REPORT NO. 13
MARCH 14, 1967

national communicable disease center

SHIGELLA

surveillance

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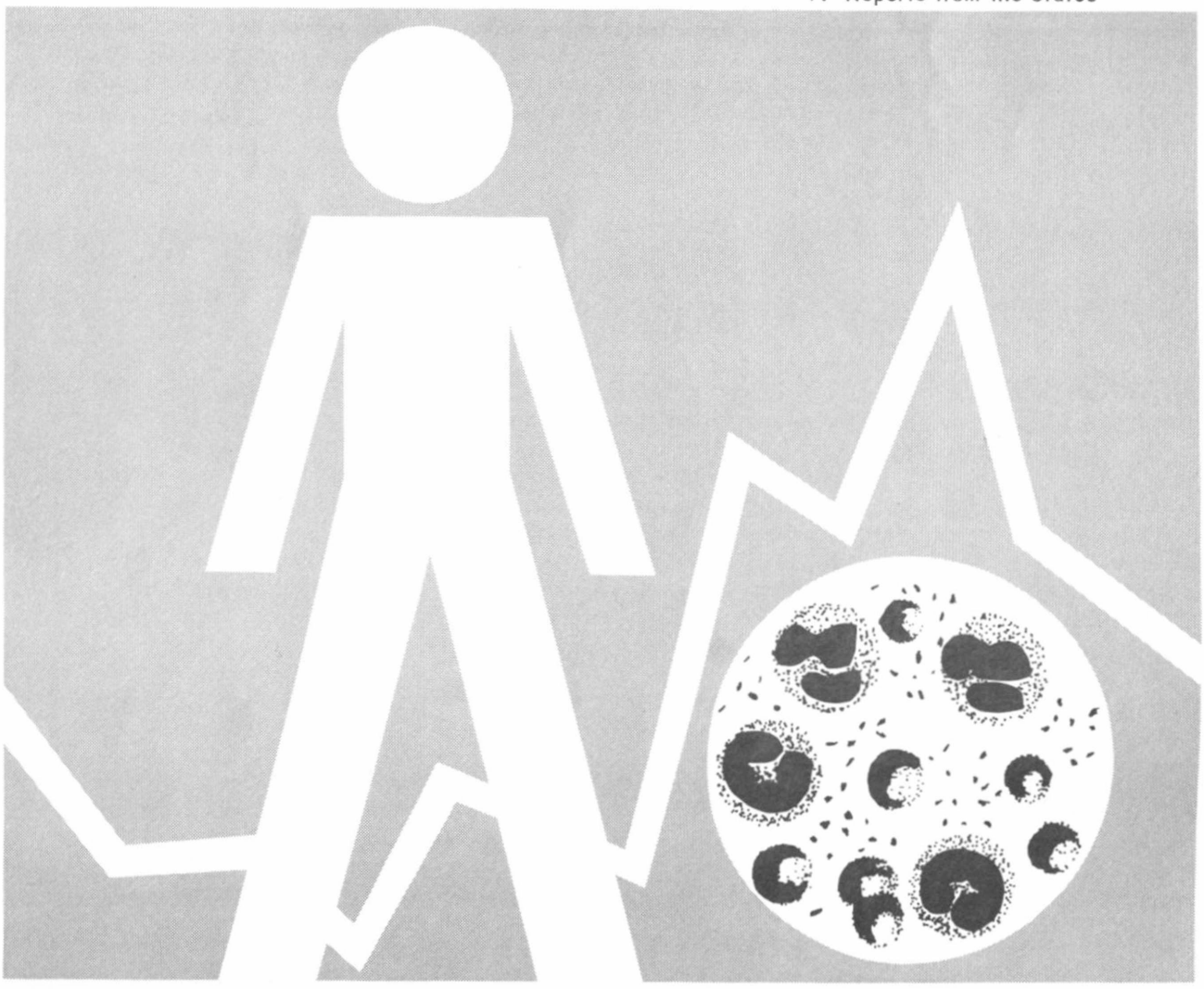
for the
Fourth Quarter 1966



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

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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I Current Trends and Developments

Antibiotic Treatment of Shigellosis

As recently as 1965, Haltalin and Nelson[1] pointed out that sulfadiazine is the most widely used drug in the treatment of shigellosis. They also comment that several of the more popular textbooks of medicine and pediatrics recommend this drug as first choice in the treatment of this disease. This review is prompted by these facts, our own observation that there is often confusion as to what constitutes adequate therapy for shigellosis, and the fact that antibiotic-resistant shigella could become a serious problem[2]. It is well established that antibiotic therapy is efficacious in treatment of shigellosis; this is in marked contrast to the case with salmonellosis[3]. Garfinkel[4] showed that the inflammatory process ceases more quickly, and the excretion of shigella ends several days sooner in patients treated with an appropriate antibiotic. Abe[5] has recently confirmed these findings, and has also shown that appropriate antibiotic treatment can promptly terminate the carrier state. Sulfonamides were the first antibiotics used in treatment in shigellosis. These drugs are relatively inexpensive, generally well tolerated, and stable for long periods of time. These are probably the important reasons why sulfa drugs are still widely used today. However, general emergence of sulfonamide resistance makes sulfonamide no longer the drug of first choice[1,6]. A partial listing of antibiotics which various authors recommend for treatment are as follows:

Drugs which have been used in treatment of shigellosis

Drug	Total Daily Dosage	Route	Recommended Duration of Treatment	Reference
Ampicillin	50mg/kg/day	Oral	8 days	1, 7
Chloramphenicol*	Variable***	Oral	5 days	6
Colistin Sulfate	10-15mg/kg	Oral	5 days	5, 8
Kanamycin	60-100mg/kg	Oral	5 days	5
Nalidixic Acid	****	Oral	5 days	6
Neomycin*	50-100mg/kg	Oral	7-10	8
Nitrofuran Derivatives	Variable	Oral	5 days	5, 8
Paromomycin	50-100mg/kg	Oral	7-10	6, 8, 9
Polymyxin B	10-20mg/kg	Oral	7-10	8
Streptomycin*	Variable**	Oral	5 days	6
Tetracycline*	Variable***	Oral	5 days	6

* Strains in some areas may be found resistant to these antibiotics.

** Streptomycin dosage:

0-1 yr	250 mg po q6 hr.
1-5 yr	500 mg po q6 hr.
5-15 yr	750 mg po q6 hr.
15 + yr	1000 mg po q6 hr.

*** Chloramphenicol and Tetracycline dosage:

0-1 yr	65.5 mg po q6 hr.
1-5 yr	125.0 mg po q6 hr.
5-15 yr	125.0 mg po q6 hr.
15 + yr	250.0 mg po q6 hr.

**** Nalidixic Acid

0-1 yr	150 mg po q6 hr.
1-5 yr	300 mg po q6 hr.
5-15 yr	600 mg po q6 hr.
15 + yr	1000 mg po q6 hr.

In our experience, antibiotic treatment alone is not sufficient to end an outbreak of shigellosis, especially in an institutional setting. Ample illustration of failure of antibiotic therapy may be seen in the reports of the family outbreak (p. 4 of Shigella Surveillance Report for the third quarter of 1966) and the institutional outbreak (reported on p. 6 of the same report). Mass chemoprophylaxis, i.e., simultaneous treatment of all persons at risk, whether or not they are symptomatic or infected, is of dubious value unless there is adequate isolation of all infected persons[10]. Hence, the key to ending an outbreak is prompt and rigorous

isolation and appropriate individual antibiotic therapy. Because of the rapidity with which multiple antibiotic resistance can arise, antibiotic sensitivity testing is clearly indicated if there is not a prompt response to the antibiotic chosen.

References

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4. Garfinkel, B. T., et al.: Antibiotics in Acute Bacillary Dysentery. JAMA 151:1157-1159, 1953.
5. Abe, M., et al.: Chemotherapy of Acute Dysentery Caused by Antibiotic-Resistant Shigella. J. Antibiot. (Tokyo) 17:82-87, 1964.
6. Moorhead, P. J., Parry, H. E.: Treatment of Sonne Dysentery. Brit. Med. J. 2:913, 1965.
7. Howard, P. et al.: Use of Ampicillin in the Treatment of Shigellosis. Antimicrobial Agents and Chemotherapy, 1964, p. 233.
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9. Ascoli, W., Mata, L. J.: Studies of Diarrheal Diseases in Central America: VII Treatment of Preschool Children with Paromomycin and Sulfamethoxypyridazine under Field Conditions in a Guatemalan Highland Village. Amer. J. Trop. Med. 14:1057-1061.
10. Gerstmann, R. E. and LaVeck, G. D.: Shigellosis: Mass Drug Therapy in an Institutional Setting. Amer. J. Public Health 53:266-273, 1963.

II Summary

A total of 3,309 isolations of shigella from humans were reported by the 54 reporting centers during the fourth quarter of 1966 (Table I). This number was a 5.4 percent increase over the 3,139 isolations reported during the third quarter. This slight increase is not inconsistent with the seasonal downward trend seen in the fourth quarter in past years.

During the fourth quarter, 70.8 percent of the isolations of shigella were from children under 10 years of age (Table IV); this is consistent with the distributions of previous quarters. There was no apparent sex predilection seen in this quarter. The regional distribution continued as in previous quarters (Figure 1).

III Reported Isolations

A. Human

1. General Incidence

The seasonal pattern (Figures 2 and 3) continued as in 1964 and 1965; these figures are based on reports from the centers which have been reporting since January 1964.

2. Serotype Frequencies

Forty-eight of the fifty-four reporting centers now participating in the Shigella Surveillance Program reported isolations of shigella from humans; 18 different serotypes were reported.

The six most frequently reported serotypes during the third quarter were the following:

Rank	Serotype	Number Reported	Calculated Number*	Calculated Percent*	Rank Last Quarter
1	S. sonnei	1653	1669	50.47	1
2	S. flexneri 2a	321	701	21.20	2
3	S. flexneri 3a	72	268	8.10	3
4	S. flexneri 4a	99	194	5.87	5
5	S. flexneri 6	154	186	5.62	4
6	S. flexneri 2b	37	81	2.45	8
Total		2336	3099		
Total (all serotypes)		3309	3307		

* from Table II

Tables II and III, calculated from data compiled during the fourth quarter of 1966 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.

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 and 1965 data, when only 17 states were reporting. Of these 17, Alaska and Hawaii were excluded since they are not among the contiguous states.

Of the 3,309 isolations reported in the United States during the fourth quarter of 1966, 938 (28.3 percent) represented isolations from families with other members of the same family positive for shigella. This is consistent with past experience.

B. Nonhuman

There were 45 nonhuman isolations of shigella reported during the fourth quarter of 1966:

Serotype	Number	Source	Reporting Center
S. flexneri 2a	1	Gorilla	Illinois
	2	Stock Culture	Texas
S. flexneri 3	34	Monkeys (26)	Maryland
		Unknown (8)	
S. flexneri 3c	2	Monkeys	Louisiana
S. flexneri 4a	2	Monkeys	California
	1	Stock Culture	Texas
S. sonnei	3	Monkeys	Illinois (2)
			Louisiana (1)
	45		

IV Current Investigations

A. Shigellosis in Seattle, Washington. Reported by Dr. Donald Peterson, Seattle-King County Health Department; Dr. Phillip H. Jones, Medical Epidemiologist, Washington State Department of Health; and an EIS Officer.

In Shigella Surveillance Report No. 10 an epidemic of shigellosis in Seattle was reported. This consisted of 64 isolations of S. sonnei among 21 families in the Seattle-King County area. The outbreak seemed to present several unusual features. Families involved were mainly middle-class Caucasians, they were scattered throughout the city, and the index cases in these families seemed to be adults. The suggestion was made that perhaps a common foodborne source was involved. The following report summarizes the results of an investigation.

Between January and mid-June, 1966, there were 135 cases of shigellosis reported from the Seattle-King County area. The epidemic curve (Figure 4) seems most consistent with person-to-person spread in the county, and probably also in the city. Most of these cases came from known "endemic pockets" of shigellosis, involving lower socioeconomic families, and were transmitted person to person, mainly through children.

Preliminary data on a small group of cases seemed to belie the above pattern. This was a group of eight families with 18 cases in a newly involved, basically middle-class section of the city. All these cases occurred in January and February 1966. In six of the families preliminary information had indicated the index case was an adult.

Further investigation revealed that four of these families were in the lower socioeconomic strata, and that the means of spread was person to person. The index cases were in children in three of the families. The four remaining families were in a middle socioeconomic group, but again, means of spread was person to person, and three of the families were associated. Index cases were children in two of the families.

An interesting trend in shigellosis in Seattle is the decreasing involvement of nonwhites. Although they constitute only a small fraction of the Seattle population, they have accounted for a great percentage of the shigellosis in the past. However, for the past 2 years, there has been a decrease of shigellosis in this nonwhite population (Table V). This trend correlates with a decline in attack rates in certain lower socioeconomic areas inhabited mostly by nonwhites, and higher attack rates in different areas of the city (largely lower strata) inhabited mainly by Caucasians.

Summary

There were some changes in populations and areas involved with shigellosis in Seattle in 1966. Nevertheless, most of the families involved were of the lower socioeconomic strata, most of the index cases were children, and the means of spread was person to person. No evidence for a common-source epidemic of shigellosis could be found.

V Reports from the States

A. Shigella sonnei in an elementary school in Corfu, New York, with one death. Reported by Dr. Julia Freitag, Director, Office of Epidemiology, New York State Department of Health.

On November 2, 1966, approximately 30 first grade pupils at the Public School, Corfu, New York, became ill with diarrhea, vomiting, abdominal cramps, headache, and fever. Fifteen of the children were ill enough to be sent home before lunch. Subsequently,

additional children were ill bringing to about 50 the total number of cases. Shigella sonnei was isolated from the stools of the children. Nearly all of the cases were in the 4½ to 6 year age group with similar illness virtually nonexistent among the older of the 700 children in the school. Intensive investigation failed to reveal the initial source of the infection, but later cases were thought to be spread by direct contact. Later in November, three family outbreaks were related to a commonly shared Thanksgiving dinner prepared in the home of one of the schoolchildren.

One 6-year-old boy who was sent home with febrile diarrhea on November 2 was not thought to be sick enough to see a doctor that afternoon and was apparently well by evening. Although he was noted to be in no distress at 6 AM he died suddenly at 9 AM. Autopsy revealed edema and hyperemia of the colon with severe superficial ulceration and fibrinous leukocytic exudate present. The most prominent feature, however, was bilateral adrenal hemorrhage with thrombosis of most of the radicals of the adrenal veins. Shigella sonnei was cultured from the colon, but no meningococci or other pathogens were reported. No blood culture was reported. The cause of death was ascertained to be Waterhouse-Friderichsen syndrome in association with shigellosis.

B. Shigella flexneri type 2 milkborne outbreak in the Jacksonville, Florida, area. Reported by Dr. Patricia C. Cowdery, Health Officer, Duval County Health Department; Dr. E. Charlton Prather, Director, Division of Epidemiology, Florida State Board of Health; and an EIS Officer.

Ninety-nine cases of Shigella flexneri type 2 dysentery occurred in the Jacksonville area over a 2-week period, beginning November 14, 1966. Sixty-five of the cases had onsets over the first 5 days of the period, suggesting a common-source outbreak. Ninety-six of the cases were associated with the consumption of milk delivered to homes in glass containers from one dairy. Further investigation revealed that the daughter of an employee of the dairy became ill with febrile diarrhea on November 9 and was cared for at home until hospitalization on November 12. Her father had to leave his job as operator of the bottle filling machine at the dairy on both November 14 and 15 because of fever, diarrhea, and malaise. Shigella flexneri type 2 was recovered from both the father and daughter. The dairy in question had had an excellent record with regard to sanitation. Intensive investigation of the plant failed to reveal the exact mechanism of inoculation of the product.

C. Shigella sonnei in a low socioeconomic neighborhood in St. John, New Brunswick. Reported in Epidemiological Bulletin, Epidemiology Division, Department of National Health and Welfare, Ottawa, Canada.

Ninety-nine cases of Shigella sonnei dysentery were reported from a low socioeconomic neighborhood in St. John, New Brunswick, between May 21 and September 16, 1966. The majority of the cases occurred in the 1 to 5 year age group. In a neighborhood orphanage, 16 of 18 cases among 39 at risk were in the 2 to 4 year age group. Only two cases were observed among the 33 adult staff members. The pattern of the epidemic suggested that the disease was spread by direct contact. It was felt that shigella was introduced into the orphanage from the infected community of St. John. Efforts were made to improve public health education in the neighborhood and to isolate and treat all diarrheal illness, especially in the orphanage.

TABLE I
SHIGELLA SEROTYPES ISOLATED FROM HUMANS
FOURTH QUARTER, 1966

SEROTYPE	NORTHEAST																									NORTHWEST													North Total
	Conn	Del	DC	Ill	Ind	Iowa	Ky	Me	Md	Mass	Mich	Minn	Mo	NH	NJ	NY-A	NY-Bl	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																					2		1			3													3
1																																							
2				6						1																7													7
3	1																									1													1
4																																							
5																																							
6																																							
7																																							
8																																							
9																																							
10																																							
3573-50																																							
Variant R.																																							
Total	1			6						1											2		1			11													11
B. S. flexneri Unspecified			8		2		1				2		11		1	20		60	1				1		21	128						1	4	9	7		5	26	154
1 Unspecified									1		1					1			1							4													4
1a											1															1	4			6			1					11	12
1b																											1											1	1
2 Unspecified				6					28	1	6	1	2			12			6					4		66	1								5	3		9	75
2a				49							4			1												54	11	1	1	6		1	2					22	76
2b				4																						4	1											1	5
3 Unspecified				26					4	3	2								2	2						39	1								1	1		3	42
3a	1																									1													1
3b																																							
3c											1															1													1
4 Unspecified											1	31				1			8							41									1			1	42
4a				3									1		3											7	2											2	9
4b																1										1													1
5				2																						2	9											9	11
6				4					6		7	1				4			1							23	11									1		12	35
Variant X																																							
Variant Y																																							
Variant R																																							
Total	1		8	94	2		1		39	4	25	33	14	1	4	39		60	19	2		1	4	21	372	41	1	1	12		2	7	9	7	7	10		97	469
C. S. boydii Unspecified																		1								1	1											1	2
1												1														1													1
2											1															1		2										2	3
3																																							
4																																							
5																																							
6																																							
7																																							
8																																							
9																																							
10																																							
11																																							
12																																							
13																																							
14																																							
15																																							
3615-53																																							
2710-54																																							
1621-54																																							
2044-54																																							
Variant R																																							
Total											1	1						1								3	1	2										3	6
D. S. sonnei	15		16	90	4	15	1		54	133	59	45	51	1	7	92		115	19	69	2		12		42	842	124		4	15			2	47	8	11	65		276	1,118
untypable																																							
unknown			4																		5				7	16							9					9	25
Grand Total	17		28	190	6	15	2		93	138	85	79	65	2	11	131		176	38	71	9	1	14	4	70	1,244	166	3	5	27		2	18	56	15	18	75		385	1,629

TABLE I (Continued)
SHIGELLA SEROTYPES ISOLATED FROM HUMANS
FOURTH QUARTER, 1966

SOUTHEAST										SOUTHWEST						OTHER							PREVIOUS QUARTER		1966 CUMULATIVE		SEROTYPE
Ala	Ark	Fla	Ga	La	Miss	NC	SC	Tenn	Southeast Total	Ariz	NM	Okla	Tex	Southwest Total	South Total	Alaska	Calif	Hai	Virgin Islands	Other Total	Total	Percent Total	Total	Percent of Total	Total	Percent of Total	
						3			3		2			2	5						8	0.2	10	0.3	27	0.3	A. S. dysenteriae Unspecified
5		5							10				1	1	11		1			1	2	0.06			2	0.02	1
													1	1	11		6			6	24	0.7	6	0.2	54	0.5	2
													1	1	1		2			2	4	0.1	1	0.03	13	0.1	3
																											4
																											5
																											6
																											7
																											8
																							1	0.03	1	0.01	9
																											10 3573-50 Variant R.
5		5				3			13		2		3	5	18		9			9	38	1.1	18	0.6	97	0.9	Total
19	7	4			11	42	3	1	87		5	2	2	9	96	4			1	5	255	7.7	304	9.7	824	7.9	B. S. flexneri Unspecified
		2	4					2	8	1	1	3	3	7	15		10			10	19	0.6	26	0.8	77	0.7	1 Unspecified
										1	2		1	2	2						24	0.7	37	1.2	104	1.0	1a
	1								1	1			9	10	11		4	1		5	17	0.5	18	0.6	85	0.8	1b
	1	107	62		1			19	190		24		1	25	215		48	55		103	290	8.8	260	8.3	902	8.7	2 Unspecified
	8								34	9		19	80	108	142		17			17	321	9.7	425	13.5	1,451	13.9	2a
				26					4				11	11	15						37	1.1	24	0.8	125	1.2	2b
		10	44		1			18	73	1	32	3	1	37	110		20	3		23	175	5.3	253	8.1	803	7.7	3 Unspecified
	7			8					15				56	56	71						72	2.2	54	1.7	227	2.2	3a
				1					1				6	6	7						7	0.2	6	0.2	21	0.2	3b
				4					4						4						5	0.2	13	0.4	23	0.2	3c
	1	4	6					5	16		5			5	21		1			1	64	1.9	76	2.4	227	2.2	4 Unspecified
	6	1		10					17	10		10	27	47	64		26			26	99	3.0	94	3.0	305	2.9	4a
				1					1						1		1			1	3	0.09			11	0.1	4b
										1			1	2	2		1			1	14	0.4	29	0.9	62	0.6	5
	2	16	5	3				3	29	15	33	1	12	61	90		29			29	154	4.7	204	6.5	569	5.5	6
																											Variant X Variant Y Variant R
19	33	144	121	57	13	42	3	48	480	38	100	38	210	386	866	4	157	59	1	221	1,556	47.0	1,823	58.1	5,816	55.9	Total
		6							6		1			1	7						9	0.3	4	0.1	18	0.2	C. S. boydii Unspecified
											1			1	1						2	0.06	1	0.03	4	0.04	1
		3							3				3	3	6		8			8	17	0.5	11	0.4	47	0.5	2
																											3
																	2			2	2	0.06	1	0.03	8	0.08	4
																									3	0.03	5
																											6
																									1	0.01	7
																											8
																									1	0.01	9
																									11	0.1	10
																									1	0.01	11
																											12
																							1	0.03	2	0.02	13
																											14
																											15
																											3615-53 2710-54 1621-54
																											2044-54 Variant R
		9							9		2		3	5	14		10			10	30	0.9	18	0.6	96	0.9	Total
10	7	90	101	35	6	12	3	30	294	6	31	3	69	109	403		87	44	1	132	1,653	50.0	1,259	40.1	4,325	41.6	D. S. sonnei
																							1	0.03	4	0.04	untypable
					3				3				3	3	6		1			1	32	1.0	20	0.6	65	0.6	unknown
34	40	248	222	92	22	57	6	78	799	44	135	41	288	508	1,307	4	264	103	2	373	3,309		3,139		10,401		Grand Total

TABLE II

Relative Frequencies of Shigella Serotypes
Reported During Fourth Quarter 1966

	Serotype	Number Reported	Calculated Number*	Calculated Percent	Rank
A.	*S. dysenteriae*				
	1	2	3	0.09	5
	2	24	30	0.91	8
	3	4	5	0.15	14
	unspecified	8			
B.	*S. flexneri*				
	1a	24	42	1.27	7
	1b	17	30	0.91	8
	1 unspecified	19			
	2a	321	701	21.20	2
	2b	37	81	2.45	6
	2 unspecified	290			
	3a	72	268	8.10	3
	3b	7	26	0.79	9
	3c	5	19	0.57	11
	3 unspecified	175			
	4a	99	194	5.87	4
	4b	3	6	0.18	13
	4 unspecified	64			
	5	14	17	0.51	12
	6	154	186	5.62	5
	unspecified	255			
C.	*S. boydii*				
	1	2	3	0.09	15
	2	17	24	0.73	10
	4	2	3	0.09	15
	unspecified	9			
D.	*S. sonnei*	1653	1669	50.47	1
	unknown	32			
	Total	3309	3307		

* 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 III

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

Serotype	Number Reported	Calculated Number*	Calculated Percent	Rank
A. S. dysenteriae				
1	3	4	0.02	21
2	83	119	0.47	13
3	23	33	0.13	15
6	1	1	0.004	24
9	1	1	0.004	24
unspecified	47			
B. S. flexneri				
1a	266	556	2.20	7
1b	194	405	1.60	8
1 unspecified	335			
2a	2614	6573	25.97	2
2b	342	860	3.40	6
2 unspecified	3195			
3a	445	2552	10.08	3
3b	43	247	0.98	10
3c	66	378	1.49	9
3 unspecified	2075			
4a	656	1554	6.14	5
4b	37	88	0.35	14
4 unspecified	666			
5	105	127	0.50	12
6	1306[1]	1578	6.24	4
variant y	17	21	0.08	16
unspecified	2457			
C. S. boydii				
1	5	8	0.03	19
2	97	153	0.60	11
4	12	19	0.08	17
5	3	5	0.02	20
6	1	2	0.008	23
7	1	2	0.008	23
8	1	2	0.008	23
9	1	2	0.008	23
10	11	17	0.07	18
11	1	2	0.008	23
12	1	2	0.008	23
14	2	3	0.01	22
unspecified	77			
D. S. sonnei	9915	9994	39.49	1
untypable	5			
unknown	196			
Total	25,306[1]	25,308		

* 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.

[1] Revised to exclude error of 30 isolations in 1965.

TABLE IV

Age and Sex Distribution of Individuals Infected with Shigellae in the United States During the Fourth Quarter of 1966

Age (years)	Male	Female	Unknown	Total	Percent	Cumulative Percent
< 1	100	87	3	190	8.2	8.2
1 - 4	453	472	9	934	40.5	48.7
5 - 9	281	225	4	510	22.1	70.8
10 - 19	147	135	2	284	12.3	83.1
20 - 29	49	125		174	7.5	90.6
30 - 39	41	63	1	105	4.6	95.2
40 - 49	13	23		36	1.6	96.8
50 - 59	12	16		28	1.2	98.0
60 - 69	11	16		27	1.2	99.2
70 - 79	4	9		13	0.6	99.8
80 +	3	3		6	0.3	100.1
Subtotal	1114	1174	19	2307		
Child (unspec.)	13	19	1	33		
Adult (unspec.)	4	15	2	21		
Unknown	409	456	83	948		
Total	1540	1664	105	3309		
Percent of Total	48.1	51.9				

Table V

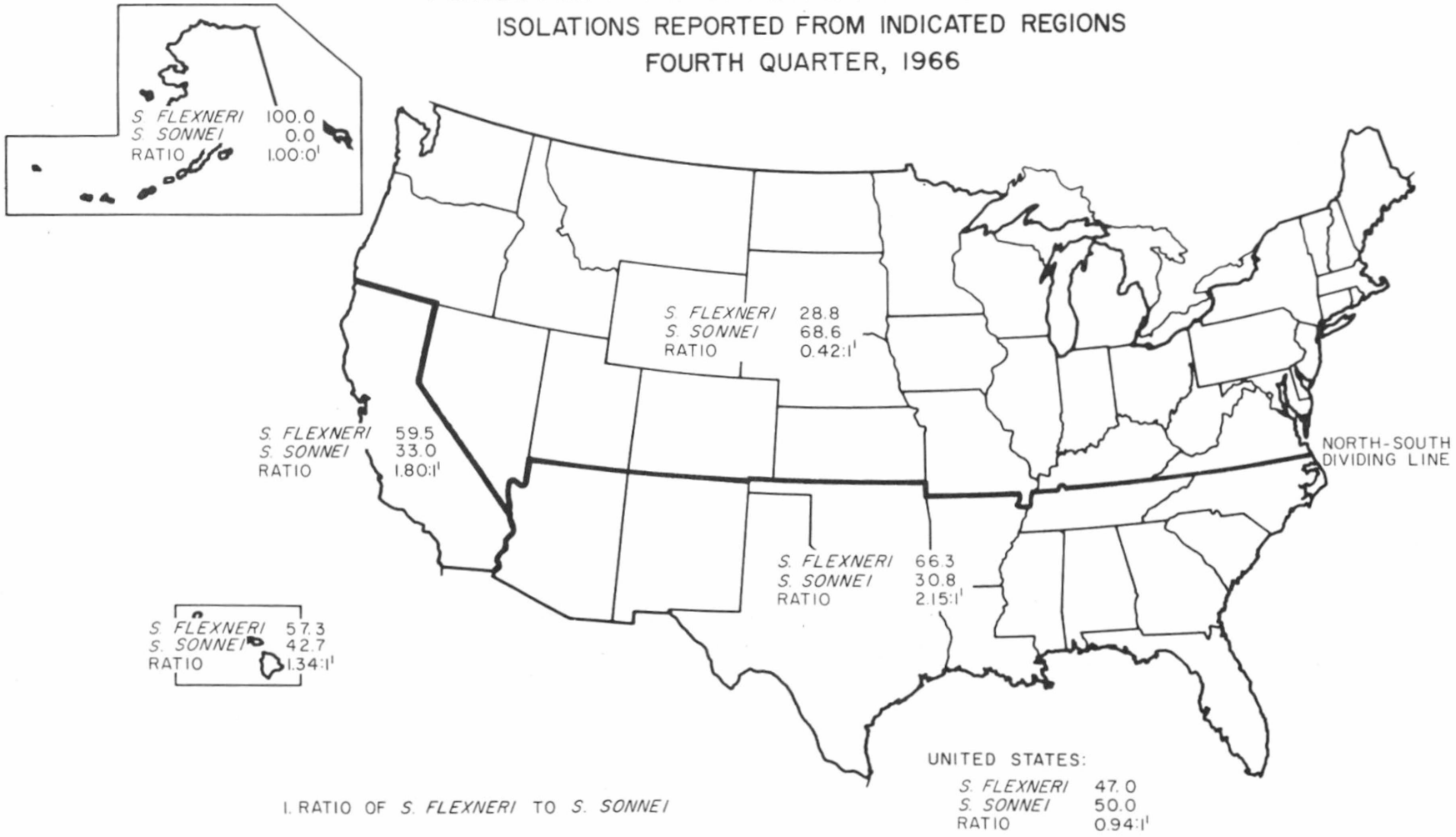
Percent of Total Cases of Shigellosis in Nonwhites

	Seattle Proper	King County	Remarks
1958	Race not recorded		
1959	Race not recorded		
1960	57.7	0	All cases in King County occurred in whites
1961	25.0	0	Overall incidence of only 25 cases this year make percentages unreliable
1962	73.9	0	
1963	58.3	0	
1964	47.0	0.9	
1965	15.0	0	
1966*	18.0	0	

* To June 15, 1966

Figure 1.

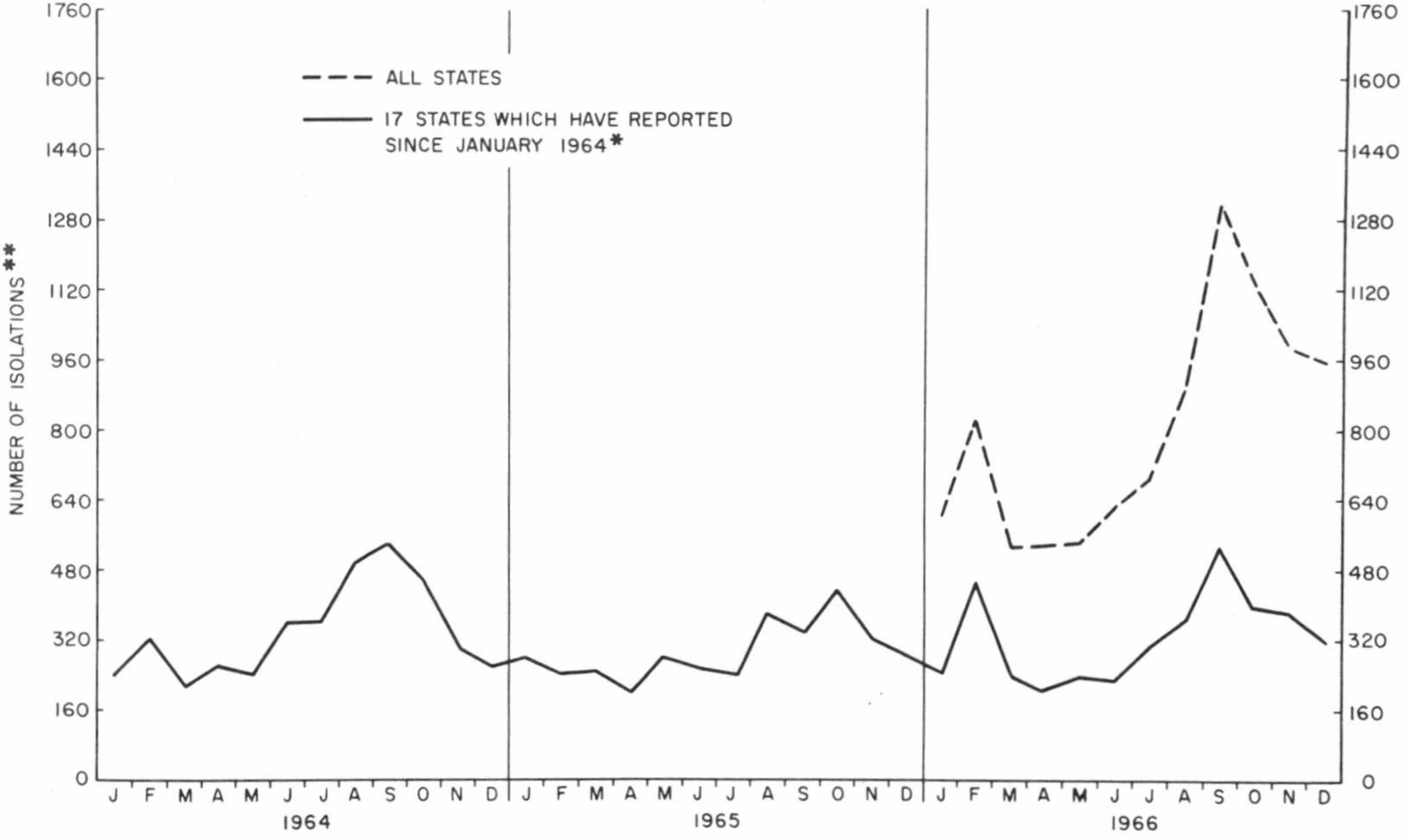
PERCENTAGE *S. FLEXNERI* AND *S. SONNEI* OF TOTAL SHIGELLA ISOLATIONS REPORTED FROM INDICATED REGIONS FOURTH QUARTER, 1966



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

Figure 2.

REPORTED ISOLATIONS OF SHIGELLA IN THE UNITED STATES



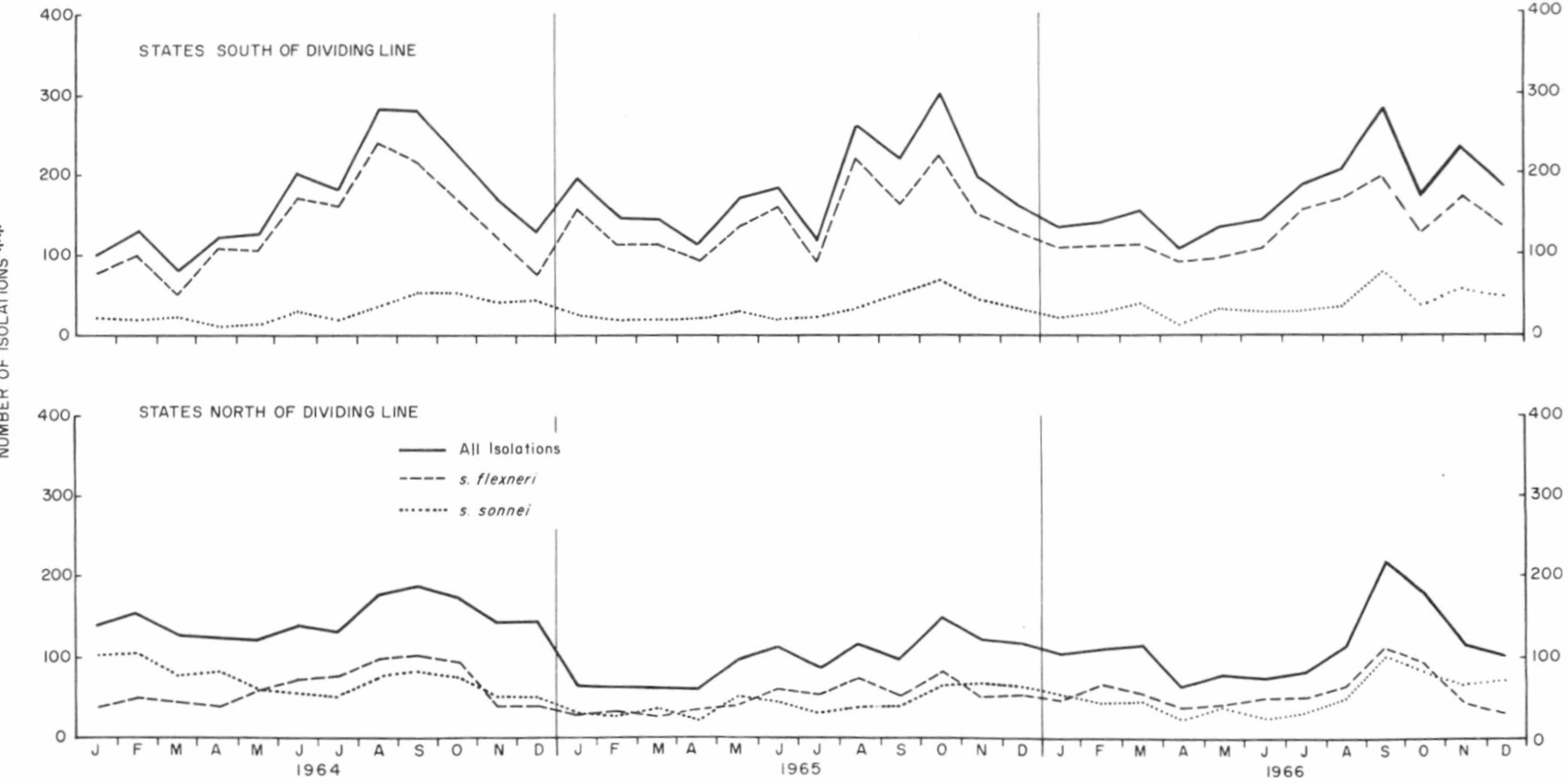
*ALASKA, ARIZONA, HAWAII, ILLINOIS, KANSAS, MARYLAND, NEW JERSEY, NEW MEXICO, NORTH CAROLINA, NORTH DAKOTA, OHIO, OKLAHOMA, OREGON, SOUTH DAKOTA, TENNESSEE, TEXAS AND VERMONT.

**ADJUSTED TO FOUR-WEEK MONTHS.

Figure 3.

SEASONAL DISTRIBUTION OF SHIGELLA ISOLATIONS BY SEROTYPE AND REGION

15 STATES WHICH HAVE REPORTED SINCE JANUARY 1964*



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

** ADJUSTED TO 4-WEEK MONTHS.

Figure 4.

CASES OF SHIGELLOSIS IN SEATTLE-KING COUNTY AREA
BY WEEK OF ONSET OF SYMPTOMS - 1966