2.7)	(6.8)	(2.5)	(2.1)	(2.1)	
10-19	15	4	7	2	2	0
years	(1.4)	(2.8)	(3.3)	(0.6)	(0.7)	
20-44	71	27	19	18	5	2
years	(2.2)	(3.8)	(3.7)	(1.9)	(0.6)	(1.2)
45-59	27	13	6	5	2	1
years	(2.0)	(4.6)	(2.9)	(1.2)	(0.5)	(1.2)
≥ 60	5	2	1	2	0	0
years	(0.4)	(0.8)	(0.6)	(0.5)		
Total	148	56	41	33	15	3
	(1.8)	(3.6)	(3.1)	(1.3)	(0.7)	(0.7)

TABLE 13: 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 (2005)*

	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	47 (2.2)	12 (2.9)	25 (3.9)	7 (1.4)	3 (0.5)	0
White non-Hispanic	38 (1.4)	23 (3.3)	3 (1.5)	5 (0.6)	5 (0.7)	2 (0.6)
Black non-Hispanic	48 (2.4)	16 (6.8)	12 (2.9)	18 (2.1)	1 (0.2)	1 (2.5)
Asian, Pac Islander, Amer Indian, Alaska Native	11 (1.4)	4 (2.7)	0	1 (0.5)	6 (1.5)	0
Unknown	4	1	1	2	0	0
Total	148 (1.8)	56 (3.6)	41 (3.1)	33 (1.3)	15 (0.7)	3 (0.7)

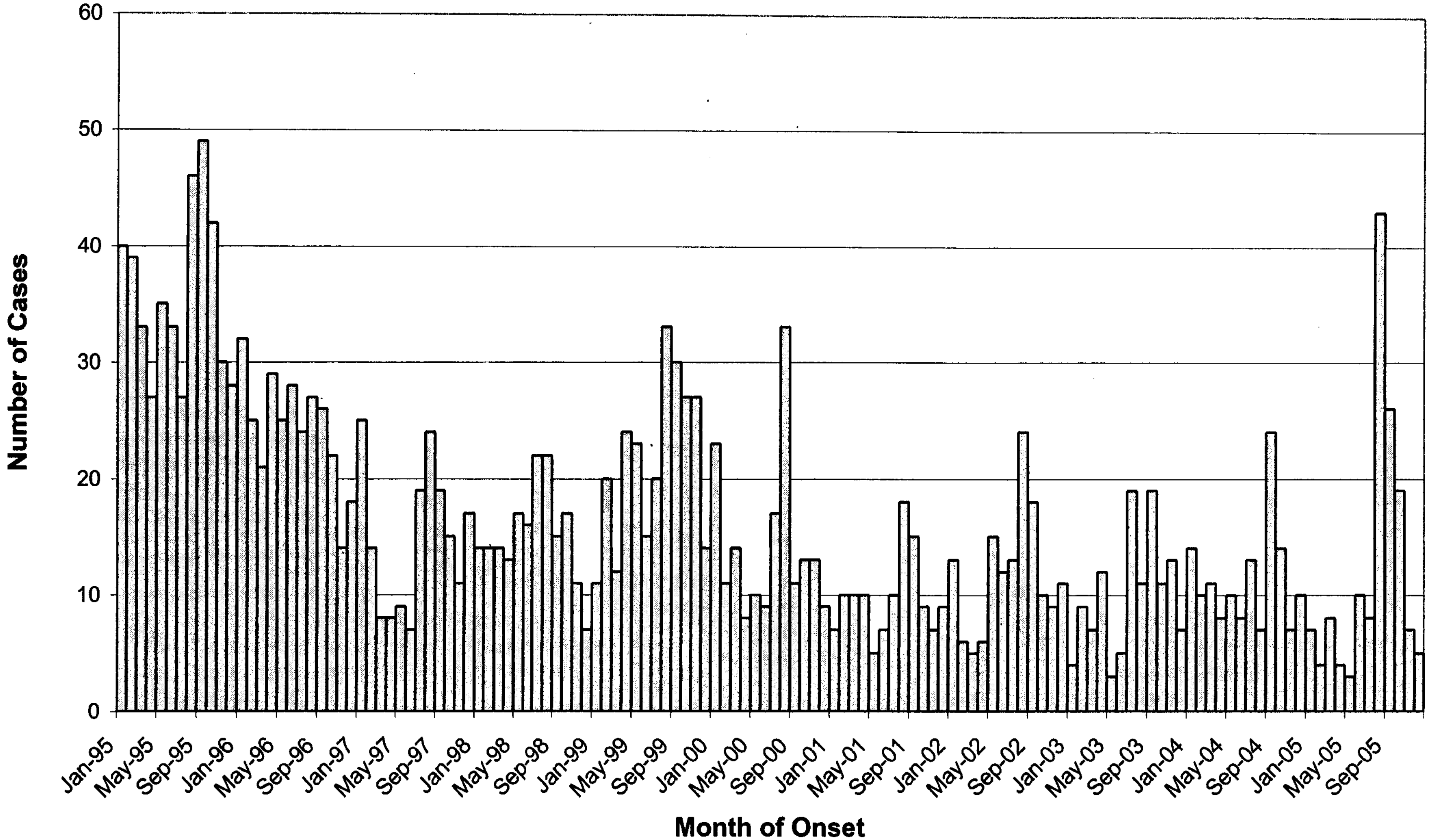
* Because year 2000 U.S. Census data include race/ethnicity categories not included in disease surveillance data, 3.5% of the total population was not included in the denominator used to calculate rates by race/ethnicity. Rates pertaining to race/ethnicity may therefore be inflated.

TABLE 14: 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 (2005)

Race /ethnicity	Age group < 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	7 (3.8)	9 (4.6)	9 (2.6)	12 (1.3)	7 (2.2)	3 (1.5)	47 (2.2)
White non-Hispanic	3 (2.2)	3 (2.4)	3 (1.2)	22 (2.1)	7 (1.3)	0	38 (1.4)
Black non-Hispanic	1 (0.7)	0	1 (0.3)	35 (4.7)	9 (2.7)	2 (0.8)	48 (2.4)
Asian, Pac Islander, Amer. Indian, Alaska Native	3 (6.0)	3 (6.0)	2 (2.1)	2 (0.5)	1 (0.7)	0	11 (1.4)
Unknown	1	0	0	0	3	0	4
Total	15 (2.8)	15 (2.7)	15 (1.4)	71 (2.2)	27 (2.0)	5 (0.4)	148 (1.8)

* 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 3: Cryptosporidiosis by Month of Onset, New York City, January 1995 - December 2005*



* Figure does not include cases in which an onset date was unavailable. Figure includes 6 cases diagnosed in 2006 with onset date in 2005.

Figure 4: Cryptosporidiosis Among Persons Living with HIV/AIDS by Month of Diagnosis, New York City, January 1995-December 2005

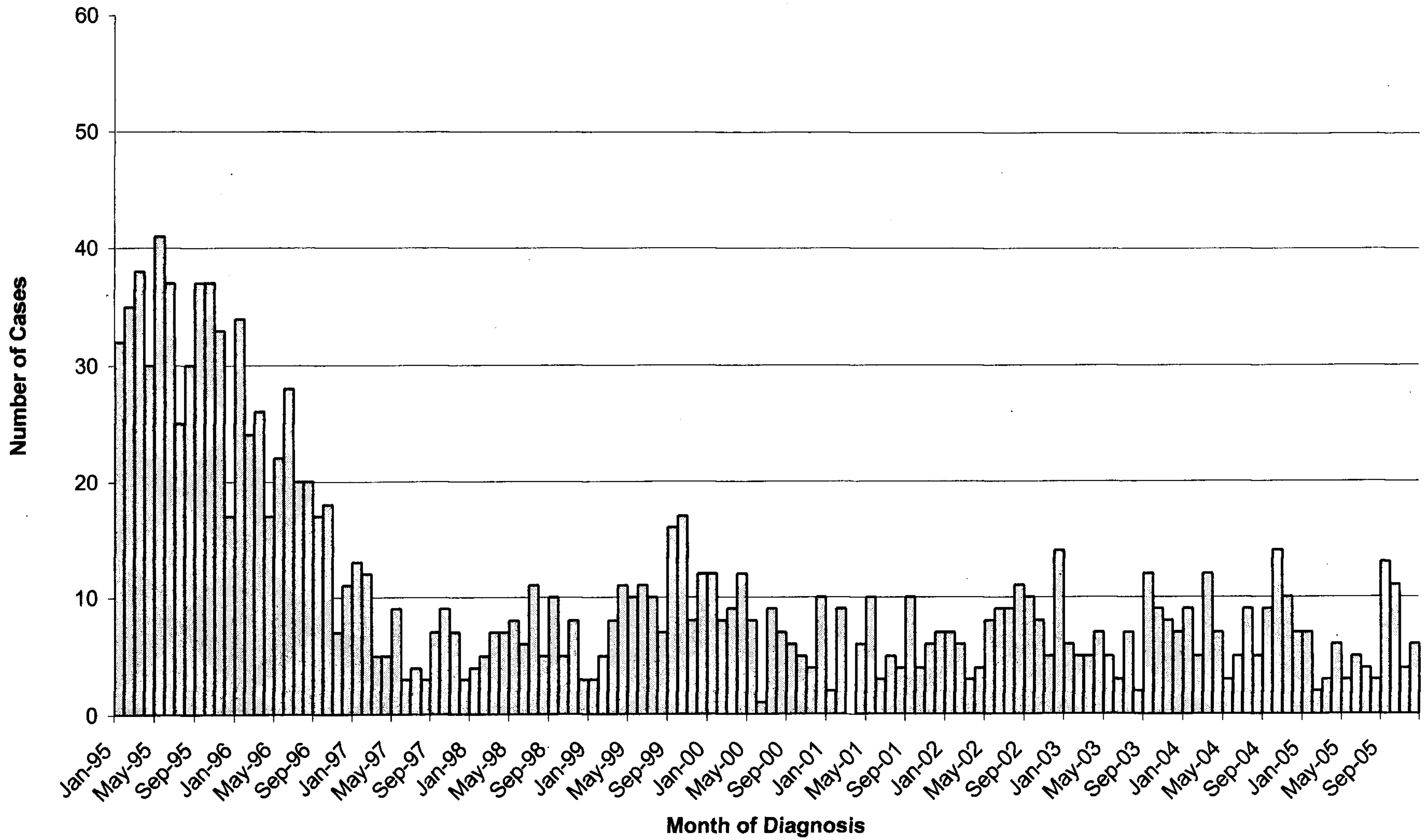


Figure 5: Cryptosporidiosis Among Immunocompetent Persons by Month of Diagnosis, New York City, January 1995-December 2005

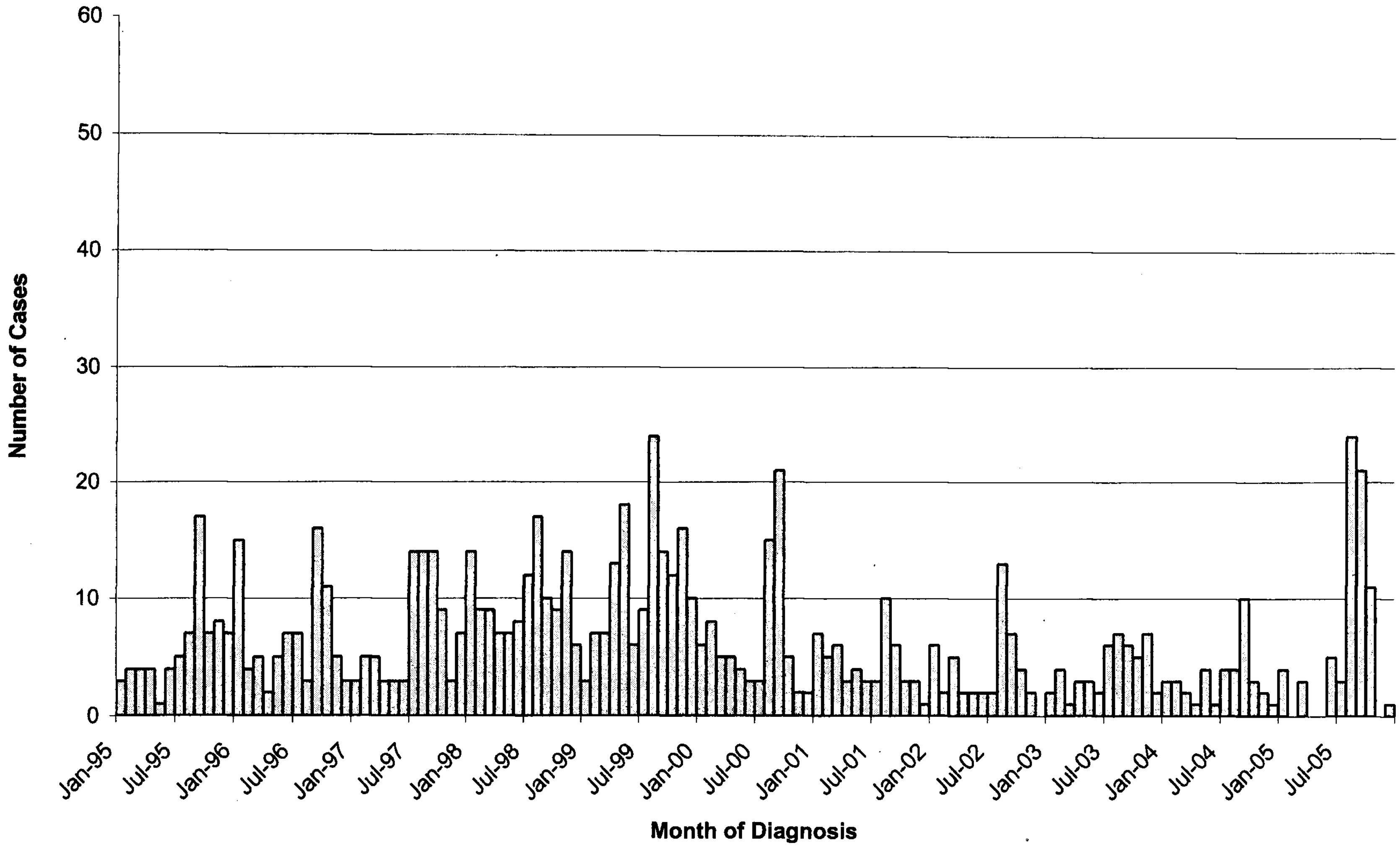


Table 16: Percentage of Interviewed **Cryptosporidiosis** Case-Patients Reporting Selected Potential Risk Exposures in the Month Before Disease Onset, by Immune Status, New York City, 1995-2005.

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

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 1995-2005 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 (1997-2005).

[b] High-risk Sexual Activity - Includes having a penis, finger or tongue in sexual partner's anus (1995-2005).

[c] International Travel - Travel outside the United States (1995-2005).

[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 (1997-2005).

* 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 17: 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, 1995-2005.

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	54%	14%	8%	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%

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 1995-2005 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 (5/11/2001-12/31/2005).

[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 (5/11/2001-12/31/2005).

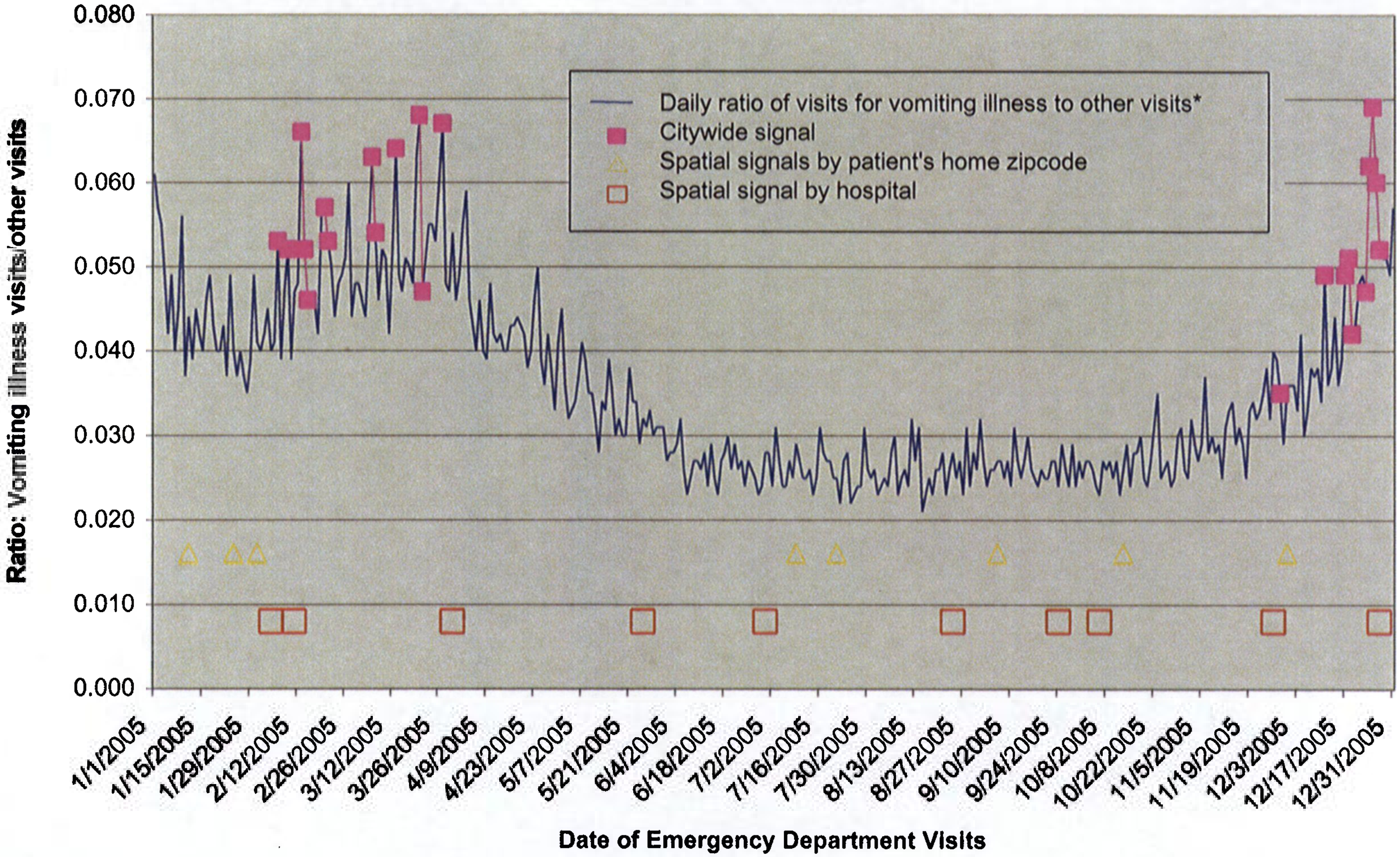
[c] Boiled Tap - Drank boiled NYC tap water (1995-5/10/2001); or drank greater than 0 cups of boiled NYC tap water, and no unboiled /unfiltered NYC tap water, and no filtered NYC tap water (5/11/2001-12/31/2005).

[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 (1997-2005)

[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 (1997-2005).

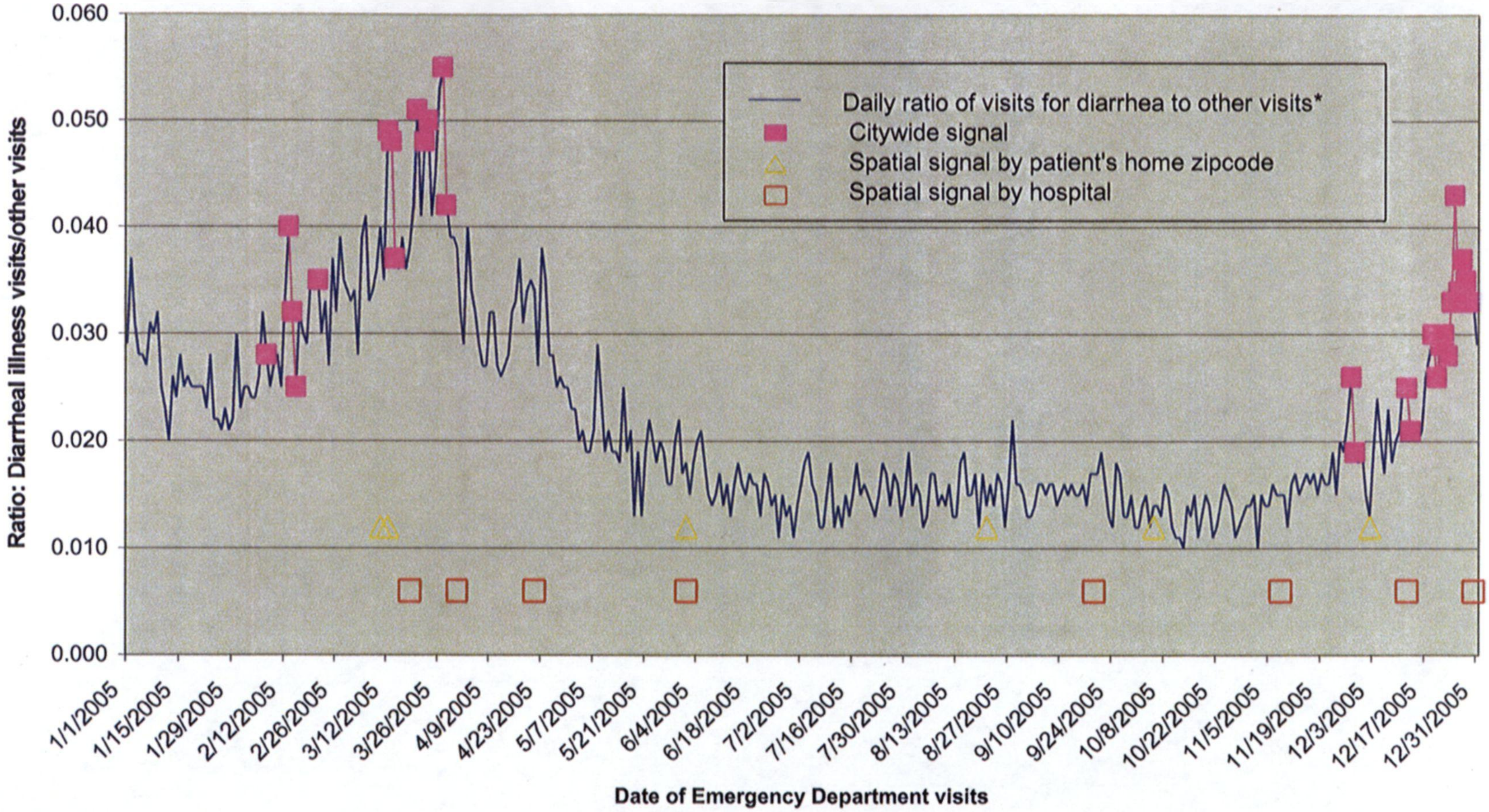
* Year 2000 percentage of interviewed cryptosporidiosis cases does not include 14 cases associated with a point source exposure at a swimming pool in Florida.

Figure 6: Emergency Department Syndromic Surveillance, Trends in visits for the vomiting syndrome, New York City, January 1, 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 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, 2005 - June 30, 2005

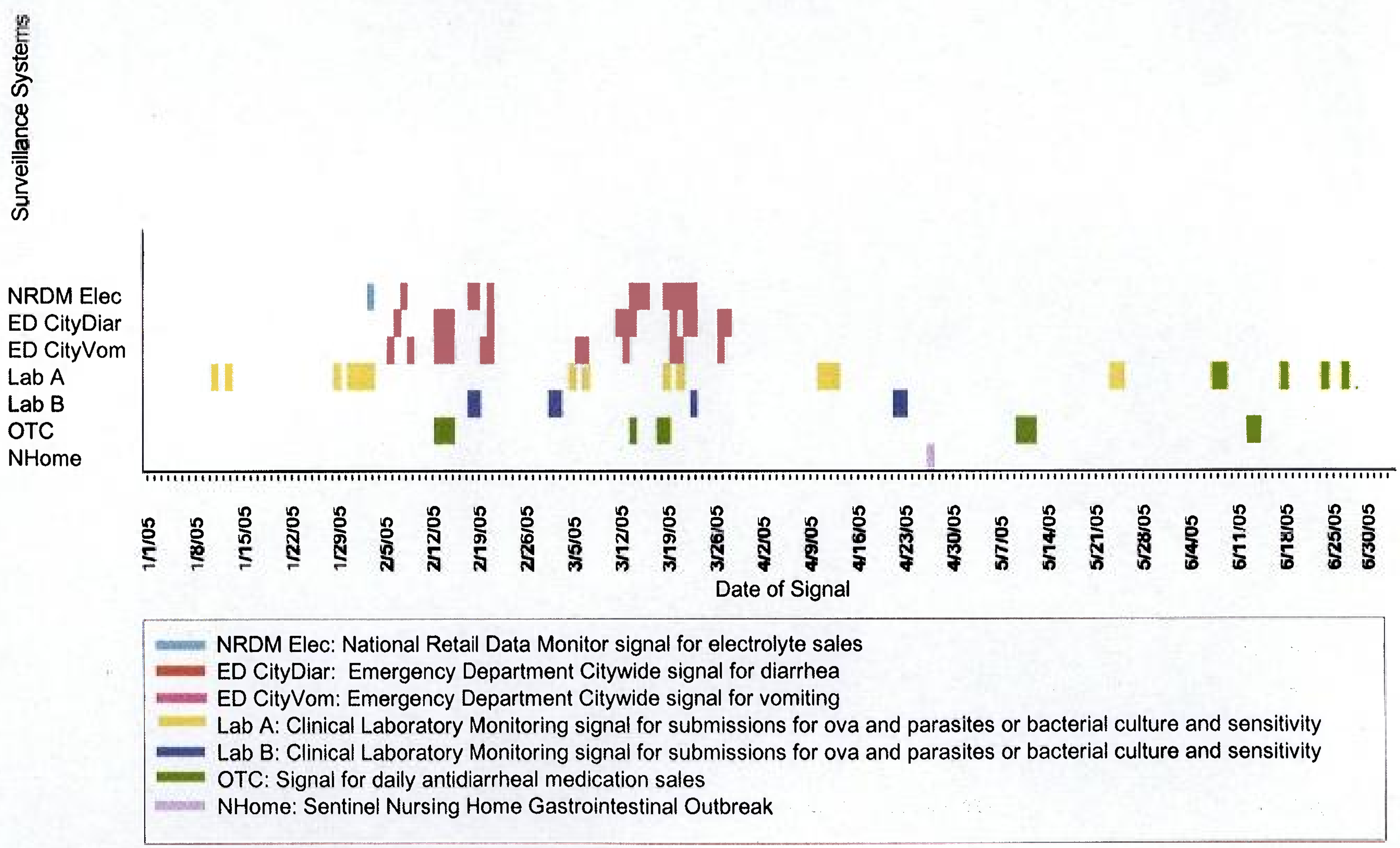
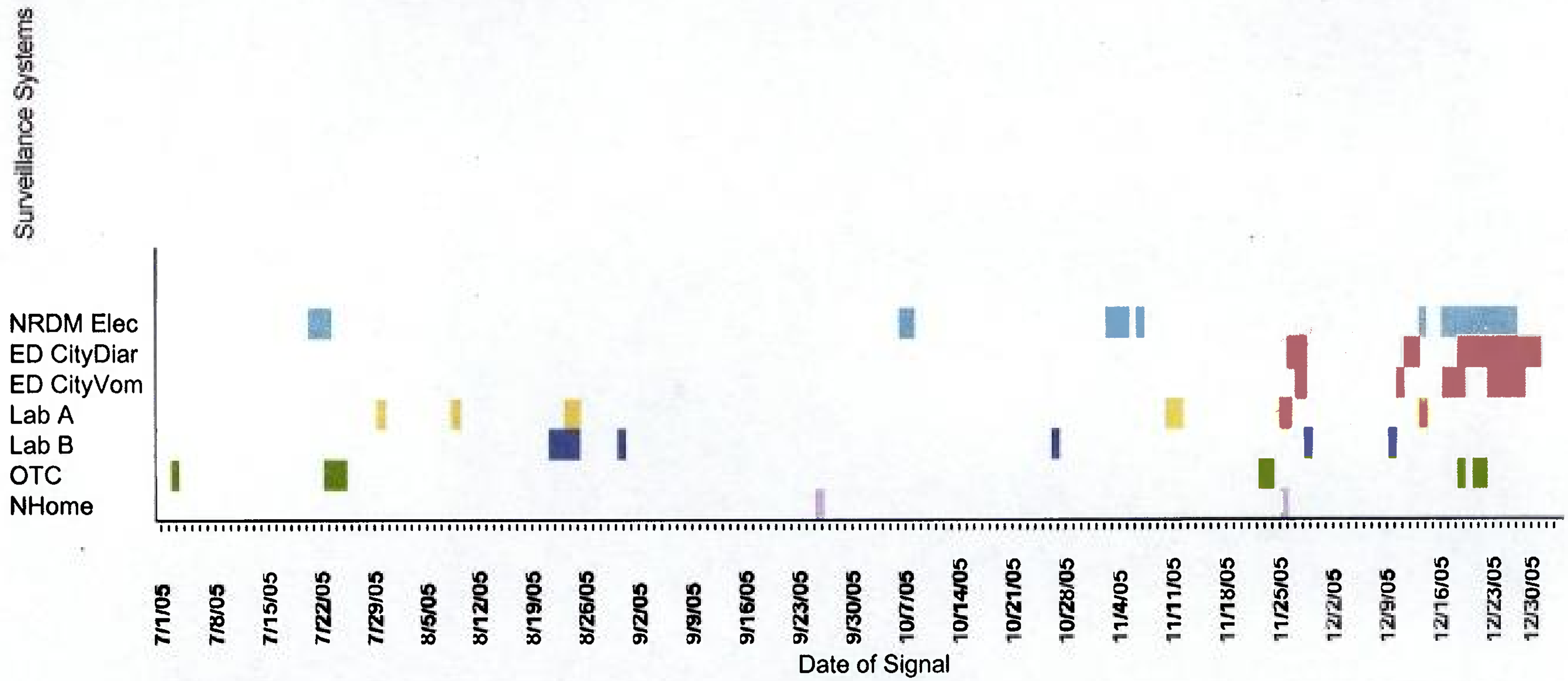


Figure 9: Signals for Gastrointestinal Illness, Department of Health and Mental Hygiene, Syndromic Surveillance Systems, New York City, July 1, 2005 - December 31, 2005



NRDM Elec: National Retail Data Monitor signal for electrolyte sales
ED CityDiar: Emergency Department Citywide signal for diarrhea
ED CityVom: Emergency Department Citywide signal for vomiting
Lab A: Clinical Laboratory Monitoring signal for submissions for ova and parasites or bacterial culture and sensitivity
Lab B: Clinical Laboratory Monitoring signal for submissions for ova and parasites or bacterial culture and sensitivity
OTC: Signal for daily antidiarrheal medication sales
NHome: Sentinel Nursing Home Gastrointestinal Outbreak

THE CITY OF NEW YORK
DEPARTMENT OF HEALTH

Michael Bloomberg
Mayor

Thomas R. Frieden M.D., MPH
Commissioner

June 30th, 2005

2005 NYC DOHMH Health Alert # 18: Recent Rain Storms have led to Elevated Levels of Turbidity in the Kensico Reservoir: Vulnerable Populations May Wish to Boil Water for Next 24 hours

Please distribute to all healthcare providers, especially those caring for young infants, the elderly, pregnant women, patients with HIV/AIDS and other immunocompromising conditions.

- **Increased turbidity (cloudiness of the water) was seen in a city reservoir for a brief period last night due to a rainstorm on June 29th and may impact the effectiveness of chlorination and increase the risk of certain diseases, such as giardiasis.**
- **Risk of illness due to drinking water with elevated levels of turbidity is not known**
  - **Persons who are more vulnerable to gastrointestinal illnesses, especially parasitic diseases, such as the very young, the elderly, pregnant women and those with immunocompromising conditions may wish to use boiled or bottled water or use water filters as a precaution for the next 24 hours (until noon on Friday July 1st).**
- **DOHMH requests increased testing for parasitic illnesses over the next 3-4 weeks among persons presenting with diarrheal disease, especially among vulnerable populations. Special laboratory tests are necessary to detect certain parasitic illnesses such as cryptosporidiosis or giardiasis.**
- **DOHMH requests immediate reporting of cryptosporidiosis, giardiasis or any suspected increase in diarrheal illness.**

Following an intense rainstorm on June 29th, soil erosion into the Kensico reservoir has resulted in a brief and localized increased level of turbidity. Turbidity measures the levels of particles in the water supply and elevated levels of turbidity may interfere with the effectiveness of the chlorination process. Ordinarily the reservoirs are protected from run-off by natural processes as well as watershed management programs, but serious storms such as the one on June 29th can overwhelm these systems and cause run-off to carry high levels of particulate matter into the reservoir. Although the water remains chlorinated and the chlorine levels should protect against bacteria and viruses, the levels necessary to inactivate *Giardia* may not have been adequate during this brief period. While the Department of Environmental Protection was able to bypass the affected area, some turbid water, approximately one percent of the total daily water delivered to NYC, did enter the distribution system before the bypass operation could be completed. The increased level of turbidity lasted for about 45 minutes. This water most likely reached New York City early on the morning of June 30th.

High levels of turbidity do not necessarily indicate a risk of infectious organisms. However these elevated levels may affect the ability of chlorine to inactivate *Giardia*. Out of an abundance of caution, the New York City Department of Health and Mental Hygiene (DOHMH), Department of Environmental Protection (DEP) and the New York State Department of Health (NYSDOH) are recommending that, persons who are more vulnerable to parasitic intestinal diseases, such as infants, the elderly, pregnant women and those with immunocompromising conditions *(e.g., patients with HIV/AIDs, especially those with CD4 counts less than 200, patients with leukemia, patients that are post bone marrow transplantation*), may wish to take special precautions regarding drinking water for the next 24 hours until noon on Friday, July 1st *(See below*).

DEP and DOHMH are assessing water quality data, and disease surveillance information daily, and are working with the Environmental Protection Agency (EPA) to closely monitor the situation. Other water testing parameters, including fecal coliforms and levels of *Giardia* cysts and *Cryptosporidium* oocysts are currently being monitored.

DEP's and DOHMH's Water Monitoring Program: New York City does routine daily monitoring of the water for fecal bacteria before it enters the City and throughout the distribution system. The city also does weekly monitoring for *Cryptosporidium* and *Giardia.*

Diarrheal Surveillance: It is too early to see an increase in diarrheal disease in New York City due to the turbidity increase especially given the incubation periods for *Cryptosporidium* (incubation 1-12 days, average 7 days) and *Giardia* (incubation 3-25 days most commonly 7-10 days). Both of these parasitic diseases are reportable to the DOHMH under Section 11.03 of the New York City Health Code. For parasitic diseases, all metropolitan area clinical laboratories are visited or contacted regularly by DOHMH to assure complete reporting of laboratory-confirmed cases.

In an effort to monitor early increases in diarrheal illness, the DOHMH has several other surveillance systems in place. The DOHMH monitors the sales of over-the-counter antidiarrheal medications at designated pharmacies, tracks the total number of stool submissions to designated clinical laboratories for bacterial culture and sensitivity and ova and parasite testing, tracks the daily number of emergency department visits for diarrheal illness and monitors gastro-intestinal outbreaks among residents in nursing homes. The DOHMH will continue to monitor these systems closely.

The DOHMH requests that providers increase testing for *Giardia* and *Cryptosporidium* in patients presenting with severe diarrhea over the next 3-4 weeks and report any increase or clustering in diarrheal disease to the DOHMH. Most clinical laboratories do not perform *Cryptosporidium* testing as part of a routine ova and parasite examination so you must specifically request testing for *Cryptosporidium* (e.g., modified acid fast staining, immunofluorescent antibody staining, or ELISA) as well as ova and parasite testing and bacterial culture and sensitivity. All positive tests should be reported routinely to the DOHMH. If you observe an increased number of patients presenting with watery diarrhea or diagnosed with giardiasis or cryptosporidiosis, please contact the Bureau of Communicable Disease at the DOHMH immediately:

<u>During business hours</u>: Phone: 212-788-9830 Fax: 212-788-4268
<u>After hours</u>: Please call the Poison Control Center at 212-764-7667 or 1-800-222-1222.

<u>Advising Patients about the Drinking Water:</u> The risk of becoming ill after drinking water with high levels of turbidity is unknown. However, patients who are more severely immunocompromised *(e.g., patients with HIV/AIDs, especially those with CD4 counts less than 200, patients with leukemia, patients that are post bone marrow transplantation*) are at higher risk of developing giardiasis and cryptosporidiosis and have higher rates of morbidity. Because there are limited treatment options for cryptosporidiosis, such patients may become chronically ill with *Cryptosporidium*. Currently the only treatment option for cryptosporidiosis is nitazoxanide (Alinia®), which has been approved for the treatment of children less than 12 years old who are not immunocompromised. For immunocompromised patients treatment would include supportive care and attempts to boost the immune system.

Persons who may be more vulnerable to giardiasis or cryptosporidiosis, including infants, the elderly, pregnant woman and those with immunocompromising conditions may therefore want to reduce the risk of illness due to drinking water by taking any of the measures listed below for the next 24 hours (until noon on Friday July 1st). To be effective these measures must be taken at all times (i.e., both inside and outside the home), including water used for drinking water and ice cubes, as well as for brushing teeth, preparing salads, and mixing with concentrates (including infant formula). Tap water may be used for preparing food that will be cooked before eating. Dishes, silverware, pots and pans may be washed with tap water as long as they dry before being used.

(a) <u>Bring tap water to a rolling boil for one minute before use. This will kill all microorganisms, including *Cryptosporidium.*</u>
- To avoid a burn injury, allow water to cool before pouring into a clean, dry container.
- Boiled water should be use for ice cubes, brushing teeth, preparing salads, and mixing with concentrates. Boiled water is not necessary for preparing food that will be cooked before eating.
- Dishes, silverware, pots, and pans may be washed with tap water as long as they dry before being used.

(b) <u>Point-of-use filters with an absolute pore size of less than or equal to one micron in diameter will remove *Cryptosporidium.*</u>
- This would include, but is not limited to, filters that are certified by the National Sanitation Foundation (NSF) for "absolute cyst removal of particles ≤ one micron", or standard #53 (cyst reduction). The certification seal can be found on the filter.
- Follow manufacturer's directions for routine maintenance and replace filters according to schedule.
- Filters that are labeled with the words "Reverse Osmosis" will also remove *Cryptosporidium.*
- The filters commonly used for chlorine and metals removal may not be NSF-certified for cyst reduction or removal. Check product label.

(c) <u>Bottled water</u>
- Only bottled waters certified by the NYSDOH for sale in NY should be considered.

Look for the NYSDOH certification identifier on the label (NYSHD Cert. # XXXX).

- A list of certified bottled waters for sale in NY, along with their sources can be obtained from the NYSDOH at 1-518-402-7676.

(d)Bathing and other uses of water

- Avoid drinking water or getting into mouth while bathing.
- It is safe to use the water to wash dishes but make sure dishes are thoroughly dried before use.

(e) It is important that patients be aware of all other precautions that are needed to prevent cryptosporidiosis and giardiasis

- Always wash hands thoroughly:
    - after any contact with animals;
    - after any contact with soil (e.g., gardening);
    - after changing diapers; or caring for someone with diarrhea.
    - before eating, or preparing food.
- Avoid sexual practices that may result in exposure to feces.
- Avoid drinking or accidentally swallowing water from lakes, rivers, ponds, streams, pools or water parks.
- Avoid contact with feces of all animals, particularly young farm animals such as calves.

For more information: The DOHMH fact sheets about *Cryptosporidium* and *Giardia* are available at the DOHMH's website at www.nyc.gov/health. For more information about New York City's drinking water, call 311 or visit DEP's website at www.nyc.gov/html/dep. Information is also available by calling EPA's Safe Drinking Water Hotline at (800) 426-4791 (9:00 am-5:30 pm, M-F) or from CDC's website at www.cdc.gov.

Thank you for your cooperation.

Sincerely,

Sharon Balter, MD,
Sharon Balter, MD
Medical Director
Bureau of Communicable Disease

Isaac Weisfuse
Isaac Weisfuse, MD, MPH
Deputy Commissioner
Division of Disease Control

THE CITY OF NEW YORK

DEPARTMENT OF HEALTH AND MENTAL HYGIENE

Michael R. Bloomberg
Mayor

Thomas R. Frieden, M.D., M.P.H.
Commissioner

July 1th, 2005

2005 NYC DOHMH Health Alert #20:

Discontinuation of Boil Water Recommendation for Vulnerable Populations

Please distribute to all healthcare providers, especially those caring for young infants, the elderly, pregnant women, patients with HIV/AIDS and other immunocompromising conditions.

- **Turbidity (cloudiness of the water) of the water in the city reservoir system is at normal levels**
- **Pathogen monitoring for *Cryptosporidium* and *Giardia* performed on 6/30/05 is also normal**

As announced yesterday, the intense rainstorm on June 29th, resulted in soil erosion into the Kensico reservoir which caused a brief and localized increase in turbidity. This area of the reservoir was excluded from the water supply within one hour, however, some of the turbid water did enter the distribution system. Exclusion will remain in effect until further testing at Kensico reservoir is completed next week. The turbidity of the water leaving the reservoir system for New York City is continuously monitored and these levels have been within the normal range since 8:30PM on June 29th . Routine analysis for *Cryptosporidium* and *Giardia,* conducted on June 30th, were also within the normal range. Testing of the water in the distribution system (from sample sites in NYC) performed on June 30th showed that all results were within acceptable limits. Therefore, DOHMH is rescinding its boil water recommendation to vulnerable populations at this time. DEP will continue to monitor water quality and DOHMH will continue to monitor its disease surveillance systems for evidence of gastrointestinal disease.

Concerns about residual water in the distribution system

DEP, DOHMH and the New York State Department of Health do not feel it is necessary to flush pipes or empty storage tanks. Ice made with water obtained from the system between 2AM on June 30th and 12:00PM July 1st should be disposed.

Reminder about susceptible populations

Patients who are severely immunocompromised *(e.g., patients with HIV/AIDs, especially those with CD4 counts less than 200, patients with leukemia, patients that are post bone marrow transplantation)* are at higher risk of developing cryptosporidiosis, and may potentially be more susceptible to low levels of *Cryptosporidium* in the water supply. Because there are limited treatment options for cryptosporidiosis, such patients may be unable to clear the infection. These patients may wish to reduce their potential risk of cryptosporidiosis due to drinking water. To be effective, these precautions must be taken at all times (i.e., both inside and outside the home).

Please continue to consider *Giardia* and *Cryptosporidium* in the differential diagnosis of patients presenting with watery diarrhea and report any increase in diarrheal disease to the DOHMH:

Because of the long incubation period for giardiasis and cryptosporidiosis, and the delay for many patients in seeking medical care for diarrheal illness, please continue to consider giardiasis and cyrptosporidiosis in the differential diagnosis of patients presenting with watery diarrhea. Most clinical laboratories do not perform *Cryptosporidium* testing as part of a routine ova and parasite examination. If you suspect your patient may have cryptosporidiosis, your order for laboratory testing should specifically request a test for *Cryptosporidium* (e.g., modified acid fast staining, immunofluorescent antibody staining, or ELISA). All positive *Cryptosporidium* tests should be reported routinely to DOHMH. If you observe an increased number of patients presenting with watery diarrhea, please contact the Bureau of Communicable Disease Program at DOHMH immediately

<u>During business hours:</u> Phone: 212-788-9830 Fax: 212-788-4268

<u>After hours:</u> Please call the Poison Control Center at 212-764-7667 or 1-800-222-1222.

<u>For more information:</u> For more information about New York City's drinking water, call 311 or visit DEP's website at www.nyc.gov/html/dep. Information is also available by calling EPA's Safe Drinking Water Hotline at (800) 426-4791 (9:00 am-5:30 pm, M-F) or from CDC's website at www.cdc.gov.

Thank you for your cooperation.

Sincerely,

Sharon Balter, MD,

Sharon Balter, MD
Medical Epidemiologist
Bureau of Communicable Disease

Isaac Weisfuse

Isaac Weisfuse, MD, MPH
Deputy Commissioner
Division of Disease Control