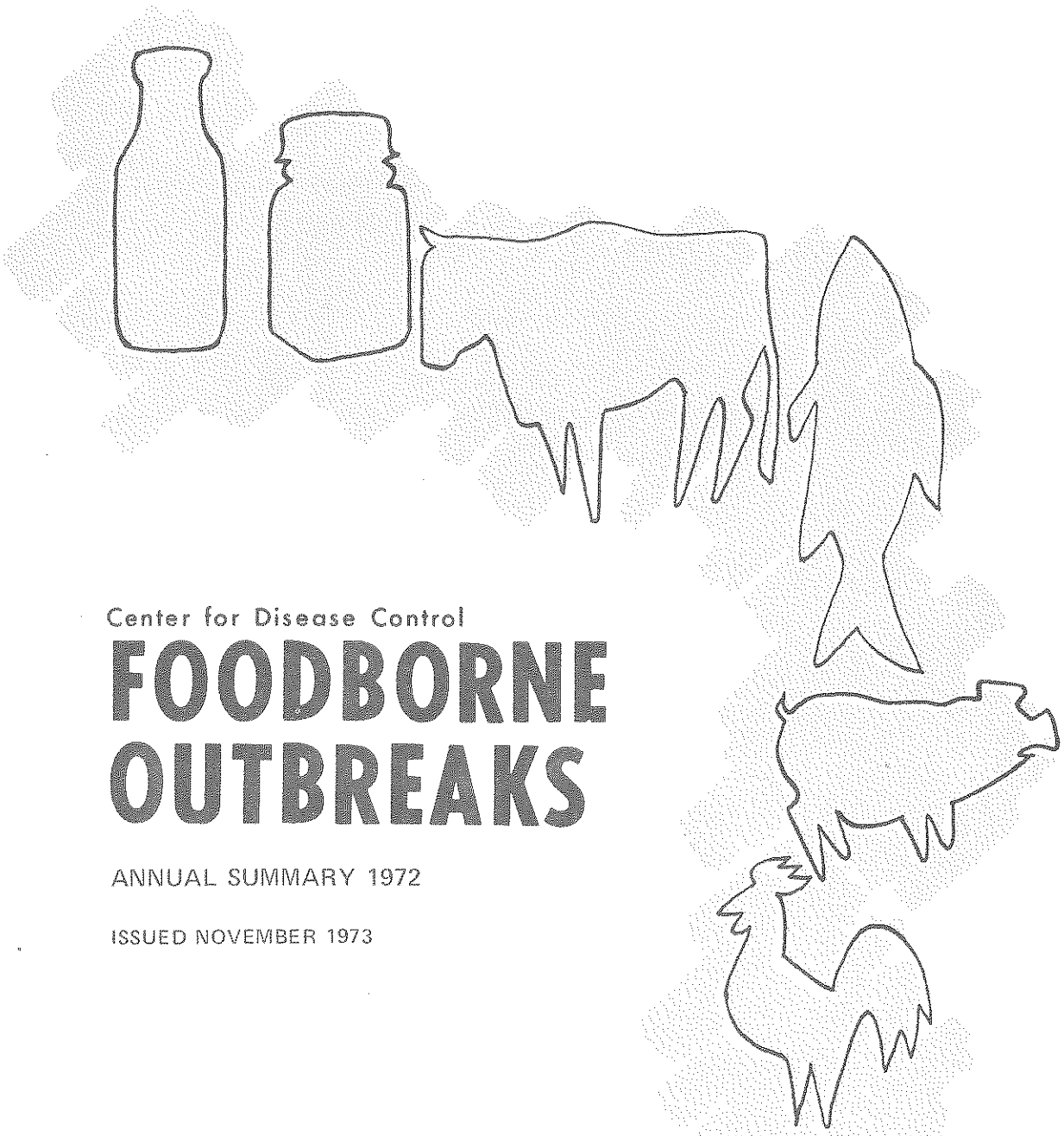

Center for Disease Control

FOODBORNE OUTBREAKS

ANNUAL SUMMARY 1972

ISSUED NOVEMBER 1973

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE / PUBLIC HEALTH SERVICE

PREFACE

Summarized in this report is information received from state and city health departments, Food and Drug Administration, and other pertinent sources. Much of the information is preliminary. It is intended primarily for the use of those with responsibility for disease control activities. Anyone desiring to quote this report should contact the Enteric Diseases Section for confirmation and interpretation.

Contributions to the Status Report are most welcome. Please address to the:

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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 infant 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 of sound public health action. Beginning in 1923, the Public Health Service published summaries of outbreaks of gastrointestinal illness attributed to milk. In 1938 reports of outbreaks caused by all foods were added to these summaries. These early surveillance efforts led to the enactment of important public health measures which have had a profound influence in decreasing the incidence of enteric diseases, particularly those transmitted by milk and water.

From 1951 through 1960, reported outbreaks of foodborne illness were reviewed and published annually in Public Health Reports by the National Office of Vital Statistics. In 1961, responsibility for reporting was transferred to the Communicable Disease Center (CDC). From 1961 to 1966, the publishing of annual reviews was discontinued, but pertinent statistics and detailed individual investigations were reported in the Morbidity and Mortality Weekly Report (MMWR).

The present system of surveillance of food-and waterborne diseases began in 1966 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 food-and waterborne outbreaks. In this report data from foodborne disease outbreaks reported to CDC in 1972 and from waterborne outbreaks reported in 1971 and 1972 are summarized.

Food-and waterborne 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 the 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 30-50% of foodborne disease outbreaks reported to CDC in each of the last 5 years. The appreciation in England of Clostridium perfringens as an important foodborne pathogen and an awareness in Japan of the role of Vibrio parahaemolyticus in foodborne illness 15 years before the importance of either organism as a foodborne pathogen was realized in the United States emphasize the need for proper clinical documentation and laboratory analysis in the investigation of foodborne outbreaks. The importance of some foodborne pathogens, e.g., Bacillus cereus and enteropathogenic Escherichia coli still needs to be defined. The etiologic agent(s) responsible for "sewage poisoning," the most commonly reported cause of waterborne outbreaks, also awaits elaboration.

3. Administrative Guidance: The collection of data from outbreak investigations allows for assessment of trends in causative agents and food vehicles and focuses on common errors in food and water handling. By compiling the data into 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 become apprised of the factors involved in food and waterborne outbreaks. With respect to food and water protection, comprehensive surveillance should result in a clearer appreciation of priorities, 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 illnesses.

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 the laboratory evidence for specific etiologic agents is obtained and fulfills specified criteria (see page 30 for criteria).
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 periods--less than 1 hour (likely chemical), 1-6 hours (likely staph), 6-12 hours (likely C. perfringens) and greater than 12 hours (other infectious agents).

B. Source of Data

Participants in foodborne disease surveillance include the general public and local, state, and federal agencies which have responsibility for public health and food protection. Figure 1 depicts various lines of notification between these participants. Complaints of illness originate with the general public (e.g. consumer, physicians, hospitals, food services and processing industries) and are then reported to health departments or regulatory agencies. Most epidemiologic investigations are carried out by local health department personnel (epidemiologists, sanitarians, public health nurses, etc) and are subsequently reported to state health departments. State agencies concerned with food safety frequently participate in the initial investigation of the outbreak and offer laboratory support. Utilizing the standard CDC reporting form (see page 16) a summary of the outbreak is sent to CDC.

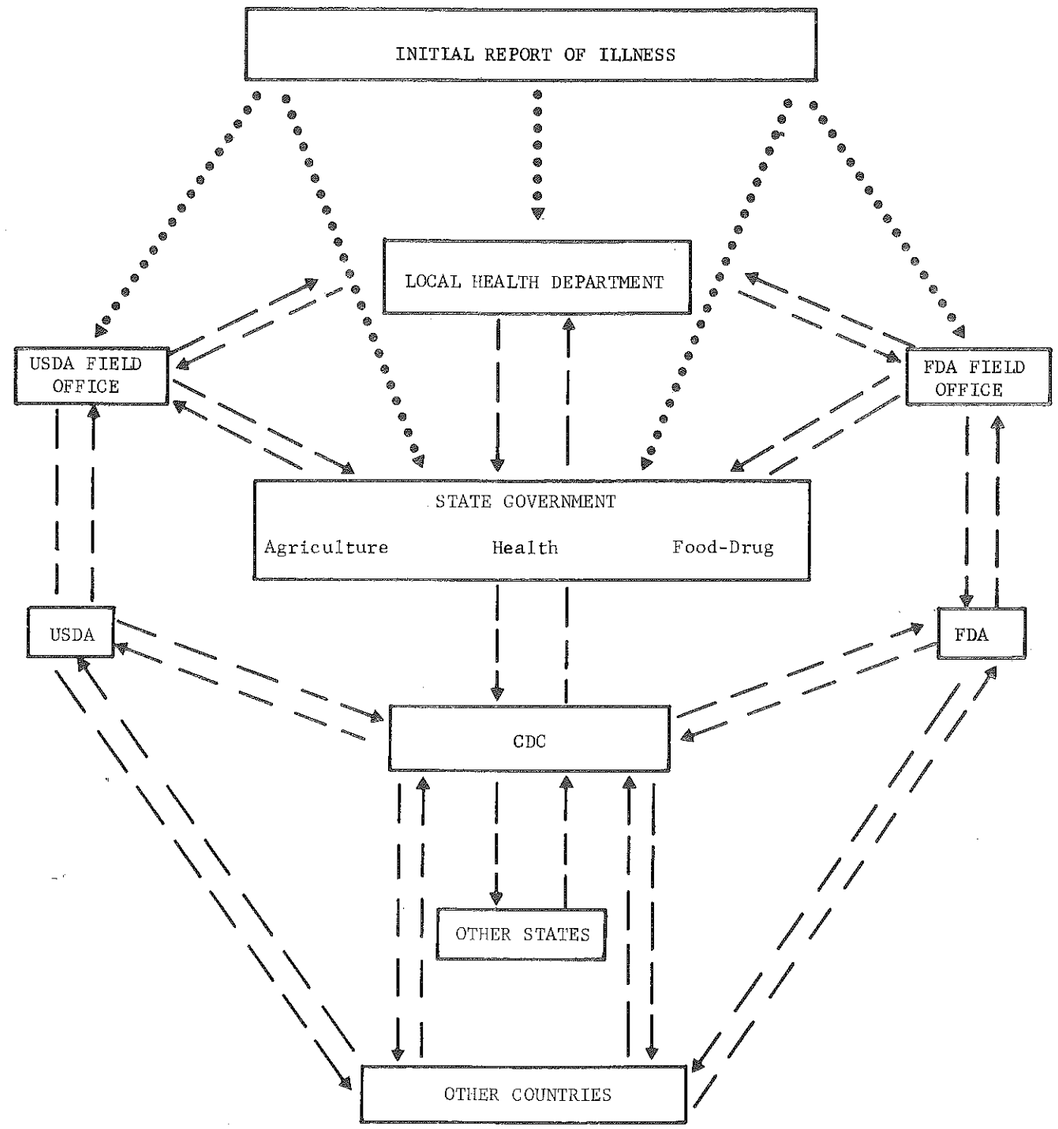
Two federal regulatory agencies which have the major responsibilities for food protection, the Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA), participate actively in the CDC surveillance program. They report to CDC and to state and local health authorities episodes of foodborne illness which they receive. CDC and state and local health authorities in turn report to FDA or USDA any foodborne disease outbreaks which involve commercial products. Both agencies assist in epidemiologic and laboratory investigations.

This notification system is ideal and variations often occur. If an outbreak is large or if multiple local jurisdictions are involved, a local health department may ask for immediate assistance in its investigation from its state health department. If an outbreak involves illness in persons from more than 1 state, CDC should be notified during the investigation of the outbreak and may provide epidemiologic assistance. CDC also renders assistance in large intrastate outbreaks when requested.

In suspect botulism cases, physicians and health authorities are urged to promptly notify CDC. In such instances CDC works in close cooperation with physicians, state and local health authorities, and FDA or USDA representatives to provide diagnostic and therapeutic consultation and to rapidly identify responsible foods and remove them from further public consumption.

FIGURE 1

FOODBORNE DISEASE SURVEILLANCE SYSTEM, UNITED STATES



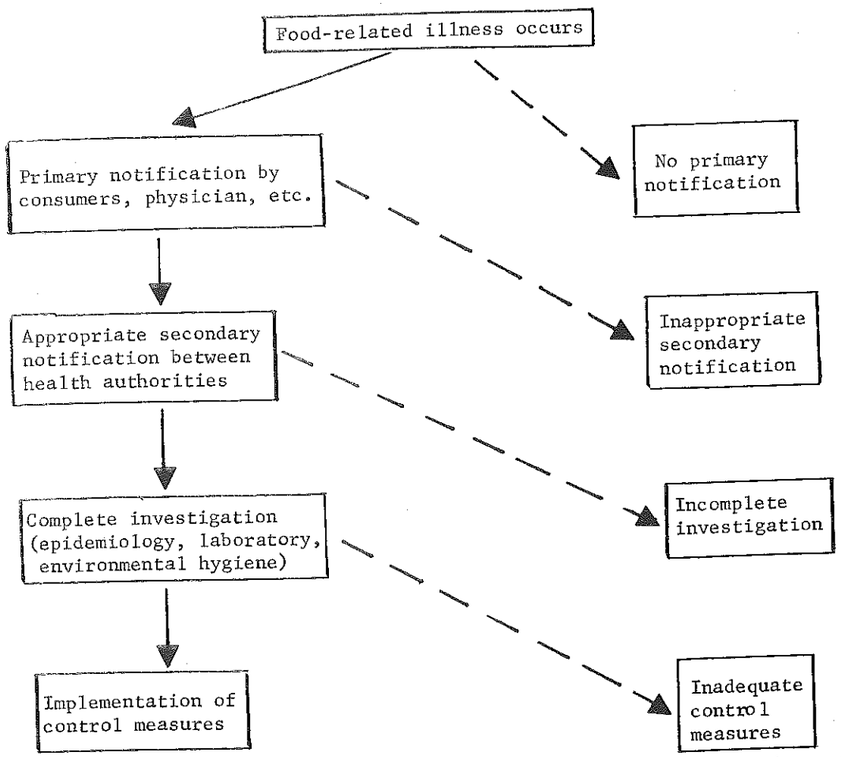
Occasionally outbreaks are reported to CDC through communications to the MMWR or by reports from the U.S. Armed Forces, pharmaceutical companies (notably botulism), and university medical centers. Reports to other CDC surveillance systems, including those for hepatitis, brucellosis, and trichinosis also provide information about foodborne outbreaks.

C. Interpretation of Data

As in the past, the variation in quality of foodborne disease investigation and reporting among state and local health departments places limitations on the data presented in this report. The success of outbreak investigations is dependent on a series of operational steps depicted in Figure 2. A number of factors, including consumer awareness, physician interest, and health department budgetary constraints and investigative capabilities vary considerably.

Figure 2

Contingencies of Successful Foodborne Disease Surveillance

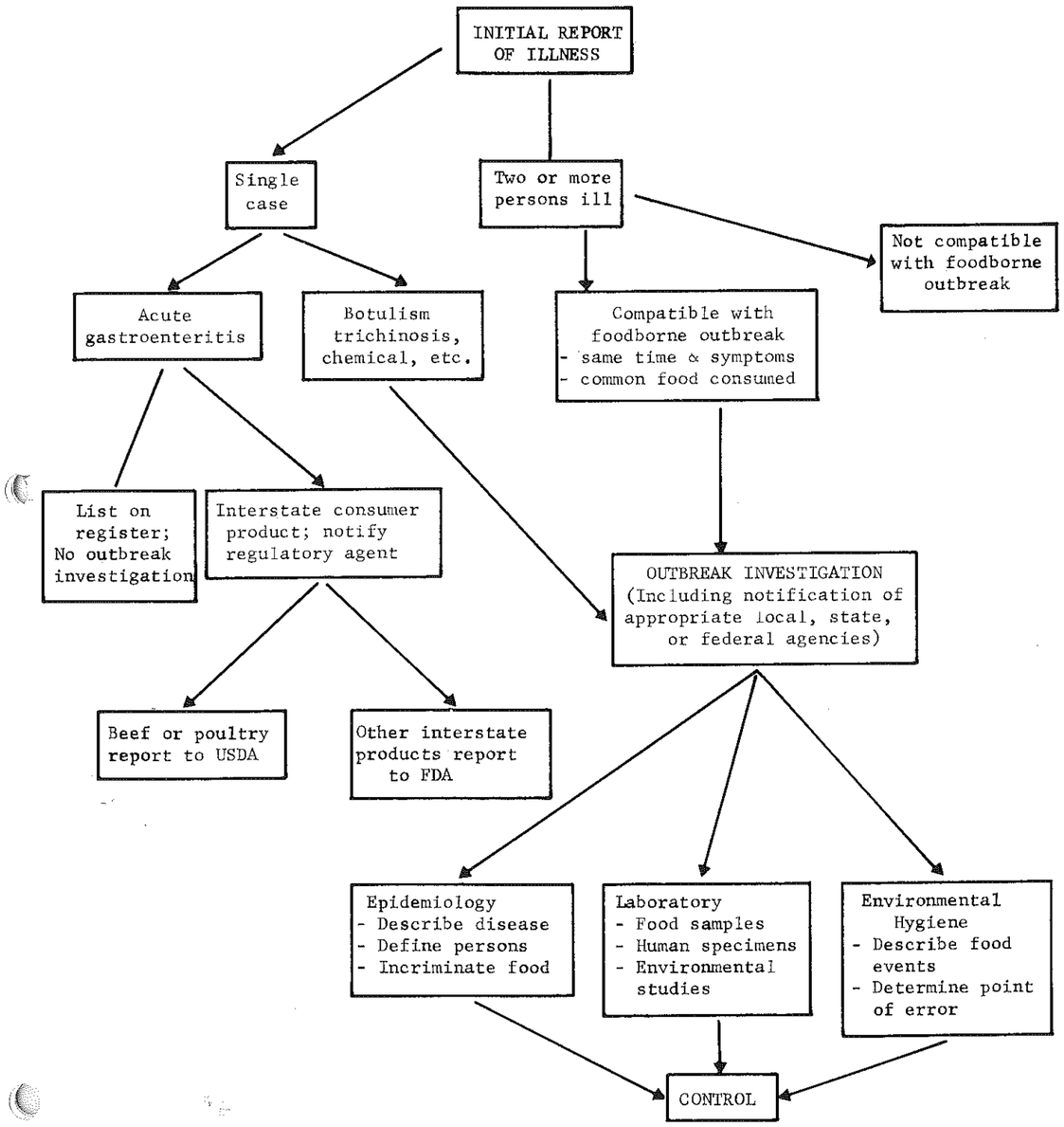


These data, based upon a variety of reporting systems, must be used carefully as they present only a selected part of a public health problem, the true dimension of which is unknown.

A recommended set of guidelines for use in the investigation of foodborne disease is provided in Figure 3. A comprehensive and uniform approach for the handling of such illness and for the collection and laboratory analysis of human and food specimens is imperative for good foodborne disease surveillance.

FIGURE 3

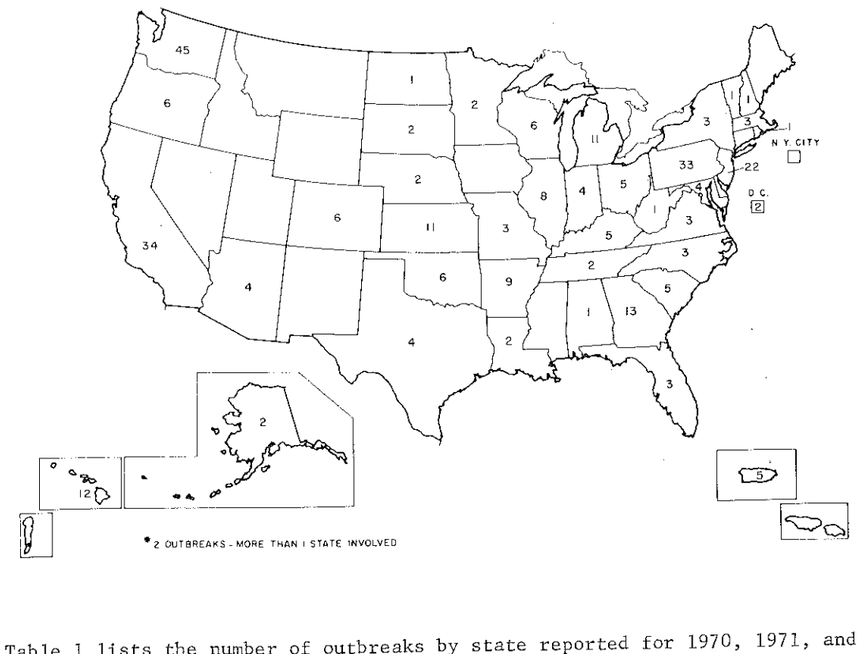
A SCHEME FOR THE HANDLING OF FOODBORNE DISEASE COMPLAINTS BY STATE AND LOCAL HEALTH DEPARTMENTS



D. The Data

Figure 4 shows the geographic distribution of the 301 foodborne outbreaks reported by states in 1972; 12 states did not report any outbreaks. Of the 301 outbreaks, 286 (95%) emanated from state, local, or territorial health departments, 9 (3%) were reported by the FDA, USDA, or U.S. Armed Forces, and 6 (2%) were reported through the MMWR.

Fig. 4 FOODBORNE OUTBREAKS, 1972*



*2 OUTBREAKS - MORE THAN 1 STATE INVOLVED

Table 1 lists the number of outbreaks by state reported for 1970, 1971, and 1972. The 4 health departments contributing the most reports for 1972 were Washington State (15%), California (11%), Pennsylvania (11%), and New Jersey (7%). Compared with 1971, a substantial increase in reported outbreaks was apparent in 1972 in Arkansas, Kansas, New Jersey, and Pennsylvania, while decreases occurred in New York City, South Carolina, and Washington State.

There were 14,559 cases of foodborne illness reported in the 301 outbreaks; laboratory confirmation was obtained for 136 (45%) of these outbreaks and in 5,992 cases (42%). Table 2 records the number and percent of the confirmed outbreaks and cases by etiology. Bacterial pathogens accounted for 70% of confirmed outbreaks and 96% of cases.

Despite the implementation of strict criteria for laboratory confirmation in 1972, 45% of outbreaks were confirmed in 1972, compared with 29% in 1971. In Table 3 the 1971 and 1972 data for confirmed outbreaks and cases are compared. The overall frequency of confirmed outbreaks of bacterial etiology was higher in 1972 than 1971; the number of cases with bacterial etiology remained essentially the same. In both years, salmonella and Staphylococcus aureus were responsible for over 50% of confirmed outbreaks. There was a notable increase in outbreaks related to consumption of chemical substances, from 14% in 1971 to 21% in 1972. Reported outbreaks attributed to C. perfringens, salmonella, and staphylococcus involved more cases in 1972

than in 1971 while there was a corresponding decrease in cases of foodborne shigellosis. More cases in 1972 were confirmed compared with 1971. In all reported outbreaks there were 14,559 cases reported in 1972 compared with 13,453 cases in 1971.

Table 1

Outbreaks of Foodborne Illness by Location, 1970--1972*

State	1970	1971	1972	State	1970	1971	1972
Alabama	0	2	1	Missouri	3	2	3
Alaska	2	5	2	Montana	1	2	0
Arizona	2	1	4	Nebraska	2	3	2
Arkansas	2	3	9	Nevada	1	1	0
California	26	31	34	New Hampshire	1	2	1
Colorado	1	1	6	New Jersey	8	14	22
Connecticut	3	2	0	New Mexico	5	9	0
Delaware	1	2	0	New York City	43	16	0
District of Columbia	0	1	2	New York State	6	9	3
Florida	8	5	3	North Carolina	5	2	3
Georgia	12	11	13	North Dakota	1	1	1
Hawaii	3	10	12	Ohio	2	8	5
Idaho	4	3	0	Oklahoma	2	6	6
Illinois	7	5	8	Oregon	3	0	6
Indiana	3	1	4	Pennsylvania	13	14	33
Iowa	1	4	0	Puerto Rico	3	4	5
Kansas	2	4	11	Rhode Island	1	1	1
Kentucky	2	3	5	South Carolina	4	15	5
Louisiana	7	3	2	South Dakota	0	1	2
Maine	0	1	0	Tennessee	8	3	2
Maryland	4	6	4	Texas	1	3	4
Massachusetts	3	2	3	Utah	3	4	0
Michigan	3	14	11	Vermont	0	1	1
Minnesota	11	6	2	Virginia	6	2	3
Mississippi	0	1	0	Washington	68	57	45
Other				West Virginia	2	0	1
Virgin Islands	1	0	0	Wisconsin	4	8	6
Guam and Trust				Wyoming	0	0	0
Territories	1	2	1	Others	0	3	2
Canal Zone	0	0	2				

1970 total 305
1971 total 320
1972 total 301

* Annual Summaries, 1970 - 1972
**Others include 2 unknown and 3 multiple state outbreaks

Table 2a

Confirmed Foodborne Outbreaks by Bacterial Etiology, 1972

	Outbreaks		Cases	
	#	%	#	%
C. botulinum	4	2.9	24	0.4
C. perfringens	9	6.6	973	16.2
Salmonella	36	26.5	1880	31.4
Shigella	3	2.2	86	1.4
Staphylococcus	34	25.0	1948	32.5
Group A streptococcus	1	0.7	35	0.6
Group D streptococcus	1	0.7	50	0.8
V. parahaemolyticus	6	4.4	701	11.7
Alkalescens dispar	1	0.7	39	0.7
Subtotal	95	69.7	5736	95.7

Table 2b

Confirmed Foodborne Outbreaks by Nonbacterial Etiology, 1972

	Outbreaks		Cases	
	#	%	#	%
PARASITIC				
Trichinella spiralis	8	5.9	20	0.3
VIRAL				
Infectious hepatitis	5	3.7	90	1.5
CHEMICAL				
Chinese restaurant syndrome (MSG)	1	0.7	3	0.1
Mushroom poisoning	9	6.6	21	0.4
Fish toxin	9	6.6	82	1.4
Heavy metal	3	2.2	8	0.1
Other chemical	6	4.4	32	0.5
Total	136	99.8	5992	100.0

Table 3a

Confirmed Foodborne Outbreaks and Cases by Bacterial Etiology, 1971-1972

	1971				1972			
	Outbreaks		Cases		Outbreaks		Cases	
	#	%	#	%	#	%	#	%
B. cereus	0	0.0	0	0.0	0	0.0	0	0.0
C. botulinum	6	6.4	15	0.4	4	2.9	24	0.4
C. perfringens	3	3.2	106	2.7	9	6.6	973	16.2
E. coli	1	1.1	387	9.7	0	0.0	0	0.0
Salmonella	28	29.8	729	18.3	36	26.5	1,880	31.4
Shigella	6	6.4	806	20.3	3	2.2	86	1.4
Staphylococcus	26	27.7	930	23.4	34	25.0	1,948	32.5
Group A streptococcus	1	1.1	498	12.5	1	0.7	35	0.6
Group D streptococcus	0	0.0	0	0.0	1	0.7	50	0.8
V. parahaemolyticus	3	3.2	370	9.3	6	4.4	701	11.7
Alkalescens dispar	0	0.0	0	0.0	1	0.7	39	0.7
Subtotal	74	78.7	3,841	96.6	95	69.9	5,736	95.7

Table 3b

Confirmed Foodborne Outbreaks and Cases by Nonbacterial Etiology, 1971-1972

	1971				1972			
	Outbreaks		Cases		Outbreaks		Cases	
	#	%	#	%	#	%	#	%
PARASITIC								
Trichinella spiralis	4	4.3	18	0.5	8	5.9	20	0.3
VIRAL								
Infectious hepatitis	3	3.2	10	0.3	5	3.7	90	1.5
CHEMICAL								
Chinese restaurant syndrome (MSG)	0	0.0	0	0.0	1	0.7	3	0.1
Mushroom poisoning	0	0.0	0	0.0	9	6.6	21	0.4
Fish toxin	2	2.1	7	0.2	9	6.6	82	1.4
Heavy metal	4	4.3	19	0.5	3	2.2	8	0.1
Other chemical	7	7.4	83	2.1	6	4.4	32	0.5
Total	94	100.0	3,978	100.2	136	100.0	5,992	100.0

Fourteen deaths were reported in outbreaks in 1972: C. botulinum was responsible for 4, C. perfringens 1, salmonella 4, T. spiralis 1, and mushroom poisoning 4.

Table 4 lists the outbreaks of undetermined etiology by mean incubation periods. If an assumption is made that outbreaks with incubation period of 1 to 7 hours are primarily staphylococcal and those 8 to 14 hours are due mostly to C. perfringens, then both these etiologies were responsible for substantially more outbreaks than is suggested by the data in Table 2. That few outbreaks of C. perfringens are confirmed is related in part to the problems involved in the handling and culturing of specimens anaerobically.

Table 4

Outbreaks of Unknown Etiology, by Incubation Period

Incubation period	Number of outbreaks
<1 hr	0
1-7 hr	80
8-14 hr	45
>15 hr	25
unknown	15
Total	165

Table 5 lists vehicles of transmission by specific etiology. The most commonly incriminated vehicles were pork and pork products (15%), beef (14%), fish, including seafood (10%), and poultry (10%). In 54 outbreaks (18%) the vehicle was unknown. Staphylococcal intoxication was most often associated with pork and pork products; salmonella outbreaks were caused by a variety of food vehicles.

Table 6 lists the place where the outbreaks occurred. Approximately two-thirds of the outbreaks occurred in restaurants (34%) or in homes (30%). Ten percent of outbreaks took place in schools; all of these outbreaks where the etiology was known were attributed to a bacterial pathogen. Outbreaks in restaurants accounted for 38% of all cases of foodborne disease, while outbreaks in homes accounted for 7% and in schools 25%.

In Table 7 the place is described where the food which accounted for the outbreak was improperly handled. The heading "Food Processing Establishment" refers to the location where a food is prepared for market. The heading "Food Service Establishment" refers to a location where food is prepared for public consumption, i.e., restaurants, cafeterias, caterers, institutions. In 1972 food service establishments were responsible for the mishandling of food in 44% of all outbreaks and in 66% of outbreaks in which the place of mishandling was reported. The homemaker was responsible for 30% of outbreaks in which the place of mishandling was reported while industry was responsible for only 4%. In 33% of outbreaks the place of improper handling was not determined. A majority of the staphylococcal and V. parahaemolyticus outbreaks and all the C. perfringens outbreaks were attributed to mishandling in food service establishments.

Table 8 lists the factors contributing to foodborne outbreaks by etiology. Although this information was provided for only 62% of the outbreaks, it is evident from the available data that improper storage or holding temperature was the major factor responsible for outbreaks of C. perfringens, salmonella, and staphylococcal illness. Inadequate cooking was important in V. parahaemolyticus and salmonella outbreaks, while contaminated equipment and poor personal hygiene of food handlers were contributing factors in salmonella and staphylococcal outbreaks.

Table 9 lists the monthly incidence of outbreaks by etiology. Outbreaks were assigned to a month according to date of onset of the first case. Outbreaks were distributed equally throughout the year except for a slight decline in January. Salmonella and staphylococcal outbreaks were most common between April and September.

Table 5

Foodborne Illness Outbreaks by Vehicle of Infection and Specific Etiology, 1972

	Beef**	Pork*	Poultry	Shellfish	Other fish	Eggs	Milk	Other dairy	Bakery products	Fruits & vegetables	Mexican food	Chinese food	Multiple vehicles	Other	Unknown	Total
BACTERIAL																
C. botulinum										3					1	4
C. perfringens	2		4											3		9
Salmonella	6	3	3	1	1	1		5	2				3	6	5	36
Shigella										1					2	3
Staphylococcus	4	15	3		1	1			3	1	1		2	2	1	34
Group A streptococcus					1											1
Group D streptococcus		1														1
V. parahaemolyticus				6												6
Alkalescens dispar														1		1
PARASITIC																
Trichinella spiralis		8														8
VIRAL																
Infectious hepatitis														2	3	5
CHEMICAL																
Chinese restaurant syndrome (MSG)													1			1
Mushroom poisoning										9						9
Fish toxin				2	7											9
Heavy metal							1							2		3
Other chemicals		1							1	3				1		6
Unknown	29	17	19	5	7	2		1	5	5	12	4	5	12	42	165
Total	41	45	29	14	17	4	1	6	11	22	13	5	10	29	54	301

* Includes frankfurters, salami, ham
**Includes liver

Table 6

Foodborne Disease Outbreaks by Place of Acquisition and Specific Etiology, 1972

	Restaurant	Home	Picnic	School	Church	Camp	Other *	Total
BACTERIAL								
C. botulinum	1	3						4
C. perfringens	1	1		6			1	9
Salmonella	9	9	3	5	1	1	8	36
Shigella	1			1		1		3
Staphylococcus	13	10	2	2			7	34
Group A streptococcus				1				1
Group D streptococcus							1	1
V. parahaemolyticus		3	3					6
Alkalescens dispar	1							1
PARASITIC								
Trichinella spiralis		8						8
VIRAL								
Infectious hepatitis	2	1			1		1	5
CHEMICAL								
Chinese restaurant syndrome (MSG)	1							1
Mushroom poisoning		8					1	9
Fish toxin	4	4					1	9
Heavy metal	2	1						3
Other chemicals	2	3					1	6
Unknown	65	39	5	6	3	3	34	165
Total 1972	102	91	13	31	5	5	55	301
Total 1971	96	123	12	22	10	1	56	320

*Includes 19 unknown

Table 7

Foodborne Disease Outbreaks by Place Where Food Was Mishandled and Specific Etiology, 1972

	Food processing establishments	Food service establishments	Homes	Unknown-Unspecified	Total
BACTERIAL					
C. botulinum	1		3		4
C. perfringens		6		3	9
Salmonella	2	16	9	9	36
Shigella		1		2	3
Staphylococcus		23	6	5	34
Group A streptococcus				1	1
Group D streptococcus	1				1
V. parahaemolyticus		5	1		6
Alkalescens dispar		1			1
PARASITIC					
Trichinella spiralis			8		8
VIRAL					
Infectious hepatitis		2	2	1	5
CHEMICAL					
Chinese restaurant syndrome (MSG)		1			1
Mushroom poisoning			8	1	9
Fish toxin	3	2		4	9
Heavy metal		2	1		3
Other chemicals	2	3		1	6
Unknown		70	22	73	165
Total 1972	9	132	60	100	301
Total 1971	27	114	56	123	320

Table 8

Foodborne Disease Outbreaks by Contributing Factors and Etiology*

Etiology	Number of reported outbreaks	Number of outbreaks in which factors reported	Improper holding temperature	Inadequate cooking	Contaminated equipment	Poor personal hygiene	Other
C. botulinum	4	2		2			
C. perfringens	9	6	6	1	1		
Salmonella	36	23	15	7	8	11	4
Shigella	3	2				1	1
Staphylococcus	34	29	26		8	13	1
Group A streptococcus	1	0					
Group D streptococcus	1	0					
V. parahaemolyticus	6	6	2	4	2		
Alkalescens dispar	1	1				1	1
PARASITIC							
Trichinella spiralis	8	8		8			
VIRAL							
Infectious hepatitis	5	4				4	
CHEMICAL							
Chinese restaurant syndrome (MSG)	1	0					1
Mushroom poisoning	9	9					9
Fish toxin	9	5	2				3
Heavy metals	3	3					3
Other chemicals	6	5		2			3
Unknown	165	83	66	12	19	22	9
Total	301	186	117	36	38	52	35

* For many outbreaks more than 1 factor was responsible.

Table 9

Foodborne Disease Outbreaks by Month of Occurrence and Specific Etiology, 1972

	1972													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unk.	Total
BACTERIA.														
C. botulinum				1			1				1	1		4
C. perfringens		3	2		1			1		1	1			9
Salmonella	1	1	1	5	3	1	4	9	4	4	3			36
Shigella			1	1		1								3
Staphylococcus		3	2	3	6	2	3	6	6	1		2		34
Group A streptococcus				1										1
Group D streptococcus												1		1
V. parahaemolyticus						1	1	1		3				6
Alkalescens dispar								1						1
PARASITIC														
Trichinella spiralis		1	3	1	1	1				1				8
VIRAL														
Infectious hepatitis		1				1		2				1		5
CHEMICAL														
Chinese restaurant syndrome (MSG)								1						1
Mushroom poisoning	1				1				1	1	4	1		9
Fish toxin					1		2		3	1	2			9
Heavy metal			1					1				1		3
Other chemicals		1			2		1	1		1				6
Unknown	8	8	18	21	19	10	11	10	15	13	18	13	1	165
Total 1972	10	18	28	33	34	17	23	33	29	26	29	20	1	301
Total 1971	23	21	27	21	32	31	40	35	15	18	24	19	14	320