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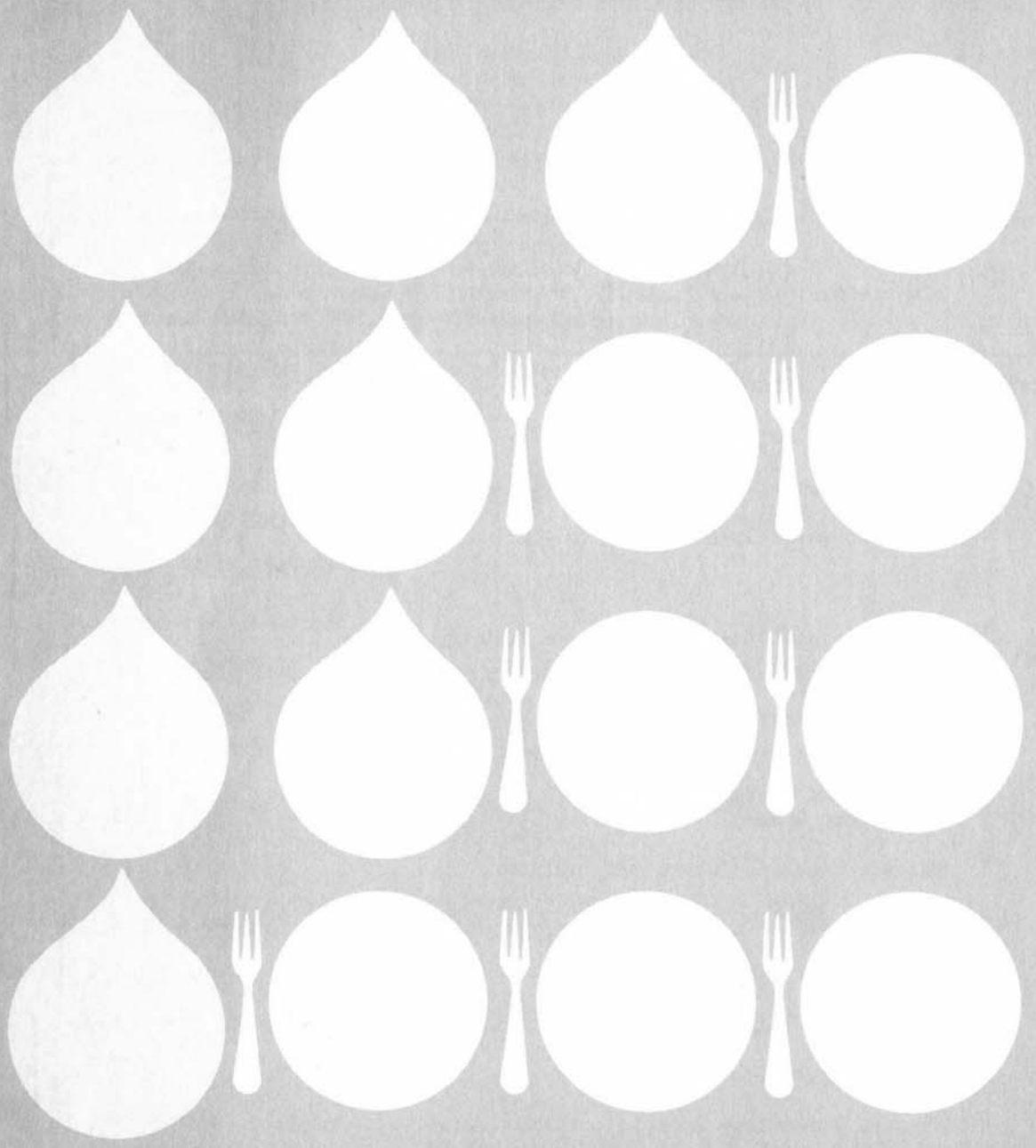
Center for Disease Control

Foodborne and Waterborne Disease Outbreaks

Annual Summary 1974
Issued January 1976

U.S. Department of Health, Education, and Welfare
Public Health Service



PREFACE

This report summarizes information received from state and local health departments, the Food and Drug Administration, the U.S. Department of Agriculture, and other pertinent sources. The information is preliminary and is intended primarily for use by those with responsibility for disease control activities. Anyone desiring to quote this report should contact the Enteric Diseases Branch for confirmation and further interpretation.

Contributions to the report are most welcome. Please address them to:

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TABLE OF CONTENTS

		Page
I.	INTRODUCTION	1
II.	FOODBORNE DISEASE OUTBREAKS 1974	2
	A. Definition of Outbreak	2
	B. Source of Data	2
	C. Interpretation of Data	3
	D. Analysis of Data	4
	E. Foodborne Outbreaks on Cruise Ships, 1974	19
	F. Investigation of a Foodborne Outbreak, (Summary Form)	23
	G. Line Listing of Foodborne Disease Outbreaks, 1974	25
	H. Guidelines for Confirmation of Foodborne Outbreak	53
III.	WATERBORNE DISEASE OUTBREAKS 1974	58
	A. Definition of Outbreak	58
	B. Source of Data	58
	C. Interpretation of Data	58
	D. Analysis of Data	58
	E. Waterborne Outbreaks Involving Passengers on Cruise Ships or Travelers to Foreign Countries	62
	F. Investigation of a Waterborne Outbreak (Pretest Summary Form)	69
	G. Line Listing of Waterborne Disease Outbreaks, 1974	71
IV.	REFERENCES	74
V.	ARTICLES ON FOODBORNE AND WATERBORNE DISEASE OUTBREAKS, 1974, TAKEN FROM MORBIDITY AND MORTALITY WEEKLY REPORT	78

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I. INTRODUCTION

The reporting of foodborne and waterborne diseases in the United States began about 50 years ago when state and territorial health officers, concerned about the high morbidity and mortality caused by typhoid fever and infantile diarrhea, recommended that cases of enteric fever be investigated and reported. Their purpose was to obtain information about the role of food, milk, and water in outbreaks of intestinal illness as the basis for sound public health action. Beginning in 1923, the United States Public Health Service published summaries of outbreaks of gastro-intestinal illness attributed to milk. In 1938, it added summaries of outbreaks caused by all foods. These early surveillance efforts led to the enactment of important public health measures which had a profound influence in decreasing the incidence of enteric diseases, particularly those transmitted by milk and water.

From 1951 through 1960, the National Office of Vital Statistics reviewed reports of outbreaks of foodborne illness and published summaries of them annually in Public Health Reports. In 1961, the Center for Disease Control (CDC), then the Communicable Disease Center, assumed responsibility for publishing reports on foodborne illness. For the period 1961-66, CDC discontinued publication of annual reviews, but reported pertinent statistics and detailed individual investigations in the Morbidity and Mortality Weekly Report (MMWR).

In 1966, the present system of surveillance of foodborne and waterborne diseases began with the incorporation of all reports of enteric disease outbreaks attributed to microbial or chemical contamination of food or liquid vehicles into an annual summary. Since 1966, the quality of investigative reports has improved primarily as a result of more active participation by state and federal agencies in the investigation of foodborne and waterborne outbreaks. In this report, data from foodborne and waterborne disease outbreaks reported to CDC in 1974 are summarized.

Foodborne and waterborne disease surveillance has traditionally served 3 objectives:

1. Disease Control: Early identification and removal of contaminated products from the commercial market, correction of faulty food preparation practices in food service establishments and in the home, and identification and appropriate treatment of human carriers of foodborne pathogens are the fundamental control measures resulting from surveillance of foodborne disease. Identification of contaminated water sources and adequate purification of these sources are the primary control measures in the surveillance of waterborne disease outbreaks. Rapid reporting and thorough investigation of outbreaks are important for prevention of subsequent outbreaks.

2. Knowledge of Disease Causation: The responsible pathogen has not been identified in 30 to 60% of foodborne disease outbreaks reported to CDC in each of the last 5 years. In many of these outbreaks, pathogens known to cause foodborne illness may not have been identified because of late or incomplete laboratory investigation. In others, the responsible pathogen may have escaped detection even when a thorough laboratory investigation was carried out because the pathogen is not yet appreciated as a cause of foodborne disease or because it cannot yet be identified by available laboratory techniques. These pathogens might be identified and suitable measures to control diseases caused by them might be instituted as a result of thorough clinical, epidemiologic and laboratory investigations. Pathogens suspected of being but not yet determined to be etiologic agents in foodborne disease include Group D streptococcus, *Yersinia enterocoliticus*, *citrobacter*, *enterobacter*, *klebsiella*, *pseudomonas*, and the presumably viral agents of acute infectious non-bacterial gastroenteritis. Other pathogens such as *Escherichia coli* and *Bacillus cereus* are known causes of foodborne illness, but the extent and importance of their role have

not as yet been determined. The etiologic agent(s) responsible for the majority of waterborne outbreaks also awaits identification. In waterborne disease, as in foodborne disease, the roles of a variety of viral and bacterial agents, e.g. Yersinia enterocolitica, remain to be clarified.

3. Administrative Guidance: The collection of data from outbreak investigations permits assessment of trends in etiologic agents and food vehicles and focuses on common errors in food and water handling. By compiling the data in an annual summary, it is hoped that local and state health departments and others involved in the implementation of food and water protection programs will be kept informed of the factors involved in food and waterborne outbreaks. Comprehensive surveillance should result in a clearer appreciation of priorities in food and water protection, institution of better training programs, and more rational planning.

II. FOODBORNE DISEASE OUTBREAKS

A. Definition of Outbreak

For the purpose of this report a foodborne disease outbreak is defined as an incident in which:

1. 2 or more persons experience a similar illness, usually gastrointestinal, after ingestion of a common food, and
2. epidemiologic analysis implicates the food as the source of the illness.

There are a few exceptions; 1 case of botulism or chemical poisoning constitutes an outbreak.

In this report outbreaks have been divided into 2 categories:

1. Laboratory confirmed--Outbreaks in which laboratory evidence of a specific etiologic agent is obtained and specified criteria are met (see Section H).
2. Undetermined etiology--Outbreaks in which epidemiologic evidence implicates a food source, but adequate laboratory confirmation is not obtained. These outbreaks are subdivided into 4 subgroups by incubation period of the illnesses--less than 1 hour (probable chemical, 1 to 7 hours (probable staph), 8 to 14 hours (probable Clostridium perfringens), and greater than 14 hours (other infectious agents).

B. Source of Data

The general public and local, state, and federal agencies which have responsibility for public health and food protection participate in foodborne disease surveillance. Consumers, physicians, hospital personnel, and persons involved with food service or processing report complaints of illness to the health departments or regulatory agencies. Local health department personnel (epidemiologists, sanitarians, public health nurses, etc.) carry out most epidemiologic investigations of these reports and make their findings available to state health departments. State agencies concerned with food safety frequently participate in the initial investigation of the outbreak and offer laboratory support. Occasionally, on special request, CDC participates in an investigation, particularly if the outbreak is large or involves products that move in interstate commerce. State or other officials eventually summarize the findings of the investigation on the standard CDC reporting form (see Section F) and send it to CDC.

The 2 federal regulatory agencies which have major responsibilities for food protection, the Food and Drug Administration (FDA) and Department of Agriculture (USDA) report episodes of foodborne illness to CDC and to state and local health authorities. CDC and state and local health authorities, in turn, report to FDA or USDA any foodborne disease outbreaks which might involve commercial products. The U.S. Armed Forces also report outbreaks directly to CDC.

By special arrangement, pharmaceutical companies immediately report all requests for botulinal antitoxin to CDC. This is sometimes the first communication of a botulism outbreak to public health authorities, although physicians are urged to promptly report all suspect botulism cases. In botulism outbreaks, CDC works closely with physicians, state and local health authorities, and FDA or USDA representatives to provide diagnostic and therapeutic consultation and to rapidly identify the responsible food or foods.

Other sources of foodborne disease data during 1974 were the Morbidity and Mortality Weekly Report, the Salmonella Surveillance Activity and the Trichinosis Surveillance Activity.

C. Interpretation of Data

The limitations on the quantity and quality of data in this report must be appreciated in order to avoid misinterpretation. The number of outbreaks of foodborne disease reported by this surveillance system clearly represents a minute fraction of the total number that occur. The likelihood of an outbreak coming to the attention of health authorities varies considerably from one locale to the next depending largely upon consumer awareness and physician interest.

Interstate outbreaks, large intrastate outbreaks and outbreaks of serious illness such as botulism or mushroom poisoning with species containing amanita toxin are more likely to come to the attention of health authorities including CDC. The quality of the investigation conducted by state or local health department varies considerably according to the department's interest in foodborne disease outbreaks and its investigative and laboratory capabilities. The likelihood that the findings of the investigation will be reported depends upon a state's commitment to foodborne disease surveillance.

Just as this report should not be the basis of firm conclusions about the absolute incidence of foodborne disease, it should not be used to draw conclusions about the relative incidence of foodborne disease of various etiologies (Table 2). For example, foodborne diseases characterized by short incubation periods such as most outbreaks of chemical etiology or outbreaks caused by staphylococcus are more likely to be recognized as common-source foodborne disease outbreaks than those diseases with longer incubation periods. The common source aspect of a foodborne outbreak of hepatitis A which typically has an incubation period of several weeks would be particularly likely to escape detection. Outbreaks of serious disease such as botulism or mushroom poisoning with species of mushrooms containing amanita toxin are probably more likely to be reported than less serious illnesses but, because of their rarity, they may be less likely to be recognized and diagnosed. Outbreaks of *C. perfringens* are recognized readily but confirmed with difficulty because of problems involved in the transport and culturing of anaerobic specimens. Outbreaks of *B. cereus* and *E. coli* are probably less likely to be confirmed because these organisms are less often considered clinically, epidemiologically and in the laboratory.

The number of reported outbreaks of some etiologies may depend upon the interest of a particular health department or individual. For example, the great increase in the number of reported outbreaks of ciguatera in 1974 probably reflects greater interest in the surveillance of this disease in the states in which they occur. If a microbiologist becomes interested in looking for *C. perfringens*, he is likely to confirm more outbreaks of this etiology.

While the relative proportions of reported outbreaks attributed to most etiologies fluctuate minimally from year to year, it is worth noting that a few outbreaks involving very large numbers of persons may vastly alter the relative proportions of cases attributed to various etiologies (Tables 2 and 3).

Information on the number of deaths associated with outbreaks was unreported in one-fourth of the outbreaks. In many of the others, complete information was lacking. Particularly when death is not immediate, foodborne disease may not be appreciated as contributing to the demise of an elderly or debilitated person unable to withstand otherwise minor physical stresses. These limitations on the data must be appreciated in interpreting Table 4.

In outbreaks of unknown etiology, the accuracy of reported information is always suspect. In these outbreaks, when the epidemiology incriminating a particular food item was very weak, the food item was listed as unknown in this report (Table 6). Information on the place of acquisition in these outbreaks was judged reliable and recorded (Table 7). However, information on the place where food was mishandled in these outbreaks was generally judged unreliable; in most of them, the place of mishandling was listed as unknown (Table 8). Only in outbreaks in which a specific etiology was very much suspected although unconfirmed in the laboratory and in which

the information on mishandling was consistent with the suspected etiology, was a known place of mishandling designated.

The implications of a food-processing establishment mishandling food are great both to the public health and the establishment concerned. Consequently, the outbreaks attributed to mishandling at these establishments are thoroughly investigated and reported data carefully scrutinized. For these reasons, data obtained in these investigations is considered highly reliable (Tables 8 and 9).

Much is known about contributing factors in foodborne disease. Thus, in most outbreaks of botulism and trichinosis, the food is usually inadequently cooked. In most of the outbreaks of bacterial etiology other than botulism and in outbreaks of scombroid (in which bacterial growth is responsible for toxin production), the food is usually stored at improper holding temperatures. In outbreaks of ciguatera, puffer fish poisoning, mushroom poisoning, and paralytic and neurotoxic shellfish poisoning, the food is obtained from an unsafe source, almost by definition. The investigators of foodborne disease outbreaks are usually aware of these contributing factors and consequently seek and find the appropriate factors. Sometimes, however, investigators report factors which are not known to be contributing to outbreaks of the type of etiology confirmed. In such cases, the factors are considered in light of the evidence presented; if they are totally unsubstantiated, they are rejected. These considerations must be borne in the mind in interpreting Table 10.

There is no reason to doubt the accuracy of the data on month of occurrence of outbreaks presented in Table 11.

D. Analysis of Data

In 1974, there were 456 outbreaks of foodborne disease involving 15,489 cases. This is by far the most outbreaks ever reported in a single year to the CDC Foodborne Disease Surveillance Activity (Figure 1). An etiology was confirmed in 44% (201) of the outbreaks--similar to the percentage of confirmed outbreaks in 1973 (41%) and in 1972 (45%), the year that strict criteria for laboratory confirmation were implemented.

Of the 456 outbreaks, state, local, or territorial health departments reported 418 (92%), the Trichinosis Surveillance Activity reported 15 (3%), the USDA reported 8 (2%), private physicians reported 5 (1%), and U.S. Armed Forces reported 4 (1%), the Salmonella Surveillance Activity reported 2 (0.4%), the FDA reported 2 (0.4%), the Indian Health Service reported 1 (0.2%), and the MMWR supplied the only information on 1 (0.2%).

The reported outbreaks occurred in 44 states, the District of Columbia, Puerto Rico, and Guam (Figure 2 and Table 1). No outbreaks were reported from 6 states, the Virgin Islands, and the Canal Zone. Five outbreaks occurred in more than 1 state. The 3 state health departments reporting the most outbreaks were Pennsylvania, Washington, and California as in the previous 2 years. Pennsylvania reported the largest number of outbreaks of any state health department, doubling the number reported in 1973. Florida, Hawaii, New York, Ohio, and Illinois reported substantially more outbreaks in 1974 than in 1973 and 1972. The large number of outbreaks reported from these states undoubtedly reflects the interest of the respective state health departments in foodborne disease surveillance.

Of the 201 confirmed outbreaks, the etiology was bacterial in 122 (61%), chemical in 57 (29%), parasitic in 16 (8%) and viral in 6 (3%) (Table 2). The percentage of outbreaks with bacterial etiology was slightly less than in the previous 2 years, and the percentage of chemical outbreaks slightly greater (Table 3). This probably reflects a greater appreciation of chemical etiologies of foodborne disease outbreaks, particularly ciguatera fish poisoning. While outbreaks of bacterial etiology accounted for only 61% of the outbreaks, they accounted for 94% of the cases. The bulk of the cases of bacterial etiology were caused by salmonella and over half of the salmonella cases occurred in a single large outbreak which involved 3,400 persons on the Navajo Nation Indian Reservation. As in the previous 2 years, outbreaks of *C. perfringens* and staphylococcus caused outbreaks which involved large numbers of people. The 21 outbreaks of *Clostridium botulinum* were the most reported in any year since 1935; 32 persons were involved in these outbreaks.

There were 14 deaths reported in outbreaks that occurred in 1974. This is about the same number reported in the previous 2 years (Table 4). Half of the deaths were caused by botulism, which is typically a major cause of foodborne disease mortality.

Table 5 lists the outbreaks of undetermined etiology by median incubation periods. If one assumes that most outbreaks in which the median incubation period was less than 1 hour were of chemical etiology, that those in which the median incubation period was 1-7 hours were of staphylococcal etiology, and that those in which the median incubation period was 8-14 hours were caused by C. perfringens, then these agents were responsible for substantially more outbreaks than suggested in Table 2.

Vehicles of transmission were identified in 310 (68%) of the outbreaks (Table 6); multiple vehicles were involved in 50 (11%). Of the 260 outbreaks in which a single vehicle was identified, meats or poultry were incriminated in 101 (39%), fish or shellfish in 60 (23%), dairy products in 15 (6%), fruits and vegetables in 16 (6%), salads including chicken, turkey, potato, and egg salad in 17 (7%), mushrooms in 8 (3%), Chinese food in 7 (3%), Mexican food in 11 (4%), non-dairy beverages in 9 (3%), and other foods in 5 (2%). Of the meat vehicles, beef and ham were most frequently incriminated. Of the fish vehicles, shellfish, tuna, grouper, amberjack, and po'ou were most frequently incriminated. Of the dairy foods, ice cream was incriminated three-fifths of the time. Of the salads, potato salad was incriminated half the time.

As in many reported outbreaks in which B. cereus was the responsible agent, the 1 outbreak of B. cereus in 1974 involved a Chinese food. In 1974, as in the past, C. botulinum outbreaks most frequently involved vegetables, C. perfringens outbreaks usually involved meat, salmonella outbreaks most often involved dairy foods, and staphylococcus outbreaks most frequently involved meats, particularly ham. The outbreaks of heavy metal poisoning all involved non-dairy beverages. Of the 26 ciguatera outbreaks, amberjack accounted for 10, grouper for 8, and po'ou for 4. Of the 10 scombroid outbreaks, 6 involved tuna fish. The 1 outbreak of puffer fish poisoning was caused by ingestion of the toxic flesh of the puffer fish. The 1 outbreak of neurotoxic shellfish poisoning involved clams and the 1 outbreak of paralytic shellfish poisoning involved mussels. As in previous years, the outbreaks of monosodium glutamate intoxication in 1974 involved Chinese foods. T. spiralis outbreaks almost always involved pork or sausage. Not unexpectedly, the outbreak of toxoplasmosis involved raw beef and the outbreak of anisakiasis involved raw fish.

In three-fourths of the outbreaks, the food was eaten at home, in a restaurant or at school (Table 7). The incriminated food was eaten in the home in 41%, in a restaurant in 28%, and in a school including the school cafeteria in 5%. In 20 of the 21 outbreaks of botulism, the food was eaten in the home. All 4 outbreaks caused by heavy metal poisoning occurred away from home but most of the outbreaks caused by other chemical etiologies occurred at home, including 20 of the 26 ciguatera outbreaks, the 1 puffer fish poisoning outbreak, 7 out of 10 scombroid fish poisoning outbreaks, all 6 mushroom poisoning outbreaks, both shellfish poisoning outbreaks, and 4 out of 6 outbreaks from other chemicals. None of the outbreaks of trichinosis but all of the outbreaks of hepatitis occurred at food service establishments.

The place where the mishandling of the food responsible for an outbreak occurred was specified in 183 outbreaks (Table 8). Of these, food service establishments were specified as responsible for the mishandling of food in 49%, homes in 42%, and food processing establishments in 9%. Food service establishments are locations where food is prepared for public consumption, i.e., restaurants, cafeterias, caterers, hospitals, industrial plants, etc. Food processing establishments are locations where a food is prepared for market. The distribution of places held responsible for mishandling of food in 1974 paralleled that of the 2 previous years. As usual, a food service establishment (Chinese restaurant) was responsible for the error leading to the single outbreak caused by B. cereus. Home processed foods were involved in all but 1 of the outbreaks of botulism in which a food vehicle was identified. As in 1973 and 1972, the majority of outbreaks caused by C. perfringens, salmonella, and staphylococcus, in which a place of food mishandling was

specified, were attributed to mishandling of food in food service establishments. In reported outbreaks of heavy metal poisoning, scombroid fish poisoning, and monosodium glutamate intoxication, places other than homes were found responsible for the foodhandling errors. In outbreaks of puffer fish poisoning, mushroom poisoning, and shellfish poisoning, incriminated foods were obtained by private individuals, rather than commercial sources, and eaten in homes. Since there is no practical way to distinguish fish containing ciguatoxin from fish which do not, and the presence of the toxin is not influenced substantially by the way the fish is handled or cooked, a place of food mishandling was not specified in outbreaks of ciguatera. In most reported outbreaks of trichinosis, the foodhandling error occurred in the home while in most reported outbreaks of hepatitis, it occurred away from home.

Of the 16 outbreaks attributed to mishandling of food in food-processing establishments, 8 were of chemical etiology and only 6 were of bacterial etiology (Table 9). However, 1 of these 6 outbreaks of bacterial etiology was by far the largest and involved 1,500 persons; the second, third, and fourth largest outbreaks in which a food-processing establishment mishandled food were also of bacterial etiology and involved 122, 40 and 9 persons respectively. T. spiralis was the responsible agent in 2 outbreaks in which a food-processing establishment mishandled food.

In 219 (48%) of the 456 outbreaks including 144 (72%) of the 201 confirmed outbreaks, a contributing factor in the outbreak was reported and accepted in processing data (Table 10). The data reflected patterns of disease causation seen in previous years. In reported outbreaks of botulism, trichinosis, toxoplasmosis, and anisakiasis the most frequent error was inadequate cooking of the food. Improper holding temperatures most frequently contributed to reported outbreaks of C. perfringens, salmonella, staphylococcus, and scombroid fish poisoning. Storage of beverages in metal containers or in contact with tubing of a type which allowed metallic ions to dissolve in the beverage was the most important contributing factor in the outbreaks of heavy metal poisonings. In outbreaks of ciguatera, puffer fish poisoning, mushroom poisoning, and shellfish poisoning, the food was unsafe to begin with. In the outbreaks of chemical poisoning caused by miscellaneous chemicals, the food was obtained from an unsafe source. In the 3 outbreaks of hepatitis in which a contributing factor was specified, a person suspected of having active hepatitis was involved in foodhandling.

The date of onset of an outbreak was designated as the date of onset of the first case (Table 11). Outbreaks as a whole were distributed more or less equally throughout the year. Outbreaks of botulism tended to occur most frequently in the fall probably because that is when foods home-processed in the late spring and summer are eaten. Outbreaks caused by salmonella and staphylococcus tended to occur more frequently in the summer months probably because the warm temperatures encouraged bacterial growth in unrefrigerated foods. Of the 26 ciguatera outbreaks, 15 occurred in Hawaii and 10 in Florida. Of the 15 outbreaks in Hawaii, 12 occurred in February and March and 1 in April; of the 10 outbreaks in Florida, 9 occurred in May, June, or July. Outbreaks of mushroom poisoning tended to occur in the spring and fall. The 1 outbreak of paralytic shellfish poisoning occurred in August; these outbreaks tend to occur in late summer or early fall coincident with the red tide. The 1 outbreak of neurotoxic shellfish poisoning occurred in March coincident with a red tide along the coast of Florida at that time. Reported outbreaks of hepatitis tended to occur in the summer and early fall as in 1972 and 1973.

Fig. 1 FOODBORNE DISEASE OUTBREAKS AND CASES REPORTED TO CENTER FOR DISEASE CONTROL, 1966-1974

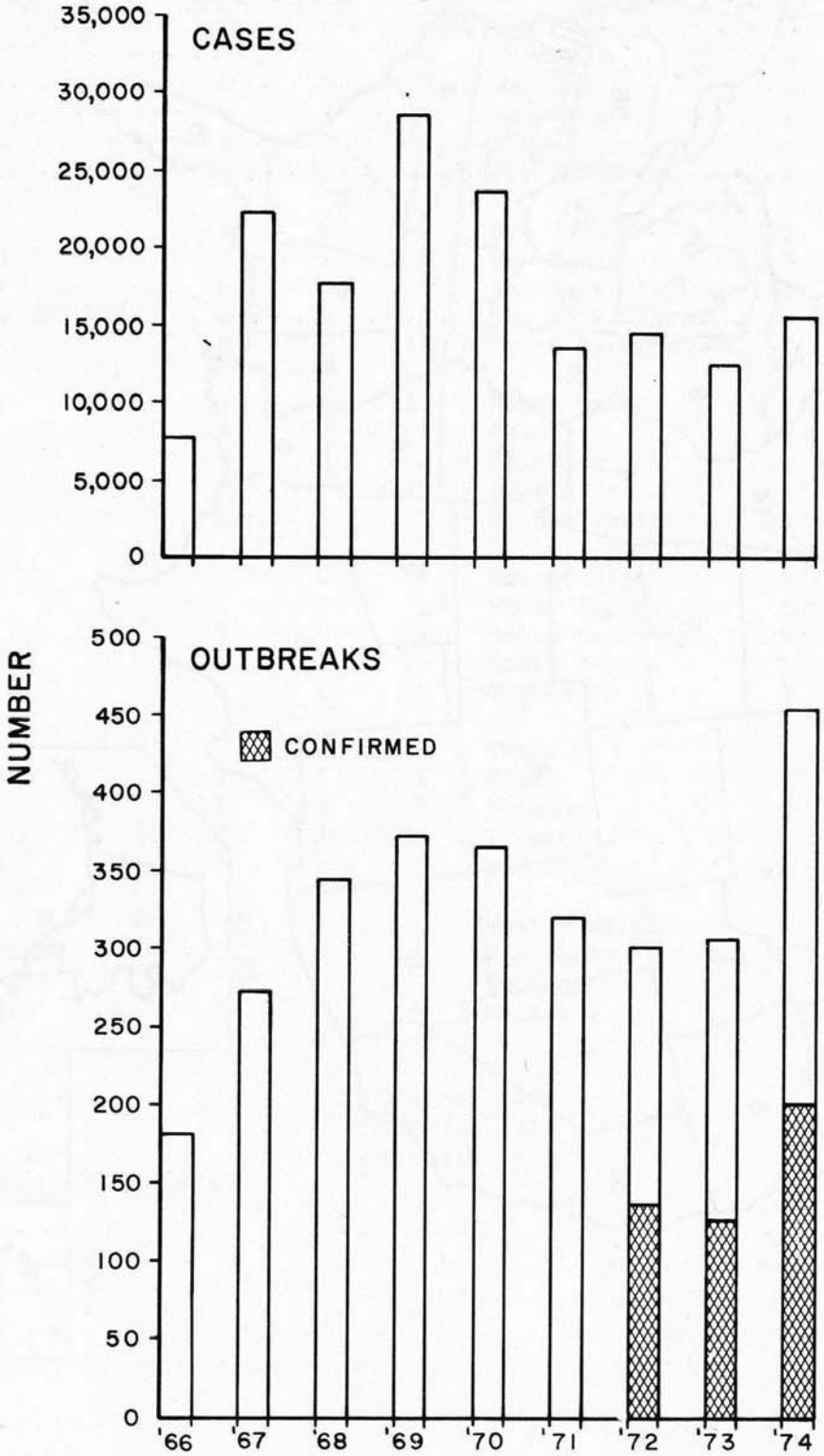
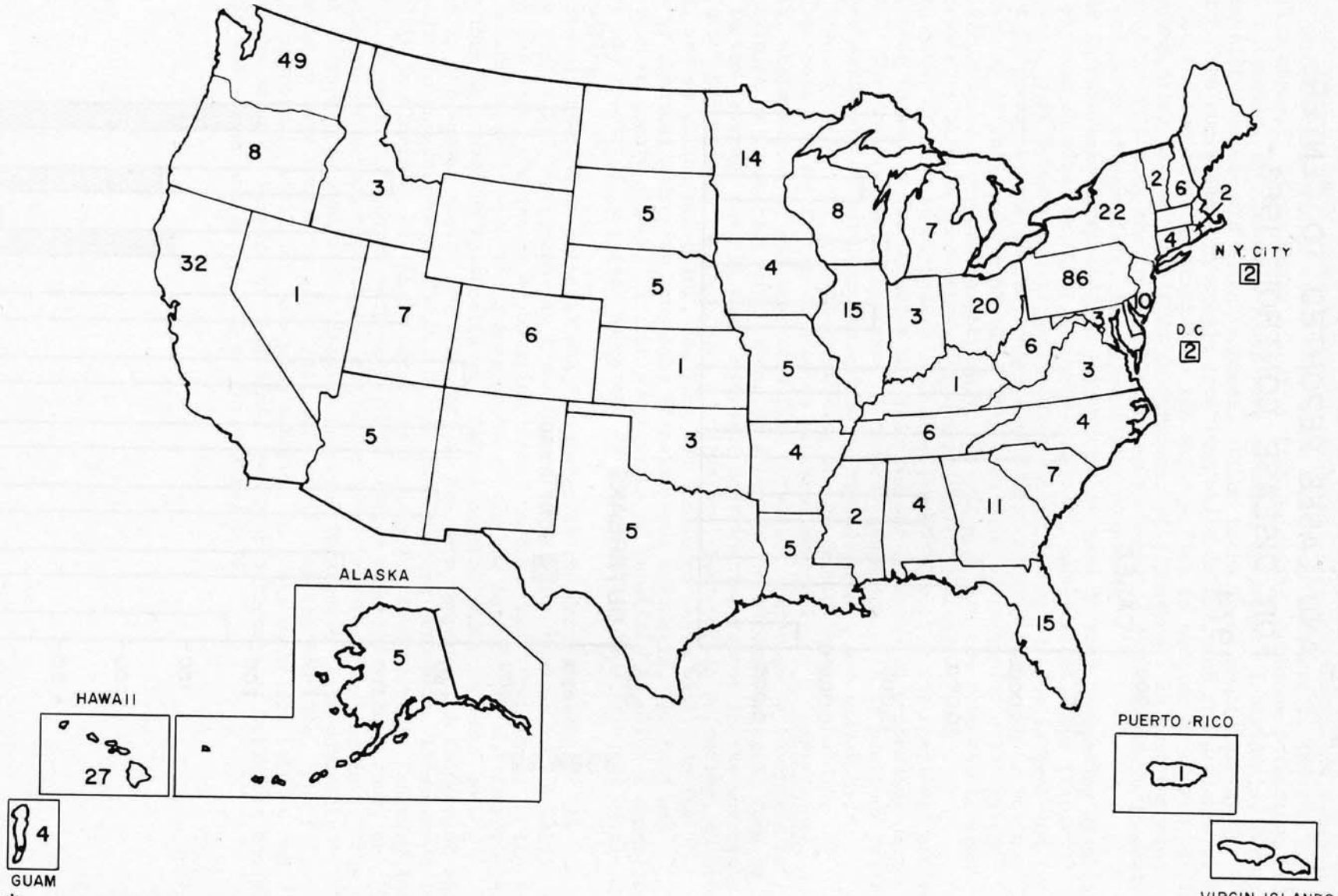


Fig. 2 REPORTED FOODBORNE DISEASE OUTBREAKS, 1974*



*5 OUTBREAKS - MORE THAN I STATE INVOLVED

Table 1

Foodborne Disease Outbreaks, by Location, 1972-1974*

State	1972	1973	1974	State	1972	1973	1974
Alabama	1	0	4	Missouri	3	1	5
Alaska	2	3	5	Montana	0	1	0
Arizona	4	7	5	Nebraska	2	3	5
Arkansas	9	3	4	Nevada	0	0	1
California	34	39	32	New Hampshire	1	4	6
Colorado	6	4	6	New Jersey	22	9	10
Connecticut	0	1	4	New Mexico	0	1	0
Delaware	0	0	0	New York City	0	3	2
District of Columbia	2	0	2	New York State	3	1	22
Florida	3	2	15	North Carolina	3	3	4
Georgia	13	8	11	North Dakota	1	1	0
Hawaii	12	7	27	Ohio	5	2	20
Idaho	0	2	3	Oklahoma	6	1	3
Illinois	8	9	15	Oregon	6	13	8
Indiana	4	1	3	Pennsylvania	33	42	86
Iowa	0	0	4	Puerto Rico	5	2	1
Kansas	11	0	1	Rhode Island	1	1	2
Kentucky	5	2	1	South Carolina	5	3	7
Louisiana	2	3	5	South Dakota	2	0	5
Maine	0	1	0	Tennessee	2	8	6
Maryland	4	3	3	Texas	4	10	5
Massachusetts	3	2	1	Utah	0	12	7
Michigan	11	10	7	Vermont	1	2	2
Minnesota	2	8	14	Virginia	3	3	3
Mississippi	0	1	2	Washington	45	55	49
Other				West Virginia	1	5	6
Virgin Islands	0	0	0	Wisconsin	6	0	8
Guam and Trust Territories	1	0	4	Wyoming	0	0	0
Canal Zone	2	0	0	Multiple	2	5	5

1972 total 301
1973 total 307
1974 total 456

*Annual Summaries, 1972-1974

Table 2

Confirmed Foodborne Disease Outbreaks and Cases by Etiology, 1974

	Outbreaks		Cases	
	#	%	#	%
BACTERIAL				
B. cereus	1	0.5	11	0.1
C. botulinum	21	10.4	32	0.4
C. perfringens	15	7.5	863	9.4
Salmonella	35	17.4	5,499	60.2
Shigella	3	1.5	212	2.3
Staphylococcus	43	21.4	1,565	17.1
Group A Streptococcus	1	0.5	325	3.6
V. cholerae	1	0.5	6	0.06
Suspect Group D Streptococcus	2	1.0	38	0.4
CHEMICAL				
Heavy metal	4	2.0	28	0.3
Ciguatoxin	26	12.9	148	1.6
Puffer fish (tetrodotoxin)	1	0.5	2	0.02
Scombrotoxin	10	5.0	26	0.3
Monosodium glutamate	2	1.0	4	0.04
Mushroom poison	6	3.0	9	0.1
Shellfish poison	2	1.0	5	0.05
Other chemicals	6	3.0	19	0.2
PARASITIC				
T. spiralis	14	7.0	58	0.6
T. gondii	1	0.5	4	0.04
Anisakidae	1	0.5	1	0.01
VIRAL				
Hepatitis A	6	3.0	282	3.1
Total Known Etiology	201	100.1	9,137	99.9

Table 3

Confirmed Foodborne Disease Outbreaks and Cases
1972--1974

	No. of Outbreaks (No. of Cases)		
	1972	1973	1974
BACTERIAL			
B. cereus	0(0)	1(2)	1(11)
Brucella	0(0)	1(4)	0(0)
C. botulinum	4(24)	10(31)	21(32)
C. perfringens	9(173)	9(1,424)	15(863)
Salmonella	36(1,880)	33(2,462)	35(5,499)
Shigella	3(86)	8(1,388)	3(212)
Staphylococcus	34(1,948)	20(1,272)	43(1,565)
Group A Streptococcus	1(35)	1(250)	1(325)
V. cholerae	0(0)	0(0)	1(6)
V. parahaemolyticus	6(701)	1(2)	0(0)
Suspect Group D Streptococcus	1(50)	0(0)	2(38)
CHEMICAL			
Heavy metals	3(8)	0(0)	4(28)
Ciguatoxin	2(27)	0(0)	26(148)
Puffer fish (tetrodotoxin)	0(0)	0(0)	1(2)
Scombrotoxin	4(15)	12(326)	10(26)
Monosodium glutamate	1(3)	2(6)	2(4)
Mushroom poison	8(20)	9(41)	6(9)
Paralytic shellfish poison	2(37)	1(3)	1(4)
Neurotoxic shellfish poison	0(0)	1(4)	1(1)
Miscellaneous chemicals	6(32)	3(12)	6(19)
PARASITIC			
T. spiralis	8(20)	10(59)	14(58)
T. gondii	0(0)	0(0)	1(4)
Anisakidae	0(0)	0(0)	1(1)
VIRAL			
Hepatitis A	5(90)	5(425)	6(282)

Table 4

Deaths Associated with Foodborne Outbreaks, 1972-74

	1972	1973	1974
C. botulinum	4	4	7
C. perfringens	1	1	1
Salmonella	4	7	1
V. cholerae	0	0	1
Mushroom poison	4	1	0
Organic chemicals	0	0	2
T. spiralis	1	1	0
Hepatitis A	0	0	1
Unknown	0	1	1
Total	14	15	14

Table 5

Foodborne Disease Outbreaks of Unknown Etiology, by Incubation Period, 1974

Incubation Period	Number of Outbreaks	Percent of Total Outbreaks
<1 hour	8	3
1-7 hours	108	42
8-14 hours	58	23
>15 hours	49	19
Unknown	32	13
Total	255	100

Table 6

Foodborne Disease Outbreaks, by Vehicle of Transmission and Specific Etiology, 1974

	Beef	Lamb	Ham	Pork	Sausage	Chicken	Turkey	Other Meat	Shellfish	Other Fish	Milk	Ice Cream	Other Dairy Products	Baked Foods	Fruits and Vegetables	Potato Salad	Poultry, Fish, Egg Salad	Other Salads	Mushrooms	Chinese Food	Mexican Food	Non-dairy Beverages	Multiple Vehicles	Other Foods	Unknown	Total
BACTERIAL																										
B. cereus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1
C. botulinum	-	-	-	-	-	-	-	1	-	4	-	-	-	-	7	-	-	-	2	-	-	1	2	-	4	21
C. perfringens	5	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	2	-	3	-	2	15
Salmonella	1	-	-	1	-	-	2	1	-	1	1	6	-	-	-	1	2	-	-	-	-	1	5	-	13	35
Shigella	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2	3
Staphylococcus	2	-	8	5	2	1	-	2	-	-	1	-	-	1	2	1	2	-	-	-	2	-	9	-	3	43
Group A streptococcus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
V. cholerae	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Suspect Group D Streptococcus	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CHEMICAL																										
Heavy metal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	4
Ciguatoxin	-	-	-	-	-	-	-	-	-	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26
Puffer fish (tetrodotoxin)	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Scombrotoxin	-	-	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10
Monosodium glutamate	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
Mushroom poison	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	6
Shellfish poison	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Other chemicals	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	1	3	-	6
PARASITIC																										
T. spiralis	-	-	-	4	7	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	14
T. gondii	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
Anisakidae	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
VIRAL																										
Hepatitis A	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	1	-	2	6
UNKNOWN	13	2	11	1	2	6	5	11	7	6	2	2	0	10	7	6	1	1	0	4	7	1	28	2	120	255
TOTAL	22	2	20	11	11	7	8	20	9	51	4	9	2	11	16	9	6	2	8	7	11	9	50	5	146	456

Table 7

Foodborne Disease Outbreaks, by Place of Acquisition and Specific Etiology, 1974

	Home	Restaurant	School	Picnic	Church	Camp	Other*	Total
BACTERIAL								
B. cereus	1	-	-	-	-	-	-	1
C. botulinum	20	-	-	-	-	-	1	21
C. perfringens	2	7	-	1	1	-	4	15
Salmonella	12	5	3	4	3	2	6	35
Shigella	2	1	-	-	-	-	-	3
Staphylococcus	12	13	3	2	3	-	10	43
Group A Streptococcus	-	-	-	-	-	-	1	1
V. cholerae	-	-	-	1	-	-	-	1
Suspect Group D Streptococcus	1	-	-	-	1	-	-	2
CHEMICAL								
Heavy Metal	-	1	1	-	-	-	2	4
Ciguatoxin	20	6	-	-	-	-	-	26
Puffer fish (tetrodotoxin)	1	-	-	-	-	-	-	1
Scombrotoxin	7	2	1	-	-	-	-	10
Monosodium glutamate	1	1	-	-	-	-	-	2
Mushroom poison	6	-	-	-	-	-	-	6
Shellfish poison	2	-	-	-	-	-	-	2
Other chemicals	4	1	-	-	-	-	1	6
PARASITIC								
T. spiralis	12	-	-	1	-	1	-	14
T. gondii	-	1	-	-	-	-	-	1
Anisakidae	1	-	-	-	-	-	-	1
VIRAL								
Hepatitis A	-	2	1	-	-	-	3	6
UNKNOWN	83	88	14	7	10	3	50	255
Total 1974	187	128	23	16	18	6	78	456
Total 1973	119	98	16	12	6	4	52	307
Total 1972	90	102	31	13	5	5	55	301

*Includes 1 outbreak of staphylococcal and 2 of unknown etiology in non-school cafeterias and 1 outbreak of unknown etiology in delicatessen

Table 8

Foodborne Disease Outbreaks, by Place Where Food Was Mishandled and Specified Etiology, 1974

	Food Processing Establishments	Food Service Establishments	Homes	Unknown-Unspecified	Total
BACTERIAL					
B. cereus	-	1	-	-	1
C. botulinum	1	-	17	3	21
C. perfringens	-	9	2	4	15
Salmonella	2	10	10	13	35
Shigella	-	-	-	3	3
Staphylococcus	3	19	13	8	43
Group A Streptococcus	-	1	-	-	1
V. cholerae	-	-	1	-	1
Suspect Group D Streptococcus	-	1	1	-	2
CHEMICAL					
Heavy metal	2	2	-	-	4
Ciguatoxin	-	-	-	26	26
Puffer fish (tetrodotoxin)	-	-	1	-	1
Scombrotoxin	2	2	-	6	10
Monosodium glutamate	-	1	-	1	2
Mushroom poison	-	-	6	-	6
Shellfish poison	-	-	2	-	2
Other chemicals	3	1	1	1	6
PARASITIC					
T. spiralis	2	-	9	3	14
T. gondii	-	1	-	-	1
Anisakidae	-	-	1	-	1
VIRAL					
Hepatitis A	-	3	1	2	6
UNKNOWN	1	39	12	203	255
Total 1974	16	90	77	273	456
Total 1973	15	109	69	114	307
Total 1972	9	132	60	100	301

Table 9

Foodborne Disease Outbreaks Caused by Mishandling of Food
In Food-Processing Establishments
1974

Etiology	Vehicle	Number of Cases
C. botulinum type A	Canned beef stew	2
Salmonella dublin	Certified raw milk	3
Salmonella typhimurium	Cider	1,500
Staphylococcus Enterotoxin A	Milk shake mix	122
Staphylococcus Enterotoxin A	Milk shake mix	40
Staphylococcus	Canned pork	9
Copper	Soft drink	6
Iron	Soft drink	1
Scombrotoxin	Canned tuna fish	1
Scombroid-like fish poison	Kumu-red goat fish (parupenus perphyreus)	5
Atropine	Tea	2
Jimson weed	Jimson weed tea	2
Sulfuric acid	Ginger ale	1
T. spiralis	Sausage	3
T. spiralis	Sausage	3
Unknown*	Ice tea	4

Total 1974	16 outbreaks	1,704 cases
1973	15 outbreaks	736 cases
1972	9 outbreaks	

*Symptoms and incubation period compatible with chemical food poisoning; same product involved in 2 separate incidences.

Table 10

Foodborne Disease Outbreaks, by Contributing Factors and Etiology, 1974

Etiology	Number of Reported Outbreaks	Number of Outbreaks In Which Factors Reported	Improper Holding Temperatures	Inadequate Cooking	Contaminated Equipment	Food From Unsafe Source	Poor Personal Hygiene	Other
BACTERIAL								
B. cereus	1	1	1	-	-	-	-	-
C. botulinum	21	14	1	14	-	-	-	1
C. perfringens	15	11	10	3	1	-	1	1
Salmonella	35	20	13	8	7	3	3	1
Shigella	3	-	-	-	-	-	-	-
Staphylococcus	43	33	29	1	5	3	10	1
Group A Streptococcus	1	1	1	-	-	-	1	-
V. cholerae	1	1	1	1	-	-	-	-
Suspect Group D Streptococcus	2	2	1	-	-	-	2	-
CHEMICAL								
Heavy metal	4	3	-	-	2	1	-	1
Ciguatoxin	26	26	-	-	-	26	-	-
Puffer fish (tetrodotoxin)	1	1	-	-	-	1	-	-
Scombrotoxin	10	8	8	-	-	-	-	-
Monosodium glutamate	2	-	-	-	-	-	-	-
Mushroom poison	6	6	-	-	-	6	-	-
Shellfish poison	2	2	-	-	-	2	-	-
Other chemicals	6	4	-	-	-	4	-	1
PARASITIC								
T. Spiralis	14	6	-	6	-	-	-	-
T. gondii	1	1	-	1	-	-	-	-
Anisakidae	1	1	-	1	-	-	-	-
VIRAL								
Hepatitis A	6	3	-	1	-	-	3	-
UNKNOWN	255	75	65	9	16	5	21	3
Total 1974	456	219	131	45	31	50	41	9
Total 1973	307	177	109	43	34	24	42	10
Total 1972	301	186	117	36	38	-	52	-

Table 11

Foodborne Disease Outbreaks, by Month of Occurrence and Specific Etiology, 1974

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
BACTERIAL													
B. cereus	-	-	-	-	-	-	-	-	-	1	-	-	1
C. botulinum	1	2	-	-	1	1	1	1	2	5	5	2	21
C. perfringens	-	-	4	1	1	2	1	2	2	1	1	-	15
Salmonella	-	-	1	2	4	3	8	5	5	-	4	3	35
Shigella	1	-	1	-	-	-	-	-	1	-	-	-	3
Staphylococcus	2	1	2	6	5	3	4	9	4	4	3	-	43
Group A Streptococcus	-	-	-	-	-	-	-	1	-	-	-	-	1
V. cholerae	-	-	-	-	-	-	1	-	-	-	-	-	1
Suspect Group D Streptococcus	-	-	-	-	-	1	-	-	-	-	1	-	2
CHEMICAL													
Heavy metal	-	-	1	-	1	1	-	-	1	-	-	-	4
Ciguatoxin	-	4	9	1	2	4	5	1	-	-	-	-	26
Puffer fish (tetrodotoxin)	-	-	-	-	-	-	-	-	-	-	-	1	1
Scombrotoxin	-	1	1	-	-	2	-	1	-	3	1	1	10
Monosodium glutamate	1	-	-	-	-	-	-	-	1	-	-	-	2
Mushroom poison	-	-	-	-	2	-	-	1	1	1	1	-	6
Shellfish poison	-	-	1	-	-	-	-	1	-	-	-	-	2
Other chemicals	-	-	1	-	-	1	-	1	-	1	-	1	5*
PARASITIC													
T. spiralis	2	1	-	2	2	1	-	-	3	-	1	2	14
T. gondii	-	-	-	-	-	-	-	-	1	-	-	-	1
Anisakidae	-	-	-	-	-	-	-	-	-	-	1	-	1
VIRAL													
Hepatitis A	-	-	1	-	-	-	1	1	1	2	-	-	6
UNKNOWN	26	12	15	21	26	23	20	19	21	21	28	19	251*
Total 1974	33	21	37	33	44	42	41	43	43	39	46	29	451*
Total 1973	10	28	24	26	40	10	26	26	32	24	31	30	307
Total 1972	10	18	28	33	34	17	23	33	29	26	29	20	300

*Month of occurrence not known in 1 outbreak of chemical etiology and 4 outbreaks of unknown etiology

E. Foodborne Disease Outbreaks on Cruise Ships, 1974

Outbreaks of foodborne disease involving United States citizens traveling on cruise ships are not included in this report's tabulations, but they contribute substantially to the known morbidity from foodborne disease. The following reports of 3 outbreaks on passenger cruise ships were taken verbatim from the Morbidity and Mortality Weekly Report.

VIBRIO PARAHAEMOLYTICUS GASTROENTERITIS ON CRUISE SHIPS (MMWR 24(12):109, 1975)

In the first 2 months of 1975, large outbreaks of Vibrio parahaemolyticus gastroenteritis occurred on 2 cruise ships sailing between Florida and the Caribbean Sea.

Outbreak 1

On the December 21, 1974-January 5, 1975 cruise of the S/S Federico C, 252 (36%) of the 703 passengers and none of the 321 crew members experienced a diarrheal illness. Additional symptoms of passengers with diarrhea are given in Table 12. The median duration of illness was 2 days; none of the 69 passengers who saw the ship's medical personnel required hospitalization. The outbreak peaked on January 2; and the shape of the epidemic curve (Figure 3) was compatible with a common-source outbreak,

A Kanagawa-positive strain of Vibrio parahaemolyticus, serotype O_8K_{22}, was isolated from rectal swabs obtained on January 5 from 17 (49%) of 35 ill passengers and 2 of 3 non-ill passengers. Rectal swabs from 15 crew members (food and beverage handlers) and cultures of potable water, ice, and environmental surfaces in the galley were negative for V. parahaemolyticus.

Telephone interviews with a random sample of passengers implicated a seafood cocktail served to passengers at dinner on January 1 as the vehicle of transmission ($p<0.01$). The attack rate was significantly higher for passengers who ate at the second of 2 dinner sittings. The seafood cocktail contained frozen shrimp, canned crab meat, and frozen grouper. After boiling, the shrimp were cleaned on a table in the galley between 8 and 10 a.m. on January 1 and subsequently refrigerated. Beginning at approximately 5 p.m., the shrimp were mixed with the other ingredients and placed in serving cups. The cocktail was then served to passengers at the first meal sitting at 6:45 p.m. and the second sitting at 8:30 p.m.

Cultures of frozen shrimp, grouper, and canned crab meat obtained from the ship on January 17 were negative for V. parahaemolyticus; a water sample from an outlet of the ship's circulating saltwater system in the galley near the fish-preparation area was positive for a different strain of V. parahaemolyticus (serotype O_5K_{30}, Kanagawa-negative). Water from this system was used to wash the galley decks after each meal and was observed to splash on food-preparation surfaces, including the area where the shrimp were cleaned. Control measures consisted of a review of appropriate food handling practices with ship personnel and removal of the saltwater outlet from the ship's galley.

(Reported by Epidemiologic Investigations Laboratory Branch and Enteric Diseases Branch, Bacterial Diseases Division and Quarantine Division, Bureau of Epidemiology, CDC; and 2 EIS Officers.)

Outbreak 2

On the February 8-20 cruise of the S/S Leonardo da Vinci, 445 (61%) of 734 passengers and 27 (5%) of 586 crew members experienced a diarrheal illness. Most passengers became ill on the 6th and 12th days of the cruise (Figure 4); their other symptoms are given in Table 12. V. parahaemolyticus, serotype O_2K_3, Kanagawa-positive, was isolated from rectal swabs of 16 (48%) of 33 ill passengers and 9 (60%) of 15 ill crew members.

Epidemiologic investigation incriminated shrimp cocktail served at dinner on the 5th day ($p<0.01$) and lobster served at dinner on the 11th day ($p<0.01$); however, the

original incriminated foods had been discarded. Cultures of shrimp and lobsters from the seafood freezer and environmental swabs from the food preparation and holding areas were negative for V. parahaemolyticus.

The incriminated lobster was pre-cooked and frozen; it thawed at room temperature for approximately 8 hours. While thawing, it was washed with seawater, which is available throughout the ship in the fire system. The shrimp were reportedly washed in salted, potable water after cooking and cleaning, so their source of contamination remains unclear.

Control measures included terminating the use of seawater in food handling areas. (Reported by Epidemiologic Investigations Laboratory Branch and Enteric Diseases Branch, Bacterial Diseases Division and Quarantine Division, Bureau of Epidemiology, CDC; and an EIS Officer.)

Fig. 3 DIARRHEAL ILLNESS IN PASSENGERS ABOARD THE S.S. FEDERICO C, BY DATE OF ONSET, DEC. 21, 1974 - JAN. 5, 1975

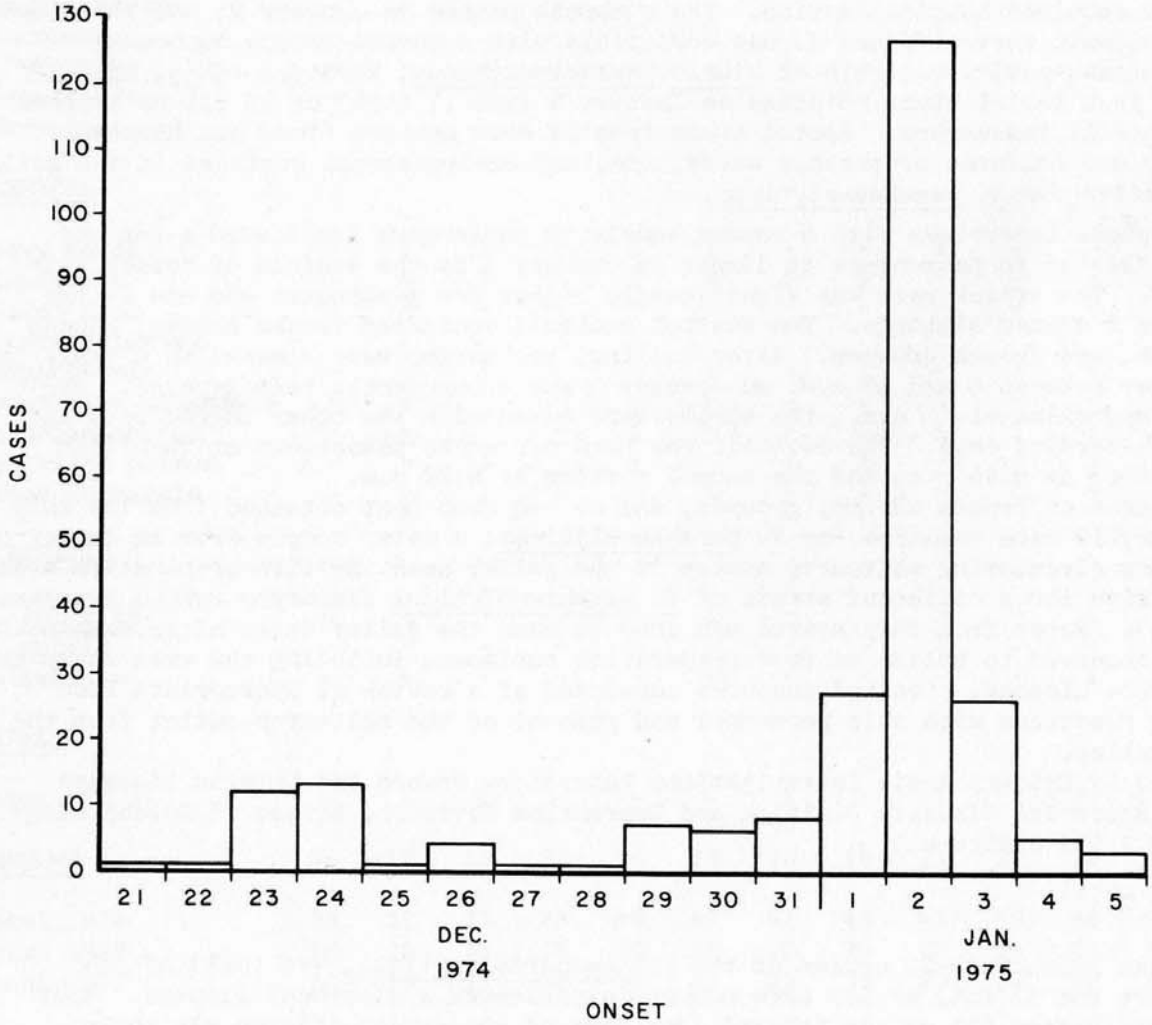


Fig. 4 DIARRHEAL ILLNESS IN PASSENGERS ABOARD THE S.S. LEONARDO DA VINCI, BY DATE OF ONSET, FEB. 8-20, 1975

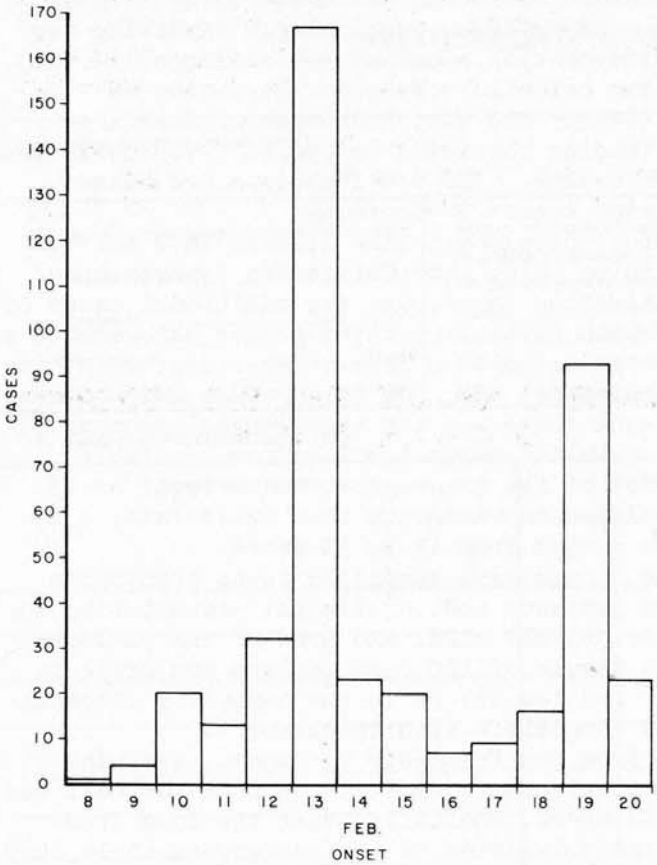


Table 12

Symptoms Associated With Diarrhea in Passengers on 2 Cruise Ships, January--February 1975

Ship	S/S Federico C		S/S Leonardo da Vinci			
Date of Onset	2 Jan 1975		13 Feb 1975		19 Feb 1975	
Symptoms	No.	%	No.	%	No.	%
Abdominal cramps	108	85	160	96	80	86
Nausea	59	46	104	63	47	51
Vomiting	42	33	97	59	35	38
Headache	42	33	77	46	30	32
Chills	57	45	118	71	34	37
Fever	36	28	57	34	16	17
Bloody diarrhea	4	3	8	5	1	1
Total Ill	127		166		93	

Editorial Note

These are the first known outbreaks caused by V. parahaemolyticus on cruise ships sailing from U.S. ports. Both outbreaks were associated with consumption of seafood which was probably contaminated by seawater aboard the ship and which had been held at room temperature. V. parahaemolyticus, a halophilic bacterium, is found in coastal waters throughout most of the world. Fish and seafoods have been incriminated vehicles of transmission in most previously reported outbreaks.

TRICHINOSIS ABOARD A CRUISE SHIP--California, Florida, New York
(MMWR 24(37):319, 1975)

On September 25, 1974, a 52-year-old California woman had onset of an illness characterized by fever, periorbital edema, and myalgia, particularly involving her neck and shoulders. A white blood cell differential count showed eosinophilia (8%). Her husband, age 54, had experienced similar but milder symptoms beginning on September 20. A friend of the couple, a 55-year-old man, had onset of similar symptoms on September 27. The woman's attending physician suspected trichinosis and advised the California State Department of Health. All 3 ill persons had been passengers on a cruise ship during the period August 24-September 7.

On October 11, CDC received reports of a trichinosis-like illness in 2 New York City residents who had been on the same cruise ship. The California Department of Health and CDC jointly initiated an investigation to uncover any additional cases of trichinosis in passengers, to insure that each patient received proper management, and to attempt to identify the trichinella-contaminated food item. The cruise ship had carried 840 passengers and a crew of approximately 450. An attempt was made to contact each passenger by letter or by telephone, and those who had experienced symptoms compatible with trichinosis were asked to submit a serum specimen for serologic testing. Responses were obtained from 82.5% of the passengers, and a total of 13 cases (7 in women and 6 in men) were identified in residents from California, Florida, and New York. The patients' ages ranged from 19 to 80 years.

The diagnosis of trichinosis was based on positive serologic tests (bentonite flocculation and latex agglutination) in 9 patients and on clinical presentation in 4. In most of the cases the illness was relatively mild, and none of the patients were hospitalized. Serologic testing of a sample of 100 crew members and officers revealed that 2 officers and 1 crew member had low titers in the bentonite flocculation test. None of the 3 had had symptoms compatible with trichinosis.

The cruise ship had sailed round-trip from San Francisco to Juneau, stopping at 6 ports of call in Canada and Alaska. No single restaurant at the ports of call had been visited by more than half the ill passengers, indicating that the food item responsible for the infections was most likely ingested by the passengers while they were on board ship. An analysis of the food histories obtained from the ill passengers and from a non-ill control group revealed a statistically significant association between becoming ill and having a preference for chopped beef items that appeared on the menu. This led to speculation that a ground beef preparation may have become inadvertently contaminated with pork and may have been served without adequate cooking.

A single meat grinder had been used for both pork and beef products at the time of the cruise. The records of the cruise lines indicated that all pork and beef cuts for the cruise had been obtained from a single meat dealer in Los Angeles who delivered the meats to the ship frozen. According to the records of the dealer, the meats would have been frozen long enough and at a low enough temperature to kill trichina larvae. The possibility that certain cuts were not held at a sufficiently low temperature cannot be ruled out, however, because the freezer's temperature was not continuously monitored.

(Reported by M. H. Goloff, M.D., private physician, Berkeley; Linda Bradford, Microbiologist, Microbial Diseases Laboratory, S. B. Werner, M.D., Medical Epidemiologist, Infectious Disease Section, and James Chin, M.D., State Epidemiologist, California State Department of Health; Chester L. Nayfield, M.D., State Epidemiologist, Florida Division of Health; John S. Marr, M.D., Director, Bureau of Infectious Disease Control, New York City Department of Health; and a team of EIS Officers.)

Editorial Note

This is the first reported account of trichinosis acquired by passengers while on board a cruise ship. Mild cases of trichinosis often go undiagnosed or misdiagnosed. Of the 13 cases detected by this retrospective investigation, only 4 were in patients whose physicians had suspected trichinosis. All other ill persons were not suspected of having trichinosis until their physicians were contacted by public health investigators.

FORM APPROVED
OMB NO. 68-R557

F. INVESTIGATION OF A FOODBORNE OUTBREAK

1. Where did the outbreak occur?
State _____ (1,2) City or Town _____ County _____

2. Date of outbreak: (Date of onset 1st case)
_____ (3-8)

3. Indicate actual (a) or estimated (e) numbers:
Persons exposed _____ (9-11)
Persons ill _____ (12-14)
Hospitalized _____ (15-16)
Fatal cases _____ (17)

4. History of Exposed Persons:
No. histories obtained _____ (18-20)
No. persons with symptoms _____ (21-23)
Nausea _____ (24-26) Diarrhea _____ (33-35)
Vomiting _____ (27-29) Fever _____ (36-38)
Cramps _____ (30-32) Other, specify _____
_____ (39)

5. Incubation period (hours):
Shortest _____ (40-42) Longest _____ (43-45)
Approx. for majority _____ (46-48)

6. Duration of Illness (hours):
Shortest _____ (49-51) Longest _____ (52-54)
Approx. for majority _____ (55-57)

7. Food-specific attack rates: (58)

Food Items Served	Number of persons who ATE specified food				Number who did NOT eat specified food			
	Ill	Not Ill	Total	Percent Ill	Ill	Not Ill	Total	Percent Ill

8. Vehicle responsible (food item incriminated by epidemiological evidence): (59,60) _____

9. Manner in which incriminated food was marketed: (Check all applicable)

(a) Food Industry (61)
- Raw ☐ 1
- Processed ☐ 2

Home Produced
- Raw ☐ 3
- Processed ☐ 4

(b) Vending Machine ☐ 1 (62)

(c) Not wrapped ☐ 1 (63)
- Ordinary Wrapping ☐ 2
- Canned ☐ 3
- Canned--Vacuum Sealed ☐ 4
- Other (specify) ☐ 5

_____

(d) Room Temperature ☐ 1 (64)
- Refrigerated ☐ 2
- Frozen ☐ 3
- Heated ☐ 4

If a commercial product, indicate brand name and lot number
_____

10. Place of Preparation of Contaminated Item: (65)
- Restaurant ☐ 1
- Delicatessen ☐ 2
- Cafeteria ☐ 3
- Private Home ☐ 4
- Caterer ☐ 5

Institution:
- School ☐ 6
- Church ☐ 7
- Camp ☐ 8
- Other, specify ☐ 9

_____
_____

11. Place where eaten: (66)
- Restaurant ☐ 1
- Delicatessen ☐ 2
- Cafeteria ☐ 3
- Private Home ☐ 4
- Picnic ☐ 5

Institution:
- School ☐ 6
- Church ☐ 7
- Camp ☐ 8
- Other, specify ☐ 9

_____
_____

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
PUBLIC HEALTH SERVICE
CENTER FOR DISEASE CONTROL
BUREAU OF EPIDEMIOLOGY
ATLANTA, GEORGIA 30333

CDC 4.245
1-74

(Over)

LABORATORY FINDINGS (Include Negative Results)

12. Food specimens examined: (67)
Specify by "X" whether food examined was original (eaten at time of outbreak) or check-up (prepared in similar manner but not involved in outbreak)

Item	Orig.	Check up	Findings Qualitative	Quantitative
Example: beef	X		C. perfringens, Hobbs type 10	$2X10^6$/gm

13. Environmental specimens examined: (68)

Item	Findings
Example: meat grinder	C. perfringens, Hobbs Type 10

14. Specimens from patients examined (stool, vomitus, etc.): (69)

Item	No. Persons	Findings
Example: stool	11	C. perfringens, Hobbs Type 10

15. Specimens from food handlers (stool, lesions, etc.): (70)

Item	Findings
Example: lesion	C. perfringens, Hobbs type 10

16. Factors contributing to outbreak (check all applicable):

	Yes	No
1. Improper storage or holding temperature	☐ 1	☐ 2 (71)
2. Inadequate cooking	☐ 1	☐ 2 (72)
3. Contaminated equipment or working surfaces	☐ 1	☐ 2 (73)
4. Food obtained from unsafe source	☐ 1	☐ 2 (74)
5. Poor personal hygiene of food handler	☐ 1	☐ 2 (75)
6. Other, specify _____	☐ 1	☐ 2 (76)

17. Etiology: (77, 78)
Pathogen _____
Chemical _____
Other _____

Suspected ☐ 1 (79)
Confirmed ☐ 2
Unknown ☐ 3

18. Remarks: Briefly describe aspects of the investigation not covered above, such as unusual age or sex distribution; unusual circumstances leading to contamination of food, water; epidemic curve; etc. (Attach additional page if necessary)

Name of reporting agency: (80)

Investigating official: | Date of investigation:

NOTE: Epidemic and Laboratory Assistance for the investigation of a foodborne outbreak is available upon request by the State Health Department to the Center for Disease Control, Atlanta, Georgia 30333.

To improve national surveillance, please send a copy of this report to:
Center for Disease Control
Attn: Enteric Diseases Section, Bacterial Diseases Branch
Bureau of Epidemiology
Atlanta, Georgia 30333

Submitted copies should include as much information as possible, but the completion of every item is not required.

CDC 4.245 (BACK)
1-74

LINE LISTING OF FOODBORNE DISEASE OUTBREAK

1974

G. LINE LISTING OF FOODBORNE DISEASE OUTBREAKS, 1974

Etiology	State	Number of Cases	Date of Onset	Lab Data: Patient	Lab Data: Vehicle	Lab Data: Food-handler	Vehicle	Location Where Food Mishandled* And Eaten
BACTERIAL								
BACILLUS CEREUS								
B. cereus	California	11	10-2		+		fried rice	(B) home
CLOSTRIDIUM BOTULINUM								
C. botulinum, type B	Alabama	1	2-6	+	+		tomatoes	(C) home
C. botulinum, type Unknown	Alaska	1	7-19				white fish	(C) home
C. botulinum, type E	Alaska	2	9-14	+	+		seal and seal oil	(C) home
C. botulinum, type Unknown	Alaska	2	10-6				unknown	(C) home
C. botulinum, type A	Alaska	1	10-10	+			salmon eggs	(C) home
C. botulinum, type E	Alaska	1	11-29	+			unknown	(D) unknown
C. botulinum, type A	California	1	6-27	+	+		salmon	(D) home
C. botulinum, type B	California	1	11-15		+		beets	(C) home
C. botulinum, type B	California	1	11-?	+			figs	(C) home
C. botulinum, type A	Georgia	2	11-28	+	+		beef stew	(A) home
C. botulinum, type A	Idaho	1	5-10	+	+		tomato juice	(C) home
C. botulinum, type A	Iowa	2	9-12	+			mixed vegetables	(C) home
C. botulinum, type A	Nevada	4	10-?	+	+		beets	(C) home

C. botulinum, type A	Ohio	1	11-24	+		unknown	(D) home
C. botulinum, type A	Oregon	1	8-04	+	+	potatoes & peas	(C) home
C. botulinum, type A	Pennsylvania	1	12-11	+	+	beef & mushroom stew	(C) home
C. botulinum, type B	Rhode Island	2	10-15		+	mushrooms	(C) home
C. botulinum, type B	Texas	1	1-11	+		chow chow	(C) home
C. botulinum, type A	Utah	1	10-10	+		unknown	(C) home
C. botulinum, type A	Washington	2	2-2	+	+	corn	(C) home
C. botulinum, type B	New York City	3	12-12	+	+	mushrooms	(C) home
CLOSTRIDIUM PERFRINGENS							
C. perfringens	Arizona	12	5-13		+	Mexican food	(B) restaurant
C. perfringens	California	11	10-27		+	Mexican food (beef & bean burrito)	(B) restaurant
C. perfringens, PS 65, PS 76	Illinois	45	6-1	+	+	beef	(B) home
C. perfringens	Illinois	27	8-4		+	beef	(D) home
C. perfringens Hobbs type 8, PS 15	Illinois	18	8-20	+		blenderized meat loaf	(B) nursing home
C. perfringens, PS 52	Illinois	80	9-15	+	+	unknown	(B) restaurant
C. perfringens	Missouri	127	11-30	+	+	turkey gravy	(C) wedding reception
C. perfringens	New Hampshire	14	7-10		+	chop suey	(B) picnic

*(A)--Food processing establishment; (B)--Food service establishment; (C)--Home; (D)--Unknown

Etiology	State	Number of Cases	Date of Onset	Lab Data: Patient	Lab Data: Vehicle	Lab Data: Food-handler	Vehicle	Location Where Food Mishandled* And Eaten
C. perfringens, Hobbs type 13	New Jersey	5	3-?	+	+		turkey	(D) unknown
C. perfringens, Hobbs type 11	New Jersey	121	6-17	+	+		unknown	(D) unknown
C. perfringens	Ohio	325	3-31	+	+		roast beef	(B) restaurant
C. perfringens	Ohio	6	3-?		+		roast beef	(D) restaurant
C. perfringens	Pennsylvania	31	9-8		+		roast beef sandwich	(B) restaurant
C. perfringens	Utah	11	3-14		+		chili	(C) church
C. perfringens	Wisconsin	30	4-24	+	+		tenderloin tips	(B) restaurant
SALMONELLA								
S. typhimurium	Alabama	6	5-19	+	+	+	ice cream	(C) home
S. newport	Arizona	3,400	9-5	+			potato salad	(B) barbecue
S. dublin	California	3	3-5	+			certified raw milk	(A) unknown
S. typhimurium	California	18	4-15	+	+	+	ice cream	(C) home
S. newport	California	13	8-5	+			raw goat meat	(C) home
S. oranienburg	Connecticut	133	11-10	+	+	+	meat sauce, sausage	(B) church
S. infantis, S. anatum	Georgia	6	5-27	+	+		barbecue pork	(C) home
S. anatum	Georgia	10	9-8	+		+	barbecue sandwich	(D) restaurant
S. oranienburg	Georgia	250	11-26	+			turkey dressing, giblet gravy	(B) school

S. panama	Hawaii	29	5-4	+			enenue "poki" (raw fish & sea weed)	(C) picnic
S. enteritidis	Hawaii	10	7-24	+			unknown	(D) home
S. agona	Hawaii	10	12-31	+			unknown	(D) home
S. braenderup	Illinois	5	7-16	+		+	ice-cream	(C) home
S. hvittingfoss	Illinois	2	7-?	+			unknown	(D) restaurant
S. Group C_1	Indiana	30	7-?	+			ice cream	(C) unknown
S. enteritidis	Indiana	23	8-5	+			ice cream	(D) church
S. blockley	Iowa	300	12-18	+			unknown	(D) country club
S. bredeney	Louisiana	38	6-8	+			chicken salad	(B) parish
S. typhimurium	Louisiana	30	8-?	+			unknown	(D) school
S. typhimurium	Missouri	60	9-25	+			unknown	(D) school
S. infantis	New Hampshire	17	7-4	+	+	+	unknown	(B) camp
S. newport	New Jersey	15	11-1	+		+	roast beef	(B) restaurant
S. kottbus	Ohio	30	9-29	+			turkey stuffing	(C) home
S. typhimurium	Oklahoma	10	7-15	+	+		ice cream	(C) home
S. reading	Pennsylvania	5	4-8	+			turkey	(C) home
S. typhimurium	Pennsylvania	8	5-19	+			unknown	(D) firemen's supper
S. manhattan, S. anatum	Pennsylvania	40	6-15	+	+		chicken salad	(B) wedding reception
S. infantis	Pennsylvania	6	6-24	+			chicken & noodles	(D) picnic

*(A)--Food processing establishment; (B)--Food service establishment; (C)--Home; (D)--Unknown

Etiology	State	Number of Cases	Date of Onset	Lab Data			Vehicle	Location Where Food Mishandled* And Eaten
				Patient	Vehicle	Food-handler		
S. heidelberg	Pennsylvania	23	7-9	+		+	unknown	(D) camp
S. enteritidis	Pennsylvania	4	8-24	+			unknown	(D) home
S. typhimurium	Pennsylvania	15	8-25	+			unknown	(D) picnic
S. St. Paul	Texas	379	11-5	+	+		turkey	(B) convention
S. enteritidis	Vermont	55	12-8	+		+	unknown	(B) restaurant
S. typhimurium	New York, Illinois	5	7-20	+			unknown	(D) train
S. typhimurium	New Jersey, New York	1,500	9-30	+	+	+	cider	(A) home
SHIGELLA								
S. sonnei	Arizona	7	3-31	+			unknown	(D) home
S. sonnei	Iowa	15	9-22	+			potato salad	(D) home
S. sonnei, colicin type 9	Washington	190	1-25	+		+	unknown	(D) restaurant
STAPHYLOCOCCUS								
S. aureus	Arkansas	8	8-28		+		barbecued beef	(D) folk cultural center
S. aureus	California	8	2-28		+		Mexican food (enchiladas)	(B) jail officers' dining room
S. aureus	California	18	5-4		+		chicken molé	(C) home
S. aureus	California	39	7-21		+		Mexican food	(C) home

S. aureus	Colorado	2	6-13		+		sausage	(D) restaurant
S. aureus, WH-1, Enterotoxin B	Colorado	145	8-25		+	+	potato salad	(B) fire station picnic
S. aureus, Enterotoxin A	Georgia	3	11-8		+		Rizzo-Valenszzo (rice dish)	(B) restaurant
S. aureus	Georgia	3	11-9		+		unknown	(B) restaurant
S. aureus, 29/52/42E/53/83A/55/85	Hawaii	3	4-21		+		char sui (roast pork)	(C) home
S. aureus, phage groups I, III, IV	Hawaii	1	6-2		+		cream puff	(B) restaurant
S. aureus, 55/85	Hawaii	9	8-18	+	+	+	roast pork	(B) restaurant
S. aureus, Enterotoxin A and D	Illinois	159	9-8		+	+	Polish sausage	(B) church banquet hall
S. aureus	Indiana	35	11-5	+	+		ham	(B) voting poll
S. aureus	Louisiana	3	4-26		+		tuna salad	(C) home
S. aureus	Louisiana	9	9-12	+	+		meat, ham, cheese sandwiches	(B) oil rig
S. aureus	Michigan	6	7-10		+		ham	(C) home
S. aureus	Minnesota	6	4-20		+	+	rice	(D) restaurant
S. aureus	Mississippi	104	9-13		+	+	spaghetti sauce	(B) school
S. aureus	Missouri	8	10-28	+	+		ham	(D) restaurant
S. aureus	New Jersey	25	10-6	+	+		turkey gravy & dressing	(C) church
S. aureus, 187	New York	4	4-24		+	+	unknown	(D) home
S. aureus	Ohio	19	1-9	+			unknown	(D) airplane

*(A)--Food processing establishment; (B)--Food service establishment; (C)--Home; (D)--Unknown

Etiology	State	Number of Cases	Date of Onset	Lab Data			Vehicle	Location Where Food Mishandled* and Eaten
				Patient	Vehicle	Food-handler		
S. aureus, 85	Ohio	100	10-23	+	+		ham & other foods	(D) church
S. aureus, Enterotoxin A	Pennsylvania	40	3-24		+		milk shake mix	(A) restaurant
S. aureus	Pennsylvania	6	5-18		+		ham sandwich	(B) cafeteria
S. aureus, 85	Pennsylvania	4	8-3		+	+	slice ham	(C) home
S. aureus	Pennsylvania	16	8-14		+	+	fish salad	(B) country club
S. aureus	Pennsylvania	15	8-25	+	+		ham	(C) home
S. aureus, 3A/3C	Pennsylvania	250	9-15	+	+		ham & other foods	(B) private club
S. aureus	South Carolina	8	6-9	+	+	+	ham, potato salad	(C) home
S. aureus	South Dakota	6	5-28		+		deer	(C) home
S. aureus	Tennessee	80	5-22	+			turkey, chicken salad	(B) school
S. aureus	Tennessee	166	7-3	+	+		barbecue pork	(B) home
S. aureus	Tennessee	68	8-4	+	+	+	ham	(C) picnic
S. aureus, 53/85	Tennessee	5	8-8	+	+		barbecue pork	(B) restaurant
S. aureus	Utah	15	3-12		+		milk	(C) home
S. aureus	Vermont	11	10-17		+		ham	(B) restaurant
S. aureus	Virginia	12	8-6		+		ham	(B) hospital snack bar
S. aureus	Washington	9	1-10		+		canned pork	(A) school

S. aureus	Washington	2	4-1		+		barbecue spare ribs	(D) picnic
S. aureus	Washington	7	7-5	+	+		barbecue beef	(B) restaurant
S. aureus	Wisconsin	6	5-21	+	+		Hollandaise sauce	(B) restaurant
S. aureus, Enterotoxin A	Pennsylvania, Maryland, New Jersey, West Virginia, New York	122	4-18		+		milkshake mix	(A) multiple places
STREPTOCOCCUS								
Group A ß-hemolytic M-9 T-9 Streptococcus	Florida	325	8-16	+		+	egg salad	(B) county jail
Suspect Group D Streptococcus	Hawaii	12	11-2	+	+		lomi salmon	(B) home
Suspect Group D Streptococcus	South Dakota	26	6-16		+		barbecue	(C) church
VIBRIO CHOLERAE								
V. cholerae	Guam	6	7-18	+			padas (bagoon) fish	(C) picnic
CHEMICAL								
Copper	Arizona	9	6-19		+		orange drink	(B) nursery bible school
Copper	California	6	3-28		+		soft drink	(A) factory
Copper	Pennsylvania	12	9-28		+		whiskey sour	(B) restaurant
Iron	Pennsylvania	1	5-6		+		soft drink	(A) fire hall
Ciguatoxin	Alabama	1	8-?				grouper	(D) restaurant

*(A)--Food processing establishment; (B)--Food service establishment; (C)--Home; (D)--Unknown

Etiology	State	Number of Cases	Date of Onset	Lab Data			Vehicle	Location Where Food Mishandled* And Eaten
				Patient	Vehicle	Food-handler		
Ciguatoxin	Florida	5	3-31				grouper	(D) home
Ciguatoxin	Florida	8	5-19				grouper	(D) home
Ciguatoxin	Florida	5	5-26				barracuda	(D) home
Ciguatoxin	Florida	2	6-2				grouper	(D) home
Ciguatoxin	Florida	2	6-3				grouper	(D) home
Ciguatoxin	Florida	4	6-7				grouper	(D) home
Ciguatoxin	Florida	4	6-30				grouper	(D) home
Ciguatoxin	Florida	1	7-9				dolphin fish	(D) home
Ciguatoxin	Florida	6	7-10				probably grouper	(D) home
Ciguatoxin	Florida	1	7-10				red snapper	(D) restaurant
Ciguatoxin	Hawaii	5	2-7				Kahala (amber-jack)	(D) home
Ciguatoxin	Hawaii	6	2-12		+		Kahala (amber-jack)	(D) restaurant
Ciguatoxin	Hawaii	3	2-18				Kahala (amber-jack)	(D) home
Ciguatoxin	Hawaii	5	2-19				Kahala (amber-jack)	(D) home
Ciguatoxin	Hawaii	7	3-9		+		Kahala nitsuke (amberjack)	(D) restaurant
Ciguatoxin	Hawaii	56	3-9		+		Kahala sashimi (amberjack)	(D) restaurant
Ciguatoxin	Hawaii	3	3-12				Kahala sashimi (amberjack)	(D) home

Ciguatoxin	Hawaii	4	3-14		Kahala (amberjack)	(D) home
Ciguatoxin	Hawaii	2	3-26	+	po'ou fish (Cheilinus species)	(D) home
Ciguatoxin	Hawaii	2	3-27		po'ou fish (Cheilinus species)	(D) home
Ciguatoxin	Hawaii	2	3-27	+	po'ou fish (Cheilinus species)	(D) home
Ciguatoxin	Hawaii	1	3-29	+	po'ou fish (Cheilinus species)	(D) home
Ciguatoxin	Hawaii	2	4-29		goat fish (Mulloidichtys samoensis)	(D) home
Ciguatoxin	Hawaii	7	7-18		Kahala (amberjack)	(D) home
Ciguatoxin	Hawaii	4	7-28		Akute sashimi (jack)	(D) home
Puffer fish (tetrodotoxin)	Florida	2	12-5	+	puffer fish	(C) home
Scombrotoxin	California	6	3-8	+	Spanish mackeral	(B) school
Scombrotoxin	California	2	12-7		tuna fish, yellowtail	(D) food stand
Scombroid-like** fish poison	Hawaii	5	2-6	+	Kumu-red goat fish (parupenus perphyreus)	(A) home

*(A)--Food processing establishment; (B)--Food service establishment; (C)--Home; (D)--Unknown
**Fish not members of order Perciformes, suborder Scombroidei, Family Scombridae are not commonly associated with scombroid fish poisoning. Although all 3 of these particular fish have been associated with ciguatera fish poisoning, the illness in these outbreaks was scombroid-like. Non-scombroid fish (particularly mahi-mahi) have frequently been reported as causing outbreaks of scombroid-like fish poisoning.

Etiology	State	Number of Cases	Date of Onset	Lab Data: Patient	Lab Data: Vehicle	Lab Data: Food-handler	Vehicle	Location Where Food Mishandled* And Eaten
Scombrotoxin	Hawaii	2	6-4		+		tuna fish	(D) home
Scombroid-like** fish poison	Hawaii	2	8-13		+		red snapper (Myripristes berndti)	(D) home
Scombroid-like** fish poison	Idaho	2	6-21		+		mahi mahi	(B) restaurant
Scombrotoxin	Ohio	1	10-24				tuna fish	(D) home
Scombrotoxin	Oregon	1	11-?		+		tuna fish	(A) home
Scombrotoxin	Utah	2	10-31		+		tuna fish	(D) home
Scombrotoxin	Washington	3	10-10		+		home-canned tuna fish	(D) home
Monosodium glutamate	Ohio	1	9-22		+		Chinese food	(D) home
Monosodium glutamate	South Carolina	3	1-12				Chinese vegetable soup	(B) restaurant
Mushroom poison	California	3	8-22				mushrooms	(C) home
Mushroom poison	Maryland	1	9-13		+		Lepiota morganii	(C) home
Mushroom poison	Washington	1	5-27		+		Amanita pantherina	(C) home
Mushroom poison	Washington	1	5-29		+		Amanita pantherina	(C) home
Mushroom poison	Washington	1	11-21		+		Galerina autumnalis	(C) home
Mushroom poison	New York City	2	10-29		+		Galerina marginata	(C) home

Paralytic shellfish poison (Gonyaulax tamarensis)	New Hampshire	4	8-31	+	+	mussels	(C) home
Neurotoxic shellfish poison (Gymnodinium breve)	Florida	1	3-10		+	clams	(C) home
Atropine	Colorado	2	10-?		+	tea	(A) home
Caustic detergent	Washington	1	3-25			white wine	(B) restaurant
Endrin (hexachloro-octahydro-endo, endodimethano Naphthalene)	South Carolina	8	8-12	+	+	potatoes, meat, beans, okra	(C) home
Jimson tea weed	Oregon	2	12-28		+	jimson tea weed	(A) home
Jimson weed	Oregon	5	?			wild jimson weed	(D) unknown
Sulfuric acid	Georgia	1	6-18			ginger ale	(A) home
PARASITIC							
TRICHINELLA SPIRALIS							
T. spiralis	California	2	12-15	+	+	sausage	(C) home
T. spiralis	Connecticut	5	12-13	+	+	sausage	(C) home
T. spiralis	Hawaii	10	9-4	+		wild pig	(D) camp
T. spiralis	Illinois	4	4-3	+		sausage	(D) home
T. spiralis	Louisiana	2	2-17	+		pork	(C) home
T. spiralis	Michigan	3	6-11	+		sausage	(A) home
T. spiralis	New Jersey	2	5-8	+		hamburger	(C) home
T. spiralis	New Jersey	3	5-30	+		commercial sausage	(A) picnic

*(A)--Food processing establishment; (B)--Food service establishment; (C)--Home; (D)--Unknown

Etiology	State	Number of Cases	Date of Onset	Lab Data			Vehicle	Location Where Food Mishandled* And Eaten
				Patient	Vehicle	Food-handler		
T. spiralis	New Jersey	4	9-16	+			sausage & spare ribs	(D) home
T. spiralis	New York	5	1-2	+	+		sausage	(C) home
T. spiralis	New York	11	1-11	+	+		sausage	(C) home
T. spiralis	Rhode Island	3	4-1				pork	(C) home
T. spiralis	Texas	2	9-23	+	+		pork	(C) home
T. spiralis	Texas	2	11-8	+			pork	(C) home
TOXOPLASMA GONDII								
T. gondii	Pennsylvania	4	9-2	+			raw beef	(B) restaurant
ANISAKIDAE								
Phocanema genus	California	1	11-?	+			ceviche--raw red snapper	(C) home
VIRAL								
Hepatitis A	California	132	9-24	+		+	salad	(B) Navy training center
Hepatitis A	Illinois	12	7-?	+		+	unknown	(D) university cafeteria & attorneys' cocktail party
Hepatitis A	Michigan	15	8-8	+			ham	(C) wedding reception
Hepatitis A	Minnesota	107	3-18				cold sandwiches	(B) restautant