REPORT NO. 14
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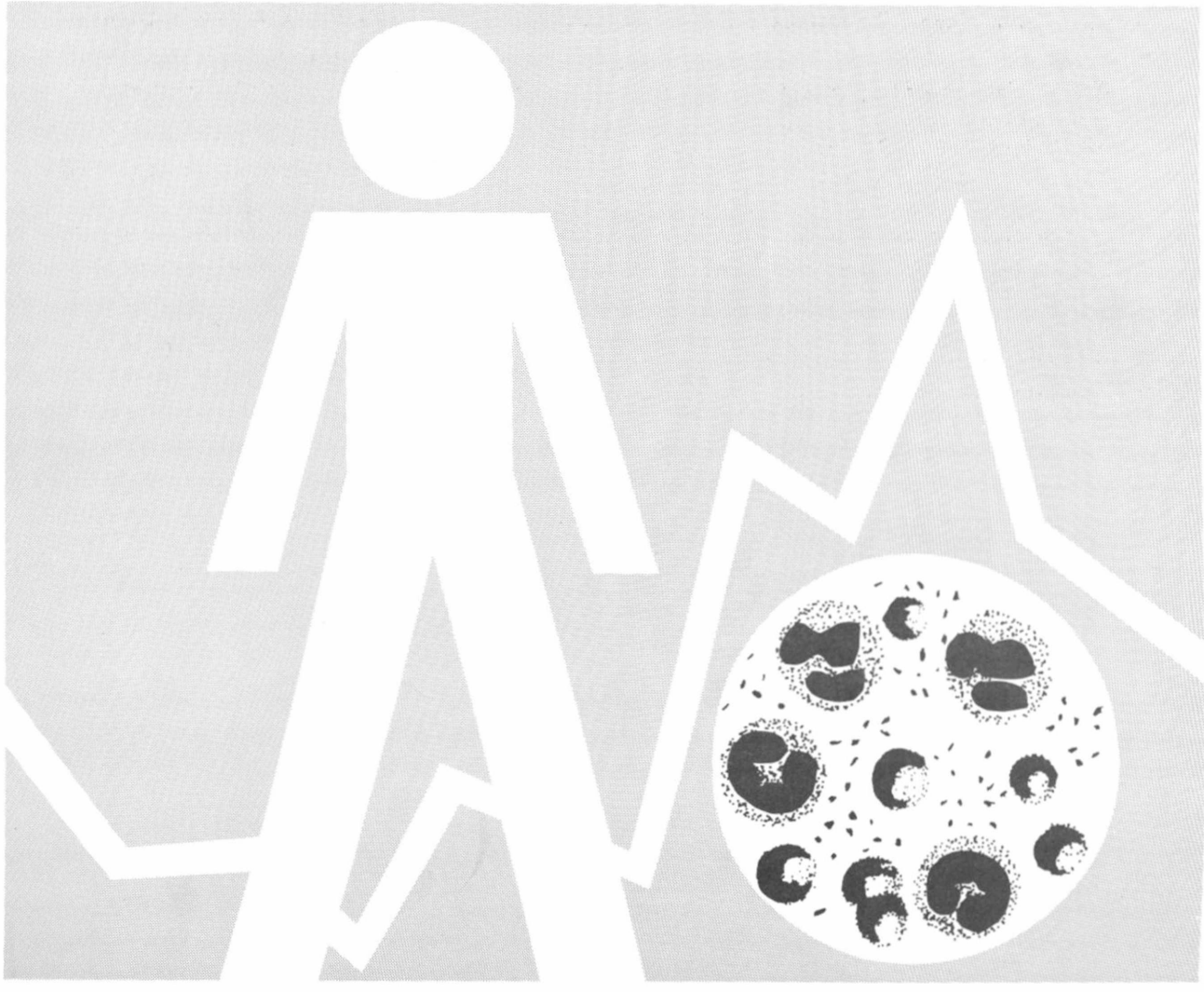
national communicable disease center

SHIGELLA

surveillance

TABLE OF CONTENTS
for the
First and Second Quarters 1967



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE : PUBLIC HEALTH SERVICE
BUREAU OF DISEASE PREVENTION AND ENVIRONMENTAL CONTROL

PREFACE

This report summarizes data voluntarily reported from participating state, territorial, and city health departments. Much of the information is preliminary.

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TABLE OF CONTENTS

I. Summary

A total of 4,849 isolations of shigella from humans were reported by the 54 reporting centers during the first 6 months of 1967 (Table I). This number was a 24.8 percent decrease from the 6,448 isolations reported during the last 6 months of 1966 and a 22.6 percent increase over the 3,955 isolations reported during the first half of 1966.

II. Reported Isolations

A. Human

1. General Incidence

The seasonal pattern (Figures 2 and 3) continued as in past years; these figures are based on reports from the centers which have been reporting since January 1964.

During the first half of 1967, 69.7 percent of isolations of shigella were from children under 10 years of age (Table IV); this is consistent with the distributions of previous reports. There was no apparent sex predilection seen in this period. The regional distribution continued as in the past (Figure 1).

2. Serotype Frequencies

Fifty-one of the fifty-four reporting centers now participating in the Shigella Surveillance Program reported isolations of shigella from humans; 22 different serotypes were reported.

The six most frequently reported serotypes during the first 6 months were the following:

Rank	Serotype	Number Reported	Calculated Number*	Calculated Percent	Rank Last Half
1	S. sonnei	2360	2378	49.0	1
2	S. flexneri 2a	592	994	20.5	2
3	S. flexneri 3a	156	473	9.8	3
4	S. flexneri 4a	150	293	6.0	5
5	S. flexneri 6	219	267	5.5	4
6	S. flexneri 2b	88	148	3.1	6
Subtotal		3565	4553	93.9	
Total (all serotypes)		4849	4852		

* from Table II

Tables II and III, calculated from data compiled during the first half of 1967 and from data compiled since the beginning of the Shigella Surveillance Program in October 1963 respectively, show the relative importance of the various serotypes. In these tables the isolations in each of the unspecified categories have been distributed in their subgroups in the same proportions as the completely specified isolations of that group. The resulting distributions in these tables are called the "calculated number," and from these are derived a "calculated percent" for each serotype. These provide approximate indices of the relative frequencies of the more common shigella serotypes in the United States.

3. Geographical Observations: Attack Rates for the General Population

Figures 4 and 5 portray attack rates per state per semiannum, utilizing 1965 census data as the denominator. Reflecting seasonal trends, the attack rates are generally lower in the first half of 1967 as compared to the last half of 1966, and each state tends to follow a consistent pattern over the two periods. The degree to which this reflects differences in actual amount of shigellosis or in completeness of reporting from individual states cannot be determined. The overall U.S. attack rate was 25.0 cases per million for the first 6 months of 1967, as compared to 33.3 cases per million for the last half of 1966 and 20.4 cases per million for the first half of 1966.

A regional difference exists in shigella isolations with a significantly higher percentage of S. flexneri isolations in the South than in the North. In the southern states S. flexneri has accounted for about two-thirds of the shigella isolations.

Shigella flexneri has an apparent seasonal pattern which is more evident in the southern states as is shown in Figure 3. This figure was prepared from data from only 15 states in order that comparison could be made with 1964, 1965, and 1966 data, when only 17 states were reporting. Of these 17, Alaska and Hawaii were excluded since they are not among the contiguous states.

4. Shigellosis on Indian Reservations and Mental Institutions

Table V presents cases that were reported by the states to be in mental hospitals and Indian reservations at the time of onset of shigellosis. Over half of the total reported isolates were from persons whose residences were not specified in the state reports.

Supplemental data have been made available by the Division of Indian Health, U.S. Public Health Service, concerning cases of shigellosis on Indian reservations. These reports are preliminary and should not be quoted without permission of the Division of Indian Health. Cases and attack rates for various reservations are presented in Table VI. Population estimates for 1967 were used for the denominators. Figure 6 portrays attack rates by reservations.

There is a discrepancy between isolates from cases on reservations reported by the states (54 isolations - Table V) and cases reported by the Division of Indian Health (380 isolations - Table VI). Apparently many cases of shigellosis which occur among Indians are not reported to the states or are not specified as being among Indians on the state reports to the NCDC.

The overall reported attack rate among Indians, 97.6 per 100,000, is 39 times the reported attack rate for the whole U.S. population, 2.5 per 100,000, for the first 6 months of 1967.

B. Nonhuman

There were 16 nonhuman isolations of shigella reported during the first 6 months of 1967:

Serotype	Number	Source	Reporting Center
S. flexneri 2	2	Lab animal	Oklahoma
S. flexneri 2a	1	Stock culture	Texas
S. flexneri 3	5	Monkeys (3)	Maryland (4)
		Lab animal (2)	Utah (1)
S. flexneri 3c	1	Monkey	Louisiana
S. flexneri 4	1	Monkey	Ohio
S. flexneri 4a	2	Monkey	California
S. flexneri 4b	1	Monkey	Illinois
S. flexneri 6	1	Lab animal	Georgia
S. sonnei	2	Monkey	Illinois
Total	16		

III. Current Investigations

Shigellosis in Denver, Colorado, an investigation of a possible relationship between eggs and shigellosis. Reported by Dr. R. L. Cleere, Director, State Department of Public Health, Dr. C. S. Mollohan, State Epidemiologist, and Dr. Gordon Reid, EIS Officer, Denver, Colorado.

As part of routine surveillance of shigellosis, Colorado public health officials include a question in their investigations about the use of cracked or checked eggs by individuals affected with shigellosis. This was prompted by the isolation of Shigella sonnei I from turkey droppings used as cattle feed in February 1965. Alerted by this finding, a survey of checked (cracked) eggs was conducted in Denver in which six pool samples were cultured. Three isolates of Shigella flexneri 2b were obtained from two pools of checked eggs from egg wholesalers and one from freshly broken liquid whole eggs from a grocery store. Additional studies during 1965 revealed six more isolates of S. sonnei I and two isolates of S. sonnei II from checked eggs, frozen whole eggs, and fresh whole liquid eggs. Cultures taken from a hennery revealed an isolation of S. sonnei I from water used to flush chicken cages and S. flexneri 6 from a drainage ditch leading from the hennery. A chicken feed mixture was positive for S. sonnei I,and on another occasion S. flexneri 4a was found at the same hennery. Shigella flexneri 3 was isolated from another chicken feed source. Thus, an awareness of the possible association of shigella with fowl and fowl products led to studies that resulted in 17 isolates representing six serotypes from various fowl-associated sources, including products commercially available. There were no known cases of disease attributable to these sources.

By state law, effective in mid-1966, cracked eggs can be sold only in a pasteurized liquid form to bakeries and other volume consumers. However, checked eggs, which have a cracked shell but intact membrane, can be sold commercially to groceries and individuals.

In November and the first 2 weeks of December 1966, 62 cases of shigellosis were reported, mainly from Denver. Of these, 27 denied use of cracked, checked, or powdered eggs during the preceding 6 months. Three had used checked eggs, each from a separate grocery and each more than 4 months previously.

During the first 6 months of 1967, Colorado reported 194 cases of shigellosis, 58 percent of which came from the Denver General Hospital. Of the reports available for review, there was still insufficient information available to permit meaningful interpretation as to the relationship of eggs and shigellosis. Further evaluation of the significance of cracked eggs in the etiology of shigellosis is currently under review (see Shigella Surveillance Reports No. 9 and 10).

IV. Reports from the States

A. Neighborhood shigellosis in Earlsboro, Oklahoma. Reported by Dr. A. B. Colyar, Commissioner, State Department of Health, Dr. R. LeRoy Carpenter, Assistant Chief, Communicable Disease Control and Laboratory Services, and Dr. Ira Kassanoff, EIS Officer, Division of Epidemiology, State Department of Health, Oklahoma City, Oklahoma.

In late December 1966, two cases of shigellosis were reported in three family members, one of whom was a food handler who had been relieved from work in a local school cafeteria until stool cultures were negative. Over the next month several more cases occurred in four other families, all of whom were close friends of the first family and shared living, eating, and sanitary facilities. There were 27 family members in all with 18 stool cultures subsequently positive for Shigella flexneri 2a. There was no other epidemiological information available other than that the water supply was bacteriologically within acceptable limits.

Six of the isolations were from symptomatic individuals. Five of these were treated with antimicrobial agents, and two were lost to further investigation. Of the four remaining for follow-up, all had two or three negative cultures after therapy. There were 11 carriers treated among a total of 12, with at least 1, and usually 2 or 3, subsequent negative stool cultures. One of the nine contacts was treated for a Salmonella infantis infection.

Antimicrobial treatment consisted of sulfadiazine, triple sulfa, tetracycline, or various combinations of these agents. In six instances therapy was initiated with a sulfa compound but was changed to tetracycline when cultures remained positive.

B. Outbreak of shigellosis in a nursing home. Reported by Dr. A. B. Colyar, Commissioner, State Department of Health, Dr. R. LeRoy Carpenter, Assistant Chief, Communicable Disease Control and Laboratory Services, and Dr. Herschell King, EIS Officer, Division of Epidemiology, State Department of Health, Oklahoma City, Oklahoma.

In March and April 1967, three separate diseases occurred in a nursing home for mentally retarded teenagers and adults in Nowata, Oklahoma. From March 18 to March 21, 37 of the total 49 patients developed a nonfebrile illness characterized by a maculopapular rash of the face, neck, chest, and upper extremities. It lasted 24-48 hours. Stool isolations have tentatively identified an ECHO 4, 11, or 14 virus as the causative agent.

On March 19, one patient was diagnosed as having infectious hepatitis, and by March 24, all patients and employees had received prophylactic immune globulin.

Approximately March 25, 38 patients developed a nonfebrile diarrheal illness. They were treated with an antidiarrheal agent and chloramphenicol for 48 hours. Stools were loose but not watery and did not exceed three per day in any patient. One of 13 stool cultures obtained at this time grew Shigella sonnei. On March 27, the individual from whom this culture was obtained developed a more severe diarrhea. From April 4-16, six more patients developed diarrhea. Two of these had mild illness without fever; their stool cultures were negative. The remaining four patients had more severe disease with frequent stools and high fever, their stool cultures grew S. sonnei. Three of these patients were treated with chloramphenicol and recovered. However, the fourth person had protracted vomiting, more than 14 stools daily, and a temperature of 104°F. She eventually died in shock, without specific therapy.

No systematic cultural survey was performed on patients or employees. It was felt that transmission occurred by close personal contact.

C. Shigellosis in Syracuse, New York. Reported by Dr. Harry A. Feldman, Professor of Preventive Medicine, Upstate Medical Center, State University of New York. Dr. Howard H. Volan, Director, Bureau of Communicable Disease, Syracuse City Health Department, and Dr. Sheldon Greenfield, EIS Officer, Department of Preventive Medicine, State University of New York, Upstate Medical Center.

In early February 1967, two children, ages 4 and 5 years, were admitted to Syracuse City Hospital with diarrheal disease due to Shigella flexneri. Investigation of the family of the first child revealed that all six members had had diarrheal disease at varying times in the preceding month. Stool cultures on February 16, 1967, grew S. flexneri from five of the six people. The organism was subsequently identified as serotype 3a by the State Laboratory in Albany.

The second hospitalized child developed diarrhea one day following contact with a child in the first family. During the following week, three of four members of this family had diarrhea; all three had stool cultures positive for the same organism.

The mother of the first family stated that for the preceding 6 months she had visited her cousin almost daily. This cousin's family was involved in an earlier outbreak of shigellosis in September 1966. However, at that time S. flexneri 4b was the implicated bacterium. Repeat cultures of the cousin's family on February 17, 1967, were all negative for shigella.

A common source could not be incriminated for the February outbreak involving 9 of 10 people in two families. It was felt that the most likely mode of spread was person-to-person contact, possibly initiated by a carrier from the family in which cases occurred in September. The change in serotype from September to February, however, did not support this theory.

V. Current Trends and Developments

Carrier State in Shigellosis

One of the mental institutions our group has been working with has seemingly eliminated its decade-old shigellosis problem. This has apparently come about as a result of a concerted effort to find carriers, to isolate them so long as they continue to excrete shigella, and to treat them intensively with antibiotics until cured. The emphasis on carriers in the dissemination of shigella has prompted this review.

Carriers of shigella can be divided into three categories; asymptomatic, convalescent, and chronic. Carrier rates in healthy populations vary with locality, season, and age. Generally, the rates are low but have varied from 0.5 to 11 percent in various series[1,2,3]. Hardy and Watt[2] found highest rates in June - August and lowest rates in January and that children aged 1-9 years had prevalence rates twice as high as other age groups. There was no significant difference in carrier rates between sexes.

Carrier rates in healthy contacts of cases of shigellosis are much higher. A cultural survey of families of school children ill with shigellosis showed that 50 percent of family contacts were infected and 16 percent of these were ill[4]. Likewise, healthy individuals in an area endemic for shigellosis have high carrier rates. Hardy and Watt found that the usual carrier rates per year in institutions for the mentally retarded were 70-80 per 100 inmates[5].

The chronic carrier state, defined as the carrying of shigella for a year or more, is quite rare in shigellosis and is probably less important in its epidemiology. Although Perry[6], who cultured British soldiers during World War I, reported that 4 percent of the men ill with S. sonnei and 7 percent ill with S. flexneri carried the organism for one year, it is difficult to see how he could have excluded reinfection. There have been many reported instances of multiple infections (with and without symptoms) with the same serotype in the same individual (sometimes called "relapsing carrier"). Hardy and Watt[5] recorded only one individual who carried shigella for more than a year, as did Manson-Bahr[1].

It is generally agreed that the convalescent carrier state is important in the epidemiology of shigellosis. Various studies have reached different conclusions as to its duration, which varies with general health of the individual, serotype, and antibiotic regimen. Neter[7], quoting Fletcher, states that invalids in his study carried shigella longer than did those in good health. Similarly, Mata[8], in following institutionalized Guatemalan children, thought that malnutrition prolonged the carrier state, as well as the clinical course of shigellosis.

Hardy and Watt[5] followed 103 untreated subjects with proven shigellosis, 20 percent of whom carried shigellae only when ill. Eighty percent became convalescent carriers who continued to excrete shigella for an average of 34 days. By one month 70 percent of those with S. sonnei were negative, but only 40 percent of those with S. flexneri were negative. Ten percent of all subjects still had shigella in their stools at ten weeks, when the study was terminated.

Van Gelder[9] followed 67 Navy men after epidemics aboard a ship. Some had negative periods as long as ten days between positive cultures. Even in persistent carriers, only 50 percent of their stool cultures yielded shigellae. Sixteen percent still carried the organism after two months.

Philbrook[10] serially cultured 14 symptomatic patients and 46 asymptomatic carriers after an epidemic on a ship. His study was conducted in a naval hospital, thus minimizing, but not eliminating the chances of reinfection. Seventy percent of the men had shigellae in their stools at sometime during the follow-up, which extended for more than five months. None of the 60 subjects followed closely (at least five cultures weekly) became negative before one month, only five within two months, and only 32 (53 percent) within three months. Seven of the men (one of the cases and six carriers) carried the organism for an average of 145 days in spite of streptomycin and sulfa drug therapy. Philbrook was unable to state how many consecutive negative cultures are necessary to be certain of a bacteriologic cure. An important finding was that if individuals had been released on the basis of 10 consecutive negative stool cultures, more than half of them would have later shed the organism. This raises the question of the adequacy of our present public health practice of requiring three negative cultures before considering a case cured.

It should be stressed that both Van Gelder and Philbrook were dealing with S. flexneri, which, most investigators feel, is characterized by longer duration and "intermittency" of the carrier state. Also, it is likely that the carrier states in both these studies could have been shortened if more adequate antibiotic treatment had been available.

Garfinkel's[11] study in prisoners of war in Korea has been quoted by some who advocate short-term chemotherapy for shigellosis. He followed his patients two weeks after completion of therapy, and he took only four stool cultures during this period. Even in his untreated group, 71 percent were negative one week after the cessation of symptoms. The brevity of the carrier state in this study stands in contrast to the findings of other workers quoted above, but this is undoubtedly due to methodology and limited follow-up in Garfinkel's study.

Appropriate antibiotic treatment of shigellosis does seem to shorten the carrier state. Nelson[12,13], who studied the efficacy of ampicillin in the treatment of shigellosis in a double-blind study found that 100 mg/kg/day for five days was effective in eliminating shigellae rapidly. "All patients treated with ampicillin were followed for at least one month. In that time not one had become a shigella carrier and there was only one relapse (or reinfection)." Recent appearance of ampicillin resistant strains in some institutions is disquieting.

The importance of increasing resistance of shigellae to various antimicrobial agents has been repeatedly emphasized in the recent literature. Hardy[14] in 1946 reported that none of 131 S. flexneri strains and only 20 percent of 139 S. sonnei strains were resistant to sulfadiazine. By 1964, Abe[15] reported that 90 percent of 2,716 shigella strains were resistant to sulfa drugs. A similar, although somewhat less impressive, increase in resistance to other antibiotics has been noted by numerous authors[16]. It is therefore important to determine the antibiotic sensitivity pattern of individual isolations.

In conclusion, asymptomatic and convalescent carriers are undoubtedly important in the epidemiology of shigellosis. It is known that untreated or improperly treated patients carry shigella in their stools intermittently for weeks or months, but that adequate antibiotic treatment can eliminate shigellae rapidly in most cases. It is also probable that treatment of asymptomatic carriers will diminish spread of shigellosis.

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TABLE I
SHIGELLA SEROTYPES ISOLATED FROM HUMANS
FIRST HALF 1967

SEROTYPE	NORTHEAST																											NORTHWEST													North Total
	Conn	Del	DC	Ill	Ind	Iowa	Ky	Me	Md	Mass	Mich	Minn	Mo	NH	NJ	NY-A	NY-B	NY-C	Ohio	Pa	RI	Vt	Va	W. Va	Wisc	Northeast Total	Colo	Idaho	Kans	Mont	Neb	Nev	ND	Ore	SD	Utah	Wash	Wyo	Northwest Total	
A. S. dysenteriae Unspecified			1																							1														1
1																																								
2	1			14																						15														15
3																																								
4																																								
5																																								
6																																								
7																																								
8																																								
9																																								
10																																								
3570-50																																								
Variant R.																																								
Total	1		1	14																						16														16
E. S. flexneri Unspecified		1	9	1	13	4	3			1			1	2		20		216		1	1		3		12	288	2			1	1	1	3	11	11			30	318
1 Unspecified								2				1	2													5									1	2		3	8
1a				3																						3				7								7	10
1b				2																						2	8												10
2 Unspecified									24	4	3	3							14	4			1			53	1						3			1	3	8	61
2a	5			109							2	1	4		4								1			126	5	7	4	6		1	8					31	157
2b				25											1											26	6											6	32
3 Unspecified																																								
3a				16					13	1	11	2							3	4						50	3									4	9	16	66
3b				30								1			2											33													33
3c											1															1														1
4 Unspecified											1	17							1							19										3		3	22
4a				5							1		1													7	7		2	2								11	18
4b																																								
5				6											2											8	1											1	9
6	1			11					3	1	6	1	2		1											26	34			2						1		37	63
Variant X																																								
Variant Y																																								
Variant R																																								
Total	6	1	9	208	13	4	3	2	40	7	25	26	10	2	10	20		216	18	9	1		3	2	12	647	67	7	6	18	1	2	14	11	11	9	15		161	808
C. S. boydii Unspecified				1												3		1					1			6								1					1	7
1																																								
2													1													1		1										1	2
3																											1											1	1
4																																								
5																																								
6																											1											1	1
7																																								
8																																								
9																											1											1	1
10																																								
11																																								
12																																								
13																																								
14																																								
15				1																						1														1
3615-53																																								
2710-54																																								
1621-54																																								
Variant R.																																								
Total				2									1			3		1					1			8	3	1						1					5	13
D. S. sonnei	33	1	20	168	8	17	2	1	59	93	157	78	52	7	8	164		154	44	69	27		5		27	1,194	124			4	4			40	1	9	182		364	1,558
Unknown			8	1																					13	22							8	3				11	33
untypable																																								
Grand Total	40	2	38	393	21	21	5	3	99	100	182	104	63	9	18	187		371	62	78	28		9	2	52	1,887	194	8	10	22	1	2	22	55	12	18	197		541	2,428

TABLE I (CONTINUED)
SHIGELLA SEROTYPES ISOLATED FROM HUMANS
FIRST HALF 1967

SOUTHEAST										SOUTHWEST					SOUTH	OTHER				Total	Percent of Total	PREVIOUS HALF		SEROTYPE
Ala	Ark	Fla	Ga	La	Miss	NC	SC	Tenn	Southeast Total	Ariz	NM	Okla	Tex	Southwest Total	Total	Alaska	Calif	Hai	Virgin Isl	Other Total			Total	Percent of Total	
						2			2		4			4	6						7	0.1	18	0.3	A. S. dysenteriae Unspecified
	1	3							4				5	5	9		2			2	26	0.5	2	0.03	1
																	2			2	2	0.04	30	0.5	2
																							5	0.08	3
																									4
																									5
																									6
																	1			1	1	0.02	1	0.02	7
																									8
																									9
																									10
																									3573-50 Variant R.
	1	3				2			6		4		5	9	15		5			5	36	0.7	56	0.9	Total
16	14				16	22	1		69	2	11	1	3	17	86	2				2	406	8.4	559	8.7	B. S. flexneri Unspecified
		2	8		1			2	13		15	1	1	17	30						38	0.8	45	0.7	1 Unspecified
	1	1		3					4	2			1	3	7		16			16	33	0.7	61	0.9	1a
									1	4			4	8	9		12			12	31	0.6	35	0.5	1b
	6	75	47		1	10		14	153	3	21	16	1	41	194	3				3	258	5.3	550	8.5	2 Unspecified
	11			23					34	30		24	118	172	206		116	113		229	592	12.2	746	11.6	2a
	1			4					5	1			32	33	38	2	16			18	88	1.8	61	0.9	2b
	3	19	76		1	3		9	111	4	22		2	28	139	3	39	6		48	253	5.2	428	6.6	3 Unspecified
	5			7					12	3			108	111	123						156	3.2	126	2.0	3a
													10	10	10		1			1	11	0.2	13	0.2	3b
									1				1	1	2						3	0.06	18	0.3	3c
	2	18	2	1				10	32	2	34			36	68		3			3	93	1.9	140	2.2	4 Unspecified
	4	1		5					10	17			66	83	93		39			39	150	3.1	193	3.0	4a
										4				4	4						4	0.08	3	0.05	4b
	1								1	4			5	9	10		19			19	38	0.8	43	0.7	5
	1	33	9	4				6	53	14	18		21	53	106	9	41			50	219	4.5	358	5.6	6
																									Variant X
																									Variant Y
																									Variant R
16	49	149	142	47	19	35	1	41	499	90	121	42	373	626	1,125	19	302	119		440	2,373	48.9	3,379	52.4	Total
											4		1	5	5						12	0.2	13	0.2	C. S. boydii Unspecified
													1	1	1						1	0.02	3	0.05	1
		4	1					1	6				8	8	14		3			3	19	0.4	28	0.4	2
																					1	0.02			3
										1			1	2	2		6			6	8	0.2	3	0.05	4
																					1	0.02			5
																									6
																					1	0.02			7
																									8
																									9
																									10
																									11
																									12
																					1	0.02	1	0.02	13
																									14
																									15
																									3615-53
																									2710-54
																									1621-54
																									Variant R
		4	1					1	6	1	4		11	16	22		9			9	44	0.9	48	0.7	Total
9	13	136	150	34	4	20		43	409	14	8	34	117	173	582		94	125	1	220	2,360	48.7	2,912	45.2	D. S. sonnei
							3		3						3						36	0.7	52	0.8	unknown
																							1	0.02	untypable
25	63	292	293	81	23	57	4	85	923	105	137	76	506	824	1,747	19	410	244	1	674	4,849		6,448		Grand Total

TABLE II

Relative Frequencies of Shigella Serotypes
Reported During First Half 1967

	Serotype	Number Reported	Calculated Number*	Calculated Percent	Rank
A.	*S. dysenteriae*				
	2	26	33	.68	10
	3	2	3	.06	15
	9	1	1	.02	16
	unspecified	7			
B.	*S. flexneri*				
	1a	33	64	1.32	7
	1b	31	60	1.24	8
	1 unspecified	38			
	2a	592	994	20.49	2
	2b	88	148	3.05	6
	2 unspecified	258			
	3a	156	473	9.75	3
	3b	11	33	.68	10
	3c	3	9	.19	13
	3 unspecified	253			
	4a	150	293	6.04	4
	4b	4	8	.16	14
	4 unspecified	93			
	5	38	46	.95	9
	6	219	267	5.50	5
	unspecified	406			
C.	*S. boydii*				
	1	1	1	.02	16
	2	19	26	.54	11
	3	1	1	.02	16
	4	8	11	.23	12
	6	1	1	.02	16
	9	1	1	.02	16
	14	1	1	.02	16
	unspecified	12			
D.	*S. sonnei*	2360	2378	49.01	1
	unknown	36			
	Total	4849	4852	100.01	

* Calculated Number is derived by distributing the unspecified isolations in each group to their subgroups in the same proportions as the distribution of the specified isolations of that group.

TABLE III

Relative Frequencies of Shigella Serotypes
Cumulated from Fourth Quarter 1963 to Present

Serotype	Number Reported	Calculated Number*	Calculated Percent	Rank
S. dysenteriae				
1	3	4	0.01	21
2	109	152	0.50	13
3	25	35	0.12	15
6	1	1	0.00	24
9	2	3	0.01	22
unspecified	54			
S. flexneri				
1a	299	619	2.05	7
1b	225	466	1.55	8
1 unspecified	373			
2a	3206	7559	25.06	2
2b	430	1014	3.36	6
2 unspecified	3453			
3a	601	3064	10.16	3
3b	54	275	0.91	10
3c	69	352	1.17	9
3 unspecified	2328			
4a	806	1848	6.13	4
4b	41	94	0.31	14
4 unspecified	759			
5	143	173	0.57	12
6	1525	1844	6.11	5
variant y	17	21	0.07	17
unspecified	2863			
S. boydii				
1	6	9	0.03	19
2	116	179	0.59	11
3	1	2	0.01	23
4	20	31	0.10	16
5	3	5	0.02	20
6	2	3	0.01	22
7	1	2	0.01	23
8	1	2	0.01	23
9	2	3	0.01	22
10	11	17	0.06	18
11	1	2	0.01	23
12	1	2	0.01	23
14	3	5	0.02	20
unspecified	89			
S. sonnei	12,275	12,372	41.02	1
untypable	5			
unknown	232			
Total	30,155	30,158		

* Calculated Number is derived by distributing the unspecified isolations in each group to their group in the same proportion as the specified isolations of that group.

Table IV

Age and Sex Distribution of Individuals Infected with Shigellae in the United States During the First Half 1967

Age (Years)	Male	Female	Unknown	Total	Percent	Cumulative Percent
<1	120	111	2	233	7.1	7.1
1 - 4	636	639	8	1283	38.9	46.0
5 - 9	396	385	1	782	23.7	69.7
10 - 19	228	203	2	433	13.1	82.8
20 - 29	77	174	1	252	7.6	90.4
30 - 39	53	94		147	4.5	94.9
40 - 49	26	41		67	2.0	96.9
50 - 59	15	22		37	1.1	98.0
60 - 69	12	25		37	1.1	99.1
70 - 79	9	12		21	.6	99.7
80 +	6	4		10	.3	100.0
Subtotal	1578	1710	14	3302		
Child (unspec.)	19	24	1	44		
Adult (unspec.)	72	25	4	101		
Unknown	600	674	128	1402		
Total	2269	2433	147	4849		
Percent of Total	48.3	51.7				

TABLE V

Cases by Residence at Time of Onset, January - June, 1967

	Jan	Feb	March	April	May	June	Total
Cases in Mental Institutions	115	101	109	106	109	52	592
Cases on Indian Reservations	15	13	13	1	6	6	54
Cases from Other Residences	-	-	-	-	-	-	1682
Cases from "Unknown" Residences	-	-	-	-	-	-	2521
Grand Total	-	-	-	-	-	-	4849

TABLE VI

Attack Rates per 100,000 (Division of Indian Health Data*)
January - June 1967

Area	Isolations	Population	Attack Rate/100,000
ABERDEEN AREA (Neb., N.D., S.D.)	44	41,200	106.8
North Dakota			
Belcourt	5	5,100	98.0
Ft. Yates	6	4,200	142.9
South Dakota			
Eagle Butte	6	3,450	173.9
Pine Ridge	25	8,350	299.4
Rapid City	1	2,700	37.0
Wagner	1	2,000	50.0
BEMIDJI SUBAREA	12	16,400	73.2
Minnesota			
Cass Lake	3	2,500	120.0
Red Lake	9	2,900	310.3
ALBUQUERQUE SUBAREA	19	27,300	69.6
Colorado			
Ignacio	2	1,550	129.0
New Mexico			
Jicarilla	2	1,550	129.0
Mescalero	1	1,400	71.4
Zuni	13	5,200	250.0
United Pueblos			
Santa Fe	1	4,500	22.2
WINDOW ROCK SUBAREA	195	95,400	204.4
Arizona			
Tuba City	118	10,300	1145.6
New Mexico			
Crownpoint	17	8,100	209.9
Gallup	44	16,000	275.0
Shiprock	16	19,300	82.9
BILLINGS AREA	13	24,200	53.7
Montana			
Browning	2	5,500	36.4
Crow Agency	8	5,350	168.2
Lame Deer	1		
Rocky Boy's	1	3,300	30.3
Poplar	1	3,500	28.6
OKLAHOMA CITY AREA	25	67,400	37.1
Mississippi			
Philadelphia	7	2,850	245.6
Oklahoma			
Claremore	3	16,000	18.8
Tahlequah	1	10,600	09.4
Talihina	14	10,650	131.5

* Only reservations with reported cases are listed

TABLE VI

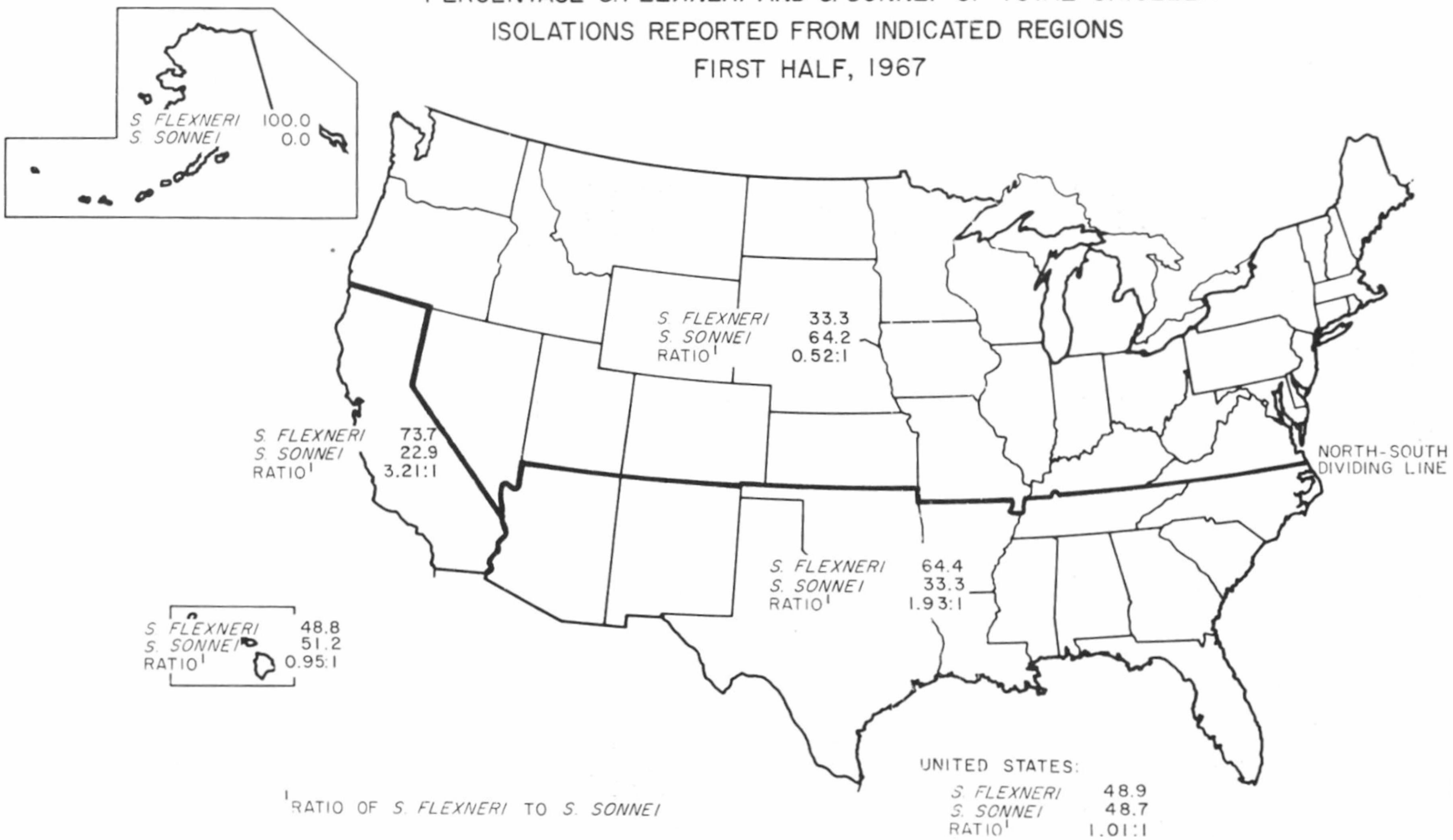
Attack Rates per 100,000 (Division of Indian Health Data*) - continued
January - June 1967

Area	Isolations	Population	Attack Rate/100,000
PHOENIX AREA	40	51,500	77.7
Arizona			
Ft. Apache	2	5,300	37.7
Sells	9	7,800	205.7
Tucson	7		
Phoenix	13	7,600	171.1
San Carlos	7	4,900	142.9
Nevada			
Schurz	1	4.650	21.5
Utah			
Ft. Duchesne	1	1,900	52.6
PORTLAND AREA	6	17,900	33.5
Idaho			
Ft. Hall	4	2,400	166.7
Washington			
Yakima	2	4,000	50.0
ANCHORAGE AREA	26	48,200	53.9
Alaska			
Anchorage	1	8,550	11.7
Bethel	1	10,800	09.3
Kotzebue	6	8,700	69.0
Tanana	18	5,200	346.2
TOTAL (all reservations)	380	389,500	97.6

* Only reservations with reported cases are listed

Figure 1.

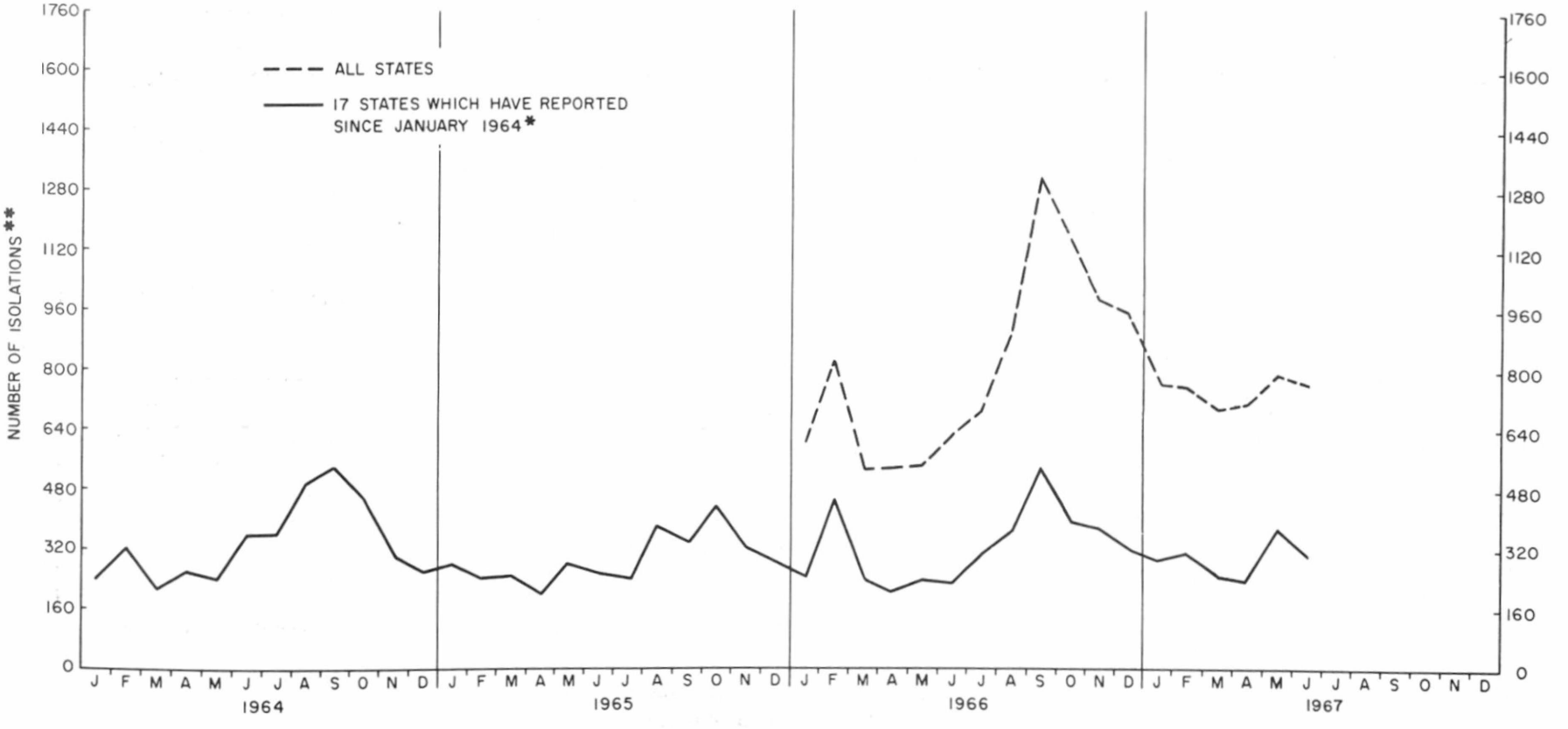
PERCENTAGE *S. FLEXNERI* AND *S. SONNEI* OF TOTAL SHIGELLA ISOLATIONS REPORTED FROM INDICATED REGIONS FIRST HALF, 1967



[1]RATIO OF *S. FLEXNERI* TO *S. SONNEI*

Figure 2.

REPORTED ISOLATIONS OF SHIGELLA IN THE UNITED STATES



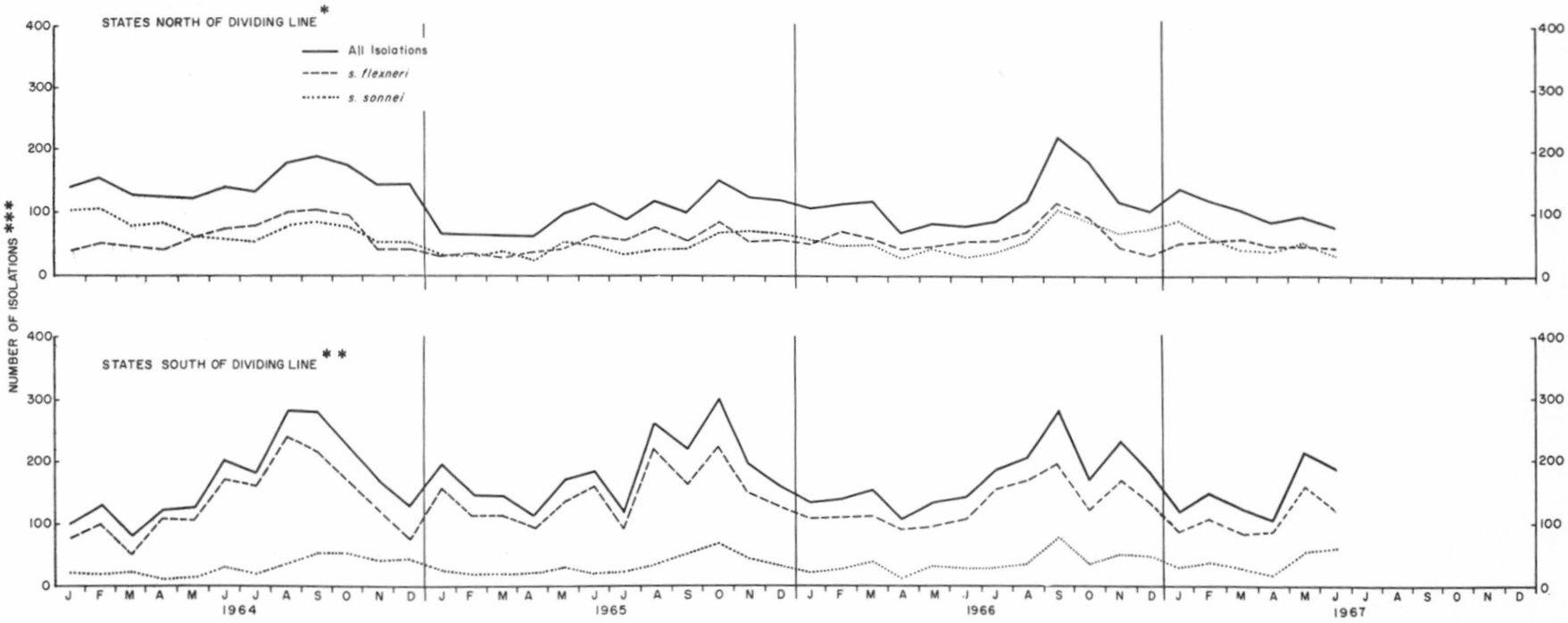
*ALASKA, ARIZONA, HAWAII, ILLINOIS, KANSAS, MARYLAND, NEW JERSEY, NEW MEXICO, NORTH CAROLINA, NORTH DAKOTA, OHIO, OKLAHOMA, OREGON, SOUTH DAKOTA, TENNESSEE, TEXAS AND VERMONT.

**ADJUSTED TO FOUR-WEEK MONTHS.

Figure 3.

SEASONAL DISTRIBUTION OF SHIGELLA ISOLATIONS BY SEROTYPE AND REGION

15 STATES WHICH HAVE REPORTED SINCE JANUARY 1964



* ILLINOIS, KANSAS, MARYLAND, NEW JERSEY, NORTH DAKOTA, OHIO, OREGON, SOUTH DAKOTA, AND VERMONT.

** ARIZONA, NEW MEXICO, NORTH CAROLINA, OKLAHOMA, TENNESSEE AND TEXAS.

*** ADJUSTED TO 4-WEEK MONTHS.

Figure 4.

ATTACK RATES OF SHIGELLOSIS BY STATE
JULY 1 – DECEMBER 31, 1966

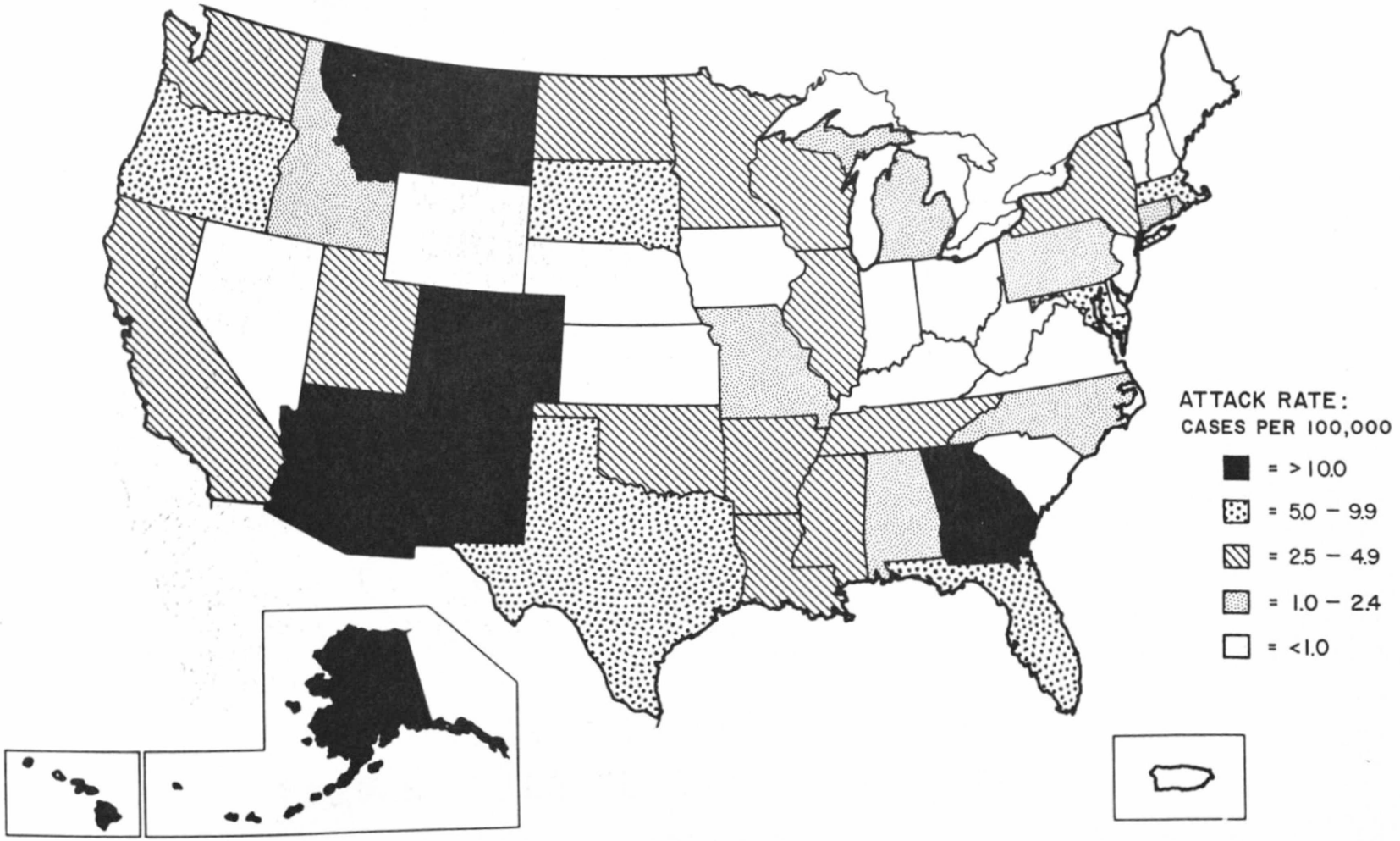


Figure 5.

ATTACK RATES OF SHIGELLOSIS BY STATE
JANUARY 1 – JUNE 30, 1967

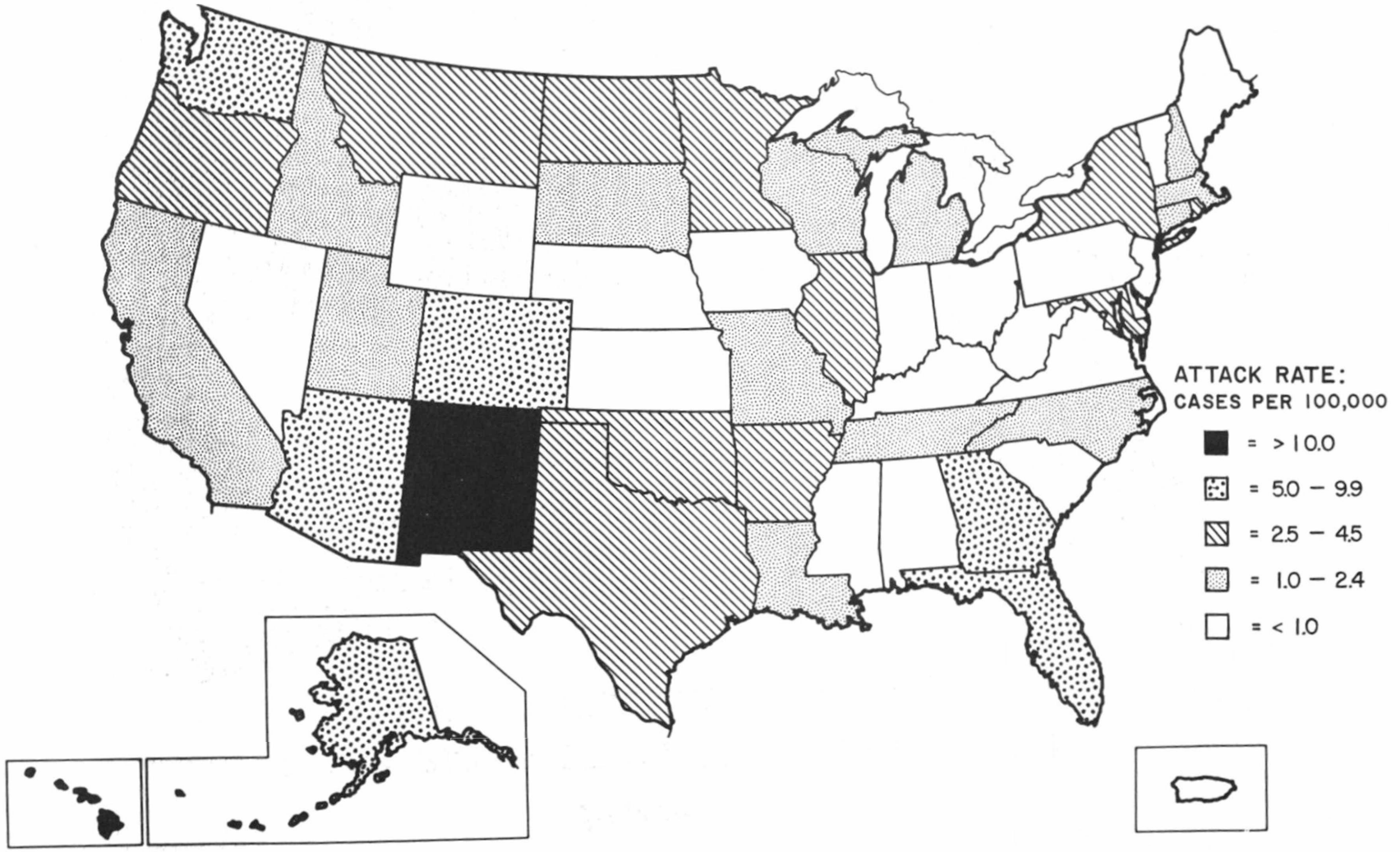


Figure 6

ATTACK RATE OF SHIGELLOSIS ON INDIAN RESERVATIONS UNITED STATES, JANUARY–JUNE 1967