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**HEALTH INNOVATION  
And  
FAMILY PLANNING  
A Study in Eight Indian Villages**

**PRODIPTO ROY**

**JOSEPH KIVLIN**

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**NATIONAL INSTITUTE OF COMMUNITY  
DEVELOPMENT, HYDERABAD**

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## Preface

This is a special companion report on health innovation and family planning of the Diffusion of Innovations project which was undertaken in collaboration with Michigan State University. Other special reports are expected on adoption of high-yielding varieties of seeds, and on an analysis of opinion leadership in relation to the adoption of new practices. There will also be an anthropological report of adoption in a West Bengal village.

Major reports of the project have been *Agricultural Innovations in Indian Villages* (NICD, March, 1968), an analysis of 108 villages; *Agricultural Innovation Among Indian Farmers* (NICD, May, 1968), an analysis of 680 Indian farmers; and *Communication in India: Experiments in Introducing Change* (NICD, May, 1968), a study of communication treatments in six villages. Data for this report were obtained from the same sample as that of the second major report, of 680 farmers.

Directors of the Diffusion of Innovations project were F. C. Fliegel, Prodipto Roy, J. E. Kivlin, L. K. Sen and J. P. Bebermeyer. The field teams were supervised by A. K. Danda, S. K. Reddy and S. S. Thorat. Members of the teams who also did the bulk of the coding and tabulation were D. K. Bhowmik, P. K. Chatterjee, B. R. Patil, K. S. S. Raju, J. M. Rao, J. V. R. Rao, S. Rudra, J. Sahabhowmik, S. K. Shelar, P. M. Shingi, G. Subharatnam and V. K. Surkar. The manuscripts were typed by G. Narayana Murty and D. S. R. Anjaneyulu. Data for this report were processed at the Computer Centre of the Programme Evaluation Organization, Planning Commission, New Delhi.

*National Institute of  
Community Development, Hyderabad,  
29th April, 1968.*

GEORGE JACOB  
Dean

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I

**Correlates of Health Innovation in  
Eight Indian Villages**

PRODIPTO ROY

Research Report 21  
Project on the Diffusion of Innovations  
in Rural Societies  
Michigan State University



# I

## Correlates of Health Innovation in Eight Indian Villages

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### Framework Of Analysis

Kingsley Davis makes a calculated guess that the number of deaths from malaria in India in 1939 was about 1.9 million. "The malaria morbidity rate in India remains unknown . . . . Most authorities agree that malaria causes more sickness and loss of working power than any other disease in India. It has been estimated that each year about 100 million suffer from it."<sup>1</sup> In the same year, 1939, the deaths caused by small-pox in India numbered about 70,000, and cholera caused a little over 100,000 deaths.<sup>2</sup>

In 20 years, with the aid of the World Health Organization, the Indian Malaria Eradication Program has essentially reduced malaria mortality and morbidity by over 99.5 per cent.<sup>3</sup> Small-pox vaccination and cholera inoculation campaigns have also been spread successfully into the countryside. Similarly, the extension of medical services to reduce infant mortality and to provide protected drinking water has made inroads in Indian villages. The mute testimony of the success of these programs is the reduction of death-rates from an estimated 30 per 1,000 in 1940 to about 20 per 1,000 in 1965. Unquestionably, much of India's 'population explosion', due to reducing death-rates, can be attributed to the success of propagation of health practices. However, as we will show later, this reduction in death-rate, is a necessary condition, before family planning programs can be effectively propagated.

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1. Kingsley Davis, *The Population of India and Pakistan*, Princeton: University Press, 1951, p. 53.

2. *Ibid.*, pp. 46-47.

3. *Fourth Five-Year Plan*, Government of India, Planning Commission, November, 1966, p. 340.

Good health is a basic value in nearly all societies and hence the United Nations agencies and world sympathy could be galvanised into action to reduce disease and death-rates in India. It is precisely because health innovations are propagated with vigor by governmental agencies that studies have sometimes found no socio-cultural factors which differentiated between individuals receiving and those not receiving an innovation like the polio vaccine.<sup>4</sup> An analysis of the dissemination of small-pox vaccination and cholera inoculations among 108 Indian villages did not reveal any village characteristics which significantly distinguished successful villages.<sup>5</sup> When health measures are analysed in the framework of public health propagation to calculated target populations it would seem that individual choice plays very little role in the adoption of health practices.

However, studies have shown that when a spectrum of health practices are studied together there is a differential acceptance of health measures within a community.<sup>6</sup> In fact, the measurement of health innovation as a continuous dimension itself sets the stage for proving that differential adoption involves individual choice. While many studies have attempted to construct uni-dimensional measures of agricultural innovations with greater or lesser success, one of the few attempts to construct a health innovation scale was by Junghare and Roy.<sup>7</sup> They found that social background, extension contact and a secular attitude affect the adoption of health practices.

The change from traditional Indian health practices to modern westernized health innovations involving the belief in a germ-theory, use of injection needles, sterilization, insecticides and pills, involves an entire rational-secular world-view. If there is a dimension of rational health knowledge,

4. John C. Belcher, "Acceptance of the Salk Polio Vaccine", *Rural Sociology*, 23 (June, 1958), pp. 158-170.

5. Sudhakar S. Thorat and Frederick C. Fliegel, "Some Aspects of Adoption of Health and Family Planning Practices in India", *Behavioural Sciences and Community Development*, Vol. 2, No. 1 (March, 1968), pp. 1-13.

6. S. G. Lowry, S. C. Mayo and D. G. Hay, "The Factors Associated with Acceptance of Health Care Practices Among Rural Families", *Rural Sociology*, 23 (June, 1958), pp. 198-202.

7. Y. N. Junghare and Prodipto Roy, "The Relation of Health Practice Innovations to Social Background Characteristics and Attitudes", *Rural Sociology*, 28 (December, 1963), pp. 394-400.

trial and practice, a judicious selection of modern health innovations should manifest such a dimension. In this study, we have selected health innovations from the major thrusts of various health programs. Even though there are national campaigns to eradicate malaria or small-pox, the understanding of and participation in such a program represents some degree of voluntary effort. Other practices like cholera inoculation or modern child-birth practices represent a more radical and voluntary change from traditional practices. Thus the preservation of health in a modern way begins to take on a unified rational innovative dimension.

#### *Hypotheses and design*

In our study we first hypothesized that we could construct a uni-dimensional measure of health innovation. Out of the many health programs being propagated, we made a parsimonious selection of behavioral traits indicating a break from traditional sacred health practices to rational innovative behavior. These would provide a pool of items manifesting such a dimension, from which a scale or index could be constructed.

Second, we felt that the background of the farmer would affect his innovative behavior. The *younger* farmers should be more willing to break with traditional practices. The size and structure of the *family* may be related to the adoption of new practices. Modern *education* has been considered the panacea which makes people rational. In the case of health innovation it may not only be a choice of the father but the education of the wife or even of the children which may affect health innovation.

Third, social status, in general, we hypothesized, would be positively related to adoption of health practices. We felt that various dimensions of status might be separately related and make a net contribution. The ritual *caste rank* of an individual might possibly be related, because the upper castes are shedding ritual taboos while the lower castes are taking them on, and hence *caste rank* should have a direct relation with adoption of health innovations. *Level of living*, the most stable measure of material well-being, we felt, would

also relate to health adoption. Even though the health services in rural India are largely socialized they are not always entirely free. For example, taking one's wife to the hospital for a confinement does involve transportation, cost of living in a city, medicines and a general wherewithal that the poorer cultivators just cannot afford or risk. On the other hand, we have the 'rational fatalism' of the poorer cultivator, when he does take his wife to the city hospital, he just does not get the medical treatment the richer clientele can command. And he quite rightly feels that his wife is better cared for emotionally and physically, in the village. Thus the richer farmers adopt health practices and the poorer do not. Finally, as *participation in formal social organizations* in a village is a mark of status and functionally may relate a person to the medical services, we considered this variable.

The fourth general hypothesis was that communications would be related to health innovation. We separately measured the relationship of adoption with various aspects of *mass media* communication—radio listening, newspaper reading, and seeing commercial and block films—and also combined all these into a total index, to determine their single and joint relation with health innovation. *Personal communication*, in terms of knowledge about and contact with specific health service personnel, we felt would be related positively with health adoption. Further, we felt that the contact the respondent had with the city would also be functionally associated with health adoption.

Fifth, we hypothesized that selected personality attitudes or orientations would be related to health adoption. A generally *secular-rational* world-view would be related to adoption. *Empathy* with officials in the outside world and *political knowledge* of the outside world, we felt, were cosmopolite linkages which would be related with health innovation.

Finally, we felt that the important factors which have been found to be strongly related to health innovation should be selected and analysed in a multiple correlation equation to determine the net contribution each factor makes when the effects of other factors are held constant.

*Sampling, field work and data processing*

The sample of the study is described in greater detail in our report of agricultural innovation.<sup>8</sup> Briefly, it comprised all farmers cultivating 2.5 acres or more land, who were below the age of 50, in eight villages—three from Andhra Pradesh, two from Maharashtra and three from West Bengal. A total of 680 farmers were interviewed. Since the study was mainly concerned with agricultural innovations we restricted ourselves to farmers whose farming operations were large enough to make the agricultural innovations feasible and who were not too old to make decisions on farming operations.

While these sampling constraints were useful for the study of agricultural innovations, they have certain biases for the study of health innovations which should be recognized. The size of farm constraint excludes all the landless laborers and purely artisan castes who constitute about 30 to 50 per cent of our village population.<sup>9</sup> In addition, we excluded another 20 to 30 per cent of cultivators who have holdings of less than 2.5 acres. This would mean that well over half, and the poorer half, of the village people were excluded by this criterion. If our status variables relate to health innovations, as we will show they do, we can reasonably assume that the poorer half of the village would have had less adoption of health practices. Hence, in this study we are merely analysing the variance of the upper half of the distribution. The effect of this sampling limitation is probably to reduce the size of the correlation coefficients and the total amount of variance which can be explained by various factors. The age criterion of 50 years only excluded about 5 to 10 per cent of the respondents. Our data do not show any relation of health innovations with age of respondent and, therefore, this criterion would not bias our study unduly.

The interviewing was conducted by three teams of four interviewers and one supervisor each of whose mother-tongue

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8. Prodipto Roy, Frederick C. Fliegel, Joseph E. Kivlin and Lalit K. Sen, *Agricultural Innovation Among Indian Farmers*, National Institute of Community Development, Hyderabad, May, 1968.

9. In our sample, agricultural laborers comprised from a low of 32 per cent to a high of 54 per cent in eight villages, and the other artisan castes varied from a low of 2.5 per cent to a high of 27 per cent.

was Telugu, Marathi or Bengali, respectively. Field work was conducted in March and April of 1967. The teams established residence in the village, usually in a private house. Where possible, the interview was conducted in private and lasted about an hour and fifteen minutes. Since the team had been in the village earlier, rapport was easy to establish and most interviews were in private because people were not that curious any more.

The data were coded and processed at the National Institute of Community Development in Hyderabad and most of the statistical analyses were done by the Programme Evaluation Organization of the Planning Commission in New Delhi.

### The Health Practices Studied

#### *Selection of practices*

Unlike agriculture, in which we encountered a great variety of crops, the area of public health in India is characterized by a far more uniform spread of common diseases. Probably one reason why health programs have been so successful is this uniform pattern of diseases. While there are variations among states of India in incidence and mortality, the major diseases against which campaigns are being run are generically the same. The same strains of cholera, typhoid, small-pox and malaria are extant throughout India. It is only recently that resistant strains of malaria mosquitoes have begun to cause problems.

Hence, we selected six of the most common health problems and asked whether the respondent knew about their prevention measures, if he or any member of his family had ever tried these measures, and whether they were still using these measures. The health practices selected were: (1) small-pox vaccination, (2) cholera inoculation, (3) malaria prevention, (4) making drinking water safe, (5) bed-bug killer, and (6) modern child-birth practices. The questionnaire went through two pre-tests. In the first pre-test, we asked respondents when they had first tried the practice. Responses to the date of trial did not seem to be accurate and hence the time element was dropped. Other questions

on these six practices, on both pre-tests, seemed to yield satisfactory answers in all three states and hence all six practices were retained in the final questionnaire.

#### *Knowledge, trial and usage of health practices*

We asked three questions: (a) 'Do you know about . . .'; (b) 'Have you or any member of your family ever tried . . .'; and (c) 'Were you or any member of your family still using . . .'. The per cent of respondents answering in the affirmative for each question is given in Table 1 by state and village.

No state showed any clear superiority in knowledge, trial or usage of health practices, although Andhra Pradesh showed slightly higher levels of present-usage. Maharashtra had the highest adoption of cholera inoculation and use of safe drinking water. West Bengal villages had the highest level of malaria prevention. Differences among villages and states were not nearly as pronounced as in the case of agricultural innovation.<sup>10</sup>

The data show that levels of knowledge about all six practices was very high, varying from a low of 70 per cent knowledge about modern child-birth practices to a high of 96 per cent knowledge about small-pox vaccination. Trial varied from a low of 23 per cent to a high of 93 per cent and present-usage varied from 12 per cent to 70 per cent.

#### *Uni-dimensionality*

Two methods were used to test the uni-dimensionality of the practices in order to construct a single measure of health innovativeness. We first used Guttman scaling and then a principal component factor analysis. All three stages of adoption — knowledge, trial and usage — were subjected to scaling and factor analysis.

Table 2 gives the results of scaling knowledge, trial and usage, using a 10 per cent sample of 68 respondents. We used Guttman scaling blocks to construct our scales. Cutting-points and the actual number of scale errors are given in the Table, using this sample of 68 respondents. The coefficient

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10. Roy, *et al.*, *Agricultural Innovation Among Indian Farmers*, *op. cit.*, Table 1.

TABLE 1: PER CENT OF RESPONDENTS WHO INDICATED KNOWLEDGE, TRIAL AND USAGE OF HEALTH INNOVATIONS BY VILLAGE AND STATE

	N	Small-pox vaccination			Cholera inoculation			Bed-bug killer			Making drinking water safe			Malaria prevention			Modern child-birth practices		
		K	T	U	K	T	U	K	T	U	K	T	U	K	T	U	K	T	U
Manchili ..	78	100	96	78	99	88	58	79	49	23	88	81	55	82	56	29	90	40	19
Kanchumarru	33	91	91	52	91	91	48	94	58	36	97	76	52	79	67	18	94	42	21
Polamuru ..	99	91	91	77	94	89	65	89	59	37	93	84	61	89	71	40	99	35	17
<i>Andhra Pradesh</i>	210	94	93	73	95	89	60	86	55	32	92	81	57	85	65	33	95	38	19
Pophali ..	100	96	89	70	92	84	71	69	21	12	85	70	64	73	59	35	74	11	7
Mulawa ..	146	95	93	74	93	84	59	77	21	12	90	71	62	88	75	34	86	29	15
<i>Maharashtra</i> ..	246	95	92	72	93	84	64	74	21	12	88	71	63	82	69	35	81	22	12
Amdole ..	103	97	94	51	97	84	31	47	15	11	54	28	10	75	64	31	46	18	14
Harishpur ..	59	100	95	68	98	90	58	63	31	15	51	29	12	90	81	71	32	3	0
Laxmi-Danga	62	100	95	79	97	81	35	65	29	23	60	44	39	85	77	71	27	2	3
<i>West Bengal</i> ..	224	99	95	63	97	85	39	56	23	15	55	33	18	82	72	53	37	10	7
TOTAL ..	680	96	93	70	95	86	54	72	32	19	78	61	46	83	69	40	71	23	12

of reproducibility computed from these actual figures is also given.

TABLE 2: GUTTMAN SCALING OF KNOWLEDGE, TRIAL AND USAGE ITEMS IN DEPENDENT VARIABLE (1ST SAMPLE, N = 68)

	Knowledge		Trial		Usage		
	Cutting-point	Errors	Cutting-point	Errors	Cutting-point	Errors	
Small-pox vaccination	67	0	63	1	56	5	
Cholera inoculation	67	1	61	3	48	4	
Malaria prevention	61	4	55	6	27	12	
Making drinking water safe	..	56	1	46	6	36	10
Bed-bug killer	..	50	7	26	9	19	10
Modern child-birth practices	..	41	4	13	2	8	1
Total errors	..		17		27		42
Coefficient of reproducibility	..	95.83		93.38		89.71	

In each case a second sample of 68 was used to test the reliability of the scale. Table 2 shows that all three stages of knowledge, trial and usage form acceptable scales on the criterion of the coefficient of reproducibility. The knowledge dimension had the highest coefficient of reproducibility with 95.8 per cent and usage was barely acceptable with 89.7 per cent. However, on the criterion of marginal frequencies of the cutting-point, two or three items may need to be dropped from the knowledge scale and it would still have very little discrimination at the lower end of the scale; that is over 60 per cent of the respondents knew about all practices. The scale for trial had two items with marginal frequencies of less than 10 per cent and the usage scale had one item at 10 per cent. Using both criteria of reproducibility and of marginal frequencies, the trial scale seemed to be the best scale to use in analysis.

Table 3 gives the factor loadings that each practice contributed to a principal component factor of knowledge, trial and usage. All three stages manifest a high level of uni-dimensionality with positive and high loadings. All items for all three measures gave high positive loadings indicating that they belonged to the same dimension. Only one item—modern child-birth practices—had a loading below

.400 in the trial and usage dimension. The knowledge dimension explained the highest amount of variance of the intercorrelations, demonstrating the greatest degree of uni-dimensionality.

TABLE 3: FACTOR LOADINGS OF FIRST PRINCIPAL COMPONENT FACTOR OF KNOWLEDGE, TRIAL AND USAGE (N = 680)

Items	Knowledge	Trial	Usage
Small-pox vaccination.. ..	0.631	0.700	0.632
Cholera inoculation .. ..	0.681	0.745	0.734
Bed-bug killer .. ..	0.656	0.430	0.509
Making drinking water safe .. ..	0.754	0.630	0.631
Malaria prevention .. ..	0.588	0.467	0.403
Modern child-birth practices .. ..	0.615	0.371	0.230
<i>Per cent of variance explained</i> .. ..	<i>43.06</i>	<i>33.06</i>	<i>30.18</i>

#### *Selection of an index of health innovation*

In our consideration of selecting a single measure of health innovativeness we were concerned about three things: (a) that all practices would be applicable to all respondents in the sample; (b) that the measure would be uni-dimensional because we were going to use mainly correlation analysis; and (c) that the final measure would have a somewhat normal distribution so that it would take into consideration the variation between respondents.

The knowledge dimension was ruled out because about 60 per cent of the respondents had knowledge of all practices and hence an index of knowledge would ignore the variation within this group. Besides, we preferred trial or usage as more concrete manifestations of innovativeness. Usage had the most normal distribution of the three measures but trial had an acceptable distribution. On the criterion of uni-dimensionality, trial was superior to usage, using either scale analysis or factor analysis. In addition, the logic of sometimes unfairly penalizing an adopter of a health practice like modern child-birth, because this year no child was born and hence was not applicable, seemed unjust. Hence, on logical and empirical grounds, it was decided to use trial or 'ever used' as the best measure of health innovation or adoption in pre-

ference to 'now using'. The terms adoption or innovation are used interchangeably in this paper. In the following analysis, when we refer to adoption of innovation, we will mean 'ever used', as measure by our trial index.

A simple unit-weighted index of trial which gave a range of scores of zero to six, was computed for each respondent. This was used as the dependent variable for all the statistical analysis. We have used correlation analysis as our main statistical tool. With a sample of 680, an  $r$  of .08 is significant at the 5 per cent level and an  $r$  of .11 is significant at the 1 per cent level. Since our sample size makes these low correlations statistically significant we have only used the 1 per cent level throughout this report.

#### Social Background, Status and Health Innovation

In this section we will consider the social background of the respondent and his family, and his relative position in the social structure of his village, to see if these factors affect his adoption of health practices.

##### *Age and family*

We took the position that the younger farmers would probably adopt more health practices. The correlation coefficient ( $r = -.005$ ) shows practically no relationship, though it is in the expected direction (Table 4). We expected that the larger families particularly the joint families, would be more apt to adopt partly because joint families in villages, particularly in West Bengal, typically belong to the higher castes. In joint families, some of the children or grandchildren get exposed to new health practices which gradually diffuse through the family. We found only modest correlations between adoption and either size of family or jointness and these were not significant. Since jointness was a dichotomous variable and about a third of our families were joint and two-thirds nuclear, we also used a chi-square analysis to test for differences found that the relation was statistically significant ( $\chi^2 = 11.25$ ,  $P .01$ , 1 d.f.). The joint families had a higher level of adoption.

TABLE 4: CORRELATION OF SOCIAL BACKGROUND AND STATUS VARIABLES WITH HEALTH INNOVATION

Variable	Correlation coefficient
Age of respondent .. .. .	-.004
Size of family .. .. .	.058
Joint family .. .. .	.073
Can read newspaper .. .. .	.347**
Education of respondent .. .. .	.357**
Education of spouse .. .. .	.306**
Children's education index .. .. .	.216**
Caste rank .. .. .	.306**
Level of living .. .. .	.391**
Social participation .. .. .	.205**

\*\* Significant at the .01 per cent level.

### *Education*

Literacy and education have been considered as doorways opening up new vistas of health and happiness. We asked the respondent whether he could read a newspaper, which we considered an adequate measure of his functional literacy.<sup>11</sup> We found that those farmers who were literate adopted more health practices. Functional literacy is quite important for reading labels on medicines, newspaper advertisements on drugs or bill boards, and advertisements on health practices. We found in our sample that literacy was functionally related to health innovation.

We took three different measures of education to appraise their separate effects on health innovations. We wanted to know if the education of the respondent, the education of his wife and the education of children were related to health adoption. Education of respondent and wife was measured by graded categories reflecting illiterate, primary, middle, high school, etc. For the children we computed the actual cumulative grades completed as a per cent of the grades possible for the age of the child.

We found that all three measures were highly significantly related to adoption of health practices. Education of respondent had the highest coefficient of correlation ( $r = .357$ ) followed by education of the spouse ( $r = .306$ ) and then child-

11. See Prodipto Roy and B. Radha Iyer, "Measuring Functional Literacy in Indian Villages", *Behavioural Sciences and Community Development*, Vol. 1, September, 1967, pp. 107-113.

ren's education index ( $r=.216$ ). As would be expected, the education of the husband is most important, but the education of the wife and children also affect health innovation.

#### *Socio-economic status*

We used three measures to determine the effect of socio-economic status on adoption. We ranked the castes according to ritual purity and found that the upper castes had adopted more modern practices than the lower castes ( $r=.306$ ). As we had hypothesized, the upper castes were adopting practices which are often considered ritually improper like the inoculation of dead germs, the spraying of insecticides, changing child-birth taboos, etc., while the lower castes were still practising or may be adopting some of the traditional ritual taboos.

We constructed a level of living index based on material possessions like a bicycle, watch, torch, furniture and various housing items like pucca walls, cement floor, and separate latrine, and found that it was highly related with health adoption,  $r=.39$ . This coefficient is considerably lower than the correlation of level of living with agricultural innovation,  $r=.39$  compared with  $r=.59$ , indicating that level of living was less of a constraint in health adoption.

The third measure of socio-economic status which we used is, participation in and being elected to the formal organizations of the village. A social participation index was computed by weighting office-holding as two and membership as one for each respondent. This social participation index had a statistically highly significant but somewhat low correlation with health adoption,  $r=.205$ .

#### Communication and Health Innovation

We examined various aspects of communications to determine what effect they had on health adoption. *First*, we looked at three types of mass communication, radio-listening of a respondent or members of his family, whether he sees block films or commercial films and whether he reads newspapers. *Second*, we found out how well he knew and

interacted with the health workers. *Third*, we examined the respondent's contact with an urban centre.

#### *Mass media*

We asked the respondent whether he listens to the radio and also whether his family listens to the radio. We found that both the respondent's and his family's radio-listening were directly associated with health innovation. The correlation coefficients are .328 and .316, respectively, and both are highly significant (Table 5).

TABLE 5: THE CORRELATION OF COMMUNICATION VARIABLES WITH HEALTH INNOVATION

Variables	Correlation coefficients
Radio-listening (respondent)	.328**
Radio-listening (family)	.316**
Block films seen	.152**
Commercial film seen	.258**
Newspapers read (or read to)	.399**
Mass media index	.477**
Knowledge of health workers	.364**
Extension contact with doctor	.242**
Extension contact with FP worker	.308**
Urban contact	.335**

\*\* Significant at the .01 per cent level.

We asked the respondent the number of times he had seen a film shown by the block and the number of times he had seen a commercial film. We found that both figures correlated significantly and positively with the degree of health innovation. The coefficient for commercial films ( $r = .258$ ) was considerably higher than for block films ( $r = .152$ ).

Then we asked the respondent if he read a newspaper or had one read to him. We coded the responses 0 for no papers read or read to him, 1 for papers read to him and 2 if he read one or more papers. We found a highly significant relationship between newspaper reading and health adoption ( $r = .399$ ).

We made a composite mass media index of radio-listening, commercial films seen, and newspaper reading and it

correlated with a higher coefficient than any of the parts ( $r = .477$ ).

#### *Extension contact*

We computed a simple index of the knowledge that the respondent had of the two health workers who were responsible for his village. We simply scored a respondent one point each for knowing either the doctor or *dai* (nurse), and an additional point if he knew their names. This index was strongly related with health practice adoption ( $r = .364$ ).

The respondent was asked how often he had spoken with the doctor and this figure correlated positively with health adoption ( $r = .242$ ). Similarly, the number of times he had spoken with the family planning worker, who was sometimes the *dai* (nurse), also correlated positively with health adoption ( $r = .308$ ).

#### *Urban contact*

The degree to which a person visits a town or a city may be functionally related to health innovation very simply because he may be going to purchase medicines, take his wife to a hospital or for some other medical reason. In addition, contact with urban life is likely to bring him in touch with knowledge about health practices and prevention of disease which he may later adopt. We found that the number of visits to a city or town was strongly related with adoption of health practices ( $r = .335$ ).

### Social-psychological Correlates of Health Adoption

Various attitudes and postures are often necessary conditions before an individual adopts rational practices and breaks with past tradition. We constructed a sacred-secular scale based on several items dealing with caste taboos, health and cow.<sup>12</sup> We hypothesized that a secular view of life

<sup>12</sup> Items in the scale were: (1) should Harijans (untouchables) be allowed to draw water from all common wells in the village; (2) should Harijans and other children take meals together in schools; (3) can the evil eye cause disease; (4) do you think Harijans should be allowed to enter and worship in all temples of the village; (5) what do you do with bullocks who are too old to work; (6) should non-Hindus be allowed to eat beef; (7) if your son wanted to marry a lower caste girl, would you allow it; (8) in your opinion, is an illiterate village Brahmin superior to a lower caste college graduate?

would be a condition necessary for and conducive to the adoption of rational health practices. The correlation coefficient was statistically significant, but not very strong. This correlation was far below that found by Junghare and Roy,  $r = .485$ , compared with  $r = .129$  in the present study.<sup>13</sup>

TABLE 6: SOCIAL-PSYCHOLOGICAL CORRELATES OF HEALTH ADOPTION

Variable	Correlation coefficient
Secularism .. .. .	.129**
Political knowledge .. .. .	.428**
Empathy .. .. .	.258**

\*\* Significant at the .01 per cent level.

Finally, we used two psychological measures of contact with the outside world—knowledge about political leaders and empathy or ability to take the role of officials and politicians—and found that both dimensions were related to health adoption. We have found knowledge of the political world to be one of the best measures of a cosmopolite linkage dimension and here it had a higher zero-order correlation than any other single variable ( $r = .428$ ). Ability to empathise with outside officials was not related as strongly as political knowledge ( $r = .258$ ).

#### The Important Factors Affecting Health Innovation

##### *Summary*

We constructed a single measure of health innovation based on six health practices which represent the major thrusts of the health program in India: (a) small-pox vaccination, (b) cholera inoculation, (c) bed-bug killer, (d) making drinking water safe, (e) malaria prevention, and (f) modern child-birth practices. We found a reasonable amount of knowledge, trial and usage of all six practices in all our eight villages, manifesting the country-wide diffusion of these health innovations. We also tested the uni-dimensionality of the measures of knowledge, trial and usage by Guttman scaling and factor analysis and found that all three dimensions

13. Junghare and Roy, *op. cit.*, p. 397.

showed an acceptable level of uni-dimensionality. Of the three measures on logical and empirical grounds we selected trial as our best measure of health innovation. We felt that knowledge was too widespread and thus did not discriminate very well; present usage would have often unjustly penalized an adopter because he was not currently using a practice which was then not applicable. Hence we selected trial as our best measure of health innovation.

Among social background variables we found that age and size of family were not related to health adoption. Joint families, using a chi-square test, showed a significantly higher level of adoption than nuclear families. This finding is in contrast with results we obtained in analyses of agricultural innovations and family planning where family structure, whether joint or nuclear, was not related to adoption. One possible explanation is that joint families have a greater number of nuclear units which can be exposed to health innovation and which can make separate decisions. Our question was 'Did you or any member of your family . . . have a small-pox vaccination?' The chances that one member of a joint family would have been vaccinated would be larger by pure chance. Hence not much importance should be attached to this association.

Literacy and education showed strong associations with health innovation. And all three measures of socio-economic status demonstrated a strong association with health adoption. Level of living, which showed a very high correlation coefficient with agricultural adoption ( $r = .59$ ), had a more modest correlation with health adoption ( $r = .39$ ). Agricultural adoptions require far greater economic risks and only farmers with a relatively high level of material well-being could afford to take these risks. Health innovation, on the other hand, requires less economic investment than agriculture. Of the eight background variables we tested, four were selected and carried into the multiple correlation analysis. Selection was based mainly on the strength of the zero-order coefficient and on the exclusion of variables which were logically overlapping.

All measures of mass communication showed strong relationships with health innovation, and a joint index showed

an even stronger relationship. Knowledge about and contact with health workers showed strong associations with adoption. Urban contact also showed a strong relationship with adoption. We selected four of these variables to be carried forward into the multiple correlation analysis.

All of the social-psychological variables we tested had a significant correlation with health adoption. The secular scale which had been found in an earlier study to be strongly related to adoption proved to have only a modest association. The other two variables were carried forward into the multiple correlation analysis.

#### *Multiple correlation*

Although all of the ten variables selected for multiple correlation analysis had substantial zero-order correlations, ranging from .242 to .477, none explained by itself as much as 25 per cent of the variability in health adoption. All ten variables together only explained 30 per cent of the variance in health adoption, which was rather modest and manifested a great deal of interaction between variables (Table 7).

TABLE 7: ZERO-ORDER CORRELATION COEFFICIENTS AND TENTH-ORDER PARTIAL CORRELATION COEFFICIENTS OF SELECTED VARIABLES WITH HEALTH INNOVATION

Variable	Zero-order correlation coefficient	Tenth-order partial correlation coefficient
Can read newspaper .. .. .	.347**	.027
Education of respondent .. .. .	.357**	.007
Level of living .. .. .	.391**	.093**
Social participation .. .. .	.200**	.018
Mass media index .. .. .	.477**	.171**
Knowledge of health workers .. .. .	.304**	.125**
Contact with doctors .. .. .	.242**	.025
Urban contact .. .. .	.335**	.061
Political knowledge .. .. .	.428**	.110**
Empathy .. .. .	.258**	.057
R <sup>2</sup> .. .. .		.305
R .. .. .		.552

\*\* Significant at the 1 per cent level.

Based on the highest order partials, only four variables made a significant net contribution to the explanation of

health adoption: the mass media index, knowledge of health workers, political knowledge and level of living.

Both literacy and education drop very low when the effect of all other variables are removed—in fact, probably one of these variables may be partialling the other out. The effect of the two status variables, level of living and social participation, is reduced considerably although level of living continues to make a significant net contribution.

Two communication variables continue to be important factors which explain health innovation, the mass media index and knowledge of health workers. Knowledge of health workers probably overshadows contact with doctors and reduces its partial into insignificance.

Only one linkage variable, political knowledge, continues to make a net contribution to the explanation of health adoption. The effect of both urban contact and empathy are reduced a great deal when other variables are taken into consideration.

#### *Conclusions*

(1) Communication variables were the best predictors of health innovation in our broad sample of farmers. The first was a composite mass media index, comprised of radio-listening, film-going and newspaper reading.

(2) The second communication variable was a measure of knowledge of the health extension agents. Knowledge about and contact with the extension agency remains an important factor in health adoption. While a farmer can get agricultural supplies through other agencies, medical supplies and services are distributed and administered only through medical or paramedical personnel. Hence a knowledge about health personnel becomes a pre-condition to health innovation.

(3) Level of living was positively related to the adoption of health practices. It should be recalled that we were analysing the variance among the richer one-third of the village population. Among this group, money was not as great a constraint as it may be among the rest of the village population.

(4) Neither education nor literacy, which have high zero-order correlations, had much net effect on health innovation. One explanation was that one variable partialled the other out. Another explanation could be that among our sample, less than 30 per cent of whom had no education and over 60 per cent of whom could read newspapers, education was not an important constraint for the adoption of health practices.

(5) Three variables, measuring a linkage with the outside world—urban contact, political knowledge and empathy—had significant zero-order correlations with health adoption. Of these, political knowledge overshadowed the others. This general dimension of having knowledge of people in the outside world seems to be important and functional for the adoption of health practices. The secular posture which we hypothesized would relate to adoption did not show a high coefficient. Again, it is possible that among the upper third of farmers rationality toward medicine has already been accepted and is no longer a constraint for adoption.

#### *Recommendations*

(1) Among the richer farmers, and probably among the poorer farmers too, the propagation of health information and persuasion through the mass media is going to continue to be very useful. Radio programs, films and newspaper reports about health practices should be continued and increased. Not only will these media have a direct functional benefit of disseminating health innovations but they will have the indirect global benefit of general education and of increasing cosmopolite linkage with the outside world, which is also functional for health practice adoption.

(2) As the knowledge about and demand for health innovation increases, the need for more medical personnel will increase. The village people will no longer be satisfied with the minimal prophylactic services studied here, but will demand more diagnostic and curative treatment. In a sense these initial practices are opening the doors to the entire gamut of modern medical practices. As the traditional ayurvedic doctor, priest and *hakim* are discredited, they have

to be replaced by modern medical supplies and services. This study has shown that a wide gap exists between knowledge of health practices and usage of those same practices. This gap can be expected to produce a tide of expectation of improvement in health conditions.

(3) We found that level of living, even among the bigger farmers, affected health adoption. Hence among the poorer cultivators and the landless laborers, level of living is going to be a more severe constraint in adopting health practices. As medical services are being extended to the countryside, socialistic safeguards will need to be kept in mind. No country can afford to debilitate over two-thirds of its peasant stock, because it will take a terrible toll on the agricultural and industrial labor force and productivity.

II

**Correlates of Family Planning in  
Eight Indian Villages**

JOSEPH KIVLIN

Research Report 18  
Project on the Diffusion of Innovations  
in Rural Societies  
Michigan State University

## II

# Correlates of Family Planning in Eight Indian Villages

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### Introduction

India's population now numbers about 520 million. The population is increasing at about 2.5 per cent per year, a little over one million per month. We can think of no better way to stress the importance of family planning than to state these salient facts of population size and growth.

The study which we report has limited but timely and relevant data on family planning in eight Indian villages. We confined our analyses to two widely promoted contraceptive practices, vasectomy (male sterilization) and the loop (IUCD—Intra—Uterine Contraceptive Device). Our data show widespread knowledge and considerable approval of the practices. Adoption of these family planning methods, however, is at low levels.

#### *The climate for family planning*

By climate we mean the social environment of opinions, values, relationships and activities which affect human decisions to practise family planning. These include attitudes and activities of government agencies and officials which may deter or facilitate family planning programs. In the last few years there has been a marked change in the direction of increased recognition by government agencies of the problems of unchecked population growth. Attitudes have changed from indifference or active hostility to support and a willingness to implement far-reaching programs. The Government of India, long a leader in recognition of the need for a national program of family planning, has recently moved to widespread implementation of programs. Vasectomy camps at which over 1500 operations were performed in a single day, national promotion of the red triangle as a symbol of family planning, and the recently constituted plan to distribute

condoms nationwide through small shopkeepers and tea stalls are but three examples of government attempts to shift family planning programs into high gear. Agencies of the United Nations, the United States Agency for International Development, and other organizations engaged in international programs have also given family planning a new and increased emphasis. The official climate for family planning, then, is generally favorable and is likely to become more so in the future.

But what of the individual? It is with individual husbands and wives that the problem of family planning ultimately rests. How does the individual himself contribute to the climate for family planning? He contributes in the knowledge that he has or does not have, in the approval that he gives or does not give, in the decision to adopt that he takes or does not take. It is on these three areas of individual knowledge, approval and adoption of vasectomy and the loop that our study focuses.

#### *The sample*

Our family planning data are part of a larger study investigating the diffusion of agricultural, health and family planning innovations in village India. Details of village selection and other sampling procedures are given in two of our previous reports and only their relevant aspects will be given here.<sup>1</sup> The sample for the present study consisted of 680 cultivators in eight villages, located in three states in India: three villages in Andhra Pradesh, two in Maharashtra and three in West Bengal. All respondents were farmers who were not more than 50 years of age and who were farming at least 2.5 acres of land at the time of interview.

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1. See F. C. Fliegel, P. Roy, L. K. Sen and J. E. Kivlin, *Agricultural Innovations in Indian Villages*, Hyderabad: National Institute of Community Development, March, 1968, and P. Roy, F. C. Fliegel, J. E. Kivlin and L. K. Sen, *Agricultural Innovation among Indian Farmers*, Hyderabad: National Institute of Community Development, May, 1968. These larger studies, in turn, were part of an international study, "Diffusion of Innovations in Rural Societies", under contract between the United States Agency for International Development and Michigan State University, E. M. Rogers, Project director, which was conducted in Brazil, Nigeria and India. The Indian part of the study was done in collaboration with the National Institute of Community Development, Hyderabad.

I wish to acknowledge the critical comments of F. C. Fliegel in the writing of this report.

These criteria were intended to restrict our sample to farmers who had sufficient scope of farming operation to make agricultural practices relevant for them to adopt, and to restrict our sample to those not likely to be involved in an ambiguous decision-making situation in which the older generation was handing over responsibility to the younger. The sample included every cultivator in the eight villages who fitted the size and age specifications. Only males were interviewed. We did not interview wives of respondents.

The above sampling limitations have important consequences for the present study of family planning. First, of course, the age limitation resulted in a highly relevant sample of husbands and wives. Very nearly all were in their reproductive years. The average age of respondents was 37, with a range of from 17 to 50. Reflecting the Indian norm for wives to be substantially younger than husbands, the average age of respondent's wife was 30, with a range of from 14 to 49. There were no wives who were older or of the same age as their husbands. The range in differences between age of husband and wife was from one to 36 years. All but 14 of the 680 respondents had been married and all but 20 of those who were married had had one or more children.

The second consequence of our sampling limitations may have been less desirable from the standpoint of relevancy for family planning. The limitation of 2.5 acres of land cultivated undoubtedly skewed our sample distribution above the average level of living for the study villages. Thus we would likely record more knowledge, approval and adoption than if we had interviewed all village families. On the other hand, it may well be that our sample represents a highly relevant target audience, about whom it is particularly important to get information. Our own and most other research indicates that it is the more educated, more affluent segment of the population which is most receptive to family planning. Given the limitations of birth control technology, family size norms, high infant mortality, and other factors, lowering the birth rate of the least affluent segments of the population may have to await at least partial solution to these problems. Certainly, there was much scope for family

planning promotion in our sample. With the wives of most respondents still in their reproductive years, the average number of children ever born was 4.31. The average number of living children was 3.26. We conclude that our sample is highly relevant for useful family planning data, but that a complete enumeration of heads-of-household would have afforded additional information to permit comparisons across social strata.

*Field work and data tabulation*

Field work was conducted from March to May, 1967, by teams of interviewers with a supervisor all of whom spoke the language of the region in which they interviewed (Marathi, Telugu or Bengali) as mother-tongue. The teams had been in each of the eight villages for an earlier phase of the project and had good rapport with villagers. Efforts were made to conduct the interview in private but this was not always possible, and the occasional lack of privacy probably resulted in fewer disclosures of adoption of the loop or vasectomy than were actually the case. That is, we assume that respondents were not likely to falsely claim adoption, but that they might have dismissed the subject of family planning with denials of adoption in situations where others were present during the interview. To the extent that this assumption is correct, our data are conservative and levels of adoption may be a little higher than we indicate in our Tables.

Data were tabulated by punching response categories onto McBee-sort cards and casting tabulations into chi-square frequency Tables. The chi-square test of significance was used because knowledge, approval and adoption data for family planning are dichotomous variables and thus not suitable for correlation analysis. Coding was checked for both random and systematic error. McBee-sort card counts were also checked against computer frequency counts available from the larger study to further reduce the possibility of error.

**Analysis**

We begin our analysis with presentation of data on village and personal norms sanctioning family planning. We then

indicate what the levels of knowledge and adoption were, among the 680 cultivators in our sample, for vasectomy and the loop. We also present data on sources of information which led to knowledge and adoption of vasectomy and the loop. The bulk of our analysis concerns Tables of relationships between selected demographic, communication and social-psychological variables and knowledge, approval and adoption of vasectomy and the loop.

#### *Village and personal norms*

Village and personal norms sanctioning family planning are obviously important. It is difficult to take action which one knows is not approved by those with whom one lives in close contact. We indicated earlier that the official climate for family planning is now quite favorable. Rarely does one notice adverse comments on family planning by officials or agencies. At the local level, in order to determine village norms on vasectomy, we asked respondents 'Suppose a man of this village had an operation to keep from having more children, would most people encourage him, discourage him, or not care?' Responses are given in Table 1 and show that 53 per cent of the sample felt that most people would encourage, 6 per cent felt that most people would not care, and 41 per cent felt that most people would discourage. By this measure of respondent appraisal, then, village norms are definitely more favorable than unfavorable.

TABLE 1: "SUPPOSE A MAN OF THIS VILLAGE HAD AN OPERATION TO KEEP FROM HAVING MORE CHILDREN, WOULD MORE PEOPLE ENCOURAGE HIM, DISCOURAGE HIM, OR NOT CARE?"

					Number	Per cent
Encourage	..	..	..	..	331	53
Not care	..	..	..	..	37	6
Discourage	..	..	..	..	258	41
Total	..	..	..	..	626	100
No answer	..	..	..	..	54	

It is probably most useful to compare the above appraisal of village norms with data on personal norms, shown in

Table 2. We asked respondents 'Personally, do you approve or disapprove of the idea of using these methods (vasectomy and loop) to stop having children?' There were 67 per cent who approved and 33 per cent who disapproved. This percentage who approved of family planning for themselves (personal norms) is substantially higher than the percentage for village norms (53 per cent, Table 1). It is difficult to decide whether respondents perceived the rest of the village to be less favorable to family planning than they themselves were, or whether they were giving what they perceived to be a socially acceptable (favorable) answer. As adoption levels of vasectomy and loop were low, despite the favorableness of both personal and village norms, we can infer that favorable norms are a necessary but not sufficient condition for adoption of family planning. We obtained similar results in another phase of our project. Village respondents scored very high on an index of favorableness toward programs of change but had low levels of actual adoption of agricultural, health and family planning practices.<sup>2</sup>

TABLE 2 : 'PERSONALLY, DO YOU APPROVE OR DISAPPROVE OF THE IDEA OF USING THESE METHODS (VASECTOMY AND LOOP) TO STOP HAVING CHILDREN?'

					Number	Per cent
Approve	..	..	..	..	436	67
Disapprove	..	..	..	..	219	33
Total	..	..	..	..	655	100
No answer	..	..	..	..	25	

#### *Knowledge and adoption of vasectomy and the loop*

Because the primary focus in the larger study was on agricultural practices and we could give but limited attention to family planning, we have here concentrated our attention on the two methods of birth control most widely promoted at the time of our study, vasectomy and the loop.

<sup>2</sup> J. E. Kivlin, P. Roy, F. C. Fliegel and L. K. Sen, *Communication in India: Experiments in Introducing Change*, Hyderabad: National Institute of Community Development, May, 1968.

Knowledge of vasectomy was at a very high level (Table 3). Only 14 per cent of the 680 respondents said they did not know 'about an operation that a man can have to keep from having a baby.' Because most respondents knew about vasectomy, we decided against trying to compare those who knew with the few who did not know, in order to better understand the spread of knowledge. It is apparent that the widespread promotion and accounts of vasectomy camps, subsidies for sterilization, and other information about vasectomies have been effective in making villagers aware of this method of family planning.

TABLE 3: KNOWLEDGE AND ADOPTION OF VASECTOMY, 680 INDIAN CULTIVATORS, 1967

	Knowledge		Adoption	
	Number	Per cent	Number	Per cent
Yes	583	86	61	9
No	97	14	585	91
Total	680	100	646	100
No answer	—	—	34	—

TABLE 4: KNOWLEDGE AND ADOPTION OF LOOP, 680 INDIAN CULTIVATORS, 1967

	Knowledge		Adoption	
	Number	Per cent	Number	Per cent
Yes	397	58	12	2
No	283	42	590	98
Total	680	100	602	100
No answer	—	—	78	—

Knowledge of the loop, on the other hand, afforded a more even numerical balance between those who knew of it and those who did not (Table 4). There were 58 per cent who knew about the loop and 42 per cent who did not. Therefore, we used knowledge of the loop in our analysis of factors contributing to knowledge of a family planning method.

Adoption of both vasectomy and loop was at low level (Tables 3 and 4). There were 61 vasectomies, 9 per cent

of those responding. There were only 12 reported adoptions of the loop, 2 per cent of those responding. In addition, there were 34 respondents who did not answer as to adoption of vasectomy and 78 who did not answer as to adoption of the loop.

Since all respondents answered the questions about knowledge of vasectomy and the loop, it is likely that lack of privacy or sensitivity to personal references to the subject of family planning methods resulted in the failure to respond regarding adoption. As we suggested earlier in our discussion of field work and interviewing, the failure to respond may mask some adoptions and make our adoption figures slightly lower than they should be. However, the figures we present or the slightly higher ones we would have gotten with 100 per cent response, still reflect a low level of adoption. Considering the fact that the wives of almost all of our respondents were still in their reproductive years, and that the average number of living children was 3.26, the need for greater adoption is apparent. We do not have data for adoption of other family planning methods; but these may be presumed to be low. In another phase of our project, with another sample, we found very low levels of adoption of family planning (less than 5 per cent), and the only method reported other than sterilization and the loop was the condom.<sup>3</sup> Current increased emphasis in some areas on the condom and the oral pill, of course, will tend to increase family planning adoptions. In general, it is likely that the more the availability of methods the more will be the total adoptions.

#### *Sources of information for knowledge and adoption*

Research on sources of information in adoption behavior has mainly focussed on the relative importance of various information sources at different stages in the adoption process.<sup>4</sup> We obtained data on only two stages in the process

3. *Ibid.*

4. E. M. Rogers, *Diffusion of Innovations*, New York: The Free Press of Glencoe, 1962, pp. 98-100. These researches are predominantly of agricultural innovations. Rogers and other researchers commonly use five stages: awareness, interest, evaluation, trial and adoption. These stages are frequently collapsed to three: knowledge, trial and adoption. Because most of the adoptions in the present study were of vasectomy, which is not easily reversible, we necessarily omitted consideration of the trial stage.

of adoption of vasectomy or the loop, knowledge and actual adoption. We expected that the mass media would be cited more often as an information source for knowledge, and that persons such as neighbors, friends or relatives would be cited more often as an information source leading to adoption. The mass media are not so much convincing as informative. Because of the technical nature of both vasectomy and the loop, we expected change agents such as the family planning worker or medical doctor to be cited often in both stages. This is essentially what we found (Table 5).

TABLE 5: SOURCES OF INFORMATION LEADING TO KNOWLEDGE AND ADOPTION OF VASECTOMY, 680 CULTIVATORS, 1967

Sources of information	How did you first come to know of vasectomy		What sources convinced you to have a vasectomy	
	Number	Per cent	Number	Per cent
Person (friend, relative) .. ..	298	51	35	58
Change agent (family planning worker, medical doctor) .. ..	187	32	24	40
Place (e.g. market, city) .. ..	42	7	—	—
Media (radio, papers, films) .. ..	54	9	1	2
Total .. .. .	581	100	60	100
Did not know about vasectomy .. ..	97	—	—	—
Had not had operation .. ..	—	—	586	—
No answer .. .. .	2	—	34	—

Persons such as a friend or relative were mentioned as a source of information for knowledge by 51 per cent of the respondents who knew about vasectomy and by 58 per cent of adopters as a source of information which convinced them to have a vasectomy. The mass media were mentioned for knowledge by only 9 per cent and for adoption by only 2 per cent. Change agents were important for both stages, being mentioned for knowledge by 32 per cent and for adoption by 40 per cent. Seven per cent mentioned only a place, such as market or city as a source of information for knowledge.

The data for sources of information leading to knowledge

and adoption of the loop show quite similar results (Table 6). Comparisons with sources of information for vasectomy (Table 5), are somewhat risky because there were only 12 adoptions of the loop. However, we might observe that for both knowledge and adoption of the loop, change agents were more important than friends and relatives, whereas for vasectomy the opposite was true. The percentage mentioning mass media as a source of information for knowledge of the loop (15 per cent, Table 6) was also somewhat higher than the corresponding percentage for vasectomy (9 per cent, Table 5). It may be that as the general level of knowledge of an innovation increases, personal sources of information such as friends and neighbors become used more and the mass media and professionals are used less. The conclusion seems clear: the mass media can inform and can help to create favourable attitudes but they are not likely to convince people to adopt family planning. It also seems clear that the role of change agents is an important one. This conclusion holds the promise that increased efforts by larger numbers of change agents are likely to bring results.<sup>5</sup> These results may not be dramatic or speedy but they will probably be worth the effort in accelerated adoption of family planning.

#### *Correlates of family planning*

We turn now to the major focus of our report, correlates of family planning.<sup>6</sup> By correlates we mean factors which we expect to be related to our dependent variables, knowledge of loop, approval of vasectomy or loop, and adoption of vasectomy or loop. Education, for example, is one such correlate. Very nearly every adoption study shows education to be related positively with knowledge, approval and adop-

5. We realize that this conclusion and promise may be unduly optimistic. There are very few examples in India so far of successful attempts to reduce the birth rate.

6. E. M. Rogers and E. P. Bettinghaus concluded that research on the diffusion of agricultural innovations and family planning ideas show similarities in design, methodology and data-collection procedures and that both traditions of diffusion research have depended heavily on an analysis scheme which correlates innovativeness with other variables such as age, education and literacy. See their "Comparison of Generalizations from Diffusion Research on Agricultural and Family Planning Innovations", a paper presented at the annual meeting of the American Sociological Association, Miami Beach, Florida, August, 1966.

tion of innovations and this is what we found in the present study. The reasons seem obvious: the better educated are also apt to be more affluent and to be in a better position to know about and to adopt innovations. They are also more likely to be rationally-oriented and hence approve of such changes.

TABLE 6: SOURCES OF INFORMATION LEADING TO KNOWLEDGE AND ADOPTION OF THE LOOP, 680 CULTIVATORS, 1967

Sources of information	How did you first come to know of the loop		What sources convinced you or your wife about the loop	
	Number	Per cent	Number	Per cent
Person (friend, relative) .. ..	134	34	3	25
Change agent (family planning worker, medical doctor) .. ..	178	45	8	67
Place (e.g. market, city) .. ..	26	7	—	—
Media (radio, papers, films) .. ..	59	15	—	—
Change agent and media .. ..	—	—	1	8
Total .. ..	397	101	12	100
Did not know about loop .. ..	283	—	—	—
Had not tried loop .. ..	—	—	590	—
No answer .. ..	—	—	78	—

It is not always possible to determine which variable 'causes' which effect. While most people finish their education before they reproduce, and hence education may be said to cause or influence adoption of family planning because it precedes family planning, other variables may have a reverse or reciprocal effect. A higher level of living, for example, which is also regularly found to be positively related to adoption of innovations, may well be a consequence of family planning as well as a contributor to its adoption. Fewer children usually mean that more family income can be used for material possessions. This reciprocal or reverse effect of some of our correlates need not concern us unduly, however. Many relationships can be assumed to be at least reciprocal. We will say here that if a positive relationship exists between an independent variable and one of our three dependent variables, then to some extent that independent variable

serves to bring about knowledge, approval or adoption of family planning. Additionally, of course, correlates of family planning serve to distinguish those who know, approve or adopt from those who do not.

A final note on our analysis of correlates of family planning concerns our dependent variable, adoption of vasectomy or loop. All but nine of the 61 respondents who reported vasectomies lived in Andhra Pradesh. Only two of the 12 reported adoptions of the loop came from that state. The former imbalance among the states is the more serious and we investigated whether the relationships we obtained between adoption and other variables might not be due to conditions unique to Andhra Pradesh. We found that this was not the case. The same relationships obtained when we ran our chi-square tests on the Andhra Pradesh respondents only. For example, both in Andhra Pradesh and in the larger, three-state sample, education, caste and level of living were positively related to adoption of vasectomy and the loop. As there was an approximately even distribution among the three states for our other two dependent variables, knowledge and approval, we decided to present a uniform analysis for all three dependent variables, using the three-state sample.

#### *Demographic variables related to family planning*

In Table 7 we present some demographic variables whose relationships with our dependent variables we wished to determine. They were selected from those available in the larger study on the basis of relevancy for family planning and usage by other researchers.<sup>7</sup> Rather than give frequencies or percentages for our 2 × 2 chi-square Tables, we have chosen to describe the relationships. We hope that this will make for readier comprehension and more parsimonious presentation. Because the sample is relatively large, we chose the 1 per cent level of significance for two-tailed tests, although in most cases we expected to find a certain direction of relationship and a one-tailed test would have been appropriate. All continuous variables were dichotomized, as near the median as possible, giving us fairly even distributions. There

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7. *Ibid.*

TABLE 7: SOME DEMOGRAPHIC VARIABLES RELATED TO KNOWLEDGE, APPROVAL AND ADOPTION, TWO METHODS OF FAMILY PLANNING, 680 INDIAN CULTIVATORS, 1967

Variables	Knowledge of loop	Approval of vasectomy or loop	Adoption of vasectomy or loop
Caste .. ..	-High caste more likely to have knowledge*	High caste more likely to have approval*	High caste more likely to have adopted*
Level of living** .. ..	-Higher level more knowledge*	Higher level more approval*	Higher level more adoption*
Panchayat tax paid .. ..	More tax paid more knowledge*	More tax paid more approval	More tax paid more adoption*
Education of respondent .. ..	-More education more knowledge*	More education more approval*	More education more adoption*
Education of respondent's wife	More education more knowledge*	More education more approval*	More education more adoption*
Functional literacy .. ..	-Literates more, illiterates less knowledge*	Literates more, illiterates less approval*	Literates more, illiterates less adoption*
Age of respondent .. ..	Young more, older less knowledge	Older more, young less approval	Older more, young less adoption
Age of wife of respondent .. ..	-Young more, older less knowledge*	Older more, young less approval	Older more, young less adoption*
Family type .. ..	Joint more, nuclear less knowledge*	Nuclear more, joint less approval	Nuclear more, joint less adoption
Size of family .. ..	Large more, small less knowledge	Large more, small less approval	Large more, small less adoption
Children ever born .. ..	Fewer children more knowledge	Fewer children more approval	More children more adoption*
Number of living children .. ..	Fewer living children more knowledge	Fewer living children more approval	More living children more adoption*
Number of children who died	Fewer who died, more knowledge*	Fewer who died, more approval*	Fewer who died, more adoption*

\* Significant at the .01 per cent level of probability, two-tailed test for chi-square,  $df = 1$ . N varies from 680 to 536.

\*\* For this and succeeding variables, statements of relationships are shortened for parsimony of presentation. Thus the words 'more likely to have' should be read into the statement, where appropriate.

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were relatively few missing data. We have already discussed missing data in responses to questions on adoption of vasectomy or loop. For some variables, such as caste, there were missing data because the variable did not apply to some respondents. For example, there were two Muslim villages in West Bengal in our sample whose respondents did not have caste rankings.

We dichotomized caste as low and medium on the one hand and high on the other. Intra-village ritual caste rankings were first obtained by having village leaders rank the castes represented in the village, using pictures of people at work in caste occupations. Inter-village rankings were then determined by project staff on the basis of a four-point scale into which the larger number of ranked castes in the various villages were arrayed on the basis of frequency distributions and knowledge of the castes.<sup>8</sup> Those in higher castes were significantly more likely to have knowledge, approval and adoption (Table 7). We also found, as expected, that caste is positively and very highly related to level of living and education. As the latter variables were also strongly related to our three dependent variables, we conclude that if caste represents a traditional influence and thus an obstacle to family planning, it may well give way to the positive influence of education and higher income. It is a fact that most lower caste people are poor and uneducated. However, to the extent that lower caste people emulate those in the upper castes, the adoption of family planning by the upper castes may provide an incentive. This effect is likely to have an earlier impact than the long-range and difficult goals of improvement in education and in level of living of the lower castes.

Level of living was measured by an index which took into consideration housing features such as the number of rooms, and material possessions such as a torch, bicycle or time-piece. As we have indicated, this level of living index was positively and highly related to knowledge, approval and adoption. Another variable which measures level of living indirectly, amount of panchayat tax paid (local community general tax), was similarly related to our dependent

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8. Roy, et al., *Agricultural Innovation Among Indian Farmers*, *op. cit.*, p. 49.

variables. The more tax paid, the more knowledge, approval and adoption. It is clear that the more material possessions and taxable wealth that people have, the more likely they are to prefer them to having more children. As our low rates of adoption of family planning attest, however, a higher level of living does not automatically bring about adoption. The point we wish to make here is that there are many who are relatively well off but have not adopted and who remain as targets for family planning programs.

The same kind of analysis and conclusion which we drew for the level of living variables, we would also make for education and literacy (Table 7). Respondent's education, education of respondent's wife and functional literacy of respondent (Can you read a newspaper?) were all positively and significantly related with knowledge, approval and adoption of vasectomy or loop.<sup>9</sup> The educated and the literate, like those with higher caste and a higher level of living, have responded more readily to family planning information and persuasion. There are many reasons why this would be so. Such people have a clear advantage in understanding and acceptance of new ideas. They are apt to be more rational in planning ahead and better able to exercise the restraint necessary for effective birth control. They are also less likely to be dependent on child labor and the assistance of children in old age. They are less likely to have children die. Despite all of these reasons, many of the literate and more educated had not adopted vasectomy or the loop. There is a substantial target audience among those best equipped to receive and understand promotional efforts for family planning.

Age of respondent was not significantly related to any of our dependent variables. The younger (17 to 37) were more apt to have knowledge, and the older (38 to 50) were more apt to have approved and adopted (Table 7). The same relationships obtained with respect to age of respondent's wife, but in this case the relationships with knowledge and adoption were significant. It is likely that the young have

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9. Educational levels were rather low. There were 185 respondents and 308 wives who had no formal education. Only 77 respondents and 16 wives had more than nine years of schooling.

more knowledge because of the recent rapid increase in levels of education and in use of the mass media. The older, on the other hand, 'have' more approval and adoption because they have already established their families. They are more interested in having fewer additional children than the younger couples who have yet to complete their families. A tentative conclusion here is that it is probably very difficult to convince the young about family planning until they have the desired number of children. Examination of data on those who had adopted vasectomy or the loop showed that the average number of living children was 4.23. We will briefly discuss additional characteristics of adopters in a later section.

We next turn to several variables related to family composition. The first of these is family type, whether joint or nuclear. We defined a nuclear family as husband, wife and children, if any. We defined a joint family as two or more nuclear families who lived in the same household and ate together. By these criteria, there were 63 per cent nuclear and 37 per cent joint families in the study sample. Thirteen families could not be classified and were excluded from analysis. We had expected that the simpler structure of the nuclear family would be conducive to acceptance of innovations. However, only knowledge was significantly related to type of family (Table 7). Respondents in joint families were more apt to have knowledge but those in nuclear families were more apt to 'have' approval and adoption. Family type, whether joint or nuclear, was not closely related to acceptance of agricultural innovations for this sample.<sup>10</sup> We conclude that family type is not an important variable for this sample and that its effects can probably be ignored in most concerns with family planning.

Size of family (number of family members living in the household), was consistently but not significantly related to our dependent variables. Large families (seven to 22 members) were more apt than small families (one to six members) to have knowledge, approval and adoption. We tentatively conclude that large households probably produce some pressure toward adoption of family planning but that

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10. Roy, *et al.*, *Agricultural Innovation. . .*, *op. cit.*, pp. 46-48.

this influence is not great and no particular attention should be paid to size of household at this time. The pressure of numbers of children upon parents who produce them is likely to be more important.

We refer directly to the pressure for family planning exerted on parents by numbers of children in the next two variables in Table 7. For both variables, number of children ever born and number of living children, those with fewer children were more apt to have knowledge and approval (relationships not significant) while those with more children were more apt to have adopted vasectomy or the loop (relationship significant). This is essentially the same result we obtained with respect to age of respondent and age of his wife. That is, by virtue of their age, younger parents are apt to have fewer children and be better educated and to be exposed more to the mass media. Therefore, they have more knowledge. The older, on the other hand, are faced directly with the pressures of a growing family and hence have more adoptions of family planning. These relationships appear to support the current emphasis on family size norms. While these norms are undoubtedly difficult to change, the evidence of pressures produced by numbers of children tend to support promotion of norms of a small size of family. As the bill-boards and posters on buses aver, 'Two or three (are) enough.' The societal task is to make couples aware of these pressures vicariously before the pressures actually arise.

The last of our demographic variables in Table 7 is a poignant one, number of children who died. The 646 respondents who had had at least one child born reported 693 children dead. The range in number of children who died per family was zero to seven. Respondents who had fewer children dead were significantly more apt to have knowledge, approval and adoption of vasectomy and the loop. It seems apparent that the survival of children is an important factor here. That is, if fewer die, more remain to eventually produce pressure for family planning. We may also speculate, however, that those who had fewer children die were the more affluent and better educated. These respondents would be better able to protect their children's health. We have already shown that such respondents are more likely

to adopt family planning. We conclude from the evidence of number of children who died that infant mortality rates are a crucial factor in adoption of family planning. As long as they remain at the present high level of about 80 per 1000 live births (1962), they will constitute a powerful disincentive to adoption of effective birth control.<sup>11</sup> Indeed, such disincentives will likely to remain for some time after infant mortality rates have fallen. There is probably no alternative to a period in which death-rates decline faster than birth-rates, as people only slowly come to expect that nearly all the children who are born will survive.

A final note on family composition concerns the relative number of boys and girls. It seemed too cumbersome to include these data in Table 7 and we will describe our analysis here. We divided respondents into four categories: (1) those with less than three children; (2) those with three or more in which there were more girls than boys; (3) those with four or more in which there were equal numbers; and (4) those with three or more in which there were more boys than girls. Only for adoption of vasectomy or loop was there a significant relationship. As expected, those families with more boys than girls were more apt to have adopted. The desire in India for male children is well known and we found it reflected in these data. These data must be regarded with some caution, however, as the categories had to be derived from a listing of family members living in the household at the time of the interview. There was a substantially larger number of families with more boys than girls, reflecting the larger number of boys ever born and the tendency for girls to leave home for marriage at a much earlier age than do boys.

#### *Communication variables related to family planning*

We turn now to an examination of various communication variables to determine their relationship with knowledge

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11. Government of India, *Statistical Abstract of the Indian Union, 1963 and 1964, New Series No. 12*, New Delhi: Central Statistical Organization, Department of Statistics, Cabinet Secretariat, Government of India, 1966, p. 561. Data presented are for 1962. Infant mortality rates were shown to have declined from a figure of 130 in 1951.

of the loop, approval of vasectomy or loop, and adoption of vasectomy or loop (Table 8). In every case, for all three of our dependent variables, the relationships are positive. The more the exposure to various communication channels, both direct and indirect, the more the knowledge, approval and adoption of our two family planning methods. For knowledge and adoption, in every instance, this positive relationship is significant. For approval, the relationship is significant in seven out of the 13 comparisons. This strikingly consistent demonstration of positive relationships between communication variables and family planning variables is taken as strong evidence that the present emphasis on communication should be continued. Efforts should be intensified and modified as circumstances seem to dictate.

Because the relationships in Table 8 are so uniform we will discuss each item only briefly. Our first two communication variables are of obvious relevance. Times talked with a family planning worker and with a block doctor would be expected to be positively related with vasectomy and the loop, birth control methods which rely heavily upon medical technology. The inference seems clear that family planning programs are highly dependent upon competent medical personnel being available where needed. Increased inputs of these personnel as soon as may be possible, are likely to bring increased adoption of family planning.

The mass media are covered in the next four variables (Table 8). Radio-listening by respondent and his family, seeing commercial films, and newspaper reading are all positively related to our dependent variables. Although the mass media were not reported often as sources of information leading to knowledge and adoption (Tables 5 and 6), it is apparent that the mass media are playing an important role in communication about family planning, and their use should also be intensified and adapted to changing circumstances.

Corroboration of the importance of the mass media is supplied in the next variable, 'How does respondent know about things in district headquarters?' As one would expect, many persons mentioned radio or newspapers in

TABLE 8: SOME COMMUNICATION VARIABLES RELATED TO KNOWLEDGE, APPROVAL AND ADOPTION, TWO METHODS OF FAMILY PLANNING, 680 INDIAN CULTIVATORS, 1967

Variables	Knowledge of loop	Approval of vasectomy or loop	Adoption of vasectomy or loop
Times talked with family planning worker	More times talked more likely to have knowledge*	More times talked more likely to have approval*	More times talked more likely to have adopted*
Times talked with block doctor**	More times talked more knowledge*	More times talked more approval	More times talked more adoption*
Does respondent listen to radio	Those who listen have more knowledge*	Those who listen have more approval	Those who listen have more adoption*
Does family listen to radio ..	More knowledge if family listens*	More approval if family listens*	More adoption if family listens*
Commercial films seen ..	More films seen more knowledge*	More films seen more approval	More films seen more adoption*
Did respondent read a newspaper last week	More knowledge if a newspaper was read*	More approval if a newspaper was read*	More adoption if a newspaper was read*
How does respondent know about things in district headquarters.	Hears from mass media rather than from persons, more knowledge*	Hears from mass media rather than from persons, more approval	Hears from mass media rather than from persons, more adoption*
Index of urban contact ..	More contact more knowledge*	More contact more approval	More contact more adoption*
Lived away from own village	More knowledge if lived away*	More approval if lived away*	More adoption if lived away*
Memberships and offices held	More participation more knowledge*	More participation more approval*	More participation more adoption*
Index of agricultural extension agent contact	More contact more knowledge*	More contact more approval*	More contact more adoption*
Knowledge of high-yielding varieties of seeds	More knowledge of seeds more knowledge of loop*	More knowledge of seeds more approval	More knowledge of seeds more adoption*
Index of adoption of agricultural practices	More practices adopted more knowledge of loop*	More practices adopted more approval*	More practices adopted more adoption*

\* Significant at .01 per cent level of probability, two tailed test for chi-square, df. = 1. N varies from 680 to 540.

\*\* For this and succeeding variables, statements of relationships are shortened for parsimony of presentation. Thus the words 'more likely to have' should be read into the statement where appropriate.

response to this open-ended question about a place that is for most villagers rather remote and impersonal. A larger percentage of those so answering were respondents who had knowledge, approval or adoption of vasectomy or the loop. The alternative response category included friends, neighbors and relatives as sources of information.

The next three variables in Table 8 represent indirect channels of communication. They also measure contact with the world beyond the confines of the village. Respondents who had more urban contact (visits to town or city), who had lived away from their own village, and who participated more in organizations (memberships and offices held) were more apt to have knowledge, approval and adoption. There is probably not much that can be done to directly enhance the effect of this type of contact with the larger society upon adoption of family planning. India has a generally adequate network of roads and transportation systems which allow considerable mobility, urban contact, and social participation. Improvements are being made as fast as possible. However, as resources are allocated to transportation systems in the future, an added benefit which will accrue is this 'urbanizing' effect, which apparently results in a more receptive approach to family planning.

The final three variables in Table 8, an index of contact with agricultural extension agents, knowledge of high-yielding varieties of seeds, and an index of adoption of agricultural practices, round out our discussion of communication variables in family planning. They also provide an opportunity to demonstrate a convergence of effects in promotion of agricultural and family planning practices.<sup>12</sup>

Agricultural extension agent contact was measured by an index of the number of times the respondent talked with various officials such as the village level worker (VLW) or block development officer (BDO). It was one of the variables most highly and consistently related with agricultural adoption in previous phases of our project.<sup>13</sup> Respondents with high agent contact were more apt to know about, to approve, to

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12. Rogers and Bettinghaus, "Comparison of Generalizations . . .," *op. cit.*

13. Fliegel, *et al.*, *Agricultural Innovations . . .*, *op. cit.*, and Roy, *et al.*, *Agricultural Innovation . . .*, *op. cit.*

adopt vasectomy and the loop. The same convergence of target audiences is noted in the results concerning the remaining two variables. Those who had knowledge of high-yielding varieties of seeds, an agricultural innovation of especial importance, were also more apt to have knowledge, approval and adoption of vasectomy and the loop. Similar results were obtained for the index of adoption of agricultural practices, which was also related positively and significantly to knowledge, approval and adoption of our two family planning practices. Thus it is apparent that those who know about and adopt agricultural practices also tend to know about and to adopt family planning practices.<sup>14</sup>

We conclude that research in the diffusion of family planning practices can and should draw more heavily on methods and results obtained in the large body of research on diffusion of agricultural practices. Methods of analysis of communication variables are apt to be especially relevant.<sup>15</sup> Practical implications of the correspondence between the two areas of research are that methods of information dissemination, communication channels and target audiences can be used interchangeably to a large extent. In particular, the relatively well-educated and well-off cultivator, who uses the mass media and is receptive to ideas from the world outside the village, is a large part of the target audience for promotion of family planning. Knowledge and approval levels are generally high. Thus the principal task is the difficult one of persuasion to adopt an effective method of family planning.

*Some social-psychological variables related to family planning*

In this section we take up five variables which we have called 'social-psychological' because they touch on the linkage of an individual with the society in which he lives. These

14. We recognize that adoption of one innovation is not an especially good predictor of adoption of most other innovations. Variability in innovations, adopters and adoption settings is such that prediction levels do not greatly exceed those of most explanatory variables such as level of living, farm size and education. Indexes of adoption do 'hang together' however, and are amenable to scaling and other tests of uni-dimensionality. For example, see Roy, *et al.*, *Agricultural Innovation. . . , op. cit.*, chapter 2.

15. See, for example, P. J. Deutschmann and O. Fals Borda, *Communication and Adoption Patterns in an Andean Village*, San Jose, Costa Rica: Programa Inter-americano de Informacion Popular, 1962.

five were chosen from among those available in the larger study on agricultural adoption. In general, the same relationships were found between these variables and our family planning variables as were found in the larger study.<sup>16</sup>

The first of these variables is political knowledge (Table 9). Respondents who had more knowledge of political figures were significantly more likely to have knowledge, approval and adoption of vasectomy and the loop. Political knowledge was measured by asking the respondent to identify by name the prime minister of India, the chief minister of the state and the elected representative to the state legislature of the area in which the respondent lived. More political knowledge is assumed to reflect an orientation to the larger society beyond the village which, in our previous research, has been an excellent predictor of adoption behavior, highly related to many other variables, also positively related to adoption.<sup>17</sup>

Our next variable in Table 9 is empathy, which we defined as the ability to take others' roles. It is considered to be a psychological precondition for successful linkage of the individual in one social system with people in other systems. Empathic persons have been shown to be more favorable to change and the adoption of new ideas and practices.<sup>18</sup> Empathy was measured by asking the respondent: 'If you were (four roles: the administrative officer of the district, the block development officer, the village council president, a day laborer), then what would you do to solve (a relevant) problem?' Those with more empathy, who could assume the roles presented, were significantly more apt to have knowledge, approval and adoption of vasectomy and the loop. Like political knowledgeability, empathy describes a respondent in terms of his awareness of the world about him, which includes an awareness of the personal or social need for family planning.

The third variable in Table 9 is secular orientation, measured by a series of questions about attitudes toward the

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16. Roy, *et al.*, *Agricultural Innovation. . .*, *op. cit.*

17. *Ibid.*, pp. 110 and 116-117.

18. *Ibid.*, pp. 109-110, and D. Lerner, *The Passing of Traditional Society*, New York: The Free Press of Glencoe, First paperback edition, 1964, pp. 70-72.

cow and toward caste.<sup>19</sup> The less secular were more apt to have knowledge but the more secular were more apt to have approved and to have adopted. Only the relationship with approval was significant. The last two variables in Table 9 measure educational and occupational aspirations for the respondent's son. Only one relationship was significant and the direction of relationships was not consistent. In general, however, those with higher aspirations were more likely to have knowledge, approval and adoption. These results, like those for secular orientation, are consistent with results obtained in other phases of our project in which we used these same social-psychological variables.<sup>20</sup> One would expect such variables to be related to adoption of family planning innovations. This is because education, level of living and exposure to the mass media are highly related to adoption and also obviously contribute to higher levels of political knowledgeability, empathy, secularism and aspirations. Social-psychological variables are difficult to measure, however, and associations between them and adoption are sometimes low or not consistently related in the same direction. We consider them to be important in rounding out the distinctive characteristics of those who have knowledge, approval and adoption of vasectomy and the loop from those who do not.

*Age and family characteristics of adopters of vasectomy and the loop*

We have already indicated in our Tables of relationships that adopters of vasectomy and the loop in our sample tended to be upper caste, better educated, higher in level of living, and in general were more attuned to the outside world and a changing society. Some additional data on adopters may be of interest. Because there were only 12 adopters of the loop we shall mostly discuss those who had a vasectomy.

19. The questions were: (1) should Harijans (untouchables) be allowed to draw water from all common wells in the village; (2) should Harijans and other children take meals together in schools; (3) can evil eye cause disease; (4) do you think Harijans should be allowed to enter and worship in all temples of the village; (5) what do you do with bullocks who are too old to work; (6) should non-Hindus be allowed to eat beef; (7) if your son wanted to marry a lower caste girl would you allow it; (8) in your opinion, is an illiterate village Brahmin superior to a lower caste college graduate.

20. Fliegel, *et al.*, *Agricultural Innovations . . .*, *op. cit.*, and Roy, *et al.*, *Agricultural Innovation . . .*, *op. cit.*

TABLE 9: SOME SOCIAL-PSYCHOLOGICAL VARIABLES RELATED TO KNOWLEDGE, APPROVAL AND ADOPTION, TWO METHODS OF FAMILY PLANNING, 680 INDIAN CULTIVATORS, 1967

Variables	Knowledge of loop	Approval of vasectomy or loop	Adoption of vasectomy or loop
Knowledge of political figures	More political knowledge more likely to have knowledge of loop*	More political knowledge more likely to have approval*	More political knowledge more likely to have adopted*
Empathy—ability to take roles of others**	More empathy more knowledge*	More empathy more approval*	More empathy more adoption*
Secular orientation toward cow and caste	Less secular more knowledge	More secular more approval*	More secular more adoption
Educational aspirations for son	Higher aspirations more knowledge*	Higher aspirations more approval	Lower aspirations more adoption
Occupational aspirations for son	Higher aspirations more knowledge	Lower aspirations more approval	Higher aspirations more adoption

\* Significant at .01 per cent level of probability, two-tailed test for chi-square, df. = 1. N varies from 680 to 235.

\*\* For this and succeeding variables, statements of relationships are shortened for parsimony of presentation. Thus the words 'more likely to have' should be read into the statement where appropriate.

One of the chronic criticisms of the program for male sterilization is that some overaged males who are no longer able to reproduce or worse, some very young ones who have not yet had the chance to reproduce, are vasectomized. Very ambitious targets or over-zealous administrators and promoters of the program are principally blamed for these alleged excesses. Another more serious and more often documented problem with vasectomy as a method of birth control is the essentially terminal or irreversible nature of the operation. It is medically possible to reunite the sperm tubes but relatively few operations of this kind have been done and it would probably be very difficult for the average villager to arrange for such a reversal.

We were interested, then, in investigating the age of the adopting respondent and his wife and also the number of their children. Because of our age restriction in sampling, of course, we automatically excluded respondents over 50 years of age. The average age of respondent with vasectomy (age at time of interview in 1967) was 40.0; that of his wife was 33.6. The range in ages of respondents was from 26 to 50. Wives' ages ranged from 20 to 49. The one woman aged 20 had had four children, of whom three were living.

The average number of children ever born to respondents who had a vasectomy was 4.97. The average number of living children was 4.10. The range in number of living children was from zero to eight. Only one of the 61 respondents with vasectomies had had all (three) of his children die. There were no vasectomized respondents with only one living child and only 11 with two living children. We conclude from these limited data that there is probably no real cause for concern with excesses in the vasectomy program. In our sample all vasectomized respondents had been married and all had been sterilized only after having two or more children. Only one respondent was in the unfortunate position of having lost all of his children after being sterilized. The fear of this occurrence, however, is probably a very real deterrent to adoption of vasectomy.

As might be expected, because the loop is not a terminal method of birth control, those who had adopted the loop were younger than those who had adopted vasectomy. However,

the average number of children ever born, as well as the average number of living children, were higher than for the adopters of vasectomy. There were also fewer deaths, only one of the 12 families adopting the loop having lost one child. These comparisons rest on the very small number of 12 cases for the loop and cannot be used as a basis for generalizations.

#### Summary and Conclusions

Using data taken from a larger study of adoption of agricultural innovations in eight villages we confined our study of family planning to two widely promoted contraceptive practices, vasectomy (male sterilization) and the loop (IUCD, Intra-Uterine Contraceptive Device). Our data showed widespread knowledge and considerable approval of these two practices, but adoption was at low levels.

Sampling limitations for purposes of the larger study resulted in a total of 680 cultivators, all of whom were 50 years of age or younger and were cultivating at least 2.5 acres of land. These limitations resulted in a highly relevant sample for a study of family planning, in terms of both age and socio-economic status. Very nearly all of the respondents and their wives were in their reproductive years and all but 14 had been or were married. The average number of children ever born was 4.31. The average number of living children was 3.26.

The present attitudes of government agencies in India and abroad are mostly favorable to promotion of family planning and are likely to become even more so. Investigating village and personal norms, we found that 53 per cent of the respondents thought that village norms were favorable (most people would encourage a man to have a vasectomy) and a substantially higher percentage (67 per cent) said that they themselves approved of vasectomy and the loop.

Knowledge of vasectomy was at a very high level (86 per cent). Because only 58 per cent said that they knew about the loop, we used knowledge of the loop in our analysis of correlates of knowledge of a family planning method.

Adoption of both vasectomy and the loop for the three-state sample of 680 cultivators was at low level. Nine per cent of those responding had adopted vasectomy and 2 per cent the loop. Most vasectomies were reported in one state, Andhra Pradesh. Because relationships of our independent or explanatory variables with adoption in the Andhra Pradesh sub-sample were in every case in the same direction as those for the larger sample, we chose to use the latter in analysis of correlates of adoption of vasectomy and the loop.

Sources of information leading to knowledge and adoption of the loop were principally friends, neighbors or relatives and change agents such as the block doctor and family planning worker. Mass media were mentioned more for knowledge than for adoption, but were not mentioned often. Exposure to the mass media was, however, positively related with knowledge, approval and adoption of vasectomy and the loop.

The main focus of our report was upon correlates of family planning. We found that caste, education of both respondent and wife, level of living and literacy of the respondent were all positively and significantly related to knowledge, approval and adoption of vasectomy and the loop.

Analysis of age of respondent and age of respondent's wife indicated that the younger were more apt to have knowledge and that the older were more apt to 'have' approval and adoption.

Type of family, whether joint or nuclear, was not importantly related to our dependent variables and we concluded that its effects can probably be ignored in most concerns with family planning.

Large households were more apt than small households to have knowledge, approval and adoption, but not significantly so. We concluded that the pressure of numbers of children upon their own parents is probably a more important factor than size of household.

For both number of children ever born and number of children living, respondents with fewer children were more apt to have knowledge and approval. Respondents with larger numbers of children were more apt to have adopted vasectomy or the loop. Respondents who had fewer children die were significantly more apt to have knowledge, approval

and adoption. There was some evidence that families who have two or more living sons were more apt to practise family planning than those who have fewer sons.

There was a strikingly consistent demonstration of positive relationships between communication variables and knowledge, approval and adoption of vasectomy and the loop. For knowledge and adoption, in every instance, this positive relationship was significant. It was apparent that exposure to the mass media, contact with change agents, urban contact, geographic mobility and social participation were good predictors of our dependent variables. We also showed a similarity of target audiences for programs promoting agricultural practices on the one hand and family planning practices on the other.

Of five social-psychological variables, political knowledge and empathy (ability to take the role of others) were positively and significantly related to knowledge, approval and adoption. There was some tendency for those who know, approve and adopt vasectomy and the loop to be more secular and to have higher educational and occupational aspirations for their sons.

A brief review of relevant characteristics of the adopters of vasectomy showed that none had apparently been sterilized prematurely, and only one had had all his children die after his vasectomy.

We have offered some conclusions in our foregoing analysis. We will repeat here a few of those which we think are especially important and draw conclusions of a general nature.

1. First and foremost, we conclude that the primary job in family planning for the future is one of persuasion to adopt, rather than one of knowledge about method or inculcating approval for family planning. Most people knew about vasectomy and a majority knew about the loop. Village and personal norms about these two methods of family planning were mostly favorable. The low levels of adoption of vasectomy and the loop indicate that the task of persuasion will not be easy. However, a concerted effort uniting medical technology and new birth control techniques, mass media promotion, increased inputs of dedica-

ted and competent change agents, and continuing support by government agencies, should yield substantial results. Much of the target audience for family planning is an educated, relatively well-off one, considerably exposed to the mass media and basically oriented toward change.

2. Ranking second but still important is the conclusion that informational efforts by all possible means should be continued. Although most of our respondents knew about vasectomy and the loop, many did not. New and imaginative means of reaching more people must be employed. Levels of mass media exposure are relatively high and will probably continue to rise. There are many channels of communication to exploit. All of those we investigated were positively related to knowledge, approval and adoption.

3. Better health and reduced mortality for infants are undoubtedly important factors in adoption of family planning. There will probably not be substantial adoption until infant mortality rates are reduced from their present high levels.

4. Change agents are important sources of information leading to knowledge and adoption of vasectomy and the loop. Contact with them was highly related with knowledge, approval and adoption. Their competence and numbers should be increased.

5. Pressure of numbers of children upon the parents who produce them is probably the most important single factor motivating adoption of family planning. Type of family, whether joint or nuclear, and size of household were not very important in our study. Respondents with larger numbers of living children and with fewer children having died were more apt to have adopted vasectomy or the loop.

6. It is probably very difficult to persuade young couples to adopt effective family planning methods until they have the number of children they think is ideal. Older respondents were more apt to have adopted. We did not obtain evidence on family planning for purposes of spacing children.

7. Research in family planning should take cognizance of the abundant research which has been done in the area of diffusion of agricultural practices. We found substantial similarity of target audiences.

8. Our data showed little real cause for concern about the relative irreversibility of vasectomy. Imagined fears that all of one's children might die after one had a vasectomy and could not again have children are probably a deterrent to adoption of this highly effective method of birth control, however. These fears should be countered by research on reversals and promotion of the availability of reversals when they are needed or wanted.