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Epidemiologic Notes and Reports

Vibrio vulnificus Infections Associated with Raw Oyster Consumption — Florida, 1981–1992

Vibrio vulnificus is a gram-negative bacterium that can cause serious illness and death in persons with preexisting liver disease or compromised immune systems. From 1981 through 1992, 125 persons with *V. vulnificus* infections, of whom 44 (35%) died, were reported to the Florida Department of Health and Rehabilitative Services (HRS). This report summarizes data on these cases and presents estimates of the at-risk population in Florida.

The infections generally occurred each year from March through December and peaked from May through October. Seventy-two persons (58%) had primary septicemia, 35 (28%) had wound infections, and 18 (14%) had gastroenteritis. In patients with primary septicemia, 58 infections (81%) occurred among persons with a history of raw oyster consumption during the week before onset of illness. The mean age of these persons was 60 years (range: 33–90 years; standard deviation: 12.9 years); 51 (88%) were male. Fourteen (78%) of the patients with gastroenteritis also had raw oyster-associated illness. Their mean age was 49 years (range: 19–89 years; standard deviation: 25.7 years); seven (50%) were male.

Of the 40 deaths caused by septicemia, 35 (88%) were associated with raw oyster consumption. Nine of these deaths occurred in 1992. The case-fatality rate from raw oyster-associated *V. vulnificus* septicemia among patients with pre-existing liver disease was 67% (30 of 45) compared with 38% (5 of 13) among those who were not known to have liver disease.

Results of the 1988 Florida Behavioral Risk Factor Survey (BRFS) were used to estimate the proportions of the Florida population who ate raw oysters, and the proportion of the population who ate raw oysters and who believed they had liver disease (e.g., cirrhosis). These estimates were used in conjunction with case reports and population data from the Florida Office of Vital Statistics to estimate the risk for illness and death associated with *V. vulnificus* (*1*).

BRFS and state population data indicate that approximately 3 million persons in Florida eat raw oysters; of these, 71,000 persons believe they have liver disease. Based on the number of cases reported to the Florida HRS during 1981–1992, the

Vibrio vulnificus — *Continued*

annual rate of illness from *V. vulnificus* infection for adults with liver disease who ate raw oysters was 72 per 1 million adults—80 times the rate for adults without known liver disease who ate raw oysters (0.9 per 1 million). The annual rate of death from *V. vulnificus* for adults with liver disease who ate raw oysters was 45 per 1 million—more than 200 times greater than the rate for persons without known liver disease who ate raw oysters (0.2 per 1 million).

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Editorial Note: *V. vulnificus* was first described as a cause of human illness in 1979 (*2*). Although there is no national surveillance for infections caused by this pathogen, regional surveillance in four states along the Gulf Coast indicates an annual incidence for *V. vulnificus* infections of at least 0.6 per 1 million persons and a case-fatality rate of 22% (*3*).

V. vulnificus, a free-living bacterium, occurs naturally in the marine environment, rather than as a result of pollution by human or animal fecal waste. This organism is commonly found in estuarine waters of the Gulf of Mexico, where it may contaminate oysters and other shellfish. Legal harvesting of oysters is limited to areas free of fecal contamination; however, *V. vulnificus* is ubiquitous in warm ocean waters, and oysters harvested from approved sites may be contaminated. Therefore, regardless of the source of the oysters, the potential for infection exists whenever raw oysters are consumed.

Ingestion of raw or undercooked shellfish contaminated with *V. vulnificus* can lead to primary septicemia or gastroenteritis. In addition, *V. vulnificus* can cause infection by directly contaminating open wounds during swimming, shellfish cleaning, and other marine activities.

The findings in this report are consistent with other studies indicating that persons with liver disease are at increased risk for infection with *V. vulnificus* and death (*2,4*). Persons with compromised immune systems (e.g., chronic renal insufficiency, cancer, diabetes, steroid-dependent asthma, and chronic intestinal disease) or iron overload states (e.g., thalassemia and hemochromatosis) may also be at increased risk for infection with *V. vulnificus* and death (*2,5*).* Whether persons with acquired immunodeficiency syndrome are at increased risk for *V. vulnificus* infections is unknown.

A previous study in north Florida indicated that less than 15% of high-risk patients were aware of the risks associated with raw oyster consumption (*6*). To increase awareness of risks for infection with this pathogen, the Florida HRS has issued press releases to inform the general public and has provided gastroenterologists in the state with clinical references and information for their patients with liver disease. California and Louisiana both require written consumer alerts regarding the risk of raw oyster consumption be visible where raw oysters are sold at retail food establishments. The Florida HRS also is working with other agencies in the state to establish labeling requirements for raw oysters that would inform consumers at all points of sale of the

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*The Food and Drug Administration (FDA) publishes brochures on seafood safety, including ones with special information for patients with liver diseases, immune disorders, gastrointestinal disorders, or diabetes mellitus. Free brochures are available to patients and their physicians from the FDA's 24-hour Seafood Safety Hotline, (800) 332-4010 ([800] FDA-4010); in the Washington, D.C., area the number is (202) 205-4314.

risk for serious illness for persons with liver disease or compromised immune systems who consume raw oysters. The wording of such labeling will be similar to the label already required by the Florida Department of Natural Resources for all wholesale shellstock and shucked products: "Consumer Information—There is a risk associated with consuming raw oysters or any raw animal protein. If you have chronic illness of the liver, stomach, or blood or have immune disorders, you are at a greater risk of serious illness from raw oysters and should eat oysters fully cooked. If unsure of your risk, consult a physician."

References

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International Notes

Epidemic Cholera — Burundi and Zimbabwe, 1992–1993

The current cholera pandemic reached sub-Saharan Africa in 1970 and spread rapidly throughout the continent (*1*). Since then, epidemic cholera has persisted or reemerged in many African countries. This report summarizes cholera outbreaks in Burundi and Zimbabwe and the efforts to control these outbreaks.

Rumonge, Burundi

During February 7–May 10, 1992, an epidemic of cholera caused by *Vibrio cholerae* O1, serotype Ogawa, affected 1044 persons in Western Burundi, a small country in central Africa (Figure 1). Index patients resided in a region bordering Lake Tanganyika, Zaire, and Rwanda. The epidemic spread southward among the provinces bordering the lake, reaching Bujumubura in March and Rumonge in April.

During February, the Burundi Ministry of Health (BMOH) formed a team of health professionals to plan and implement control measures. A surveillance system of daily reporting of suspected cholera cases and deaths was established to identify affected areas, and to evaluate control efforts.

By late April, the number of new cholera cases reported weekly had decreased when an outbreak was reported in Rumonge (1990 population: 12,000), located on Lake Tanganyika. The BMOH established a cholera ward at the local hospital, and trained health workers in rehydration therapy. To identify risk factors for cholera, the

Epidemic Cholera — Continued

BMOH conducted a case-control study in Rumonge from May 5 through May 10. A case-patient was defined as any person aged >5 years admitted to the Rumonge cholera treatment ward during May 5–9. Two controls were selected for each case-patient and matched by age, sex, and neighborhood of residence.

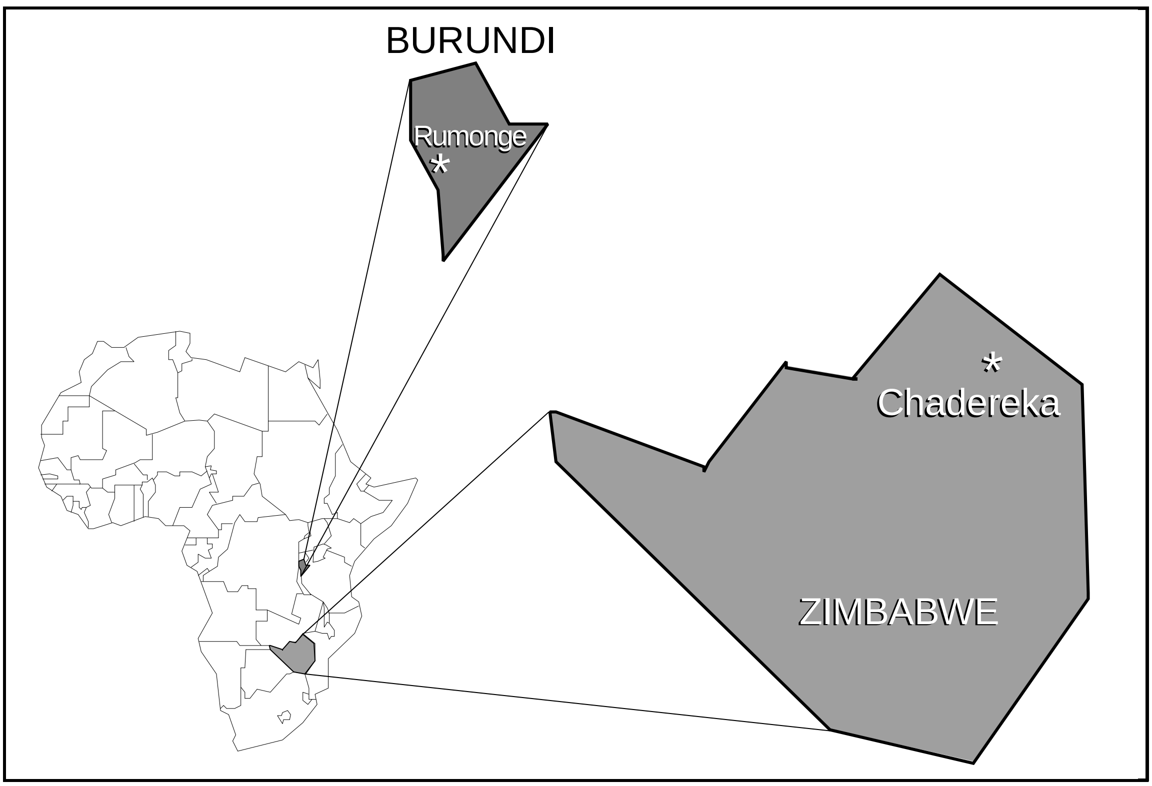
Case-patients were significantly more likely than neighborhood controls to have drunk untreated water from (odds ratio [OR]=2.7; 95% confidence interval [CI]=1.1–6.4) or bathed in (OR=5.0; 95% CI=1.1–22.3) Lake Tanganyika during the 3 days before onset of illness. Because of a shortage of potable water and an insufficient number of functioning water taps in Rumonge, untreated lake water was often used for domestic purposes. Access to a functioning water tap during the 3 days before onset of illness was protective (OR=0.4; 95% CI=0.2–1.0, $p=0.05$).

On May 4, the Rumonge port was closed and access to the lake prohibited, and potable water was transported daily to the neighborhood most affected by the outbreak. The number of case-patients began to decrease on May 5, and by May 10, the outbreak ended (Figure 2). Six (2.7%) of 272 patients died during the Rumonge outbreak. In mid-June, both the Rumonge port and the lakeshore were reopened. Since May 10, 1992, no new cases of cholera have been reported in Burundi.

Chadereka, Zimbabwe

From January 1 through February 8, 1993, 133 persons with cholera were identified in Chadereka (1992 population: 4029) in northeastern Zimbabwe (Figure 1)—an attack rate of 3.3%. Most patients (123) were identified through an emergency cholera treatment facility established by the Zimbabwe Ministry of Health and Child Welfare on January 24; 10 were identified by patients of the clinic.

FIGURE 1. Location of Rumonge, Burundi, and Chadereka, Zimbabwe — Africa, 1993



Epidemic Cholera — Continued

The median age of the 133 patients was 41 years (range: 3 weeks–92 years); 51% were male. Of 20 deaths (case-fatality rate=15%), 16 occurred before the cholera treatment center was established; mean age of patients who died was 65.5 years (range: 2–92 years). *V. cholerae* O1 was identified from rectal swabs of four of five persons with acute clinical cholera.

To identify risk factors and potential control measures, trainees in the University of Zimbabwe Master of Public Health and Field Epidemiology Training Program, in collaboration with members of the university's Department of Community Medicine and national and local health officials, conducted a case-control study. A case was defined as the occurrence of five or more episodes of acute watery nonbloody diarrhea during a 24-hour period, with onset from January 1 through February 8 in a person residing in Chadereka village. Because of the need for rapid identification of risk factors, a convenience sample (i.e., the first patients who could be located) of 56 of the 133 case-patients was interviewed for the study. Controls were identified through interviews with village residents during work and evening hours in the neighborhoods of case-patients and were matched by sex and 10-year age group. Only one case or one control was selected per household, and controls were excluded if they, or any household member, had had diarrhea since January 1.

(Continued on page 415)

FIGURE 2. Patients admitted to the cholera treatment ward — Rumonge, Burundi, April 9–June 15, 1992

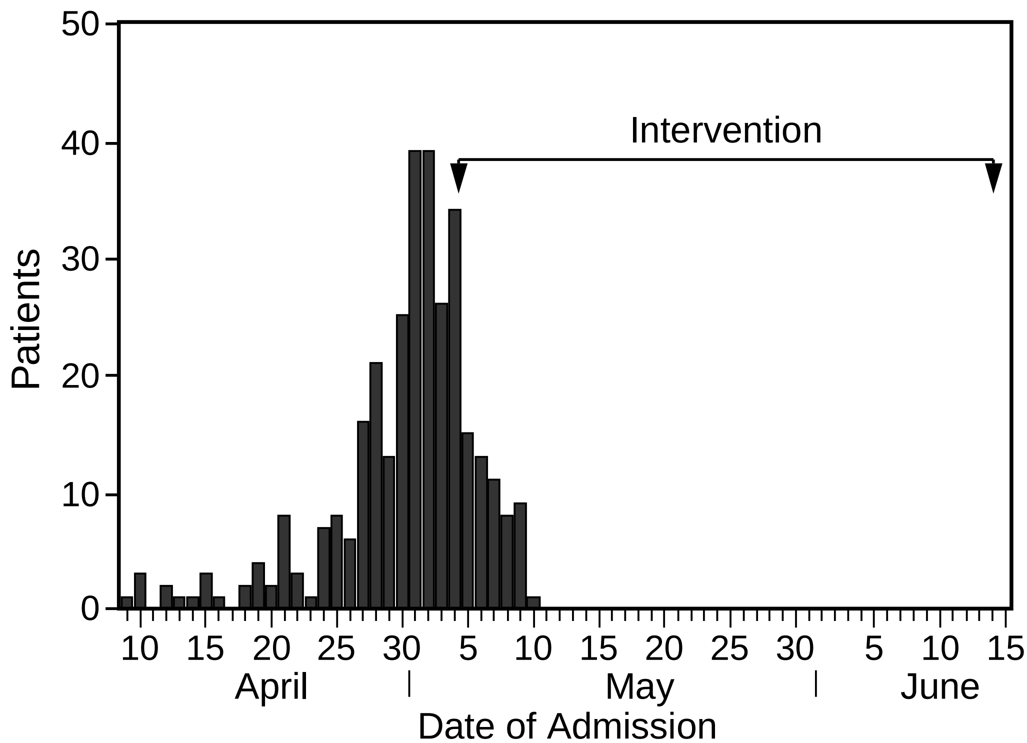
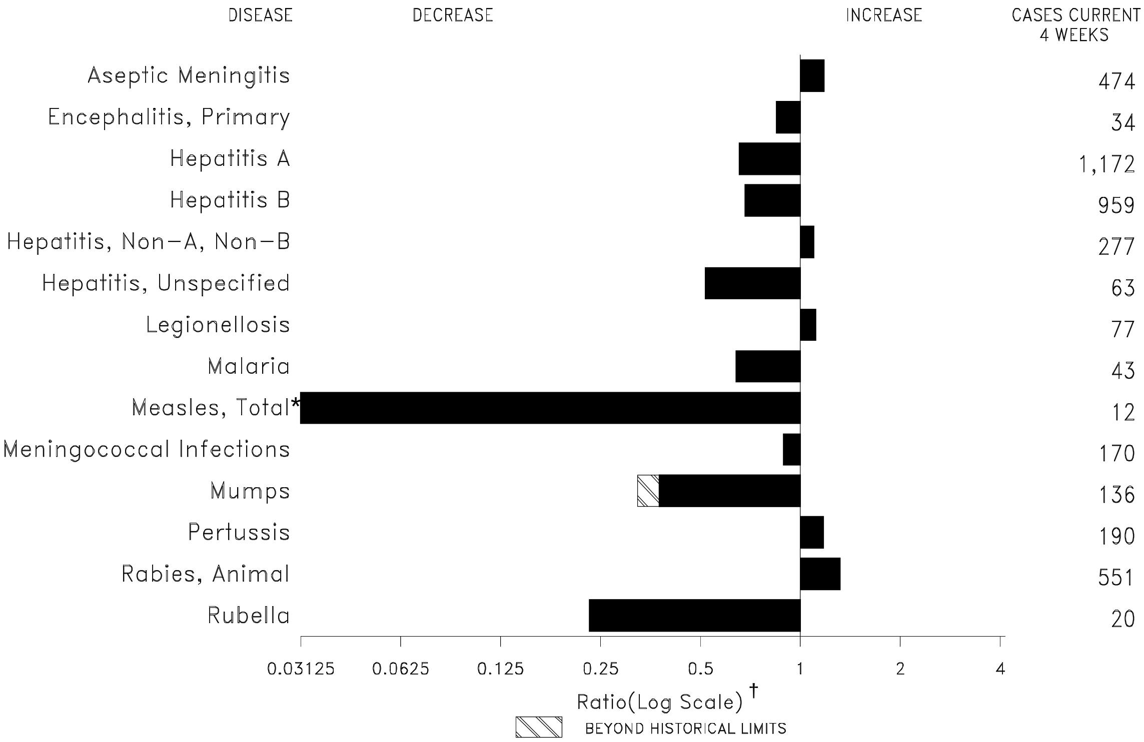


FIGURE I. Notifiable disease reports, comparison of 4-week totals ending May 29, 1993, with historical data — United States



*The large apparent decrease in reported cases of measles(total) reflects dramatic fluctuations in the historical baseline. (Ratio [log scale] for week twenty-one is 0.01220).

† Ratio of current 4-week total to mean of 15 4-week totals (from previous, comparable, and subsequent 4-week periods for the past 5 years). The point where thehatched area begins is based on the mean and two standard deviations of these 4-week totals.

TABLE I. Summary — cases of specified notifiable diseases, United States, cumulative, week ending May 29, 1993 (21st Week)

	Cum. 1993		Cum. 1993
AIDS*	45,854	Measles: imported	18
Anthrax	-	indigenous	100
Botulism: Foodborne	6	Plague	1
Infant	11	Poliomyelitis, Paralytic§	-
Other	2	Psittacosis	21
Brucellosis	30	Rabies, human	-
Cholera	9	Syphilis, primary & secondary	11,021
Congenital rubella syndrome	5	Syphilis, congenital, age < 1 year	-
Diphtheria	-	Tetanus	11
Encephalitis, post-infectious	73	Toxic shock syndrome	101
Gonorrhea	155,955	Trichinosis	7
Haemophilus influenzae (invasive disease)†	550	Tuberculosis	7,956
Hansen Disease	72	Tularemia	28
Leptospirosis	15	Typhoid fever	139
Lyme Disease	1,186	Typhus fever, tickborne (RMSF)	46

*Updated monthly; last update May 15, 1993.
†Of 501 cases of known age, 177 (35%) were reported among children less than 5 years of age.
§No cases of suspected poliomyelitis have been reported in 1993; 4 cases of suspected poliomyelitis were reported in 1992; 6 of the 9 suspected cases with onset in 1991 were confirmed; the confirmed cases were vaccine associated.

TABLE II. Cases of selected notifiable diseases, United States, weeks ending May 29, 1993, and May 23, 1992 (21st Week)

Reporting Area	AIDS*	Aseptic Menin-gitis	Encephalitis: Primary	Encephalitis: Post-in-fectious	Gonorrhea		Hepatitis (Viral), by type: A	B	NA,NB	Unspeci-fied	Legionel-losis	Lyme Disease
	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993
UNITED STATES	45,854	2,667	213	73	155,955	193,264	8,603	4,614	1,715	264	444	1,186
NEW ENGLAND	2,171	51	5	4	3,002	4,137	215	139	11	5	16	131
Maine	59	6	1	-	35	35	8	8	-	-	3	-
N.H.	60	4	-	1	16	50	5	14	3	-	-	7
Vt.	13	6	1	-	13	11	3	3	2	-	-	-
Mass.	1,197	28	3	3	1,155	1,517	124	102	3	5	10	35
R.I.	104	7	-	-	150	322	46	12	3	-	3	33
Conn.	738	-	-	-	1,633	2,202	29	-	-	-	-	56
MID. ATLANTIC	9,139	277	7	6	17,178	20,644	517	590	128	4	91	823
Upstate N.Y.	1,466	100	-	3	3,366	4,607	137	152	69	1	23	599
N.Y. City	4,860	104	1	-	4,260	6,858	177	121	1	-	3	3
N.J.	1,897	-	-	-	2,839	2,894	135	156	40	-	14	70
Pa.	916	73	6	3	6,713	6,285	68	161	18	3	51	151
E.N. CENTRAL	3,881	359	68	15	31,013	35,157	836	452	331	6	114	12
Ohio	662	110	24	3	8,547	11,278	132	102	28	-	66	10
Ind.	505	46	4	6	3,158	3,376	370	71	4	1	14	1
Ill.	1,272	76	14	-	10,860	10,337	226	86	18	2	3	1
Mich.	985	118	23	6	6,358	8,518	103	188	261	3	23	-
Wis.	457	9	3	-	2,090	1,648	5	5	20	-	8	-
W.N. CENTRAL	2,028	156	7	-	7,261	10,556	1,135	305	83	5	28	24
Minn.	359	40	4	-	320	1,181	185	31	2	4	-	3
Iowa	126	37	-	-	602	733	15	11	3	1	4	1
Mo.	1,210	28	-	-	4,562	5,719	737	226	62	-	10	3
N. Dak.	-	3	2	-	21	36	36	-	-	-	1	1
S. Dak.	20	7	1	-	109	74	9	-	-	-	-	-
Nebr.	100	2	-	-	141	596	107	8	7	-	10	-
Kans.	213	39	-	-	1,506	2,217	46	29	9	-	3	16
S. ATLANTIC	9,481	645	39	28	43,167	62,922	501	823	231	34	76	130
Del.	192	5	2	-	537	684	3	57	59	-	6	70
Md.	843	52	10	-	6,718	5,938	70	107	5	3	22	18
D.C.	479	18	-	-	2,330	2,990	2	13	-	-	8	2
Va.	726	73	12	3	4,819	7,518	60	65	19	11	2	16
W. Va.	18	5	7	-	245	354	2	16	13	-	-	2
N.C.	453	52	7	-	10,052	9,804	20	132	26	-	8	10
S.C.	672	4	-	-	3,878	4,726	5	17	-	1	8	1
Ga.	1,450	42	1	-	4,660	20,291	40	33	20	-	12	-
Fla.	4,648	394	-	25	9,928	10,617	299	383	89	19	10	11
E.S. CENTRAL	1,245	119	8	4	17,408	18,652	107	444	368	1	18	5
Ky.	147	52	3	4	1,847	1,952	59	41	4	-	7	2
Tenn.	496	19	4	-	5,252	6,064	16	355	356	-	9	1
Ala.	401	32	1	-	6,289	6,089	22	45	3	1	-	2
Miss.	201	16	-	-	4,020	4,547	10	3	5	-	2	-
W.S. CENTRAL	4,802	210	18	-	18,757	17,476	727	617	84	70	13	11
Ark.	201	12	-	-	3,221	3,481	22	26	2	-	-	1
La.	687	10	-	-	4,691	2,543	32	77	28	-	2	-
Okla.	423	-	4	-	1,504	1,879	44	89	21	6	8	6
Tex.	3,491	188	14	-	9,341	9,573	629	425	33	64	3	4
MOUNTAIN	2,480	151	11	3	4,404	4,820	1,762	247	129	45	43	3
Mont.	13	-	-	1	20	39	49	4	-	-	5	-
Idaho	43	5	-	-	70	52	84	19	-	1	1	-
Wyo.	27	2	-	-	34	17	9	9	37	-	5	2
Colo.	806	37	3	-	1,349	1,878	419	28	20	26	3	-
N. Mex.	197	20	3	2	386	367	128	106	41	1	2	-
Ariz.	851	63	4	-	1,643	1,550	633	40	9	7	8	-
Utah	175	5	1	-	145	89	412	17	18	10	6	1
Nev.	368	19	-	-	757	828	28	24	4	-	13	-
PACIFIC	10,627	699	50	13	13,765	18,900	2,803	997	350	94	45	47
Wash.	214	-	-	-	1,471	1,706	293	88	76	7	5	-
Oreg.	485	-	-	-	856	596	49	19	6	-	-	-
Calif.	9,825	659	47	13	11,008	16,084	2,063	876	262	85	35	46
Alaska	9	4	2	-	195	294	359	6	4	-	-	-
Hawaii	94	36	1	-	235	220	39	8	2	2	5	1
Guam	-	2	-	-	32	35	2	1	-	1	-	-
P.R.	1,212	23	-	-	189	61	28	124	21	1	-	-
V.I.	33	-	-	-	47	44	-	2	-	-	-	-
Amer. Samoa	-	-	-	-	11	16	9	-	-	-	-	-
C.N.M.I.	-	2	-	-	33	17	-	-	-	1	-	-

N: Not notifiable U: Unavailable C.N.M.I.: Commonwealth of Northern Mariana Islands

*Updated monthly; last update May 15, 1993.

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending May 29, 1993, and May 23, 1992 (21st Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1993	1993	Cum. 1993	1993	Cum. 1993	Cum. 1992	Cum. 1993	1993	Cum. 1993	1993	Cum. 1993	Cum. 1992	1993	Cum. 1993	Cum. 1992
UNITED STATES	364	2	100	-	18	992	1,153	15	712	50	1,020	550	4	90	75
NEW ENGLAND	25	1	45	-	4	13	70	-	5	4	262	52	-	1	5
Maine	1	-	-	-	-	-	3	-	-	1	7	2	-	1	-
N.H.	2	-	-	-	-	1	7	-	-	-	141	20	-	-	-
Vt.	1	1	30	-	1	-	4	-	-	-	42	-	-	-	-
Mass.	10	-	7	-	2	8	39	-	2	3	54	25	-	-	-
R.I.	2	-	-	-	1	-	1	-	2	-	2	-	-	-	4
Conn.	9	-	8	-	-	4	16	-	1	-	16	5	-	-	1
MID. ATLANTIC	69	-	6	-	2	185	139	-	55	2	166	71	-	27	10
Upstate N.Y.	23	-	-	-	1	96	58	-	17	2	62	22	-	3	7
N.Y. City	24	-	2	-	-	33	19	-	-	-	12	9	-	17	-
N.J.	15	-	4	-	1	51	18	-	8	-	21	18	-	6	2
Pa.	7	-	-	-	-	5	44	-	30	-	71	22	-	1	1
E.N. CENTRAL	21	-	-	-	-	31	153	4	110	2	139	44	1	2	7
Ohio	5	-	-	-	-	5	51	-	44	-	85	12	-	1	-
Ind.	3	-	-	-	-	19	22	-	1	1	21	11	-	-	-
Ill.	11	-	-	-	-	5	47	-	27	-	15	7	-	-	7
Mich.	2	-	-	-	-	1	32	4	38	1	16	1	1	1	-
Wis.	-	-	-	-	-	1	1	-	-	-	2	13	-	-	-
W.N. CENTRAL	9	-	-	-	2	6	71	-	24	18	73	38	-	1	5
Minn.	2	-	-	-	-	5	2	-	-	17	39	15	-	-	-
Iowa	1	-	-	-	-	1	13	-	7	-	1	1	-	-	-
Mo.	2	-	-	-	-	-	29	-	12	-	15	12	-	1	1
N. Dak.	-	-	-	-	-	-	3	-	4	-	2	5	-	-	-
S. Dak.	2	-	-	-	-	-	3	-	-	-	1	2	-	-	-
Nebr.	1	-	-	-	-	-	3	-	1	-	4	2	-	-	-
Kans.	1	-	-	-	2	-	18	-	-	1	11	1	-	-	4
S. ATLANTIC	107	1	19	-	3	99	221	3	196	3	95	58	-	6	3
Del.	1	-	3	-	-	1	10	-	4	-	1	-	-	2	-
Md.	9	-	-	-	2	10	19	-	37	-	33	12	-	1	-
D.C.	5	-	-	-	-	-	4	-	-	-	1	-	-	-	-
Va.	8	-	-	-	1	6	20	1	14	2	9	4	-	-	-
W. Va.	2	-	-	-	-	-	9	-	6	-	6	2	-	-	-
N.C.	58	-	-	-	-	21	40	-	100	-	13	13	-	-	-
S.C.	-	-	-	-	-	29	18	-	13	-	5	7	-	-	-
Ga.	2	-	-	-	-	-	47	-	-	-	3	6	-	-	-
Fla.	22	1	16	-	-	32	54	2	22	1	24	14	-	3	3
E.S. CENTRAL	6	-	-	-	-	403	72	2	30	5	40	11	-	-	1
Ky.	-	-	-	-	-	386	15	-	-	-	3	-	-	-	-
Tenn.	2	-	-	-	-	-	13	-	9	2	23	5	-	-	1
Ala.	2	-	-	-	-	-	27	2	16	3	14	6	-	-	-
Miss.	2	-	-	-	-	17	17	-	5	-	-	-	-	-	-
W.S. CENTRAL	10	-	1	-	-	170	97	1	102	-	30	18	-	12	-
Ark.	2	-	-	-	-	-	10	-	3	-	2	6	-	-	-
La.	-	-	1	-	-	-	21	-	7	-	4	-	-	1	-
Okla.	3	-	-	-	-	9	9	-	2	-	11	12	-	1	-
Tex.	5	-	-	-	-	161	57	1	90	-	13	-	-	10	-
MOUNTAIN	12	-	2	-	-	7	103	-	32	6	67	94	-	4	2
Mont.	1	-	-	-	-	-	6	-	-	-	-	1	-	-	-
Idaho	-	-	-	-	-	-	6	-	5	-	10	13	-	1	1
Wyo.	-	-	-	-	-	1	2	-	2	-	1	-	-	-	-
Colo.	7	-	2	-	-	6	14	-	8	4	25	20	-	-	-
N. Mex.	4	-	-	-	-	-	3	N	N	1	16	19	-	-	-
Ariz.	-	-	-	-	-	-	61	-	6	1	8	35	-	1	1
Utah	-	-	-	-	-	-	4	-	3	-	7	5	-	1	-
Nev.	-	-	-	-	-	-	7	-	8	-	-	1	-	1	-
PACIFIC	105	-	27	-	7	78	227	5	158	10	148	164	3	37	42
Wash.	5	-	-	-	-	10	34	1	8	1	17	46	-	-	6
Oreg.	3	-	-	-	-	-	17	N	N	-	-	12	-	1	2
Calif.	95	-	17	-	2	40	160	3	132	8	121	103	-	18	33
Alaska	-	-	-	-	-	9	9	-	5	1	3	-	-	1	-
Hawaii	2	-	10	-	5	19	7	1	13	-	7	3	3	17	1
Guam	1	U	1	U	-	10	1	U	6	U	-	-	U	-	1
P.R.	-	-	122	-	-	182	5	-	1	-	-	9	-	-	-
V.I.	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-
Amer. Samoa	-	-	1	-	-	-	-	-	-	-	2	6	-	-	-
C.N.M.I.	-	-	-	-	1	-	-	-	10	-	-	1	-	-	-

*For measles only, imported cases include both out-of-state and international importations.
N: Not notifiable U: Unavailable † International § Out-of-state

TABLE II. (Cont'd.) Cases of selected notifiable diseases, United States, weeks ending May 29, 1993, and May 23, 1992 (21st Week)

Reporting Area	Syphilis (Primary & Secondary)		Toxic-Shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1992	Cum. 1993	Cum. 1993	Cum. 1993	Cum. 1993
UNITED STATES	11,021	13,694	101	7,956	7,954	28	139	46	3,046
NEW ENGLAND	162	266	7	154	114	-	10	2	517
Maine	2	-	1	7	10	-	-	-	-
N.H.	5	20	2	1	-	-	-	-	24
Vt.	-	1	-	3	2	-	-	-	13
Mass.	78	125	3	84	58	-	8	2	184
R.I.	7	15	1	24	-	-	-	-	-
Conn.	70	105	-	35	44	-	2	-	296
MID. ATLANTIC	1,074	1,937	18	1,719	1,913	-	42	3	1,115
Upstate N.Y.	95	166	10	154	267	-	7	1	828
N.Y. City	541	1,031	1	1,040	1,067	-	26	-	-
N.J.	158	269	-	254	322	-	6	2	169
Pa.	280	471	7	271	257	-	3	-	118
E.N. CENTRAL	1,796	1,869	33	817	822	3	13	1	24
Ohio	496	294	15	120	133	1	5	-	3
Ind.	163	90	1	85	72	1	1	-	-
Ill.	686	775	3	401	402	-	4	1	3
Mich.	286	389	14	181	183	1	3	-	1
Wis.	165	321	-	30	32	-	-	-	17
W.N. CENTRAL	653	541	8	159	173	6	2	5	137
Minn.	14	36	2	26	42	-	-	-	21
Iowa	32	15	4	13	15	-	-	-	24
Mo.	535	408	-	79	73	2	2	4	2
N. Dak.	-	1	-	2	3	-	-	-	30
S. Dak.	-	-	-	7	10	2	-	1	10
Nebr.	7	16	-	8	9	-	-	-	2
Kans.	65	65	2	24	21	2	-	-	48
S. ATLANTIC	2,941	3,922	12	1,402	1,566	1	14	7	777
Del.	60	90	1	16	19	-	1	-	64
Md.	155	292	-	163	109	-	4	-	229
D.C.	170	175	-	66	51	-	-	-	6
Va.	264	331	2	176	116	-	1	1	155
W. Va.	2	7	-	33	25	-	-	-	34
N.C.	796	946	3	168	209	-	-	4	30
S.C.	457	515	-	161	164	-	-	-	69
Ga.	521	837	-	341	343	-	1	1	170
Fla.	516	729	6	278	530	1	7	1	20
E.S. CENTRAL	1,455	1,834	4	529	449	3	2	5	40
Ky.	120	64	2	144	149	-	-	3	5
Tenn.	402	476	1	110	-	2	-	-	-
Ala.	343	759	1	189	165	1	2	-	35
Miss.	590	535	-	86	135	-	-	2	-
W.S. CENTRAL	2,385	2,315	1	771	686	12	2	22	248
Ark.	426	380	-	73	38	6	-	-	15
La.	980	1,001	-	-	55	-	1	-	-
Okla.	148	99	1	131	52	4	-	22	48
Tex.	831	835	-	567	541	2	1	-	185
MOUNTAIN	95	166	4	178	210	1	4	1	40
Mont.	1	2	-	5	-	-	-	-	8
Idaho	-	1	1	5	11	-	-	-	-
Wyo.	2	1	-	1	-	1	-	1	6
Colo.	28	24	1	8	17	-	3	-	1
N. Mex.	17	17	-	18	31	-	-	-	2
Ariz.	40	75	-	91	101	-	1	-	23
Utah	2	5	2	9	24	-	-	-	-
Nev.	5	41	-	41	26	-	-	-	-
PACIFIC	460	844	14	2,227	2,021	2	50	-	148
Wash.	23	48	1	111	121	1	3	-	-
Oreg.	46	23	-	39	40	-	-	-	-
Calif.	387	767	13	1,948	1,726	1	45	-	132
Alaska	2	2	-	17	34	-	-	-	16
Hawaii	2	4	-	112	100	-	2	-	-
Guam	-	2	-	28	34	-	-	-	-
P.R.	222	120	-	64	55	-	-	-	21
V.I.	20	23	-	2	3	-	-	-	-
Amer. Samoa	-	-	-	1	-	-	-	-	-
C.N.M.I.	2	4	-	13	12	-	-	-	-

U: Unavailable

TABLE III. Deaths in 121 U.S. cities,* week ending May 29, 1993 (21st Week)

Reporting Area	All Causes, By Age (Years)						P&I[†] Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	551	363	104	42	23	19	46
Boston, Mass.	164	91	38	18	9	8	22
Bridgeport, Conn.	37	25	6	4	2	-	4
Cambridge, Mass.	21	13	6	2	-	-	5
Fall River, Mass.	16	11	1	1	3	-	1
Hartford, Conn.	U	U	U	U	U	U	U
Lowell, Mass.	20	14	6	-	-	-	1
Lynn, Mass.	22	16	3	1	1	1	1
New Bedford, Mass.	18	12	5	1	-	-	-
New Haven, Conn.	61	36	8	4	4	9	1
Providence, R.I.	46	35	7	3	1	-	3
Somerville, Mass.	9	8	1	-	-	-	-
Springfield, Mass.	47	31	9	5	1	1	4
Waterbury, Conn.	45	32	10	2	1	-	1
Worcester, Mass.	45	39	4	1	1	-	3
MID. ATLANTIC	2,535	1,671	481	288	41	54	115
Albany, N.Y.	40	31	7	1	1	-	4
Allentown, Pa.	17	13	4	-	-	-	1
Buffalo, N.Y.	99	68	21	5	3	2	3
Camden, N.J.	38	23	13	1	1	-	1
Elizabeth, N.J.	U	U	U	U	U	U	U
Erie, Pa.§	43	35	8	-	-	-	2
Jersey City, N.J.	66	34	11	12	2	7	3
New York City, N.Y.	1,257	795	242	182	18	20	41
Newark, N.J.	50	19	15	9	-	7	4
Paterson, N.J.	23	16	3	3	1	-	2
Philadelphia, Pa.	485	340	88	38	8	11	31
Pittsburgh, Pa.§	64	46	13	2	1	2	3
Reading, Pa.	12	9	2	1	-	-	-
Rochester, N.Y.	128	94	19	11	2	2	7
Schenectady, N.Y.	19	15	3	1	-	-	1
Scranton, Pa.§	35	26	8	1	-	-	3
Syracuse, N.Y.	81	50	14	10	4	3	3
Trenton, N.J.	40	26	7	7	-	-	-
Utica, N.Y.	17	12	3	2	-	-	-
Yonkers, N.Y.	21	19	-	2	-	-	6
E.N. CENTRAL	2,125	1,349	401	195	108	72	100
Akron, Ohio	76	60	11	-	1	4	-
Canton, Ohio	35	27	7	1	-	-	9
Chicago, Ill.	409	174	85	80	53	17	13
Cincinnati, Ohio	89	62	13	6	3	5	9
Cleveland, Ohio	170	101	36	14	5	14	1
Columbus, Ohio	216	141	44	17	10	4	8
Dayton, Ohio	134	96	21	9	5	3	4
Detroit, Mich.	201	103	57	21	13	7	3
Evansville, Ind.	44	32	8	2	2	-	1
Fort Wayne, Ind.	63	42	15	2	3	1	2
Gary, Ind.	12	6	2	3	1	-	-
Grand Rapids, Mich.	50	39	8	2	-	1	8
Indianapolis, Ind.	175	126	26	14	4	5	11
Madison, Wis.	60	49	8	3	-	-	10
Milwaukee, Wis.	141	101	30	5	2	3	11
Peoria, Ill.	38	27	7	1	1	2	1
Rockford, Ill.	47	35	4	3	3	2	3
South Bend, Ind.	29	23	3	2	1	-	2
Toledo, Ohio	86	69	11	4	-	2	4
Youngstown, Ohio	50	36	5	6	1	2	-
W.N. CENTRAL	723	506	133	40	23	20	41
Des Moines, Iowa	15	11	2	-	1	1	2
Duluth, Minn.	30	20	9	-	-	1	-
Kansas City, Kans.	38	28	7	-	-	2	-
Kansas City, Mo.	86	63	14	4	4	1	3
Lincoln, Nebr.	37	26	10	1	-	-	3
Minneapolis, Minn.	189	134	34	8	9	4	16
Omaha, Nebr.	85	57	16	7	1	4	5
St. Louis, Mo.	126	87	21	11	4	3	3
St. Paul, Minn.	66	43	12	7	1	3	5
Wichita, Kans.	51	37	8	2	3	1	4

Reporting Area	All Causes, By Age (Years)						P&I[†] Total
	All Ages	≥65	45-64	25-44	1-24	<1	
S. ATLANTIC	1,343	808	283	160	58	31	68
Atlanta, Ga.	228	130	50	35	8	5	6
Baltimore, Md.	224	129	41	36	7	10	21
Charlotte, N.C.	94	59	24	8	3	-	5
Jacksonville, Fla.	108	74	20	9	4	1	3
Miami, Fla.	118	63	33	16	5	1	1
Norfolk, Va.	63	37	13	5	6	2	2
Richmond, Va.	75	49	16	8	2	-	7
Savannah, Ga.	53	29	14	5	3	2	3
St. Petersburg, Fla.	62	51	8	1	1	1	6
Tampa, Fla.	160	100	27	19	10	2	10
Washington, D.C.	137	70	36	16	8	7	4
Wilmington, Del.	21	17	1	2	1	-	-
E.S. CENTRAL	786	523	145	63	22	33	57
Birmingham, Ala.	127	86	25	6	3	7	3
Chattanooga, Tenn.	40	30	7	1	-	2	1
Knoxville, Tenn.	64	46	9	6	2	1	8
Lexington, Ky.	71	50	10	4	4	3	7
Memphis, Tenn.	224	142	42	22	7	11	13
Mobile, Ala.	66	46	11	3	2	4	7
Montgomery, Ala.	44	32	4	4	1	3	-
Nashville, Tenn.	150	91	37	17	3	2	18
W.S. CENTRAL	1,144	733	216	104	50	41	61
Austin, Tex.	71	48	14	7	-	2	7
Baton Rouge, La.	50	35	6	6	1	2	-
Corpus Christi, Tex.	53	42	7	2	1	1	1
Dallas, Tex.	206	130	36	27	7	6	4
El Paso, Tex.	85	57	18	6	2	2	4
Ft. Worth, Tex.	93	62	18	6	5	2	3
Houston, Tex.	U	U	U	U	U	U	U
Little Rock, Ark.	79	54	10	5	4	6	7
New Orleans, La.	109	39	21	20	17	12	-
San Antonio, Tex.	218	141	46	17	9	5	17
Shreveport, La.	88	67	14	2	2	3	9
Tulsa, Okla.	92	58	26	6	2	-	9
MOUNTAIN	920	623	158	93	28	18	69
Albuquerque, N.M.	114	82	16	10	2	4	3
Colo. Springs, Colo.	45	24	7	9	2	3	4
Denver, Colo.	127	95	14	9	6	3	15
Las Vegas, Nev.	144	90	34	17	2	1	9
Ogden, Utah	22	18	-	2	2	-	3
Phoenix, Ariz.	177	106	38	23	5	5	15
Pueblo, Colo.	31	23	5	1	1	1	4
Salt Lake City, Utah	92	63	15	7	6	1	8
Tucson, Ariz.	168	122	29	15	2	-	8
PACIFIC	1,684	1,132	300	162	56	31	123
Berkeley, Calif.	17	10	5	2	-	-	4
Fresno, Calif.	84	60	12	6	2	4	7
Glendale, Calif.	18	16	2	-	-	-	2
Honolulu, Hawaii	76	57	14	5	-	-	11
Long Beach, Calif.	89	58	21	6	2	2	12
Los Angeles, Calif.	422	248	92	52	21	6	17
Pasadena, Calif.	17	13	1	2	1	-	2
Portland, Oreg.	150	103	24	16	4	3	5
Sacramento, Calif.	168	117	27	13	6	5	17
San Diego, Calif.	167	107	27	21	5	7	21
San Francisco, Calif.	U	U	U	U	U	U	U
San Jose, Calif.	153	102	27	17	4	3	10
Santa Cruz, Calif.	31	25	2	2	2	-	3
Seattle, Wash.	162	114	24	17	7	-	2
Spokane, Wash.	61	45	12	1	2	1	6
Tacoma, Wash.	69	57	10	2	-	-	4
TOTAL	11,811[¶]	7,708	2,221	1,147	409	319	680

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

[†]Pneumonia and influenza.

[§]Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

[¶]Total includes unknown ages.

U: Unavailable.

Epidemic Cholera — Continued

The 56 case-patients selected for the study were similar in age and sex distribution to the 133 case-patients. Case-patients and controls had similar sources of water; 89% of both groups obtained water from a subterranean borehole well, and 25% reported obtaining water from a nearby river. Water was often stored for longer than 24 hours before consumption. Case-patients were more likely than controls to have noted contact of a household member's hands with water and were less likely to have reported boiling water; however, these findings were not statistically significant. No specific food—including dried fish, cucumbers, meat, or sadza (a cooked cereal-based staple food)—was associated with an increased risk of illness.

Although a specific source of the outbreak was not identified, one food appeared to be protective. Ten (18%) of 55 case-patients and 27 (50%) of 54 controls reported consumption of mahewu (matched OR=0.2; 95% CI=0.1–0.5), a porridge-like drink made of fermented cooked grain. Mahewu is made from porridge that is combined with malted sorghum flour and fermented for at least 12 hours before consumption. The resulting food is a thick liquid usually consumed the following day. Mahewu prepared in a Harare household and allowed to ferment for 18 hours had a pH of 3.8. Mahewu drinkers and nondrinkers did not differ significantly in consumption of other foods nor in source of drinking water.

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Editorial Note: In 1991, 21 African countries reported 153,367 cholera cases and 13,998 cholera-related deaths to the World Health Organization, representing 26% of all reported cases and 73% of cholera-associated deaths (*2*). However, surveillance data are incomplete in many countries, and the number of cases and deaths may be substantially underestimated. The 1991 cholera case-fatality rate of approximately 9% reported in Africa was lower than rates of 30%–50% reported in the 1970s but higher than the rate of 1% in Latin America.

Improving cholera surveillance and developing a coordinated response for epidemic cholera are high public health priorities in Africa. The first priority is to prevent cholera-associated deaths by providing vigorous rehydration therapy to affected persons (*3*). As of 1991, all African countries, except the Republic of South Africa, had developed a national plan to promote oral rehydration therapy for diarrheal illness (*4*). The proportion of childhood diarrheal episodes being treated with oral rehydration increased from an estimated 4% in 1984 to 40% in 1991 (*4*). The case-fatality rate of 2.7% reported from Rumonge suggests that rapid surveillance and aggressive and coordinated response by public health authorities to deliver adequate treatment to affected areas can prevent cholera-associated deaths.

Determination of the routes of cholera transmission is important in developing effective prevention measures. Because waterborne transmission of cholera in Africa has been associated with drinking untreated water from rivers and shallow wells (*5–7*), one strategy for preventing cholera is the provision of disinfected drinking

Epidemic Cholera — Continued

water to persons residing in areas at risk. Boiling water is effective but consumes scarce fuel wood and is difficult to sustain. Chlorination is the most widely used method for purifying municipal water supplies. Providing safe, treated water supplies also may prevent other waterborne diseases (e.g., typhoid fever, hepatitis, and other diarrheal illnesses in children).

Cholera also has been transmitted by the foodborne route in Africa. Because *V. cholerae* O1 is rapidly inactivated at acid pH levels, recipes that acidify food can be protective. Transmission has been documented through consumption of contaminated moist cooked grains that were held for several hours before eating (*5,7,8*) and through contaminated shellfish (*9*). The findings in Zimbabwe that mahewu was protective suggest that it was less likely to transmit foodborne cholera than other foods available in the community. In laboratory studies, mahewu has inactivated a variety of enteric bacterial pathogens (*10*). The demonstrated safety of some traditional foods suggests prevention measures that can be recommended and implemented immediately and have particular relevance where fermented gruels are used as traditional weaning foods for young children.

Efforts to control cholera epidemics in Africa and elsewhere by mass chemoprophylaxis, vaccination campaigns, roadblocks, and broad embargoes on commodities have been ineffective and have diverted scarce resources away from the critical activities of providing treatment and improving the safety of water and food supplies. Adequate surveillance can guide the rational distribution of treatment and prevention supplies. Rapid and thorough investigation of outbreaks can identify unsuspected sources of the infection, can assess the adequacy of treatment, and are essential to development of future prevention efforts.

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Epidemiologic Notes and Reports

Ciguatera Fish Poisoning — Florida, 1991

Twenty cases of ciguatera fish poisoning from consumption of amberjack were reported to the Florida Department of Health and Rehabilitative Services (HRS) in August and September 1991. This report summarizes the investigation of these cases by the Florida HRS.

On August 9, the Florida HRS was notified of eight persons who developed one or more of the following symptoms: cramps, nausea, vomiting, diarrhea, and chills and sweats within 3–9 hours (mean: 5 hours) after eating amberjack at a restaurant on August 7 or August 8; duration of symptoms was 12–24 hours. Three persons were hospitalized. By August 12, patients began to report pruritus of the hands and feet, paresthesia, dysesthesia, and muscle weakness. Based on initial food histories, the Florida HRS suspected consumption of amberjack as the source of illness. On Aug ust 14, three additional persons with similar symptoms who also had eaten amberjack at the restaurant on August 8 were reported.

Results of cultures of stool and vomitus samples from the hospitalized persons were negative for *Salmonella*, *Shigella*, *Campylobacter*, and *Yersinia*. No cooked amberjack was available from the same lot from the restaurant for further testing. Although minor sanitation and safety violations were observed at the restaurant, they did not appear related to the outbreak. Because of the unique symptomology and common denominator of amberjack, investigators suspected either scombroid or ciguatera poisoning.

The shipment of amberjack was traced to a seafood dealer in Key West, Florida, who had distributed the fish through a dealer in north Florida. The second dealer subsequently had sold the fish to the restaurant, another restaurant in Alabama, and a third dealer who sold the fish to two grocery stores in Alabama and north Florida. On August 20 and on September 20, the Florida HRS received reports of additional suspected cases among persons who had bought amberjack at the Alabama grocery store (six persons) and at the grocery store in north Florida (three), respectively.

The Food and Drug Administration evaluated 19 amberjack samples believed to have originated from a single lot from the Key West dealer and obtained from restaurants and grocery stores in Florida and Alabama for ciguatera-related toxin. Forty percent of the specimens tested by mouse bioassay were positive for ciguatera-related biotoxins.

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Editorial Note: Ciguatera is a naturally, sporadically occurring fish toxin that affects a wide variety of popularly consumed reef fish; ciguatera becomes more bioconcentrated as it moves up the food chain. Ciguatera and related toxins are derived from dinoflagellates, which herbivorous fish consume while foraging through macro-algae (*1*). Larger predator reef fish (e.g., barracuda, grouper, amberjack, surgeon fish, sea bass, and Spanish mackerel) have been implicated in previous outbreaks (*2,3*).

Ciguatera Fish Poisoning — Continued

Humans ingest the toxin by consuming either herbivorous fish or carnivorous fish that have eaten contaminated herbivorous fish (*4,5*). The toxin is tasteless, and because it is heat-stable, cooking does not render the fish safe for consumption. As in this outbreak, ciguatera fish poisoning is diagnosed by the characteristic combination of gastrointestinal and neurologic symptoms in a person who eats a suspected fish (*6,7*). The diagnosis is supported by detection of ciguatoxin in the implicated fish. No specific, effective treatment for ciguatera fish poisoning has been proven; supportive treatment is based on symptoms (*4,7*).

Further study of seafood toxins is required to develop routine detection tests for the fishing industry, diagnostic tests to evaluate clinical cases, and effective treatment for persons who ingest ciguatera toxins.

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Notice to Readers

Use of Bleach for Disinfection of Drug Injection Equipment

On April 19, 1993, the National Institute on Drug Abuse of the National Institutes of Health, the Center for Substance Abuse Treatment of the Substance Abuse and Mental Health Services Administration, and CDC issued a joint bulletin updating recommendations to prevent transmission of human immunodeficiency virus (HIV) through the use of bleach for disinfection of drug injection equipment. The bulletin particularly addresses persons who cannot or will not stop injecting drugs. This bulletin states that 1) bleach disinfection of needles and syringes continues to have an important role in reducing the risk for HIV transmission for injecting-drug users who reuse or share a needle or syringe; and 2) sterile, never-used needles and syringes are safer than bleach-disinfected, previously used needles and syringes. The bulletin contains provisional recommendations for the use of bleach to disinfect needles and syringes (including the recommendation for the use of full-strength household bleach to disinfect needles and syringes).

CDC recommendations for disinfecting environmental surfaces contaminated with blood are unchanged. The CDC recommendation for disinfecting environmental surfaces continues to include use of a 1:100 dilution of household bleach (or ¼ cup bleach to 1 gallon tap water) or other appropriate disinfectants (*1*).

Notice to Readers — Continued

The difference in the recommended concentrations of bleach reflects the difficulty of cleaning the interior of needles and syringes and the use of needles and syringes for parenteral injection. Thorough cleaning is an important step in the disinfection process. Disposable syringes and needles are not intended for reuse and, because of their configuration, are extremely difficult to clean thoroughly. In addition, the needles and syringes will be used for parenteral injection. For these reasons, full-strength bleach is recommended for the disinfection of needles and syringes.

Copies of the bulletin are available from the CDC National AIDS Clearinghouse, telephone (800) 458-5231 or the National Clearinghouse for Alcohol and Drug Abuse Information, telephone (800) 729-6686.

Reported by: National Institute on Drug Abuse, National Institutes of Health. Center for Substance Abuse Treatment, Substance Abuse and Mental Health Svcs Administration. Office of the Associate Director HIV/AIDS, Office of the Director; Div of Sexually Transmitted Diseases and HIV Prevention, National Center for Prevention Svcs; Hospital Infections Program, and Div of HIV/AIDS, National Center for Infectious Diseases; National Institute for Occupational Safety and Health, CDC.

Reference

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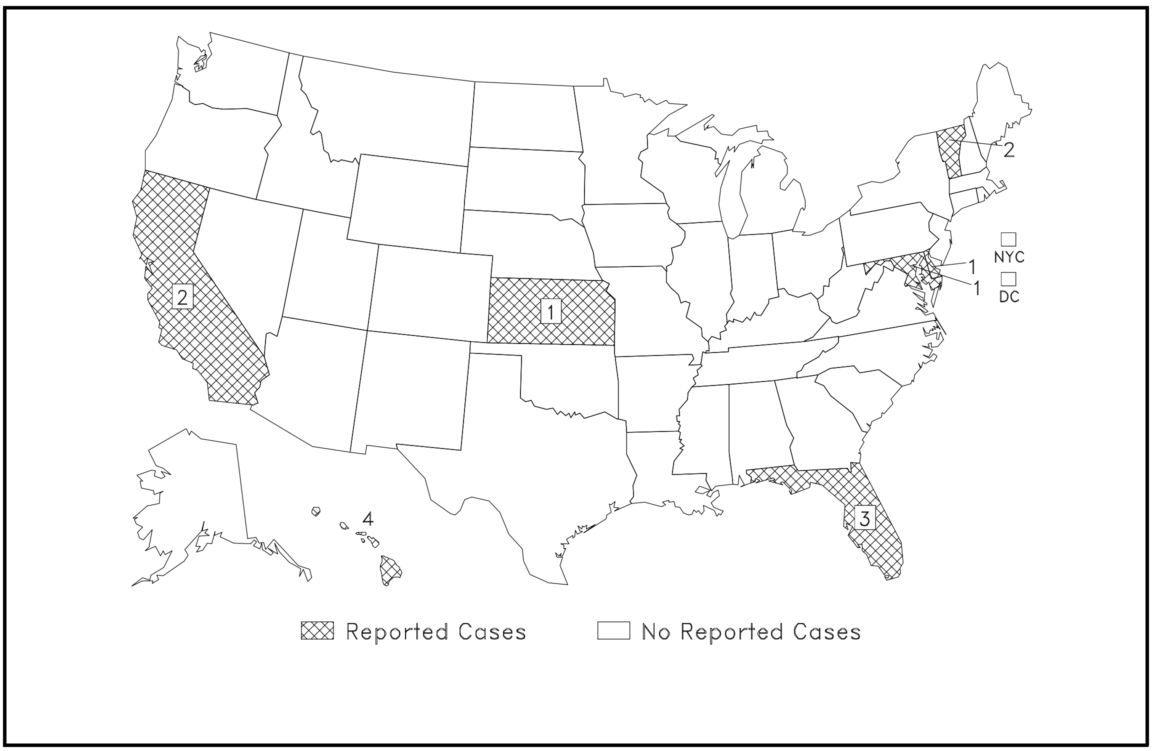
Reported cases of measles, by state — United States, weeks 17–20, 1993



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