New York City Department of Environmental Protection

Waterborne Disease Risk Assessment Program

1998 Annual Report

January 1999

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 1998 program achievements and results are presented.

Prepared by: The Waterborne Disease Risk Assessment Program Team

The *Waterborne Disease Risk Assessment Program 1998 Annual Report* was prepared by Yves B. Mikol[1], James R. Miller[2], Arthur Ashendorff[1], Anne Seeley[1] and Dan Cimini[2]. The citation for this report is: *Waterborne Disease Risk Assessment Program 1998 Annual Report*, New York City Department of Environmental Protection, New York, January 1999.

Additional copies of this report and of quarterly reports are available from Fran Guerriero at the address listed below[1], by phone (718-595-5350) or E-mail: ashndrff@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: mill172w@cdc.gov

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 Guerriero[1] and Lorraine Smith[2].

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EXECUTIVE SUMMARY

New York City's Waterborne Disease Risk Assessment Program was established to: (a) obtain data on the rates of giardiasis and cryptosporidiosis, along with demographic and risk factor information on case patients, (b) provide a system to track diarrheal illness to assure rapid detection of any outbreaks, and (c) 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 1998.

ACTIVE DISEASE SURVEILLANCE

Active disease surveillance for giardiasis and cryptosporidiosis began in July 1993 and November 1994, respectively. While figures for 1998 are still preliminary, the number of cases of giardiasis and cryptosporidiosis reported to date have increased as compared with 1997. The preliminary number of cryptosporidiosis cases reported in 1998 (n = 205) is approximately 43% of the 1995 case count (n= 472). The major decline in cryptosporidiosis cases occurred in 1996 among persons with HIV/AIDS. This decline parallels the decrease in the number of new cases of AIDS and the decline in AIDS mortality observed since the introduction of combination anti-retroviral therapy to treat persons infected with HIV. Telephone interviews of cryptosporidiosis case patients to gather risk exposure information continued and selected results are presented.

DIARRHEAL DISEASE MONITORING (Outbreak detection program)

Sentinel surveillance for gastrointestinal (GI) disease in the general population can provide valuable information regarding the occurrence of a diarrheal outbreak. Such programs for enhanced outbreak detection 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 surveillance systems have now been implemented 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

Summary results of a case-control study of giardiasis in the general population and of a cross-sectional study of cryptosporidiosis in people infected with HIV were presented in the 1997 Annual Report.

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 October 1998. Invitations to participate in various work groups and peer review groups were accepted. Requests for information from other health departments were answered. Cryptosporidiosis and giardiasis fact sheets are available on the Department of Health's website. The *1997 Waterborne Disease Annual Report* and the *1997 New York City Drinking Water Supply and Quality Statement* became available on the Department of Environmental Protection's 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 1998.

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 1998 are preliminary since the number of cases for the last quarter of 1998 will not be finalized until March 1999. During 1998, a total of 1,881 cases were reported to DOH and the annual case rate was 25.7 per 100,000. The number of cases and case rate in 1998 were greater than 1997, but less than 1994-1996 (Table 1 and Chart 1).

Table 1: Number of Cases and Case Rates for Giardiasis, Active Disease Surveillance, New York City 1994 - 1998

Year	***Number of Cases***	***Case Rate per 100,000***
1994	2,456	33.5
1995	2,485	33.9
1996	2,289	31.2
1997	1,764	24.1
1998	1,881*	25.7*

* Preliminary data for 1998 (as of January 20, 1999).

The following points provide highlights of the preliminary findings from the active disease surveillance program for giardiasis from January 1 through December 31, 1998.

- The number and rate of giardiasis cases were highest in Manhattan.
- Cases appeared to cluster in number and rate in certain zip codes in Manhattan.
- The number and rate of giardiasis cases were greater in males than females.
- 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 Reportable Disease List 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 1998 are preliminary and will not be finalized until March 1999. During 1998, a total of 205 cases were reported to the Department of Health and the annual case rate was 2.8 per 100,000. The number of cases and the case rate in 1998 have increased relative to 1997 but are lower than in previous years (Table 2 and Chart 2).

Table 2: Number of Cases and Case Rates for Cryptosporidiosis, Active Disease Surveillance, New York City 1994 - 1998

Year	***Number of Cases***	***Case Rate per 100,000***
1994	289*	3.9*
1995	472	6.5
1996	332	4.5
1997	174	2.4
1998	205**	2.8**

* Active disease surveillance began in November 1994.

** Preliminary data for 1998 (as of January 20, 1999).

The decline observed between 1995 and 1996 in the overall number of cryptosporidiosis cases was found to be due to a decline in cases among persons with HIV/AIDS. Cryptosporidiosis cases among persons with AIDS declined from 392 in 1995 to 74 in 1998 (Table 3 and Chart 3). Despite an increasing number of persons living with AIDS (because of improved therapy), the number of cases of cryptosporidiosis among persons with AIDS (PWA) has declined over this period. The rate of cryptosporidiosis among PWA has declined from 1.5/100 persons in 1995 to 0.2/100 persons in 1998. Cases among non-HIV infected persons have increased from 71 in 1995 to 116 in 1998. Among immunocompetent persons with cryptosporidiosis, cryptosporidiosis peaked in the late summer during 1995 - 1998; increased cases were also observed in January 1996 and January-February 1998.

Table 3: Number of Cases of Cryptosporidiosis by Year and Immune Status, New York City, 1995-1998

Immune Status:	YEAR			
	1995	1996	1997	1998 *
Persons with AIDS	392	243	82	74
Immunocompetent	71	83	83	116
Immunocompromised Other Than AIDS	4	3	7	2
Unknown Immune Status	5	3	2	13
TOTAL	472	332	174	205

* Case investigations are continuing.

A final report summarizing demographic and potential risk factor information is in preparation. Preliminary analysis reveals little year-to-year fluctuation among the more commonly reported potential risk exposures aside from drinking water (Table 4). Preliminary analysis also reveals that a majority of persons diagnosed with cryptosporidiosis report unboiled tap water as their primary source of drinking water. The significance of reported risk exposures cannot be determined without reference to a suitable control population.

Table 4: Percentage of Cryptosporidiosis Cases Reporting Selected Potential Risk Exposures by Immune Status, New York City 1995-1998

Exposure Type	AIDS				Immunocompetent			
	1995	1996	1997	1998	1995	1996	1997	1998
Contact with an Animal	34%	36%	33%	34%	41%	40%	41%	33%
High-risk Sexual Activity	29%	27%	21%	23%	20%	25%	13%	21%
International Travel	9%	8%	9%	14%	34%	31%	25%	27%
Recreational Water Contact	14%	7%	14%	12%	27%	29%	34%	24%

DIARRHEAL DISEASE MONITORING (Outbreak detection program)

The monitoring of gastrointestinal disease in the general population can provide evidence of a diarrheal disease outbreak earlier than reliance on laboratory-confirmed cases of specific diseases. Such programs for enhanced outbreak detection can play a significant role in limiting the extent of an outbreak of gastrointestinal illnesses by providing a rapid indication of a problem and institution 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 developed 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 different systems has allowed us to make inter-system comparisons. By comparing the data from the three systems we can assess whether a trend observed in any single system is confirmed or not by the other systems. Simultaneous variations in multiple data sets suggest actual variations in the level of diarrheal disease in the community.

Anti-Diarrheal Medication Monitoring

The monitoring of sales of anti-diarrheal medication is considered to be 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.

- Distribution network#1: The largest metropolitan distributor of medicine to independent pharmacies (N=1265) provides information on weekly shipments of Imodium®. This data includes shipments to about one third of all pharmacies located in New York City. Weekly information has been received since May 1995 and monitoring is ongoing. The profile of the volume of shipments shows small variations from week to week. An annual pattern is emerging after three and a half years of monitoring. The most noticeable event is a decrease in shipments occurring in late October-early November. It is followed by small increases or decreases at other periods of the year.

- 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 in all five boroughs 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.

Twelve nursing homes are currently participating in the surveillance program, representing approximately 1,850 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.

Usefulness of Diarrheal Disease Monitoring Data

Diarrheal disease monitoring data complement the information available from active disease surveillance in estimating the incidence of diarrheal disease in New York City. On two occasions during 1998, increasing trends in some, but not all, of the incoming data from the anti-diarrheal medicine sales and/or clinical laboratory reports led staff to assess whether a true increase in diarrheal illness was occurring among New York City residents. Additional inquiries revealed apparent increases of viral disease in the community, as indicated by: (a) reports of increased gastrointestinal illness at nursing homes, hospital emergency departments, and/or day care centers where the clinical impression was that the illnesses were viral in nature, and (b) increased viral isolation from stool and/or the lack of a bacterial/parasitic agent diagnosis. These episodes of apparent viral disease were not limited to New York City and appeared to involve person-to-person transmission. It should be noted however, that conclusive documentation of viral illness is generally lacking as virus testing is not commonly done, and symptoms are non-specific. On a separate occasion, diarrheal disease monitoring did not document any increases in diarrheal disease following the detection of low levels of *Cryptosporidium parvum* in source water in October 1998.

EPIDEMIOLOGICAL STUDIES

Summary results of a case-control study of giardiasis in the general population and of a cross-sectional study of cryptosporidiosis in people infected with HIV were presented in the 1997 Annual Report.

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 diarrhea 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 pilot program was initiated in September 1995 by New York City DOH's Bureau of Laboratories. Since that time, all stool specimens sent by Child Heath 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 5). Cryptosporidiosis is infrequently diagnosed in this group.

Table 5: Number of *Cryptosporidium* positive specimens submitted by Child Health Clinics to the Bureau of Laboratories

Year	Number of Samples Submitted	Number of Samples Positive for *Cryptosporidium*	Prevalence %
1996	3,444	3	0.09
1997	4,223	0	0
1998	5,427	3	0.05

INFORMATION SHARING AND EDUCATION

Information sharing and education efforts continued during 1998. 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:

- Presentations were made to groups of physicians and/or other health care professionals (e.g., hospital grand rounds, HIV/AIDS care providers) and at an international conference (International Conference on Emerging Infectious Diseases). Such talks serve to enhance awareness of cryptosporidiosis, including prevention measures, and may lead to more complete disease diagnosis (including laboratory evaluation) and reporting.
- Invitations for participation in several work groups and peer review groups were accepted (i.e. National Drinking Water Advisory Council's Working Group on Health Care Provider Outreach and Education).
- Active participation in the Working Group on Waterborne Cryptosporidiosis continued. The working group is coordinated by the federal Centers for Disease Control and Prevention.
- Information was provided to several State and County Health Departments, the Centers for Disease Control and Prevention, and others who requested information on the development and implementation of the anti-diarrheal medication monitoring, clinical laboratory and nursing home surveillance programs.

In addition, a special announcement to area hospitals and providers of care to persons with HIV/AIDS was faxed in October 1998 following the findings of low levels of pathogens in the source water. A subsequent fax was 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. Documents now on the website include:

DOH Webpages:

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

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

DEP Webpages:

- *1997 Waterborne Disease Annual Report*
  http://www.ci.nyc.ny.us/dep/html/watersup.html

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

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

Additional information regarding the Waterborne Disease Risk Assessment Program and other monitoring programs will be added in 1999 as it becomes available.

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

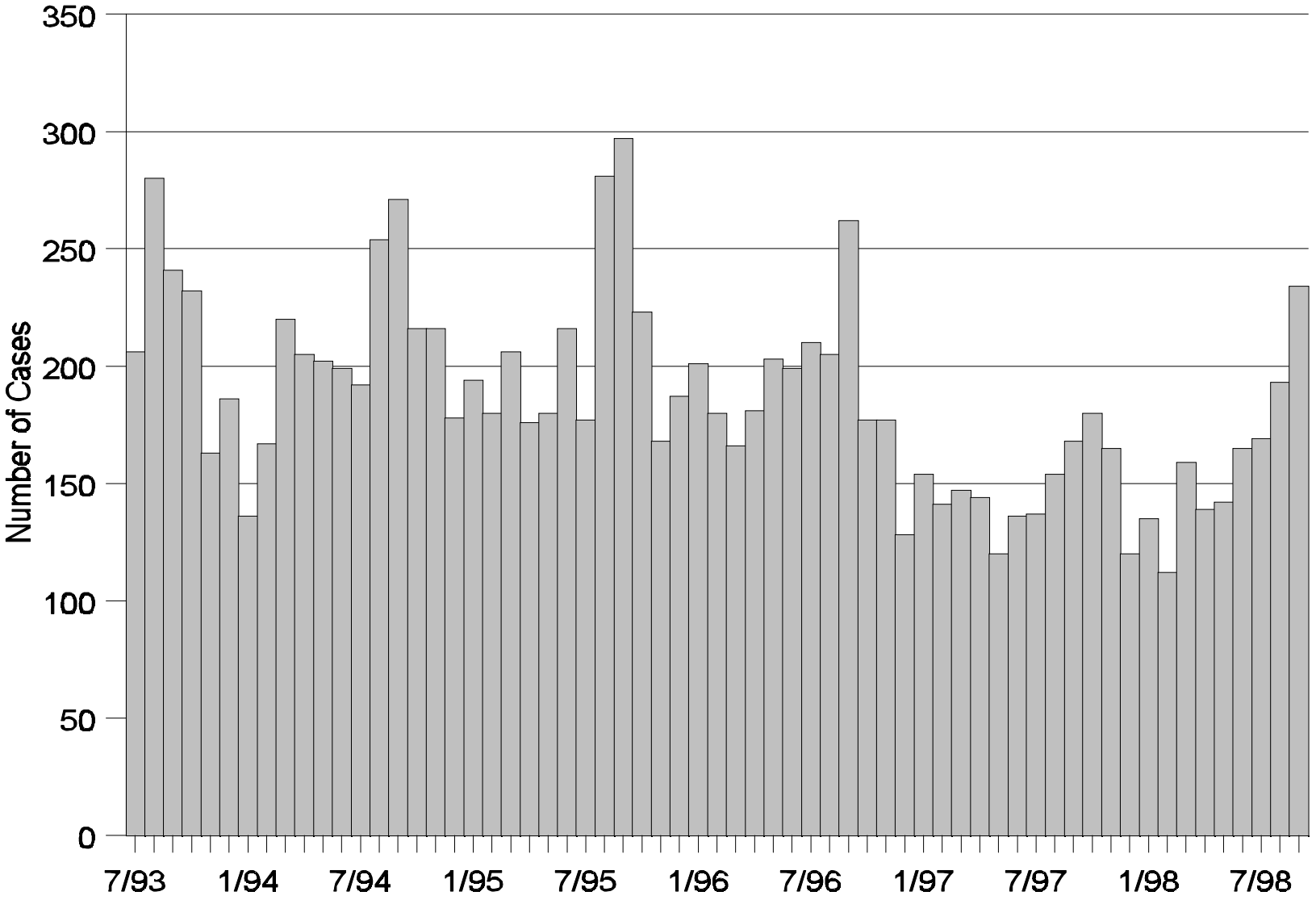

Chart 2: Cryptosporidiosis By Month of Diagnosis
New York City, November 1994-September 1998

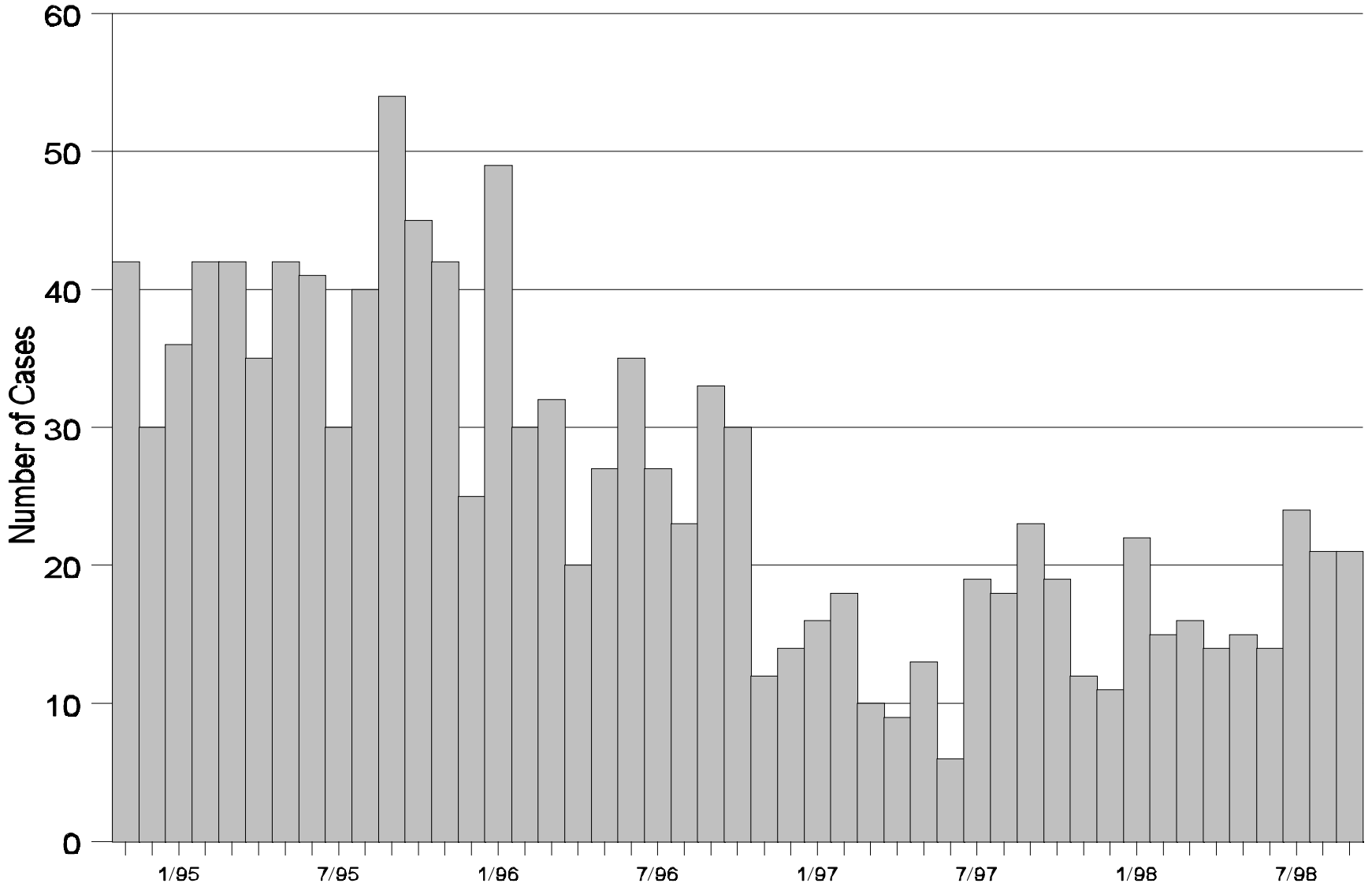

Chart 3: Cryptosporidosis Among HIV-Infected Persons By Month of Diagnosis, New York City, January 1995-September 1998