

New York City Department of Environmental Protection

Waterborne Disease Risk Assessment Program

1999 Annual Report

January 2000

Prepared in accordance with condition **704a** of the United States Environmental Protection Agency Filtration Avoidance Determination of May 1997.

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) determine the contribution (if any) of tap water consumption to gastrointestinal disease. The 1999 program achievements and results are presented.

Prepared by: The Waterborne Disease Risk Assessment Program Team

The *Waterborne Disease Risk Assessment Program 1999 Annual Report* was prepared by Yves B. Mikol⁴, James R. Miller², Arthur Ashendorff¹, Anne Seeley¹ and Dan Cimini². The citation for this report is: *Waterborne Disease Risk Assessment Program 1999 Annual Report*, New York City Department of Environmental Protection, New York, January 2000.

Additional copies of this report and of quarterly reports are available from Anne Seeley at the address listed below¹, by phone (718-595-5346) or E-mail: aseeley@nysnet.net

Copies of the questionnaire used for disease surveillance, and the letters for health care providers serving persons with HIV/AIDS and other immuno-compromising conditions and for organizations serving persons with HIV/AIDS are available from Dr. Miller at the address listed below, by phone (212-788-4728) or E-mail: jmiller@dohlan.cn.ci.nyc.ny.us

The authors wish to acknowledge the dedication of the other members of the Waterborne Disease Risk Assessment Program Team, and the continuing assistance of Fran Guerriero¹, Lorraine Smith² and Giselle Merizalde².

THE WATERBORNE DISEASE RISK ASSESSMENT PROGRAM TEAM

Erlinda Amoroso², Public Health Epidemiologist
Arthur Ashendorff¹, P.E., M.P.H., Director, Drinking Water Quality
Dan Cimini², Assistant Director, Parasitic Disease Surveillance Unit
Awilda Colon-Serrant², Public Health Epidemiologist
Solomon Dada², Public Health Epidemiologist
Chantal Delouis², Public Health Epidemiologist
Muhammad Iftexharuddin², Public Health Epidemiologist
Marcelle Layton³, M.D., Assistant Commissioner
Yves B. Mikol⁴, Ph.D., Research Scientist
James R. Miller², M.D., M.P.H., Director, Parasitic Disease Surveillance Unit
Anne Seeley¹, M.P.H., Section Chief, Drinking Water Quality Planning

¹ Bureau of Water Supply, Quality and Protection, New York City Department of Environmental Protection, 59-17 Junction Blvd., Corona, NY 11368-5107.

² Parasitic Disease Surveillance Unit, Room 322, CN-22 A, New York City Department of Health, 125 Worth Street, New York, NY 10013.

³ Bureau of Communicable Diseases, Room 300, CN-22 A, New York City Department of Health, 125 Worth Street, New York, NY 10013.

⁴ BWSQ&P, NYCDEP, 465 Columbus Avenue, Valhalla, NY 10595

TABLE OF CONTENTS

	Page
Executive Summary	
Introduction	1
Active Disease Surveillance	1
Giardiasis	1
Cryptosporidiosis	2
Diarrheal Disease Monitoring (Outbreak detection program)	5
Anti-diarrheal medication monitoring	5
Clinical laboratory monitoring	6
Nursing home monitoring	6
Epidemiological Studies	6
Additional Information Gathering Efforts	7
New York City DOH Bureau of Laboratories - Stool testing	7
Information Sharing and Public Education	7

Tables

Table 1:	Number of Cases and Case Rates for Giardiasis, Active Disease Surveillance, New York City 1994-1999	2
Table 2:	Number of Cases and Case Rates for Cryptosporidiosis, Active Disease Surveillance, New York City 1994-1999	3
Table 3:	Number of Cases of Cryptosporidiosis by Year and Immune Status, New York City, 1995-1999	3
Table 4:	Percentage of Interviewed Cryptosporidiosis Cases Reporting Selected Potential Risk Exposures in the Month Before Disease Onset by Immune Status, New York City 1995-1999	4
Table 5:	Percentage of Interviewed Cryptosporidiosis Cases by Type of Tap Water Exposure Reported in Month Before Disease Onset, by Immune Status, New York City 1995-1999	4
Table 6:	<i>Cryptosporidium</i> Testing of Specimens Submitted by Child Health Clinics to the Bureau of Laboratories	7

Charts

Chart 1:	Giardiasis by Month of Diagnosis, New York City, July 1993 - September 1999	9
Chart 2:	Cryptosporidiosis by Month of Diagnosis, New York City, November 1994 - September 1999	10
Chart 3:	Cryptosporidiosis among HIV-Infected Persons by Month of Diagnosis, New York City, January 1995 - September 1999	11
Chart 4:	Cryptosporidiosis Among Immunocompetent Persons by Month of Diagnosis, January 1995-November 1999, New York City	12

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) determine the contribution (if any) of tap water consumption to gastrointestinal disease. The program, jointly administered by the Departments of Health and Environmental Protection, began in 1993. This report provides an overview of the program achievements and progress made during 1999.

ACTIVE DISEASE SURVEILLANCE

Active disease surveillance for giardiasis and cryptosporidiosis began in July 1993 and November 1994, respectively. While figures for 1999 are still preliminary, the number of cases of giardiasis decreased and the number of cases of cryptosporidiosis increased, relative to 1998. While cases of cryptosporidiosis among persons with HIV/AIDS remain well below the 385 cases reported in 1995, the number of cases increased from 79 in 1998 to 105 in 1999. Telephone interviews of cryptosporidiosis case patients to gather potential risk exposure information continued and selected results are presented.

DIARRHEAL DISEASE MONITORING (Outbreak detection program)

Gastrointestinal (GI) disease incidence in the general population can be monitored via tracking of sentinel populations, or surrogate indicators of disease. Such tracking programs can play a significant role in limiting the extent of an outbreak of gastrointestinal illnesses by providing a rapid indication of a problem. Three distinct and complementary outbreak detection systems are in operation in New York City. One system monitors the sales of anti-diarrheal medication. The second monitors the number of stool specimens submitted to clinical laboratories for microbiological testing. The third system monitors reports of new cases of GI disease observed by health care professionals in sentinel nursing homes.

EPIDEMIOLOGICAL STUDIES

A case-control study of risk factors for cryptosporidiosis among immunocompetent persons diagnosed during April-May 1999 was conducted. Preliminary analysis is underway and a full report is planned.

OUTREACH AND EDUCATION

Outreach and education efforts have continued. Presentations were made to health care providers, and at professional meetings. A special announcement to area hospitals and providers of care to persons with HIV/AIDS was distributed by broadcast fax in May 1999. Assistance was provided in preparing the report of the National Drinking Water Advisory Council's Working Group on Health Care Provider Outreach and Education. Cryptosporidium and Giardia results from the NYC DEP's source water monitoring program, and other reports, have been added to the DEP website.

INTRODUCTION

New York City's Waterborne Disease Risk Assessment Program 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
- ! 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 (DOH). In addition to participation by staff from both agencies, an interagency unit, the Parasitic Disease Surveillance Unit, was established to implement major components of this program. The following is an overview of the program achievements and progress made during 1999.

ACTIVE DISEASE SURVEILLANCE

Giardiasis

New York City implemented a program of active disease surveillance for giardiasis in July 1993. The program provides for the collection of more accurate and thorough data on disease incidence than the passive surveillance program which was in place prior to 1993. Active laboratory surveillance to insure complete reporting of cases by laboratories is on-going, and telephone calls to physicians, laboratories, and/or patients are made to obtain missing demographic information from case reports. Interviews of giardiasis cases to identify potential risk exposures were conducted from July 1993 to August 1995. Case rates and demographic findings are compiled and reported on a quarterly basis.

The number of cases and the case rate presented here for 1999 are preliminary since the number of cases for the last quarter of 1999 will not be finalized until March 2000. During 1999, a total of 1,765 cases were reported to DOH and the annual case rate was 24.1 per 100,000. The number of cases and the case rate in 1999 decreased relative to 1998, and was nearly identical to the figures for 1997 (Table 1 and Chart 1).

Table 1: Number of Cases and Case Rates for Giardiasis, Active Disease Surveillance, New York City 1994 - 1999

<i>Year</i>	<i>Number of Cases</i>	<i>Case Rate per 100,000</i>
1994	2,456	33.5
1995	2,485	33.9
1996	2,289	31.2
1997	1,764	24.1
1998	1,964	26.8
1999	1,765 *	24.1 *

* Preliminary data for 1999 (as of January 13, 2000).

The following points provide highlights of the preliminary findings from the active disease surveillance program for giardiasis from January 1 through December 31, 1999.

- 7 The number and rate of giardiasis cases were highest in Manhattan. The largest number and highest rates occurred in Chelsea, the West 40s, Greenwich Village, and the East Village.
- 7 The number and rate of giardiasis cases were greater in males than females.
- 7 Overall, 5-9 years olds and 1-4 year olds had the highest age-specific case rates. In these age groups, the racial/ethnic grouping which is comprised of Asian/Pacific Islanders and American Indians/Alaskan Natives had the highest rate.

Cryptosporidiosis

Cryptosporidiosis was added to the list of reportable diseases in the New York City Health Code, effective January 1994. Active disease surveillance, including regular laboratory visits or telephone contact, began in November 1994. Case interviews were initiated in January 1995 and are ongoing.

The number of cases and the case rate for 1999 are preliminary and will not be finalized until March 2000. During 1999, a total of 261 cases were reported to the Department of Health and the annual case rate was 3.6 per 100,000. The number of cases and the case rate in 1999 have increased relative to 1998 (Table 2 and Chart 2).

Table 2: Number of Cases and Case Rates for Cryptosporidiosis, Active Disease Surveillance, New York City 1994 - 1999

<i>Year</i>	<i>Number of Cases</i>	<i>Case Rate per 100,000</i>
1994	289*	3.9*
1995	472	6.5
1996	332	4.5
1997	174	2.4
1998	209	2.9
1999	261**	3.6 **

* Active disease surveillance began in November 1994.

** Preliminary data for 1999 (as of January 13, 2000).

The decline observed between 1995 and 1997 in the overall number of cryptosporidiosis cases was found to be due to a decline in cases among persons with HIV/AIDS. Reported cryptosporidiosis cases among persons with AIDS increased from 79 in 1998 to 106 in 1999. (Table 3 and Chart 3). Reported cases among immunocompetent persons increased from January 1995 to 1999 (Table 3 and Chart 4).

Table 3: Number of Cases of Cryptosporidiosis by Year and Immune Status, New York City, 1995-1999

Immune Status:	YEAR				
	1995	1996	1997	1998	1999 *
Persons with AIDS	392	243	80	79	106
Immunocompetent	71	83	83	121	137
Immunocompromised Other Than AIDS	4	3	7	2	3
Unknown Immune Status	5	3	2	6	15
TOTAL	472	332	172	208	261

* Case investigations are continuing.

Summary data, for 1995 through 1999, on the most commonly reported potential risk

exposures is presented below (Table 4). Little year-to-year fluctuation is observed. Information has also been collected and presented regarding tap water consumption (Table 5). **It is important to keep in mind that the significance of risk exposures reported by cryptosporidiosis cases cannot be determined without reference to a suitable control population (i.e., non-Cryptosporidium-infected controls).**

Table 4: Percentage of Interviewed Cryptosporidiosis Cases Reporting Selected Potential Risk Exposures in the Month Before Disease Onset by Immune Status, New York City 1995-1999

Exposure Type**	HIV/AIDS					Immunocompetent				
	1995	1996	1997	1998	1999*	1995	1996	1997	1998	1999*
Contact with an Animal	35%	35%	33%	36%	32%	41%	41%	41%	33%	36%
High-risk Sexual Activity*** (≥ 18 years old)	22%	22%	9%	15%	19%	16%	25%	12%	10%	12%
International Travel	9%	9%	9%	13%	18%	28%	29%	26%	29%	29%
Recreational Water Contact	16%	8%	14%	12%	16%	21%	27%	39%	24%	21%

* Case investigations are continuing..

** Further details on Exposure Type:

S Contact with an Animal - Includes having a pet, or visiting a farm, pet store, petting zoo, or veterinarian's office.

S High-risk Sexual Activity - Includes having a penis, finger, or tongue in sexual partner's anus.

S Recreational Water Contact - Includes swimming in the ocean or a pool, or swimming in or drinking from a stream, lake, river or stream.

*** Format of case interview form changed 1/1/97; changed format may account for the difference in percentage of cases reporting high risk sexual activity for the years 1995-96 as compared with 1997-9.

Table 5: Percentage of Interviewed Cryptosporidiosis Cases by Type of Tap Water Exposure Reported in Month Before Disease Onset, by Immune Status, New York City 1995-1999

Year	HIV/AIDS				Immunocompetent			
	plain tap	filtered tap	boiled tap	no tap	plain tap	filtered tap	boiled tap	no tap
1995	69%	12%	7%	14%	58%	18%	11%	13%
1996	70%	9%	7%	18%	63%	17%	10%	13%
1997	71%	9%	3%	19%	58%	19%	8%	17%
1998	63%	19%	5%	15%	66%	22%	3%	10%
1999	65%	22%	2%	13%	56%	24%	4%	18%

DIARRHEAL DISEASE MONITORING (Outbreak detection program)

Gastrointestinal (GI) disease incidence in the general population can be monitored via tracking of sentinel populations, or surrogate indicators of disease. Such tracking programs can play a significant role in limiting the extent of an outbreak of gastrointestinal illnesses by providing a rapid indication of a problem and allowing for immediate initiation of control measures. It should be noted that these systems are designed to identify increases in diarrheal illnesses and are not limited to laboratory-confirmed diagnoses. Further investigation, such as direct contact with health care providers, is usually required to obtain information on symptoms, identification of the agent, and possible route of transmission.

The City has implemented three independent and complementary systems to monitor for outbreaks. These surveillance systems involve partnerships with the pharmaceutical industry, clinical laboratories, and nursing homes. Two of the systems monitor reports of persons taking steps in response to diarrheal illness (self-medication and submission of a stool specimen to a clinical laboratory). The third system monitors the onset of gastrointestinal disease as observed by health care professionals in a controlled environment (nursing homes). We appreciate the active and voluntary participation of our partners in these surveillance systems.

The compilation of information provided by these three systems has allowed us to make inter-system comparisons. By comparing the data between the three systems we can assess whether a trend observed in one system is confirmed or not by the other systems. Simultaneous variations in multiple data sets would suggest actual variations in the level of diarrheal disease in the community.

A descriptive article on New York City's diarrheal disease monitoring program was published in the *Journal of Urban Health* (1999;76(3):388-390). The New York City Department of Health is finalizing a contract with the New York Academy of Medicine to perform an evaluation of the outbreak detection program.

Anti-Diarrheal Medication Monitoring

The monitoring of sales of anti-diarrheal medication is a useful source of information about the level of diarrheal illness in the community. Large increases in sales of anti-diarrheal medicines have been reported during outbreaks of gastrointestinal diseases in the U.S. and overseas. In New York City's program, volume-of-sales information of over-the-counter medication is obtained from two medication distribution networks: a regional distributor and a chain of drugstores.

- 7 Distribution network#1: During 1999, important changes were made to the information provided to New York City by the largest metropolitan distributor of medicine to independent pharmacies. These changes were the consequence of the acquisition of one company by another and the use of a different computer system by the new owner. Under the original system, weekly information on shipments of Imodium® was received from May 1995 to April 1999. In August 1999, a new reporting system was implemented. The format of the report was modified to: (a) include 36 anti-diarrheal medication formulations, (b) restrict the information to shipments made to pharmacies located in

New York State, and (c) receive weekly reports by electronic mail, increasing the timeliness of the reports and eliminating the possibilities of data entry errors. The profile of the volume of shipments, between 1995 and 1999, shows small variations from week to week. An annual pattern emerged during the four years of surveillance. The most noticeable apparent trend is a decrease in shipments occurring in late October-early November. It is followed by small variations at other periods of the year.

- 7 Distribution network #2: A chain with 38 drugstores located in New York City provides information on direct sales from check-out scanners of 22 anti-diarrheal medicines. Data are available for each of the five New York City boroughs. Weekly volume of sales has been received since February 1996 and monitoring is ongoing. The profile of the volume of sales show an annual pattern with a decrease in November.

Clinical Laboratory Monitoring

The number of stool specimens submitted to clinical laboratories for bacterial and parasitic testing also provides information on the incidence of gastrointestinal illness in the population. Three clinical laboratories, including the largest laboratory in the metropolitan area, currently participate in New York City's monitoring program. The number of stool specimens examined for (a) bacterial culture and sensitivity (three laboratories), (b) ova and parasites (three laboratories), and (c) *Cryptosporidium parvum* (one laboratory) is transmitted daily by fax to New York City's Parasitic Disease Surveillance Unit. Monitoring started in November 1995 and is ongoing.

Nursing Home Monitoring

Nursing home surveillance began in March of 1997. Participating nursing homes are located throughout the City and vary as regards the type of residents (e.g., elderly, AIDS, or mixed elderly and AIDS), the type of water provided to residents (e.g., tap, filtered, bottled), and the source of tapwater (e.g., Croton vs Catskill/Delaware). Each nursing home provides, by fax, the daily number of new cases of gastrointestinal disease among residents on each ward.

Eleven nursing homes participating in the surveillance program in 1999, representing approximately 1,712 residents. Surveillance has shown the daily number of new cases of gastrointestinal disease to be very low (often no new cases). The surveillance system is ongoing.

EPIDEMIOLOGICAL STUDIES

Interview data from 18 immunocompetent symptomatic adult cases and 53 age- and neighborhood-matched controls have been entered into a case-control study of risk factors for cryptosporidiosis. Preliminary analysis is underway and a full report is planned.

ADDITIONAL INFORMATION GATHERING EFFORTS

Active disease surveillance is an effective tool for capturing all laboratory-diagnosed cases of a disease. However, it is believed that cryptosporidiosis is significantly under-diagnosed. This is due to the fact that: (a) people with cryptosporidiosis may not seek medical care, (b) physicians do not order an ova and parasite test for each of their patients with gastrointestinal symptoms, and (c) many laboratories that perform the ova and parasite tests do not include *Cryptosporidium* in their routine examination. The likelihood of diagnosing cryptosporidiosis cases in an HIV-infected person may be greater than in an HIV-negative person because cryptosporidiosis is an AIDS-defining disease and a stool sample in an HIV-positive person may be more likely to be submitted for testing. As part of our efforts to better assess cryptosporidiosis incidence in the general population, the stool testing for cryptosporidiosis on specimens submitted by Child Health Clinics has continued at the Bureau of Laboratories.

New York City DOH Bureau of Laboratories - Stool Testing

A program was initiated in September 1995 by New York City DOH's Bureau of Laboratories. Since that time, all stool specimens sent by Child Health Clinics have been tested for *Cryptosporidium*. While the clinics' population is not representative of the New York City population (the clinics serve 80,000 children), results provide information on the prevalence of *Cryptosporidium* in this age group (Table 6). Cryptosporidiosis is infrequently diagnosed in this group.

Table 6: *Cryptosporidium* Testing of Specimens Submitted by Child Health Clinics to the Bureau of Laboratories

Year	Number of Samples Submitted	Number of Samples Positive for <i>Cryptosporidium</i>	Prevalence %
1996	3,444	3	0.09
1997	4,223	0	0
1998	5,427	3	0.05
1999	5,282	0	0

INFORMATION SHARING AND EDUCATION

Information sharing and education efforts continued during 1999. Over the year, program staff participated in a number of meetings and presentations to discuss New York City's Waterborne Disease Risk Assessment Program and related issues. Activities included the following:

- 7 Presentations were made to groups of physicians and/or other health care professionals (e.g., hospital grand rounds, HIV/AIDS care providers). Such talks serve to enhance awareness of cryptosporidiosis, including prevention measures, and may lead to more

- complete disease diagnosis (including laboratory evaluation) and reporting.
- 7 Assistance was provided in preparing the report of the National Drinking Water Advisory Council's Working Group on Health Care Provider Outreach and Education.
- 7 Participation in the Working Group on Waterborne Cryptosporidiosis continued. The working group is coordinated by the federal Centers for Disease Control and Prevention.

In addition, a special announcement to area hospitals and providers of care to persons with HIV/AIDS was faxed in May 1999 following the findings of low levels of pathogens in the source water. A fax was also distributed to organizations serving persons with HIV/AIDS. The objective was to inform recipients of the findings and the significance of these low levels, and to provide the phone numbers at the Department of Health, Department of Environmental Protection, U.S. Environmental Protection Agency and the Centers for Disease Control and Prevention for additional information.

Information was added to the City's website including results from the City's source water protozoa monitoring program. Documents now on the website include:

DOH Webpages:

- 7 *Giardiasis fact sheet:*
<http://www.ci.nyc.ny.us/html/doh/html/cd/cdgia.html>

- 7 *Cryptosporidiosis fact sheet*
<http://www.ci.nyc.ny.us/html/doh/html/cd/cdcry.html>

DEP Webpages:

- 7 *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.ci.nyc.ny.us/html/dep/html/pathogen.html>

- 7 *1997 and 1998 Waterborne Disease Annual Report*
<http://www.ci.nyc.ny.us/dep/html/watersup.html>

- 7 *1997 and 1998 New York City Drinking Water Supply and Quality Statement*
<http://www.ci.nyc.ny.us/dep/html/watersup.html>

- 7 *Press Release, October 26, 1998: DEP and DOH Officials Issue Drinking Water Information*
<http://www.ci.nyc.ny.us/dep/html/press.html>

Chart 1: Giardiasis By Month of Diagnosis
New York City, July 1993-September 1998

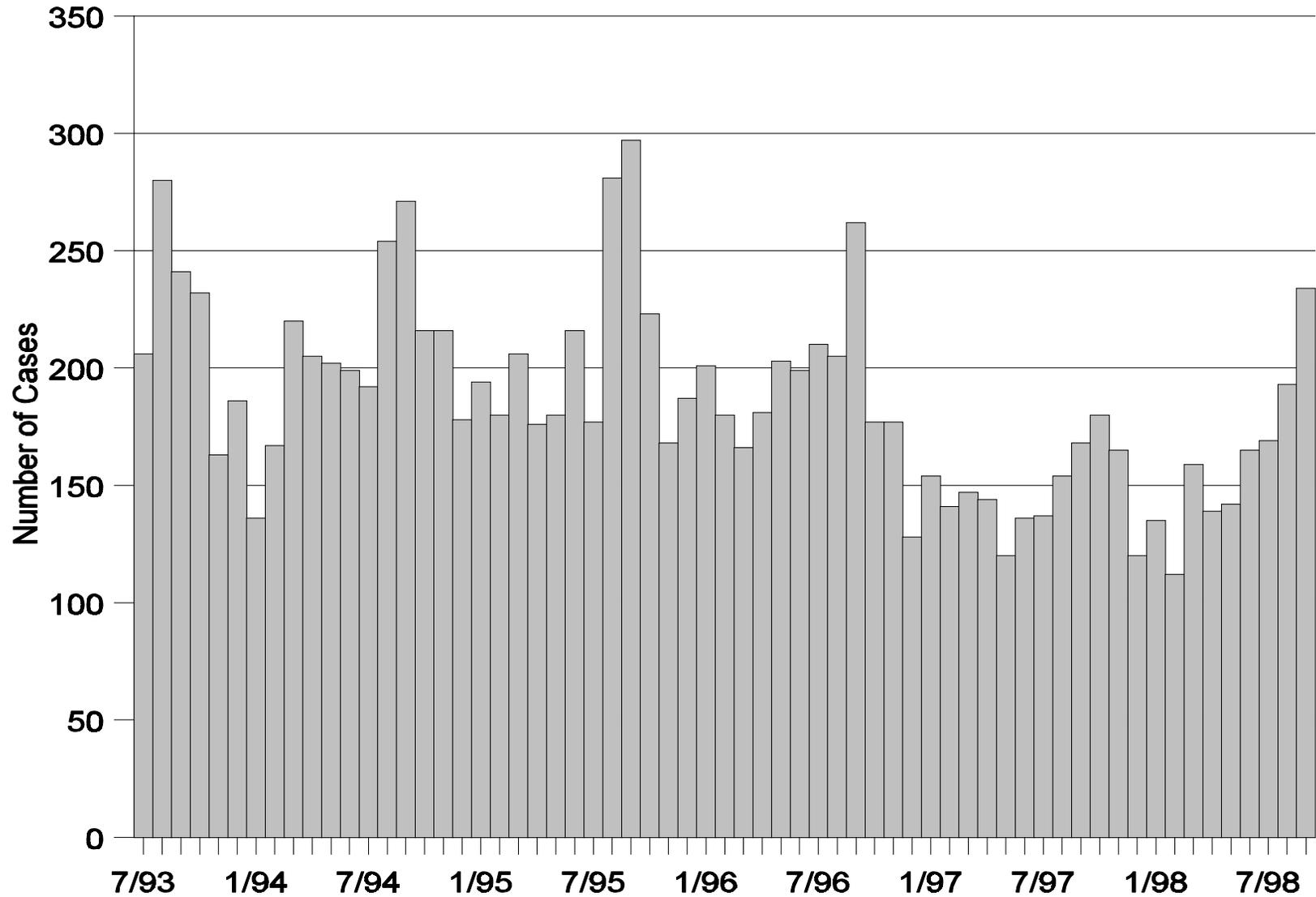


Chart 2: Cryptosporidiosis By Month of Diagnosis
New York City, November 1994-September 1998

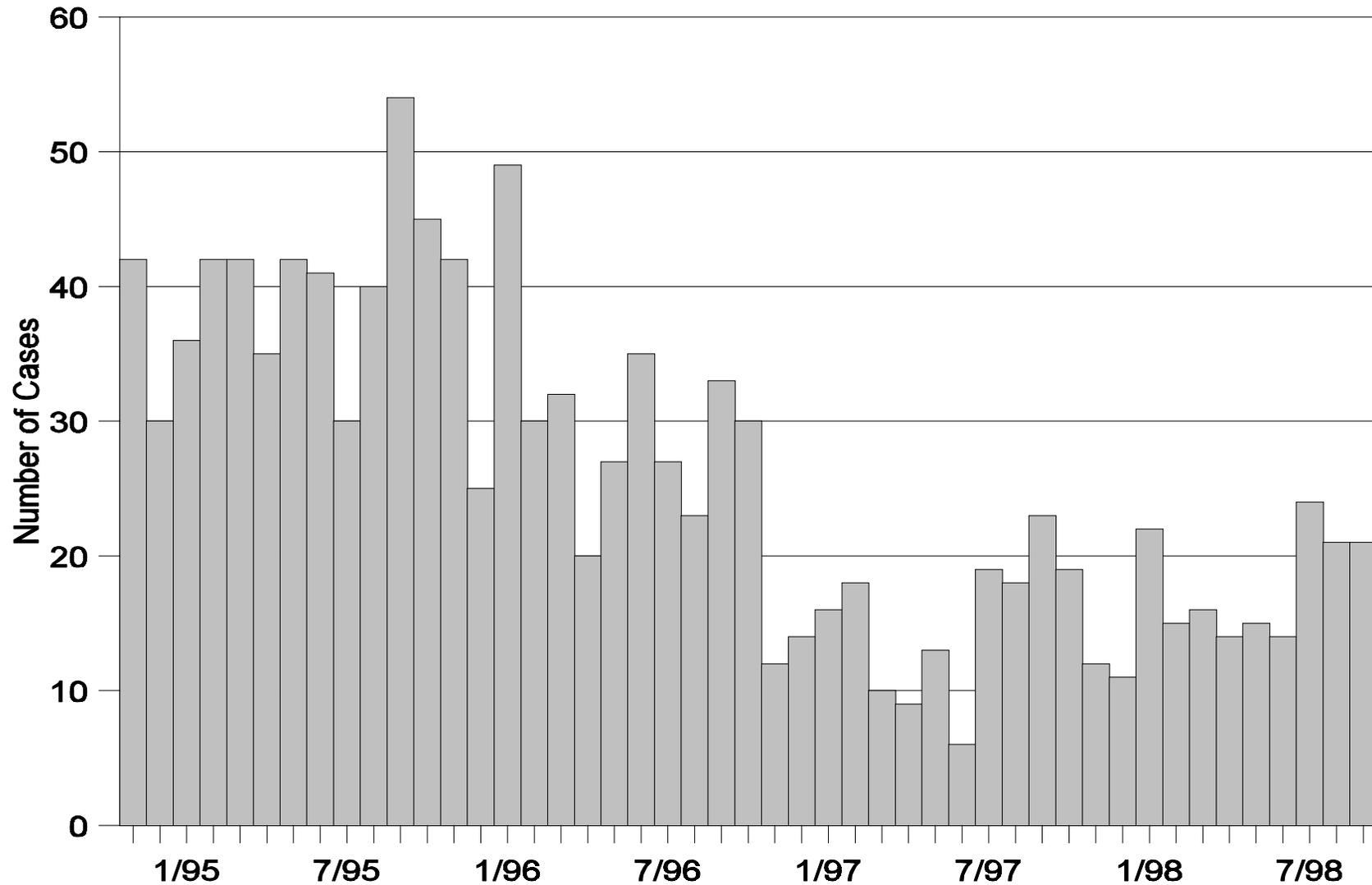
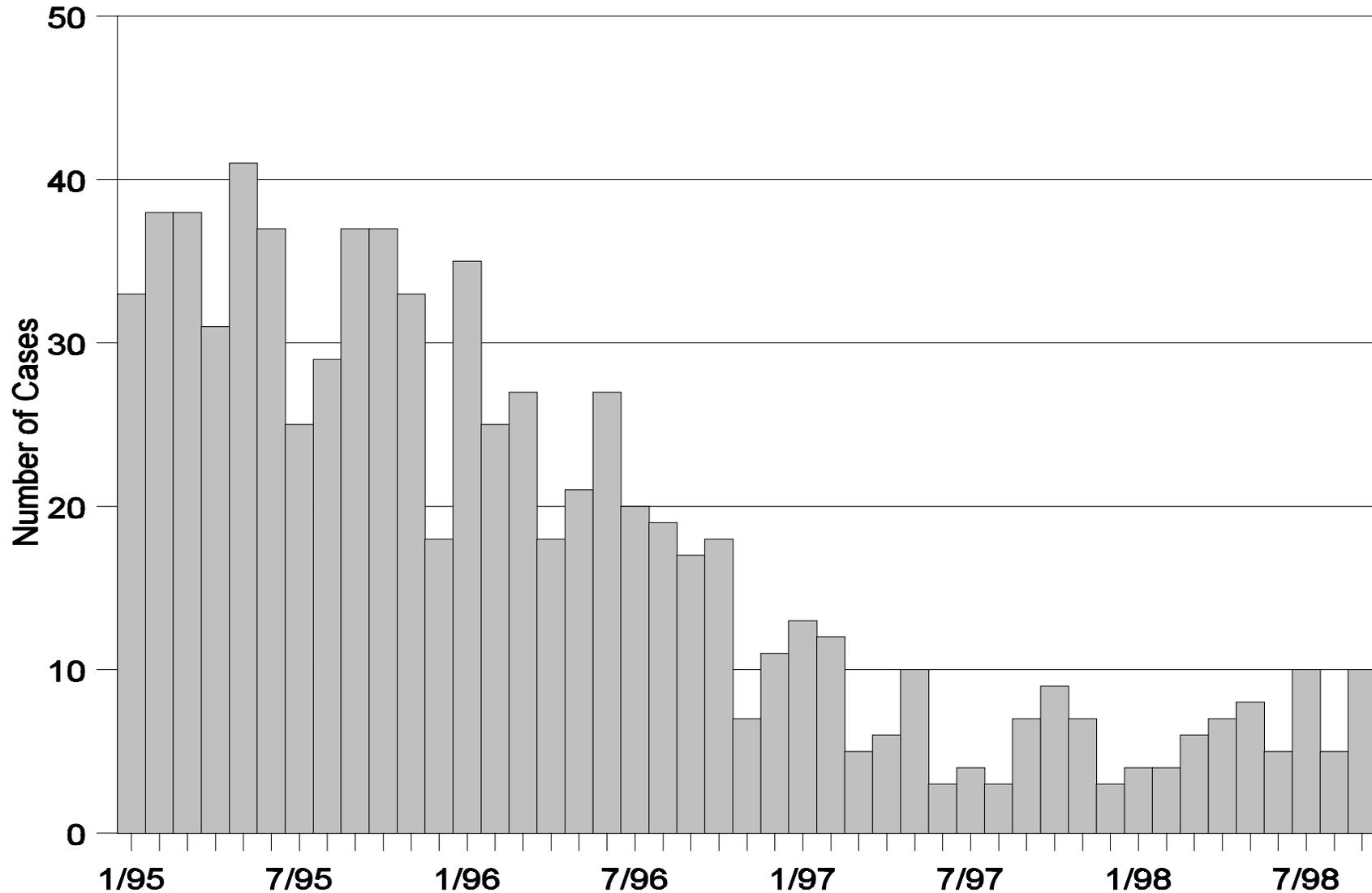


Chart 3: Cryptosporidiosis Among HIV-Infected Persons By Month of Diagnosis, New York City, January 1995-September 1998



**Chart 4: Cryptosporidiosis Among Immunocompetent Persons by Month of
Diagnosis, Jan 1995-Nov 1999, NYC**

(as of 01/13/00)

