

UNIVERSITY OF NORTH CAROLINA
SCHOOL OF PUBLIC HEALTH

P.H. 160

Principles of Epidemiology

Laboratory No. 8

Illustrations of the relationship between social and cultural variables and response to a public health program.

The prevention of diseases like poliomyelitis depends upon scientific progress in two directions: the development of safe and effective vaccines against the disease, and the development of maximally effective ways of eliciting public acceptance of the available vaccines. This exercise examines the relationship between certain social and cultural characteristics of the group and acceptance of polio vaccination.

Dade County is the area in Southeast Florida which includes the cities of Miami and Miami Beach in addition to twenty-four other municipalities and seventeen unincorporated places. The population in April, 1960 was 935,047. Since 1955 the Salk injected polio vaccine had been available to this population, and a number of public health programs had aimed at maximum protection of the population. From February, 1960 to April, 1960 a large-scale program was launched aiming to feed the live-virus orally administered trivalent vaccine developed by Dr. Herald Cox to as many as possible of the approximately 561,000 Dade County residents under the age of forty years. Between February 15 and April 30, 1960, the mass immunization program dispensed oral vaccine free of charge to a total of 414,118 persons in Dade County. At the end of this program interviews were conducted in a representative sample of all dwelling units in Dade County which included one or more persons under forty years of age. The sample consisted of 800 dwelling units, or about one in every 350 in Dade County. These 800 units housed 842 families, and data were gathered on 2,709 persons, 218 of whom were forty years of age or older, and excluded from analysis.

Table 1 indicates patterns of vaccine acceptance in the sample by age and type of vaccine.

Table 1

Polio Vaccine Acceptance In
Dade County By Age and Type of Vaccine, 1955-1960
(All numerical entries are percentages.)

Age Under 1 year
(N= 91)

Injected Vaccine	Oral Vaccine		Total
	Take	Non Take	
Take	24	20	44
Non Take	26	30	56
Total	50	50	100

Ages 1-5 Years
(N= 958)

Injected Vaccine	Oral Vaccine		Total
	Take	Non Take	
Take	68	21	89
Non Take	7	4	11
Total	75	25	100

Ages 6-19 Years
(N= 979)

Injected Vaccine	Oral Vaccine		Total
	Take	Non Take	
Take	81	9	90
Non Take	7	3	10
Total	88	12	100

Ages 20-39 Years
(N= 964)

Injected Vaccine	Oral Vaccine		Total
	Take	Non Take	
Take	45	19	64
Non Take	16	20	36
Total	61	39	100

What are the similarities and differences between the patterns of acceptance of the injected vaccine and the oral vaccine?

FRAMEWORK OF KNOWLEDGE AND BELIEF

Throughout the period of feeding of oral polio vaccine, the program was given wide publicity from many media of communication and from intensive programs of health education. Table 2 indicates the relationship between knowledge of the program and vaccine acceptance. The index used here is knowledge of the oral vaccine used in the program, answers ranging from no knowledge of the characteristics of the vaccine, to correct description, to correctly naming the vaccine. The data in this and all following tables refers to the vaccine behavior of 624 household respondents between the ages of 20 and 40.

What is the association between knowledge and behavior?

TABLE 2

Oral Vaccine Acceptance by Knowledge about the Vaccine

"What was the name of the vaccine used?"				
	Don't Know	Correct Description	"Cox Vaccine"	Total Persons Giving These Replies
TOOK DID NOT TAKE	51%	41%	13%	229
TOOK Did Not Take	49%	59%	87%	359
Total for each	100%	100%	100%	588 ^a
Reply Category	(299)	(138)	(151)	

^a Of the remaining 36 respondents, 20 said they knew but couldn't remember, and 16 gave wrong answers (e.g., Salk, Sabin, etc.)

Table 3 indicates the relationship between knowledge of the "cause" of polio and vaccine behavior. Answers to the interview question concerning the "causes" of polio were coded from the least sophisticated "don't know" responses through greater degrees of sophistication in knowledge to answers that indicate virus and virus plus other factors.

What is the association between this knowledge factor and vaccine behavior?

TABLE 3

Vaccine Acceptance by Knowledge of the Cause of Polio

	Don't Know	"Just happens" Crowds Swimming Fatigue Weakness	Dirt Flies	Germs Carriers	Virus Virus Plus Other Factors
Took	51%	62%	67%	60%	78%
Did not Take	49%	38%	33%	40%	22%
Total Respondents for each reply.	100% (214)	100% (117)	100% (80)	100% (113)	100% (100)

SOCIAL ATTRIBUTES AND GROUP MEMBERSHIP

Table 4 shows the relationship between vaccine acceptance and formal education. Describe the association.

TABLE 4

Vaccine Acceptance by Educational Level

	College Graduate	Some College	High School Graduate	Some High School	Grade School Graduate	Less than 8 Grades
Took	74%	75%	63%	50%	46%	41%
Did Not Take	26%	25%	37%	50%	54%	59%
Total Respondents at each Educational Level	100% (50)	100% (128)	100% (228)	100% (133)	100% (43)	100% (42)

Table 5 shows the association between vaccine behavior and social class. The index of social class used in this study was a weighted score on the occupation, the education, and the source of income of the head of the family. Describe this association.

TABLE 5

Vaccine Acceptance by Social Class

	Upper I & II	Middle III	Lower IV	V
Took	75%	72%	56%	39%
Did not Take	25%	28%	44%	61%
Total Respondents in Each Class	100% (84)	100% (223)	100% (198)	100% (119)

Social participation is measured by an index developed by F. S. Chapin. Respondents are asked to indicate how many organizations they belong to, whether they attend meetings regularly, contribute financially, and hold committee memberships and offices in these organizations.

Describe the association indicated in Table 6.

TABLE 6

Vaccine Acceptance by Social Participation

Scores on Chapin Index, Grouped

	High	Medium	Low	None
Took	78%	73%	67%	42%
Did not Take	22%	27%	33%	58%
Total Respondents in Each Group	100% (23)	100% (194)	100% (207)	100% (200)

Another index of social participation was derived from asking respondents how many friends they had in Dade County. Table 7 shows the association between vaccine acceptance and this index of informal social participation.

What is the nature of this association?

TABLE 7

Vaccine Acceptance by Reported Number of Friends
in the County

	"Zero" or "One"	"Two or Three"	"Quite a Few"	"Many"	Total Persons
Took	35%	50%	60%	74%	
Did not Take	65%	50%	40%	26%	
Total Giving each Reply	100% (26)	100% (90)	100% (345)	100% (160)	621 ^a

^a Three respondents refused to answer this question.

HYPOTHESES AS TO PROCESS

The preceding tables have demonstrated associations between polio vaccine behavior and some measures of framework of knowledge and belief, and some measures of social attributes and group membership and participation. These tables do not, however, directly indicate the processes producing these associations. Hypotheses as to processes explaining these associations must be drawn from larger bodies of knowledge, and tested by further analysis of the data.

The data in Tables 2 and 3 may be taken as indicators of high degrees of success of the health education program conducted in Dade County. Another hypothesis holds that the associations found between these knowledge factors and vaccine behavior are simply the results of differences in education (see Table 4). The data provided in Tables 8 and 9 may be used to test this hypothesis.

Do the effects of "knowledge" disappear when controlled for educational level?

7
Independent?

TABLE 8

Oral Vaccine Acceptance by Educational Level
and Knowledge about the Vaccine^a

Educational Level	Reply to Question: "What was the name of the vaccine?"			Total for each Education
	"Don't Know	Correct Description	"Cox Vaccine"	
At least some College	63% (65)	70% (43)	92% (62)	75% (170)
High School Graduate	55% (106)	48% (52)	88% (58)	62% (216)
Some High School	42% (72)	54% (26)	69% (26)	50% (124)
Grade School or Less	32% (56)	70% (17)	... (5)	45% (78)
Total each Reply Category	49% (299)	59% (138)	87% (151)	588 ^b

^a Entries indicate proportion of each subgroup who took oral vaccine. Numbers in parentheses denote the size of each subgroup.

^b Of the remaining 36 respondents, 20 said they knew but couldn't remember, and 16 gave wrong answers (e.g., Salk, Sabin, etc.)

TABLE 9

Vaccine Acceptance by Educational Level
and Knowledge of the Cause of Polio^a

Educational Level	Reply to Question: "How do people get polio?"					Total Persons of Each Education
	Don't Know	"Just happens," Crowds Swimming Fatigue	Dirt Flies	Germ Carriers	Virus Virus Plus	
At least some College	62% (40)	74% (34)	72% (18)	71% (34)	88% (52)	75% (178)
High School Graduate	56% (71)	67% (46)	68% (31)	65% (40)	65% (40)	63% (288)
Some High School	42% (52)	47% (30)	58% (19)	54% (26)	... (6)	50% (133)
Grade School or Less	43% (51)	... (7)	67% (12)	31% (13)	... (2)	44% (85)
Total Persons of each Response Group	51% (214)	62% (117)	67% (30)	60% (113)	78% (100)	624

^a Entries in each cell indicate the proportion taking oral vaccine. The numbers in parentheses indicate the number of persons in each subgroup.

It is well known to behavioral scientists that social class and social participation are highly related to each other, and Tables 5 and 6 have shown that each is related to vaccine behavior. Thus one might hypothesize that only one of these two variables is "working," and the other is simply being "dragged along." Table 10 shows social participation score controlled for social class.

How can you tell whether one or both variables is "working?"

TABLE 10

Vaccine Acceptance by Social Participation and Social Class

Social Participation Scores

Social Class	High 1	Medium 2	Low 3	None 4	Total for Persons in Social Class
I & II	91% (11)	79% (38)	69% (26)	... (9)	75% (84)
III	... (6)	83% (77)	73% (75)	57% (65)	72% (223)
IV	... (4)	63% (59)	62% (68)	43% (67)	56% (198)
V	... (2)	55% (20)	58% (38)	20% (59)	39% (119)
Total for Persons in S.P. Group	78% (23)	73% (194)	66% (207)	42% (200)	61% (624)

One might also wonder whether both participation in formal organizations and participation in informal friendship groups are associated with vaccine behavior. Table 11 shows formal social participation score controlled for reported number of friends. How can you read this table to find out whether both kinds of social participation are important in vaccine behavior?

TABLE 11

Vaccine Acceptance by Reported Number of Friends
and Formal Social Participation

Social Participation Scores

Reported Number of Friends	High 1	Medium 2	Low 3	None 4	Total for Persons by No. of Friends
"None" or "One"	... (0)	... (6)	... (6)	14% (14)	35% (26)
"Two or Three"	... (0)	68% (22)	64% (31)	27% (37)	50% (90)
"Quite a Few"	67% (12)	71% (101)	67% (122)	43% (110)	60% (345)
"Many"	91% (11)	78% (65)	72% (46)	63% (38)	74% (160)
Total for Persons in S.P. Group	78% (23)	73% (194)	66% (205)	41% (199)	621 ^a

^a Three persons refused to indicate number of friends.

Another hypothesis holds that none of these variables was really important in determining acceptance of the oral polio vaccine. This reasoning holds that the people who had already taken the series of three or more Salk shots felt that they were already protected against polio, and thus did not take the oral vaccine. The people who had not taken the full Salk series did not feel protected, and thus took the oral vaccine.

What is your prediction on the relation between having had Salk shots and accepting the oral vaccine?

Table 12 provides a way of testing this hypothesis by "controlling" for various levels of Salk injection.

TABLE 12
Acceptance of Oral Vaccine
by Number of Previous Polio Vaccine Injections

	Number of Polio Injections				
	0	1	2	3	4 or more
Number of Takers of Oral Vaccine	85	11	35	132	117
Total Respondents with this Injection History	202	21	56	198	147
Oral Take Rate	42%	52%	63%	67%	80%