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THE DETERMINANTS OF FAMILY PLANNING
ACCEPTANCE AND OF WORKER AND ORGANI-
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PRADESH

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INTRODUCTION

The following two papers are drawn from our larger manuscript, "Organization for Change: A Systems Analysis of Family Planning in Rural India". They are circulated in this form to permit discussion of their methodological and policy implications among management specialists working in the fields of health and population. The authors will be grateful for comments and suggestions.

PART A

THE DETERMINANTS OF FAMILY PLANNING ACCEPTANCE AT THE VILLAGE LEVEL

The poor performance of family planning in rural Uttar Pradesh would be incomprehensible without some understanding of the rural population, their past knowledge and practice of contraception and their previous contact with the family planning program. Yet even the detail of the previous three chapters* is incomplete without some attempt to integrate the information presented thus far and to test its ability to provide a complete picture of what is happening in family planning at the level of the client or the village.

Earlier chapters in this section* have described the client population, their knowledge and use of family planning, and their contacts with the government sponsored family planning program. In this chapter we show that there is variation among the villages of Kanpur and Etawah Districts in the level of contraceptive use and that a significant amount of the variation can be explained by a combination of variables reflecting the village's socio-economic environment and exposure to outside intervention. This result is interesting, but it does little to explain why the general level of exposure to contacts with the outside world about family planning is so low or what causes existing variations in this level of contact. This task is left for the remaining sections of the report.

* For details see, B.D. Misra, Ali Ashraf, Ruth Simmons & George B. Simmons, "Organization for Change: A Systems Analysis of Family Planning in Rural India", (1979) (forthcoming publication).

The rural population of Allahabad Division resides in a large number of villages. The village is a basic unit of rural society, and while it is composed of many separate families, it also has certain economic and social characteristics which make it a complete social unit in and of itself.¹ People in a given village in addition to sharing such obvious characteristics as geographical location and resources such as schools, partake of a relatively complete economy, a social structure and a somewhat shared set of information about the outside world. From the point of view of the government, the village is a basic administrative unit with a recognized political system for regulating internal problems and dealing with the outside. It is also a basic unit for the delivery of services in such areas as farm extension, or family planning or health. It is this last capacity which is of concern to us in our research.

With the research data available from the set of interviews with the client population, it would be possible to test the reasons for variation in contraceptive use using either the couple or the village as the fundamental unit of observation. This paper emphasizes the village as the basic unit for two reasons. First, the village is an important unit in and of itself. Second, there are statistical advantages to studying variations in an aggregate unit such as a village. Many variables of interest are at the individual level categorical or even bivariate. For example, one is either a contraceptive user or not. Such variables

¹There is a vast anthropological literature emphasizing the importance of the village as a social unit. Its importance in a policy sense has been emphasized by E. Driver, Essays on Population Policy (Lexington, Mass.: D.C. Heath, 1972).

are more difficult to model than the same nearly normally distributed aggregate variables, but the difficulties are especially acute in the case of this study since key variables such as contraceptive use are strongly skewed towards non-use. Variables aggregated to the village level have the strong advantage that their values are approximately normally distributed.

In our study of the client population, we sampled one hundred and twenty villages, eight from each of fifteen Primary Health Centers in Kanpur and Etawah Districts. These villages were selected with probability proportionate to population and thus, while they overrepresent the larger villages, they are representative of the place people live.

Before examining the model it is helpful to examine the basic variables of the system. Table 1.1 presents descriptive statistics of some village variables; mean, standard deviation, and range. These statistics reveal that the villages, as one might expect, mirror the average experience of the individuals who inhabit them. The average number of children is high, income is low, literacy levels are low and the typical village reports relatively little contact with the program. Table 1.1 also presents a set of F tests examining the significance of differences among villages. If couples varied randomly in their characteristics, we would expect that the differences in the mean values by village of the variables measuring these characteristics could differ only by a factor relating to the chance associated with sampling. If, however, the behavior and attitudes of individuals are influenced by the village community, we would expect people who share a given characteristic

Table 1.1 : Descriptive Statistics for Village Variables and Global Statistical Tests of Village Differences

Variable	Mean	Standard Deviation	Range		F	t
			Low	High		
Percent literate	26.4	15.2	9.5	44.8	1.72	0.000
Education in years	3.1	1.2	0.3	6.7	1.84	0.000
Income in Rupees	2514.2	772.2	968.2	5273.1	1.19	0.083
Number of additional children desired	1.2	0.4	0.3	2.4	1.29	0.021
Total number of living children	3.2	0.6	1.3	4.7	1.47	0.001
Approval of contraceptive use (1 = disapprove; 5 = approve)	3.2	0.5	2.0	4.3	2.19	0.000
Distance to government dispensary in miles	3.9	1.7	0.0	7.4	36.82	0.000
Number of family planning methods known	2.4	0.5	0.9	3.2	2.86	0.000
Percent visited by a family planning worker	13.0	10.2	0.0	44.4	1.56	0.000
Percent using a family planning method	7.8	6.5	0.0	29.2	1.17	0.192

to be concentrated by village. Some variables, such as intensity, that is whether a village is in an intensive or non-intensive area, differ by definition from one village to another. Others such as the respondent's perception of the distance to the government health center would be expected to cluster for obvious reasons. A third type such as education or attitude towards family planning may cluster depending on the availability of schools, facilities or the extent of contact between the family planning program and the village population. Finally, there may be variables such as age for which there is little expectation of important differences by village. In any event the F test for the differences among village means provides an effective measure of the extent to which people residing in a given village share a given characteristic.

The central purpose of the analysis in this chapter is to show how the various factors discussed in previous chapters affect the use of contraception at the level of the village. While family planning acceptance in the villages of rural Allahabad Division is low, there is considerable variation from one village to another. Acceptance, measured by the percentage of the interviewed clients who are currently using contraceptives, varies from 0 to 29.2% of the population interviewed. Individuals decide whether to use contraception on the basis of their own family size expectations, their previous fertility, their access to contraceptive knowledge and services and the degree of hostility they feel to the family planning program itself. These factors are in turn affected by some basic considerations such as the socio-economic status

of the family and the degree of contact they have with the program. At the level of the village the same factors tend to operate but to some extent the characteristics of individual couples tend to "average out". Nonetheless, villages will differ in their use of contraception depending on the influence of such factors as the level of development of the village, its access to contraceptive information and services, and the nature of village attitudes toward the family planning program. A basic concern is to examine the extent to which program activities influence the use of contraception.

The essential contact between the family planning program and the villages is the work of the individual family planning workers. They are expected to visit the villages and provide information concerning contraceptive methods and their availability, and persuade people to adopt these methods. As noted in another chapter of the Organization for Change manuscript, other government workers, notably from the Revenue and Development Departments, have also visited the villages in connection with family planning, but, from our date, we have no way of reliably distinguishing their visits from those undertaken by family planning workers employed directly by the program.

The following model is designed to test the relative importance of social background variables, such as literacy, and variables measuring direct family planning interventions, such as staff visits, or the use of contraceptives. These two types of ultimate influence do not operate directly; rather they are mediated through the social institutions of the village and the attitudes of the people who are its residents. Recognizing

that there is a complex set of influences that work to determine acceptance, it is desirable to model these forces so that we can assess the relative contributions made by different factors. The model which we have set out contains an implied causal ordering. Variables which are determined in the early equations are themselves determinants of the later equations.

The empirical version of the village model has seven variables. Two distance and literacy, are treated as exogenous, determined entirely by forces outside the model. Distance measures the perceived distance in miles between the village and the local PHC; the mean distance is 3.91 miles and the range is from zero to 7.4 miles. Literacy measures the percentage of the village population over five years of age that can, by the census definition, read and write. The mean value for literacy is 26.4% and the range is from 9.5 to 44.8%.

There are five endogenous variables in the system - intensity, visit, knowledge, attitude, and use. Intensity is a dichotomous variable which indicates whether a village has been designated for intensive work in family planning. Approximately one half of all villages in each PHC have been designated as intensive, and family planning workers are instructed to concentrate their work in these villages. To some extent, the government's choice of which villages should be intensive was made on grounds of convenience. Thus, the intensity designation is considered to be related to distance from Primary Health Center. Visit is the proportion of male respondents in a village who reported that they had been visited concerning family planning. The mean score for visits was 13.0%,

a surprisingly low score given the length of time the program has been in existence, and values for individual villages ranged from zero to 44.4%. Within the model, visit is determined by distance, intensity, and literacy. Intensity defines whether a worker is expected to concentrate his work in a given village; distance and literacy define the attractiveness of working in the village from the point of view of the worker. Knowledge, a function of visit and literacy, is measured by the mean number of contraceptive methods known to the male respondents in the sample; it ranges from 0.9 to 3.2 across the villages. Attitude, a function of knowledge, is the mean score of the male respondents in a village from an evaluation done by the interviewer. The evaluation took the form of a five point scale ranging from extremely hostile (1) to family planning to extremely favorable (5). Note that this measure is much closer to family planning than commonly used attitudinal measures like ideal family size. The mean scale for a village was 3.2 and the range is from 2.0 to 4.3. Finally, use, measured by the proportion of respondent couples who report contraceptive use, is the fifth endogenous variable. The mean is only 7.75%, and the range is from 0% to 29.2%. Use is a function of distance, attitude, visit, and literacy. Table 1.2 lists the variables and presents the zero order correlation matrix.

Figure 1.1 and Table 1.3 present the model in two alternative forms, first in path analysis diagrammatic form and second in the form of the estimated set of equations. In either form the model is a system. The key variables, literacy and visit, affect the level of use both directly, as measured by their coefficients in the equation in the model

Table 1.2 : The Determinants of Contraceptive Use at the Village Level

a. The Variables

X_1 = Distance between village and PHC in kilometers

X_2 = Intensity - Intensive=2; Nonintensive=1

X_3 = Literacy - percentage of population literate by census

X_4 = Visit - percentage of male respondents reporting family planning visit

X_5 = Knowledge - mean number of contraceptive methods known by male respondents

X_6 = Attitude - mean interviewer's assessment of male respondent's attitude to family planning

X_7 = Use - percentage of couples in sample from village using contraceptives

e_2, e_4, e_5, e_6, e_7 are random disturbances

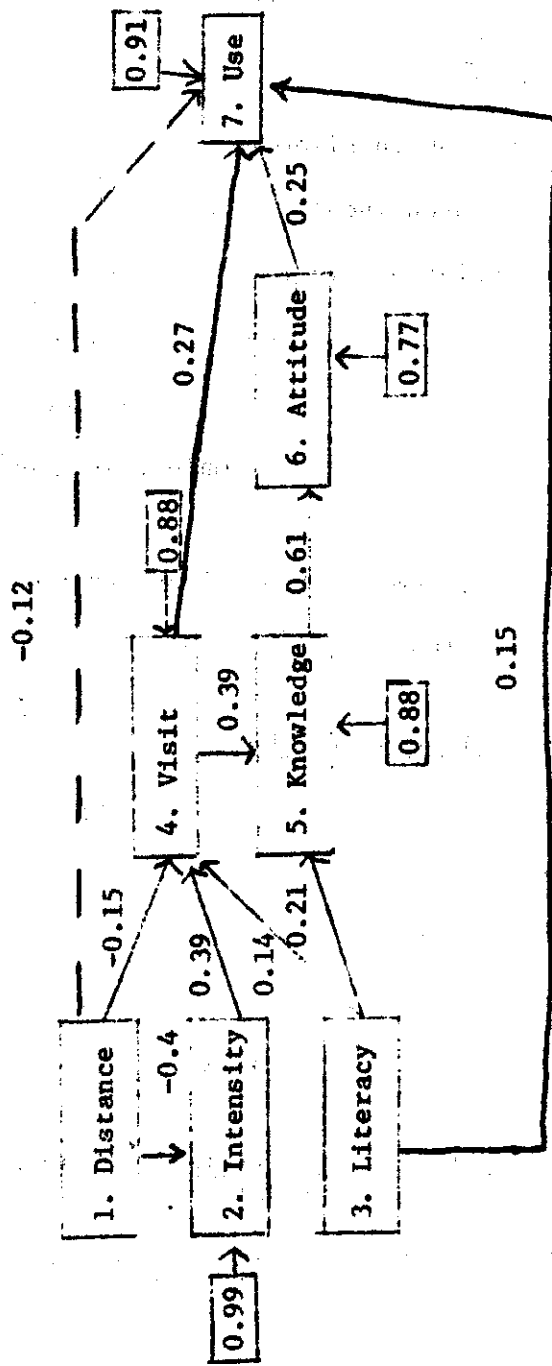
b. The Model in Equation Form

$$\begin{array}{rcl}
 1) & X_2 = b_{21}X_1 & +e_2 \\
 2) & X_4 = b_{41}X_1 + b_{42}X_2 + b_{43}X_3 & +e_4 \\
 3) & X_5 = & b_{53}X_3 + b_{54}X_4 +e_5 \\
 4) & X_6 = & b_{65}X_5 +e_6 \\
 5) & X_7 = b_{71}X_1 + & b_{73}X_3 + b_{74}X_4 + b_{76}X_6 +e_7
 \end{array}$$

c. Matrix of Zero Order Correlations Among Village Variables

	Distance	Intensity	Literacy	Visit	Knowledge	Attitude	Use
Distance	1.00						
Intensity	0.10	1.00					
Literacy	0.10	0.04	1.00				
Visit	0.21	0.41	0.16	1.00			
Knowledge	0.16	0.16	0.28	0.43	1.00		
Attitude	0.07	0.18	0.24	0.32	0.64	1.00	

Figure 1.1 : The Path Analysis Version of the Village Model



Regression Coefficients and Standard Errors

Variable	Constant	Distance	Literacy	Intensity	Visit	Knowledge	Attitude	R ²	F	sig.
Efficiency	1.38 * (0.11)	-0.04 (0.03)						0.01	1.6	0.2040
Knowledge	22.90 * (4.38)	-0.91 ^b (0.51)	0.19 ^b (0.11)	-7.92 * (1.67)				0.22	10.6	0.0000
Attitude	1.73 * (0.16)		0.015 ^a (0.006)		0.020 * (0.004)			0.23	17.1	0.0000
Efficiency	1.85 * (0.15)					0.57 * (0.06)		0.41	82.3	0.0000
Attitude	-4.22 (4.23)	-0.43 (0.34)	0.12 (0.08)		0.14 ^a (0.06)		2.59 (1.25)	0.18	6.3	0.0001

* = significant at the 1% level

a = significant at the 5% level

b = significant at the 10% level

which predicts use, and indirectly through the equations predicting the other endogenous variables in the system. Some of the effect of literacy on use is in fact channeled through its effect on visit.

The model is specified to capture those effects that we might expect to be most important at the level of the village. Some additional variables which might be important for a test of hypotheses at the level of the individual, for example, ideal family size, age, or parity, have been left out on the assumption that variations across individuals would not be reflected in the village level aggregation. It is assumed, in effect, that the aggregation procedure controls for these variables.

The results of estimating this model are indicated in the diagrammatic representation of the model, Figure 1.1. The numbers accompanying each of the arrows represent the path coefficients or standardized regression coefficients linking each of the variables, and the numbers in boxes represent the residual path. The general pattern of the results is clear. The use of family planning is determined by a number of variables operating both directly and indirectly. The most important direct effects are the number of visits and the attitudes held by the villagers toward family planning. Literacy also has a direct influence on the amount of use of family planning in a given village. Distance affects use in the expected direction, but the coefficient is insignificant. But the direct determinants of use tell only part of the story. The attitudes to family planning are determined to a very large extent by the mean number of methods of contraception known by the village

population. This family planning knowledge is in turn determined by the proportion of the village which has been visited concerning family planning and the literacy of the village. The percentage of male respondents visited concerning family planning is determined by the administrative designation of the village as intensive or nonintensive, by the distance from the Primary Health Center, and by the amount of literacy which exists in the village. Thus we see in this model that there are direct and indirect effects operating on the frequency of family planning use in the village.

The equations in the system constitute a recursive system in which there is an ordered causal relationship among the variables. The model implies that there is no simultaneity in the system, that is, that variables are not mutually causal, e.g. attitude affects use but use does not have an effect on attitude.² The practical advantage of a recursive system is that the equation making up the system can each be estimated using single equation multiple regression techniques. Table 1.3 shows the estimated equations.

There are many qualifications that one might want to express about a model of this kind. One important reservation is that the use of literacy as the sole measure of socioeconomic conditions may underestimate the influence of such factors. To test this proposition we developed a second model which was similar to this one except that it added two variables; the mean three year survival rate for infants born in the

²Naturally, this is a simplifying assumption, and there may in fact be some degree of simultaneity among the variables in the model. The empirical test which is often used to judge the validity of a particular model is the degree of correlation among the residuals. Residuals from the five equations were calculated, but none were statistically signifi-

village during the five years previous to the survey and the mean income of the village. The mean of the survival variable is 0.757 and the range is from 0.450 to 0.939. The mean of income in Rupees is 2519 and the range is from Rs. 968 to Rs.5482. In the analysis they were both hypothesized to affect use directly, but the coefficients of neither were significant in the actual estimation. Moreover, when they were added to the model the coefficient representing the effect of literacy on use fell below the 10% significance level. Indirect paths were also assumed to exist. Specifically, income and child survival were assumed to affect visit and child survival to be affected by distance, but while two of these effects were mildly significant at the 10% level, the third was not and their addition to the model reduces the influence of literacy below the 10% level of significance. Thus on balance, we feel that the relationships expressed in the original model are a reasonable description of the determinants of family planning acceptance in this region.

The most interesting question that can be asked of this model is, what is the relative contribution of the number of visits, a measure of family planning input, and of literacy, a measure of the socio-economic environment as it affects fertility decisions. The effects of each can be calculated as the sum of the direct influences and the indirect influences. The elasticity of changes in use of family planning in the village with respect to changes in literacy is .6 and with respect to increases in the proportions of households visited is .3. Thus a one per cent increase in the level of literacy in the village has twice the impact that a one per cent increase in the proportion of households

visited would be expected to have. If, however, one recognizes the cost and expense that would be involved in increasing literacy by one per cent as compared to the cost of increasing the number of households visited by one per cent, it is clear that visits concerning family planning, a directly operational variable, contains considerable potential as a means of raising the amount of contraceptive use. In short then, we find that although basic socioeconomic conditions that pertain to any given village may be important determinants of the responsiveness of the population to the family planning program, the amount of effort which has been made actually to contact the village population about family planning is also of great importance. It is interesting to note that the mean percentage of households in which the male respondent indicated that he had been visited about family planning was only 13%. Thus there is a great potential for increasing the amount of contact between family planning workers and the client population.

The role of distance in the model is worthy of special mention. Not only is there a mild negative relationship between distance and use, but there is a stronger indirect influence of distance on use through the reported visits. Villages remote from the PHC are not visited as often as other villages.

It may well be asked whether the conclusions drawn from the analysis of the aggregate village data are similar to the conclusions that would be derived from an analysis of individual data. On the basis of a multivariate examination of the determinants of contraceptive use, family planning knowledge and visits, it can be asserted that the basic conclusions

would be the same with either data set. The individual data and richness to the analysis of the aggregate analysis by adding a direct measure of the influence of individual variables such as family size, family preferences or caste. Since many of the individual level variables are dichotomous, they do not translate very easily into the modelling framework adopted for this chapter. Moreover, it is important to notice that even at the individual level, variables defined at the village level are important. For example, the index of hostility defined at the level of the village has a role in explaining the contraceptive decisions of the individual couple that can be measured independently of the couples own score on the hostility index.

The next question relevant for policy makers is, if family planning visits are potentially so effective in increasing the extent of family planning use, why have such a low proportion of the households been visited? This question cannot be adequately answered on the basis of the village data used in this section. Rather we must direct our attention to the government family planning program and the personnel that represent the program in the villages. In particular we are interested in their background, the techniques of persuasion they employ and their relationships with the larger family planning organization. Or, more generally, what are the determinants of family planning performance at the level of the individual family planning worker and at the level of the PHC? It is to these questions that the next section is addressed.

PART 8

THE DETERMINANTS OF THE PERFORMANCE OF THE WORKER AND THE PRIMARY HEALTH CENTER

Previous chapters in this section have examined the PHC and the staff. Many of the observations in these chapters help to explain the low performance which prevails in the region.* We have also noted, however, that both PHC's and individual workers vary in their performance as measured by the number of sterilization and IUD cases per thousand population. The basic purpose of this chapter is to discuss the determinants of the observed variations in worker and PHC performance.

It is important to emphasize the context in which the analysis of this chapter is conducted. Neither among PHCs nor among individual workers are there units which have distinguished themselves on an absolute scale of performance. The range of performance during the two years under consideration tends to be from poor to acceptable rather than from poor to outstanding. It may be argued that this limited range is due to environmental conditions beyond the control of the individual unit, but the fact remains that we the researchers are left with a sample of limited variation. Thus the discussion of other chapters in this section*

* For details see, B.D. Misra; Ashraf Ali; Ruth Simmons; and George B. Simmons, "Organization for Change: A Systems Analysis of Family Planning in Rural India" (Summer 1979) (forthcoming book).

of the book or in parts II and IV dealing with the relevant environments of the PHC and its staff may do more to explain the general level of performance than will any formal analysis of the variance among the sub-units of the family planning organization within this one region. We feel, nonetheless, that there are a number of important findings from the analysis that follows. They must however, be understood in the context of the full book.

We begin the discussion in this chapter with an analysis of the determinants of worker performance. We place greatest emphasis on the determinants of variations in performance among the FPHAs, but some attention is given to other designations as well. The second part of the chapter deals with the PHC taken as an organizational unit. The two levels of analysis are closely interrelated, since the PHC -- its staffing pattern, location, facilities and supervisory structure -- are part of the environment in which the individual worker must work, and the individual workers -- their backgrounds, personalities and work methods -- collectively help to make up the organization which is the PHC. The last part of the chapter describes an attempt to combine the information drawn from the analysis of the individual worker with the results of our analysis of the determinants of acceptance as already reported in Part A.

A. Variations in the Performance of Individual Workers

Our earlier discussion has suggested a large number of influences on the performance of individual workers. To test the importance of particular influences, it is necessary to abstract the most central

variables and measure their impact on acceptance. Thus, this chapter deals with a much more limited range of questions than we have treated in earlier chapters in Part III (see "Organization for Change" book) but compensates for the narrow range by greater in-depth treatment of some important determinants of performance. We hypothesize the following six kinds of influence on the number of family planning cases that a field worker is able to generate:

- 1) The general environmental conditions and program framework within which the worker operates affects his performance. The general standards of work, the equipment and training provided, may have a profound effect on the worker and his effectiveness. For the most part, these factors are common across the administrative units in the sample. Nonetheless, they are critical determinants of the level of performance for the region as a whole. These factors have received detailed treatment in other chapters of Part III (of "Organization for Change") and will be discussed further in Part IV. Within this set of influences on performance we should include the planned transactions with the environment and the planned organizing activities as defined in Chapter II (of "Organization for Change").
- 2) The characteristics of the specific organization in which the family planning worker operates as perceived by the family planning worker himself are an important determinant of his performance. Specifically, the amount of supervision, the nature of the relationship between the worker and his colleagues both at the same level as himself and in other

positions in the Primary Health Center, the goals that are organized within the organization, the resources that are available at the level of the Primary Health Center, and other factors may all help determine the individual worker's performance.

- 3) The individual background of the family planning worker affects his ability to convince villagers to use family planning. The individual family planning workers differ in age, in the amount of training which they have received, in their interest and dedication to family planning, in the number of children and the amount of family planning experience which they themselves have, and in a wide range of other factors. These background variables may be important in helping to explain the variations in performance among individual family planning workers.
- 4) The receptivity of the village population for whom the worker is responsible is important. The hostility of the population, their economic and social characteristics, their literacy, may all work to affect the ability of the worker to find new acceptors. These factors may vary from one region to another, but in some sense the general culture and economic structure are shared by most of the villages in the area studies. The influence of literacy was examined in Part A.

- 5) The quantity of work performed by the individual worker, i.e. the number of hours spent visiting individual families or otherwise in contact with the village population, is of great importance in determining his effectiveness. Unfortunately, given the nature of our data, the quantity of work is unmeasurable on the basis of information supplied by the individual worker. While it is possible to use the percentage of households visited from the client village data for that subset of worker interviews for which corresponding client data exist (Part III of "Organization for Change"), for the full set of family planning workers we are obliged to test the determinants of family planning performance on the basis of other information supplied by the interview.
- 6) The work style employed by the family planning worker affects his effectiveness. Although there is some effort to train individual family planning workers in extension methods, there is empirically a great deal of variation in the way in which workers conduct their contacts with the village population. These differences in work style may have an important effect on the number of cases the family planning worker is able to motivate.

These six sets of factors have different implications for our empirical work. The general program framework is common to all workers and is thus not a variable in the system. Its influence is important, however, and can be studied in a descriptive sense. The other factors we have listed are at least theoretically measurable, but for two of them

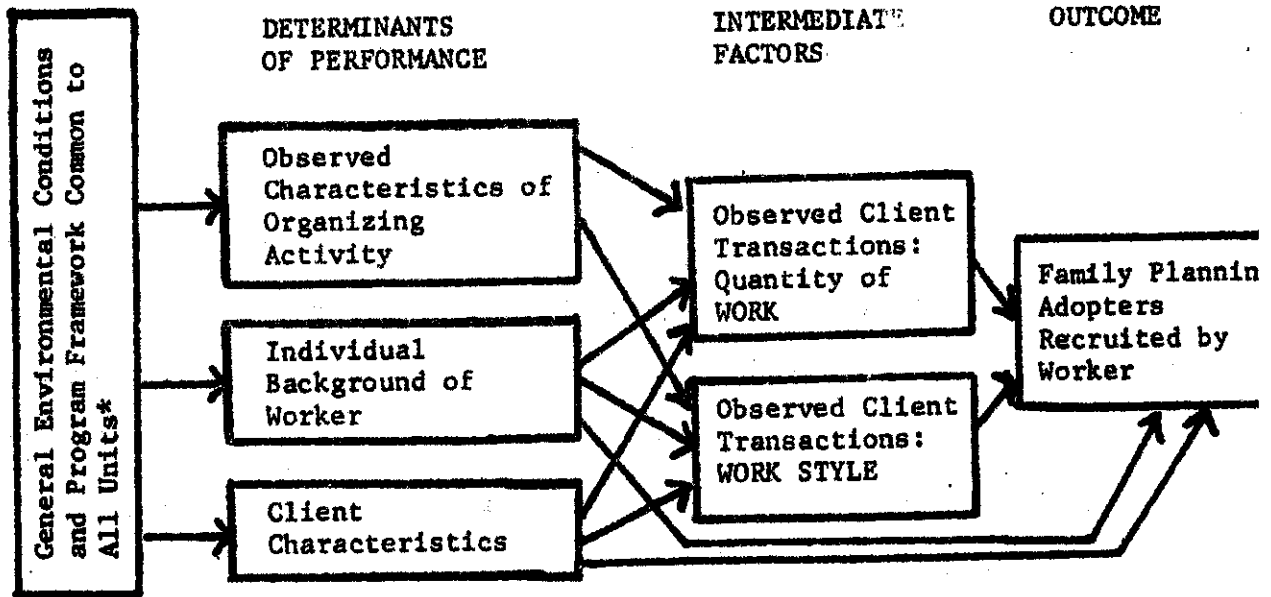
- client characteristics and the quantity of work done by the worker - such variations as do exist are difficult to observe on the basis of interviews with family planning workers. This latter qualification is especially true with regard to the quantity of work, for our experience was that the family planning workers are unable or unwilling to reveal very much concerning the amount of work which they dedicate to achieving the goals of the family planning program.¹ On the other hand, through our interviews with the individual family planning workers we were able to gather fairly extensive information concerning the remaining three factors that affect individual work performance. Furthermore, information from these individual workers can be supplemented by information taken from supervisory staff or co-workers.

The full model of worker performance is shown in Panel A of Figure 2:1. The quantity of work and work style are thought to be intermediate variables determined by the other variables in the system. They, together with the direct influence of the variables relating to the individual background of the worker and the characteristics of the client population for which the worker is responsible, determine performance. The effects of organizational variable is entirely indirect, operating through the quantity of work, work style, and the selection procedures which in part determine the individual background characteristics of the

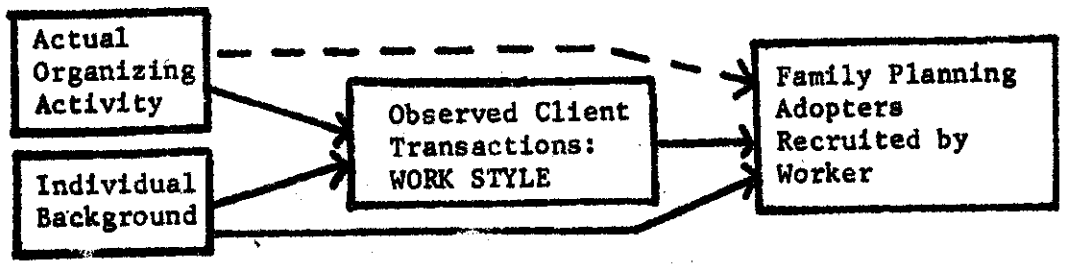
¹It may be possible to measure the quantity of work through some form of participant observation, although our experience suggests that it is difficult to avoid a "Hawthorne effect". The workers work harder when they think they are under observation.

Figure 2.1 : Determinants of Family Planning Worker Performance

Panel A: The Full Model



Panel B: The Empirical Model Using Data from Interviews with Workers



*For a detailed representation of this general program framework, see Chapter II.

workers who are chosen to work in a given area.

Panel B of Figure 2:1 depicts the same model in a form that we can examine empirically, using data from worker interviews. Note that the quantity of work and the client characteristics are left out of the model, since we have no reliable data on these variables from the worker interviews. The dotted line represents the direct effect of organizational variables that may appear when the quantity of work is not in the model. Also, factors relating to the general program framework have been eliminated due to lack of variation in the data. They can be included in a descriptive sense but not as part of a model which attempts to estimate the variations in worker performance resulting from variations in the set of independent variables.

The dependent variable for the analysis, clinic record performance, was discussed in detail in Chapter (IV) (of "Organization for Change" book). It measures the number of acceptors of clinical family planning methods, the IUD or sterilization, that a worker could be expected to have brought during the full two-year period (fiscal 70-71 and 71-72), had he been working at the same level of performance as he achieved during the period for which actual figures are available. It is necessary to project the full two years to assure comparability among workers who are working at the Primary Health Center for different periods of time. The measure has the advantage of being independent of the individual worker's personal assessment of his performance. On the other hand, the clinic records may be tainted by the internal PHC practice of allocating cases to individual workers in such a way as to protect the poor performers on the staff.

Our informal contacts with the PHCs suggest possible variations in the amount of bias across PHCs. This measure also ignores aspects of performance not reflected in the number of cases recruited. Nonetheless, clinic record performance is probably the best measure of individual performance available.²

Table 2.1 presents a distribution of field worker performance for the two years under observation. For all designations there is extensive variation in performance, but a high proportion of the field staff have fewer than ten cases. In general the female workers bring more cases than the male workers and there is greater variation in their performance. A few of the field staff have distinguished themselves with outstanding performance during the time period under observation, but the resulting skew in this variable creates problems for analysis. Thus, to make the distribution of the variable conform more closely to the normality assumptions of linear regression we have used the logarithm of the original performance variable for the analysis which is described in the later part of this chapter.

²To supplement this primary measure of worker performance, we constructed a second measure, self-reported performance based on the individual worker's own estimated output as he reported it to the interviewers. This measure has the obvious disadvantage that, embarrassed by their poor performance, many workers may have taken advantage of the interview situation to give an inflated calculation of their own performance. On the other hand, to the extent that the case record data misrepresents performance of individuals, the self-reporting may be more accurate. Furthermore, the self-reported index includes performance in the time periods when the worker was assigned to another PHC. It is reassuring then that the zero-order co-relation between the two was moderately high, but there are enough problems with self-reported performance that we have chosen to restrict the discussion in this chapter to the case record measure. Many of the results from the analysis of this alternative dependent variable are similar to those reported in the remainder of this chapter, but there are anomalies that may be related to the over-reporting bias of the measure. For example, freedom to talk to supervisor is not significant in the analysis of case record performance, but it is in the self-reported measure. However, there may have been a strong correlation between the over-reporting of performance

Table 2.1 : Percentage Distribution of Projected Case Record Performance by Designation of Worker for Two Years - 1970-71 and 1971-72

Total Cases	F.P. Health Assistant	Auxiliary Nurse Midwife	Family Welfare Worker - Trained	Family Welfare Worker - Untrained
0	15.2	18.9	20.0	17.4
1-5	20.0	12.8	19.0	8.7
6-10	22.4	15.9	13.3	26.2
11-15	24.0	14.4	6.7	17.4
16-20	8.8	12.8	6.7	13.0
21-30	6.4	6.4	13.3	8.7
31-40	2.4	6.4	16.7	4.3
41+	.8	6.4	3.3	4.3
Total per cent	100.0	100.0	100.0	100.0
Total N	125	63	30	23
Not ascertained	5	1	6	3

The analysis of the individual performance data was carried out in three steps. First, we constructed three sets of indices relating to organization, work style, and individual background - variables mentioned at the beginning of this section. Second, we examined the relationship between each one of these three sets of variables and the performance measure, saving for further analysis those variables which were most significantly related to performance. Third, we took the subset of variables which proved significant in the analysis done in the second step and combined all three types of variables - organizational, background, and work style - in a complete multivariate analysis of the determinants of individual worker performance. In the following pages, we describe some of the salient characteristics of each stage of analysis and some of the most important conclusions which can be drawn from the results. The description of variables and their construction of Step One applies to both male and female field workers. In presenting Steps Two and Three we have presented concentrated on the analysis of male worker performance. A summary of the analysis female worker performance follows:

Step One: The Construction of Individual Variables

In this chapter, we deal only with field worker performance. Three of a possible four FPHAs and about four of a possible eight possible ANM or FWs were sampled from the field staff posted at each of the 45 sample PHCs. The interviews with each of these workers lasted on the order of an hour and a half. During the process of the interview, we asked them questions concerning their personal background and training, their relationships with other staff members at the Primary Health Center, particularly

with their supervisors, and finally, a whole series of questions concerning their experience with the client population. For the analysis that follows some variables are taken directly from the responses to our questions and some are indices constructed from the answers to several questions. Since it is important to understand the derivation of each of these variables, the following pages attempt to catalogue the variables used in the multi-variate analysis.

Three types of variables were constructed: 1) the individual background characteristics of the family planning worker, 2) the organizational characteristics of the Primary Health Center as perceived by the respondent, and 3) the characteristics of the work style employed by the worker in his approach to the village population. Within each of these categories, a large number of variables were constructed. The variables attempt to measure some of the theoretical dimensions that were of primary concern to us in our study. In some instances, it has been relatively easy for us to decide which of the interview responses corresponds most closely to the theoretical construct which we had in mind. The headquarters posting variable, for example, is easily measured as a dichotomous variable indicating whether the respondent was assigned to the headquarters or to some more remote subcenter of the Primary Health Center. In other cases, however, fairly elaborate procedures have been undertaken in order to find an empirical counterpart to a theoretical variable. For example, the difficulties of measurement are particularly great in the case of the quality of worker supervision. Where the empirical counterpart of a theoretical construct of importance was obvious, we have included it in the analysis;

but when there seemed little basis to choose among a number of empirical measures, we have confined our discussion to those variables which in some sense performed best. The procedures used to decide how a particular variable should be treated are discussed along with the individual variables.

The following then is a list of the individual variables used in the multivariate analysis, which is discussed in the following pages. The bracketed material indicates whether the particular variable was used in the analysis of the male or the female staff or both.

I: Dependent Variable-Measure of Performance

- I. Case Record Performance
 (see text)
 (FPHA, ANM-FWJ)

This variable is discussed in detail above and in Chapter IV (of "Organization for Change book). It is strongly positively skewed. In order to better meet the normality assumptions for the use of linear regression techniques analyses were performed predicting the logarithmic transformation of case record performance plus one case. This latter addition was necessary to avoid the indeterminacy of the logarithm of zero.

II A: Organizational Variables³ - Location

2. Headquarters posting (FPHA, ANM-FWU)

Headquarters posting is a variable indicating whether the respondent was assigned to the headquarters of the Primary Health Center or to one of the subcenters. It was our impression that headquarters staff had considerably more contact with supervisory personnel than did their counterparts in the field. We would expect them to be more carefully supervised and more effective in recruiting cases.

II B: Organizational Variables - the Quantity of Supervision

3. Total quantity of supervisor (FPHA, ANM-FWU)

Total quantity of supervision seeks to measure the number of hours of contact during a given month between the respondent and the up-to-three supervisors concerning whom we inquired during the interview. The variable was constructed by taking the number of times the worker had contact with each of the three supervisors, and multiplying by the average length reported for each of those contacts. The sum for all the three supervisors approximates the number of hours per month of supervisory contact for the field worker. Our hypothesis is that the greater the amount of supervision the better the individual family planning worker performance.

³In our approach to the construction of specific organizational variables we were much influenced by the spirit of the writings of R. Likkert. We found it impossible to operationalize the variables in the U.P. context in the exact manner of Likkert's applications with the U.S. but the concern with aspects of supervision remains.

II C : Organizational Variables - the Extent to Which Respondent Works with Others

4. Joint fieldwork
(FPHA, ANM-FWJ)

The variable measuring the amount of joint field work indicates the number of times in a month that the respondent goes to the village with another field worker. It is based on the questions concerning joint field work which were asked for each of two possible joint field work partners. We hypothesize that those workers who were able to organize joint expeditions to the village will be more effective than workers who operate in isolation because they will enhance their ability to communicate in the village, will strengthen mutual resolve, and will have more enthusiasm for their work.

II D : Organizational Variables - The Respondent's Relationship with Supervising Staff

5. Purpose of supervisors' visit
(FPHA, ANM-FWJ)

This variable is dichotomous. Whenever the respondent indicated that the purpose of field visits by any one of the three possible supervisory staff was to give advice and help in the respondent's work, the variable was scored "1". The hypothesis underlying this variable is that if supervisors are perceived to come to the field for the purpose of helping the respondent with his work, they are much more likely to be effective in encouraging high performance than if the sole purpose of their visits is perceived to be that of checking on the performance of the respondent.

6. Freedom to talk to supervisors

(FPHA)

This variable is based on questions concerning the respondent's freedom to talk with the supervisory staff concerning problems that they encounter in their work. On the questionnaire each respondent was asked to respond to a series of questions concerning his or her relationship with each of three possible supervisors. This particular variable was constructed by using an optimal scaling index construction procedure developed by Guttman and Lingo. With respect to this variable, we hypothesize that respondents who felt free to discuss work problems with their supervisors would be more effective in resolving those problems and in bringing family planning cases to the Primary Health Center.

II E: Organizational Variables - Respondent's Perception of Supervisor's Goal Emphasis

7. Shared goal-emphasis

(FPHA, ANM-FWW)

This measure of shared goal-emphasis attempts to indicate whether or not the respondent feels that he shares the same principal professional objectives with the supervisor with whom there is greatest contact. A dichotomous variable, it is scored "1" when the respondent indicates common goal-emphasis. Our hypothesis is that a shared set of goals leads to greater organizational harmony and higher performance.

8. Supervisors' case emphasis
(FPHA, ANM-FWW)

Supervisors' case emphasis measures how strongly the respondent perceives his supervisors' emphasis to be the sheer number of family planning cases recruited. Our hypothesis is that, to the extent that the supervisory staff stresses bringing family planning cases, the worker will respond by emphasizing superficial case recruitment instead of other possible uses of time. Therefore a high score on this index is indicative of high performance.

III. Variables Related to the Background and Training of the Field Worker

9. Suitability
(FPHA, ANM-FWW)

A measure of the suitability of the background of a particular family planning worker for family planning work has been constructed from a number of questions related to age, rural-urban background, number of children, etc. A worker is given a higher score on this index if he has characteristics which correspond reasonably well with what we perceive to be the characteristics required for effective communication with the village population. Thus very young workers from urban areas with no children would be given a lower score on the index than older workers with children from rural backgrounds who used family planning themselves. The basic hypothesis is that certain personal attributes of the family planning worker would give the worker authority and help him to communicate effectively with the village population.

10. Duration of designation
(FPHA, ANM-FWJ)

This variable sums the total amount of time reported by the respondent at all postings in his current job designation. The central hypothesis bearing on this variable is that workers with long experience in a particular designation should be able to accomplish more than their less experienced counterparts.

11. Radical change orientation
(FPHA, ANM-FWJ)

This variable was constructed from the answers to a series of questions which assessed the respondents' orientation to radical change as a means to India's development. A high score indicates a high radical change orientation. Our hypothesis is that those respondents who are more committed to radical change are likely to feel free to introduce family planning and would be more effective in their performance.

12. Motivation
(ANM-FWJ)

This variable indicates an ordered progression of the degree to which the respondent offers work intrinsic related reasons for accepting his or her current position. Up to two different reasons were reported by workers for accepting their present position. Two task intrinsic reasons were indexed by the value of four. One job intrinsic reason and transfer or promotion were reported as three. A varied set of responses including one job intrinsic reason and a report that the position was the only one available, or, two references to transfer or promotion, or, finally one reason only given other than that the position was the only one available were indexed as two. A low value of one was assigned when non-availability of an alternative job and transfer or promotion were

mentioned. Work intrinsic motivation reports included self-reported interest in the position and a reported desire to serve the people. Our hypothesis is that higher intrinsic job motivation leads to better performance.

IV: Variables Related to Work Style

13. Importance of follow-up
(FPHA, ANM-FWU)
- Importance of follow-up measures the significance that respondents attach to the job of following up family planning cases, i.e., visiting family planning adopters to determine if there are clinical or other difficulties with the method they have chosen. It is based on the order in which the respondent mentioned follow-up in an open-ended question concerning the different aspects of the job. Following the suggestions in other research, our hypothesis is that the greater the importance attached to follow-up, the better will be the performance of the worker.
14. Involvement of previous adopters in motivation work
(FPHA, ANM-FWU)
- This variable measures the extent to which the respondent reports involving previous family planning users in his attempts to motivate new cases for family planning. We hypothesize that those workers who are able to identify and get help from previous family planning acceptors will be more effective in recruiting cases. That is, previous family planning adopters are able to identify potential new adopters among neighbours and relatives and to legitimate family planning in their eyes. This variable is based on responses to an extensive series of questions concerning the methods used by the respondent to attract family planning cases.

This variable indexes the extent to which the respondent is able to involve other persons -- such as village leaders, officials from other government agencies, and other family planning worker staff -- in the effort to locate and motivate village residents to use contraceptive measures. Our hypothesis is that those workers who are best able to tap existing networks will be more effective in recruiting cases.

16. Non-family Planning/
MCH help
(ANM-FWW)

This last variable indexes whether the family planning worker reports providing medical assistance other than MCH help (referrals, vaccinations, etc.) to villagers. Our hypothesis is that the ability to mobilize other resources to aid potential clients facilitates later family planning efforts.

Table 2.2 presents the descriptive statistics for the variables used in the analysis of FPHAs and ANMs.

The variable set used for the analysis of the female field workers differs somewhat from that used for the FPHAs. Since the female staff can have more than one designation, have different levels of midwife training and deal with women in the villages rather than with them it seems important to provide for the possibility that different variables may explain their success. Thus in the discussion of Steps II and III of our analysis of worker performance, we treat first the results for the FPHAs and then briefly the results for the ANMs and FWWs.

Table 2.2 : Descriptive Statistics for the Analysis of the Determinants of Field Workers Performance: Mean, Standard Deviation and Range

Number, Variable Name	FPHA N=122			ANM N=64		
	Mean	Standard Deviation	Range	Mean	Standard Deviation	Range
Logarithm of Case Record Performance	.85	.46	0-1.72	0.96	0.57	0-2.11
Headquarters Posting	1.28	.45	1 or 2	1.55	.50	1 or 2
Total Quantity of Supervision	151.8	132.6	0.0-570.0	143.5	200.4	0-967.5
Joint Field Worker	2.35	5.52	0-30	2.09	3.96	0-18.5
Purpose of Supervisor's visit	.54	.50	0-1.0	.42	.50	0-1.0
Freedom to talk	1206.1	235.4	628.0-1512.0	1095.1	199.6	683-1512
Shared goal Emphasis	.42	.50	0-1.0	0.48	.50	0-1.0
Supervisor's Case Emphasis	1.16	.81	0-2.0	.67	.81	0-2.0
Suitability	5.68	2.22	0-10.0	3.70	2.76	0-10.0
Duration of Designation	42.0	23.9	3.0-108.0	86.3	52.9	9-196
Radical change Orientation	12.1	2.3	0-15.0	10.67	3.69	0-15
Motivation				2.16	.70	1.0-4.0
Importance of Follow-up	.78	1.20	0-4.0	.91	1.54	0-5.0
Involvement of Previous adopters	1.26	.85	0-3.0	1.14	.73	0-3.0
Involvement of Others in locating clients	1.78	.93	0-4.0	1.61	.77	0-3.0
Non-family planning/MCH help	-	-	-	.14	.35	0-1.0

Step Two : Multivariate Analysis of the Determinants of Performance by Type of Determinant - FPHA's

After the full set of indices was constructed, regression analysis was used to estimate the extent to which each of the three types of independent variable is able to explain variations in the measure of FPHA performance. We used two regression procedures in the analysis. Table 2.3 presents the results of a stepwise regression procedure⁴ used to select the independent variables with the greatest explanatory power. The table lists the variables most strongly predictive of performance and presents the most salient characteristics of the overall regression - R^2 , F statistic, level of significance, and beta coefficient for individual variables. Since scale is not centrally important for most variables used in this analysis we standardized the variables before analysis. Thus Table 2.3 presents specific results only for those variables which reached the threshold level of significance (10%) preassigned in the stepwise regression.

In our analysis of the determinants of worker performance - both male and female - we have not weighted the observations to account for the proper sampling fraction for each of the three strata. We have used

⁴The stepwise regression procedure is a helpful research tool, but it differs from some other multivariate techniques in some respects. Operationally, the program examines the independent variables and selects the one which has the strongest relationship (as measured by the zero order correlation) with the dependent variable, then calculates the partial regression coefficient and other statistics. It then proceeds to reexamine the set of independent variables and selects the second one which, in combination with the first selected variable, explains the most variance. Then the program calculates the partial regression coefficients for each of the two included independent variables and other relevant statistics. Thus at each stage the partial regression coefficient is recalculated even for variables that have been included earlier in the analysis. At each state the program also calculates the level of statistical significance of the last included variable and terminates when that value falls beneath a preassigned level.

Table 2.3 : The Determinants of FPHA Case Record Performance by Variable Type N=122

Regression Number	Independent Variable Set	R ²	F	Significance	Included Variables	Standardized Regression Coefficient
1.	Organization	.106	4.68	.004	Purpose of Visit Shared goal emp. Supervisor's case emphasis	.22 .23 .19
2.	Background	.139	9.83	.001	Duration of designation Suitability	.28 .24
3.	Work style	.063	8.19	.004	Involvement of previous adoptors in motivation work	.25

the test suggested by Duncan and DuMouchel⁵ to assess the appropriateness of weighting and have concluded that there would be no gain in the use of weights. Since the use of weights makes the interpretation of some statistics more difficult, the use and presentation of unweighted regression results seems preferable. Thus all of the following analysis is conducted with unweighted regressions and with a logarithmic transformation of the dependent variable.

Stepwise regression is a tool for selecting on the basis of empirical data that subset of variables which are most strongly associated with the dependent variable. Since, in this case, we are primarily concerned with the impact of a group of variables taken as a set, the technique provides a useful procedure for shortening the list of possible explanatory variables. The results confirm the utility of the procedure. For each of the three sets - organization, work style, and background - the stepwise procedure suggests the elimination of variables less strongly related with performance.

Table 2.3 presents the results for each of the three regressions. For each regression, the type of independent variable set used, a list of the selected variables from the set and selected statistics are included.

⁵William H. DuMouchel and Greg J. Duncan, Using Sample Survey Weights to Test for Misspecification in a Linear Regression Model, October 1976.

Eleven per cent of the variance in the case records measure of performance is explained by organizational variables. The three explanatory variables listed reflect the respondent's perception of the quality of the relationship with his supervisor. In particular the nature of the goals which the FPHA perceives to motivate the supervisor and the extent to which they are shared seems important. The more emphasis on cases by the supervisor and the more goals are perceived as shared, whatever their nature, the higher is the worker's performance. Note that other variables, particularly the place of posting of the FPHA and joint field work, were not strongly related with performance although the signs of the coefficients were in the expected direction. The quantity of supervision is negatively related to performance, which is unexpected but the relationship is not significant.

Background variables by themselves account for almost 14% of the variance in performance. The most important background variable is duration of designation measuring the length of time that a worker has been a FPHA. Experience on the job is thus revealed to be an important determinant of performance. Our index of suitability is also significantly related to performance. Thus, the personal characteristics of a worker influence his effectiveness in recruiting family planning cases. Radical change orientation is not significantly related to performance.

Work style by itself explains less of the variance in FPHA performance than either organization or background. The one variable which is selected from the work style variable set is that measuring the extent to which the FPHA reports involving previous adopters in his motivation

work. This variable indicates something of the extent to which the field worker is able to make use of resources other than his own time and energy.

Step Three: Multivariate Analysis with All Three Data Sets - FPHAs

In Step Two we established that taken by itself, each type of variable is able to contribute to the explanation of variance in performance. Table 2.4 reports the general results of an analysis where the variables were grouped into sets corresponding to the three general types of influence on worker performance. We report first the overall impact of the organizational variables taken as a set, second of the individual worker variables, and third of the work style variables taken as a set. This reflects the causal ordering suggested by Figure 2.1.

When we examine the determinants of FPHA case record performance as measured by the case record data, we note that the organizational variables are able to account for approximately 11% of the variance in case records performance when they are run by themselves. When the individual background variables are added in the stepwise regression, the amount of variation explained increases to 22%, thus suggesting that, even controlling for the individual background variables, the set of organizational influences on individual performance are able to account for a large proportion of the total variance which can be explained. The work style variables themselves add about two per cent to the proportion of variance which is explained. Thus, proportion of the variance that can be explained by work style is greatly reduced when combined with the other sets. This reduction is in general agreement with the causal ordering postulated earlier.

Table 2.4 : Stepwise Improvement in FPHA Case Records Performance from Adding Select Variables by Category

Variable Set	Cumulative Number of Variables	Initial R^2	Final R^2	Increment	F	Significance
Organization	3	0	.106	.106	4.68	.004
Background	5	.106	.220	.104	7.05	.001
Work Style	6	.220	.244	.024	1.79	.17

Table 2.5 shows the results of regressing family planning worker performance with all of the variables used in the analysis. The use of this many variables has the obvious disadvantage that it tends to understate the influence of any given variable. The goal emphasis variables, suitability and duration of designation remain significant nonetheless, and the import of many of the organizational variables is suggestive. The square of the quantity of supervision and an interaction term have been added to correct for nonlinearities among the variables.

To summarize the analysis of male family planning worker performance the relationships described in this section underscore the importance of decisions within the family planning organization for generating new family planning acceptance. The selection of staff, the type of relationship established between supervisor and worker, the extent to which output-oriented goals can be established and shared and perhaps the work practices of the workers in the village all affect performance. It must be emphasized that there is less variance among either the independent or the dependent variables than would be desirable for a fully satisfactory test of these relationships. However, that they significantly explain the meager variations in performance in this region suggests that they may be even more central in regions where both organizational inputs and performance have more variance.

The analysis of family planning acceptance remains incomplete without a further discussion of the quantity of work and client responsiveness. The next section of the chapter discusses the possibility that the results from the village study can be combined with the results from the study of

Table 2.5 : The Determinants of FPHA Case Records Performance:
 All Variables - standardized coefficients,
 t - statistics (N=122) and significance.

Variable Name	Coefficient	t-statistic SE	Significance
Headquarters Posting	-.10	-1.05	.30
Total Quantity Supervisor	-.18	-.67	.51
Joint Fieldwork	.07	.74	.46
Purpose Supv.'s Visit	.12	1.32	.19
Freedom to talk to Supervisor	.15	1.53	.13
Shared Goal Emphasis	.24	2.44	.02
Supervisor's Case Emphasis	.19	1.91	.06
Quantity of Supervisors Squared	.18	.67	.50
Suitability	.28	1.84	.07
Duration of Designation	.29	1.19	.24
Radical Change Orientation	-.01	-.14	.89
Suitability times Duration Interaction	.14	-.47	.64
Importance of Follow-up	.07	.88	.38
Involvement Previous Adopters in Motivation Work	.14	1.52	.11
Involvement Others Locating Clients	.09	1.04	.30

$R^2 = .28$

Sig. = .002

FPHA performance to provide a more complete view of the extent to which family planning interventions can independently induce increases in the level of contraceptive use.

Combining the Analysis of FPHA Performance with the Village Analysis:

A general model of the determinants of family planning worker performance was developed at the beginning of the present chapter. We established that of the six major determinants of worker performance, all three which can be estimated from our worker data have a measurable influence on performance. Missing from that analysis is any discussion of the importance of the two types of variables which cannot be measured from the worker interviews -- but can be from other sources -- the quantity of work performed by the FPHA and the receptivity of the village population. These determinants can, however, be measured at the level of the village. In Part A we showed that both the amount of work as measured by visit and the receptivity of the village population as measured by literacy had a significant and independent influence on acceptance. Thus, by analyzing data from two levels in the family planning system we have established the general empirical validity of a model which includes both sets of influences. Missing, however, is a unified empirical investigation of the system there as a whole.

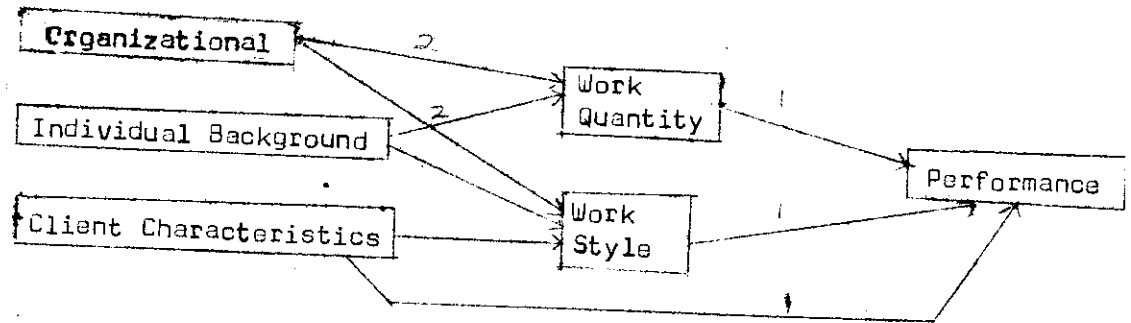
The purpose of this section is to explore the possibility of combining the results from Part A and the first part of this chapter to get a unified estimation of the determinants of acceptance. A complete analysis would assume either 1) that we had an adequate measure of Work Quantity and Client Responsiveness that could be merged into the FPHA data

set or 2) that Work could be measured at the village level and its determinants from the set of influences in the FPHA set be established.

Our empirical efforts in this direction are complicated by the difficulty of establishing reliable empirical measures at either the FPHA level or the village level from data collected at the other. The measure of family planning acceptance at the village level, for example, can be aggregated to the FPHA area (we sampled four villages in each FPHA area), but since FPHAs have responsibility for about 20 - 30 villages and since we only interviewed a small proportion of households in any village, the reliability of our estimate of FPHA performance taken from the client interviews is low. We also unfortunately have interviews with only nineteen out of thirty possible FPHAs whose work areas fall within the client sample.

Tentative results from two kinds of empirical test can be reported. First we have merged our data sets so that the village level variables can be aggregated to create a new set of FPHA variables. For example, the amount of Work done by the FPHA can be measured by the mean of the variable Visit for the four villages in a given FPHA area. The other village level variables can be similarly aggregated. Then by regressing the level of worker performance on an appropriate combined set of FPHA variables and aggregated village variables (Part A), we can test some of the relationships suggested by the theoretical material presented at the beginning of this chapter. Specifically we can test to see 1) if performance can be explained by the combined influence of the client characteristics, work style, and work quantity, and 2) if work quantity

in turn can be explained by a combination of organizational variables and individual background. The two possibilities are diagrammed as follows:



When we use the case record measure of performance to test the determinants of performance the results support the influence of work style as measured by Involvement of Others in Locating Client Characteristics as measured by Literacy, but not the direct effect of work quantity.

Perhaps due to the small sample size, the regression is not highly significant. Among the variables tested, the work style variable is the most significant, but this result may be in part due to the fact that the level of aggregation is the same for that variable and the dependent variable. The literacy measure is also suggestively strong, but the hypothesized relationship between work quantity and performance is not confirmed.

To test the relationships between Work Quantity and Organizational Variables and Individual Background, we regressed work quantity on Duration of Designation and Suitability from the Individual Background set and Number of Supervisors and Shared Goal Emphasis from the Organizational set. The results are again weak. (see Tables 2.6 and 2.7).

Table 2.6 : The Determinants of Performance from the Combined Village and FPHA Data - Regression Coefficients and Standard Errors

Dependent Variable	Independent Variable				R ²	Sig.
	constant	Aggregated Visit	Aggregated Literacy	Involvement of Others		
Case Record Performance	-7.09	.056	.45	.84	.23	.25
	(7.83)	(.25)	(.31)	(.65)		

Table 2.7 : The Determinants of Work Quantity*, from the Combined FPHA and Village Data

Variable Name	Coefficient	Standard Errors
constant	11.30	3.80
Duration of Designation	-0.019	0.042
Suitability	0.12	0.47
Number of Supervisors	2.58	1.47
Shared Goal Emphasis	-5.90	2.36
	R ² = .35	Sig. = .17
		N = 19

*as measured by Visit

Table 2.8 : The Determinants of Visit

Variable Name	Type	Coefficient	SE	Sig.
constant		11.25	3.69	.003
Duration of Designation	Background	-.003	.05	.95
Goal Emphasis Shared	Organizational	-5.14	2.77	.07
Number of Supervisors	Organizational	2.87	1.61	.08
Joint Fieldwork	Organizational	-.17	.27	.54

The organizational variables seem to be much more important than the individual background variables, but the regression as a whole is not significant.

An alternative approach is to examine the possibility that, at the village level, the quantity of work, as measured by the proportion of male respondents in a village reporting family planning visits, is explained by a set of organizational and individual background variables ignored by the model presented in Part A. The test can only be made for those seventy-six villages which have matching data from interviews with the FPFA. Table 2.8 presents the results. As will be seen, they also are weak. The organizational variables in general give the highest level of explanation, but individually and as a group they are not able to explain a large proportion of the variance in Visit. Thus the results in Part A are not greatly extended by the exercise of combining the village and FPFA data.

The results of this section are suggestive but inconclusive. Both the worker level and the village level analysis suggest that the missing variables in each of the systems may be important, but data limitations leave the results incomplete. Future research may correct this situation.

The Determinants of Performance for the Female Field Staff:

An analysis of the determinants of performance similar to that described above for the FPFA's was conducted for both the ANM's and the FW's. The results were, however, considerably less interesting. For the ANM only one variable from each of the three subsets was selected.

The variables selected were different than those chosen for the FPHAs. Among the organizational variables, teamwork was the most significantly related to performance; from among the background variables the worker's motivation in taking the job was selected and from the work style variables the ability to give medical help other than family planning or MCH was chosen. These three variables seem to highlight the very different role of the female workers with their emphasis on medical assistance. The overall level of explanation of the regression is less than that for workers. Even with all variables included the ANM regression is less significant than that for the FPHA's. For the FWU's the results are even less encouraging. A preliminary examination of the data suggested that the training status of the FWU's was systematically interrelated with a number of other potential explanatory variables. The study of the trained and untrained FWU's separately leaves relatively small numbers in each category. The regressions for these groups suggest that our variable list is unable to explain a significant amount of the variation in performance for FWU's.

Why the levels of explanation for female staff should be less than those for males is unclear. Most of the ANM's and FWU's have jobs which give them legitimate alternatives to family planning, and this study has concentrated on performance in the area of family planning rather than maternal and child health. Whatever the reasons the variations in performance are not well explained by the kinds of variables we have examined in this chapter.

B. Variations in the Performance of the PHC

The previous section has described some of the determinants of family planning worker performance. Ultimately, we are concerned not only with the performance of the individual worker, but with the performance of the entire organizational unit in which that worker functions. Characteristics of a PHC such as the quality and the quantity of supervision or the remoteness of a PHC affect all of the field staff of a given PHC, and thus we would expect these variables to have their impact on the overall level of performance of the PHC more than on the relative performance of individuals within the PHC. As indicated in Chapter IV, (of "Organization for Change" book), our sampling scheme was designed in such a way as to maximize the variance of PHC performance (measured by the number of IUD and sterilization acceptors per thousand population per year) in the data set which emerged from our field work. However, no sampling scheme could get around the basic fact that performance in all Allahabad Division was relatively weak during the time period under observation. From information available to us before the initiation of the study we were aware that we would observe few if any units performing at high standards in national terms. It was, however, our expectation that we would observe moderate variation in family planning performance among the organizational units of the Division and that this variation could be explained in part by the organizational characteristics of the PHCs in the sample.

The set of relationships which determines the performance of the PHC if anything more complex than the factors which determine acceptance

at the level of the village or performance for the individual workers. We can begin by assuming that the number of acceptors generated by a PHC is a function of the quantity of work undertaken by the PHC staff, by the work style of the staff in contact with the village population, by the work quantity and work style of other government workers operating in the area and by the nature of the client population in a given PHC area. Each of these variables is in turn influenced by other factors. A schematic representation of the relationships determining PHC performance is given in Figure 2.2

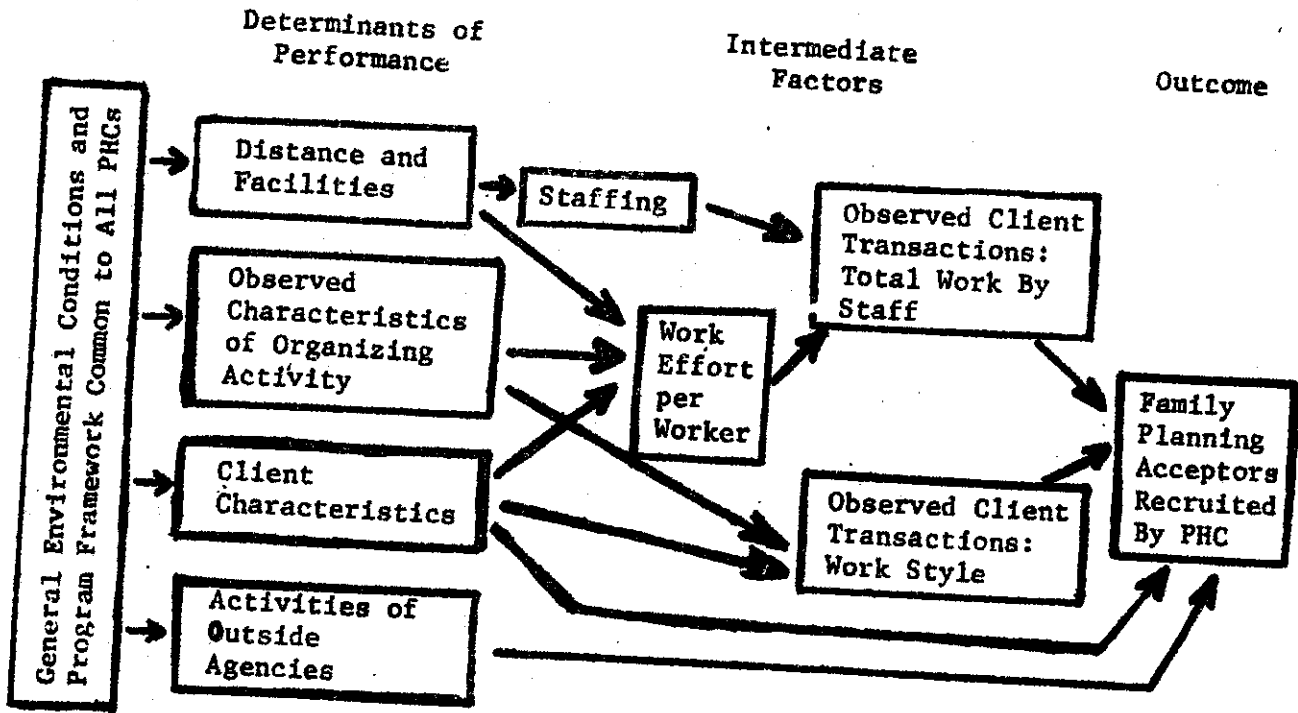
The quantity of work performed by the staff will depend on the number of staff members and the amount of effort expended per worker. The number of staff is related to the remoteness and facilities of the PHC as we have seen in Chapter IX (of "Organization for Change" book), but work effort per worker is a variable which while crucial is exceedingly difficult to measure and as emphasized earlier we remain unsatisfied with the measures we have been able to develop on the basis of the PHC interviews. Thus, our empirical investigation is lacking a key element in the measure of work quantity. If work effort could have been measured we would have expected it to be related to the quantity and quality of supervision, the background, training and degree of commitment of the staff members concerned, the esprit de corps of the staff, etc. In an empirical investigation, some of these measures may serve as proxies for the unobserved degree of effort.

Not only do we lack a measure of work effort, but our measures of the size of staff has the disadvantage that there is too little variation

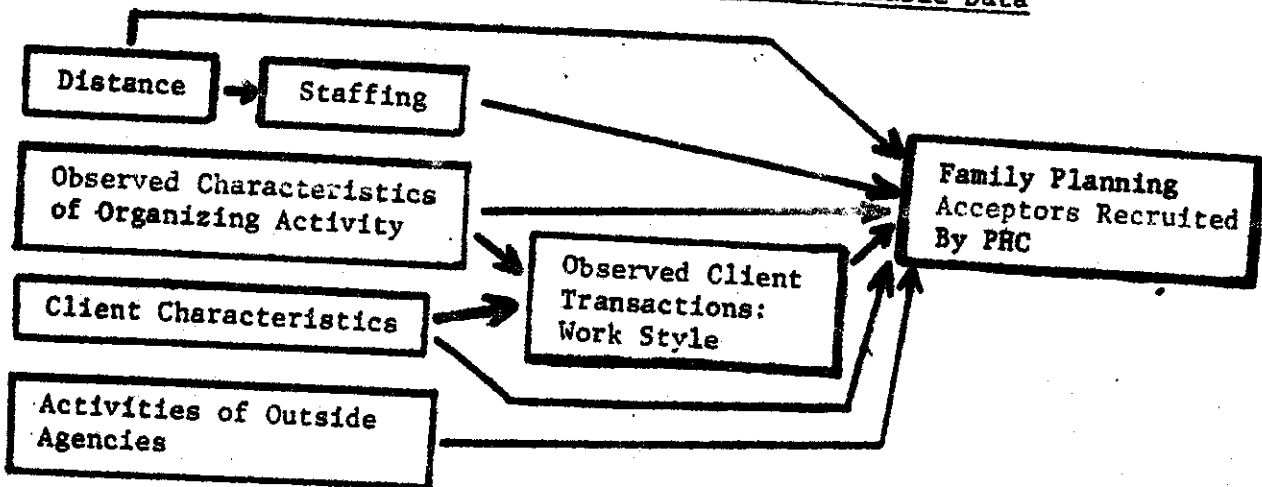
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Figure 2.2 : The Determinants of PHC Performance

Panel A: The Full Model



Panel B: The Empirical Model with Available Data



across PHCs for some designations to test adequately for the importance of numbers in determining performance. It was clear of course that to the extent the PHCs in the Division shared a common staffing pattern and thus have the same amount of staff time available for conducting their family planning activities, that there would be little variation in performance that could be expected from this source, but we knew before hand that many of the primary health centers suffered from understaffing, especially in the ranks of the female staff, and we anticipated that there would be sufficient variation in staffing patterns to permit a test of the role of the staff quantity on performance. Our field work revealed that there was indeed a considerable variation in the number of female staff, but there was little long term understaffing of FPHAs. We hypothesize that the number of staff positions filled would be related inversely both to the distance of the primary health center from the nearest urban center and to the quality of the facilities at the PHC. In our empirical model as shown in Panel B of Figure 2.2, we then hypothesize that the quantity of the staff combined with the organizational characteristics of the primary health center would together substitute for a more adequate measure of work quantity in determining the level of performance. In terms of organizational characteristics, we stress variables such as quantity supervision, the degree to which goals are shared with supervisor and other variables measuring the nature of the work environment. Many of these variables are analogous to the variables defined at the level of the individual worker. In fact, our original intention was to define many of the variables in terms of the mean scores of the workers of the primary health center.

Work style has been discussed in the section on the individual worker. In our empirical work we have tended to assume that work style has a direct effect on performance but is itself determined in part by the observed characteristics of organizing activity and the nature of the client population.

The work of outside agencies is very important both because government workers from agencies other than family planning have brought a substantial number of the cases and because their activity in a given PHC area has substantially affected the work of the family planning staff itself. In our empirical work we have tried to take these activities into account by adjusting the output measure to account for cases attributed to non family planning workers in the case records. Unfortunately we do not have a direct measure of the quantity of work undertaken by lekh-pals or village level workers, but we can also examine the reports these workers themselves give of the emphasis given to family planning by their supervisors in the development and revenue departments.

Client characteristics are important determinants of the performance of PHC staff. We have used the level of literacy as a proxy for socio-economic status. Other client characteristics such as the degree of hostility to the family planning program have been measured only for those PHCs in the client sample.

To summarize then, the empirical model differs in many respects from the variable which we could test with adequate sources of information. We do not have any acceptable measure of the quantity of work for the full range of PHC's; staffing does not vary greatly for some

important designations; and variables measuring both client characteristics and the quantity of activity by outside agencies are not as adequate as we might like.

The findings of the analysis of data at the level of the primary health center are not as strong as one would like. It is clear that the distance of the PHC from the nearest urban center and the quality of the facilities has some influence on the success of the primary health center in recruiting staff, especially female staff. There is a correlation of .47 between the total number of female field staff and the degree of remoteness of a PHC. The hypothesis that staffing should be directly related to PHC performance is borne out for the female staff but not for the males. The following regression equations indicate the strength of the relationship. An additional female staff member could be expected to recruit an additional ten users of female methods per two year period. Even for the female workers, however, the relationship is not exceptionally strong.

- 1) IUD + Tubectomy Acceptors = 35.29 + 10.02 (ANM + FWW) $R^2 = .16$
 $t=1.22$ ($t=2.81$)
- 2) Vasectomy Acceptors = 47.7 + .59(FPHA) $R^2 = .00$
 $t=2.59$ ($t=0.12$)

For both the observed characteristics of organizing activity and the work style variables we used the mean values of the individual worker variables within each PHC as aggregate indices. For example we developed an aggregate measure of the quantity of supervision by taking the average number of hours of supervision reported by the field staff in each PHC. None of the observed characteristics of organizing activity are directly

related to the number of family planning acceptors recruited by a PHC. This result may derive from the lack of an adequate measure of worker effort, but no measure of organizing activity has a statistically significant relationship on performance.

Among the work style variables the best prediction of performance at the aggregate level is the importance of follow-up as reported by the field staff. This result held for both male and female staff as well as for the PHC as a whole. The correlation between the total number of new cases recruited by the PHC and the emphasis given to follow-up is .30. A number of other measures of work style are related to performance in the hypothesized direction but not at statistically significant levels. Work style is in turn affected by the level of literacy in the population, but the levels of association are small. Work style is also related to the observed characteristics of organizing activity.

The degree of activity of outside agencies has a strong effect on performance. The correlation between the reported degree of emphasis put on family planning by the supervisors of interviewed VLWs and lekhpals of a given PHC and the total number of cases brought is .53. This relationship is positive for all family planning methods, but seems for reasons unexplained to be strongest for female methods.

To summarize, all of the variable sets of the model have a distinct relationship with performance except for the variables measuring organizing which are only indirectly related. But the levels of explanation are not very high. Table 2.9 presents the results from a set of regression which attempt to summarize the empirical determinants of performance.

Results are presented separately for vasectomies brought by PHC staff, for vasectomies brought by non-PHC staff, for users of female methods and for all acceptors. The most salient feature of the table is the consistent importance of activities by outside agencies. These activities do not significantly affect the number of cases brought by PHC staff, but they do affect all other measures of performance. Staffing is also important for the recruitment of female adopters and emphasis in follow-up seems to influence the success of PHC staff in recruiting men to use vasectomy. The central finding however is the reaffirmation of the central role of outside agencies in determining the success of the PHC program.

One possible conclusion might be that the analytical framework we have adopted is unsupported by the data and thus should be entirely rejected. There are reasons, however, for thinking that the results bear closer examination. First, we have not been fully successful in our attempts to measure either performance or the factors which help to determine variations in performance. As mentioned in Chapter IV (of "Organization for Change" book) there are numerous problems in the measurement of performance, and variables such as work effort are even more difficult to measure properly. Second, the observed variations in performance or in the explanatory variables may be so small that random factors tend to dominate the hypothesized systematic determinants of performance. It is certainly true, for example, that the variation in the size of the male staff in the PHCs is less than would be optimal for a test of the influence of staff size on performance. Third, even if the negative results are not the result of measurement problems they are of

importance since they suggest that the organizational qualities which are required for performance were so lacking in the family planning program in this region of India during this period of observation that performance is determined by factors which are random. Certainly, all of these explanations may play some role in explaining our inability to explain performance, but the last point deserves special emphasis. In well functioning organizations, whether they be directed towards the delivery of family planning services or other productive ends, there should be a relationship between both the human and physical resources which are used by the program and the way they are organized and the success it has in achieving its goals. The fact that the family planning program in rural Allahabad Division demonstrates such a lack of these expected relationships suggests that either the goals which are stated to be the objects of family planning activity are not in fact taken seriously by most of the staff in the primary health centers or that the leadership and field workers of the PHC are not able to organize themselves to accomplish accepted goals in any degree. Both interpretations suggest a need for much more detailed analysis of what it is which determines the weak organizational structure at the level of the primary health center. We have observed in Chapters VII (of Organization for Change) and Part A of this paper that the degree of exposure that an individual or village has to family planning is related to the probability that they will accept family planning services or have a high degree of hostility towards the family planning program. Thus there is some basic reason to believe that family planning extension activities can generate acceptance of contraception, yet in this section we observe that the size of

the staff has little association with the actual number of contraceptive users generated by the program. That basically confirms the impression already emphasized in earlier chapters that the program is not making use of the full amount of work which is potentially available to it. What are the organizational factors which lead to this inability to match potential with accomplishment? The problem of work style, work quantity, recruitment, leadership and relationships with outside agencies have been discussed in earlier chapters of this section. Many of these problems have their origin in turn in the organizing activities of the district and the state. These are the kinds of questions which will be addressed more fully in Part IV of the "Organization for Change" report.

C. Summary and Conclusion

In Part A of this paper and in the previous sections of this part, we have outlined the elements of a systems view of the determinants of family planning acceptance. At the level of the village, we have seen that village communities vary in their responsiveness to family planning services and that much of this variation can be explained by a combination of the effects of the basic social characteristics of the village such as literacy and the amount of extension work undertaken in the village in the form of visits. At the level of the male family planning worker we find that the variations in performance among individual workers can be explained by a combination of factors, but the characteristics of the organization and the individual background of the worker tend to be the key factors. The variations in work style that we have been able to measure have a relatively small influence on individual worker performance.

It is clear however that there are missing variables in the equation estimating the determinants of individual worker performance. The quantity of work undertaken by the individual worker and the social and economic characteristics of the population for which the worker is responsible are not estimable on the basis of data from the interviews with workers. Thus we have attempted in the last part of the discussion of FPHA performance, to reestimate a truncated version of the equation estimating the determinants of individual worker performance which includes the missing variables as well.

What are the conclusions that we can draw from this analysis? To begin, while it is apparent that these rural areas of Uttar Pradesh are not performing well in the area of family planning, it is also clear that variations in acceptance rates across villages and across FPHA working areas are associated with variations in the level of family planning activity.

Equally important, the amount of work that is performed by individual family planning workers seems to be strongly related to organizational variables. This relationship is weakly confirmed by the analysis of the combined village and FPHA data statistics and is suggested also by the strong relationship between acceptance and organizational variables in the earlier analysis of FPHA performance where the quantity of work is unmeasured. The determinants of organizational behaviour is a subject beyond the scope of this chapter, but on the basis of the discussion in Part IV(of "Organization for Change" manuscript), we can report that the characteristics of the organization are greatly affected

by factors outside of the PHC, in other organizations and at the level of the district and state.

A methodological comment is also in order. Much of this analysis is limited by our inability to measure key theoretical variables or to obtain sufficient variation in our measures. The absence of a good measure of the quantity of work is the best example but there are many others. These problems would suggest the need for more research with a better sample including a more diverse population, with some effort to redefine variables to make them more operationable and perhaps with a resort to more use of techniques such as participant observation to supplement the survey methods we have emphasized. Many of these problems reflect the inevitable weakness of non-experimental methods, but we are yet to be convinced that true experiments are feasible.

General Conclusions

From all of this we are prepared to draw the following conclusions. First, the socioeconomic conditions that are often cited as a barrier to fertility reduction operate in three ways. They directly affect the response of the population to the program; they affect the willingness of the government staff to work in a given area; and our analysis of organizational problems at higher levels suggests that they also operate to reduce the effectiveness of any program that intervenes and seeks to influence individuals to use contraception. Thus the general conditions of poverty and poor communication encourage workers to produce less effectively than might be considered optimal.

Second, while the supply of contraceptive services may be a necessary condition for the reduction of fertility, there are important organizational factors which mediate the effectiveness of any given supply effort. The prevailing work habits, the pattern of supervision, the criteria used to recruit family planning workers all affect the number of family planning cases that can be recruited. These variables are to a limited extent under the control of the family planning organizations. Consequently, it is possible to argue that changing the conditions under which contraceptive services are supplied will increase output, but since the effectiveness of the family planning workers is also affected by prevailing conditions of poverty, government authorities have only a limited range of choice in their efforts to improve and expand the performance of their organization. Thus, the prevailing socio-economic conditions are a constraint to be recognized in any effort to intervene to affect fertility. The empirical results do suggest, however, that current interventions are having some effect and that decisions under the control of the responsible authorities might help to increase their magnitude.

In this part and Part A, we have emphasized conclusions that can be drawn by examining the variations in contraceptive acceptance across villages or FPHA areas and their measured association with variations in a range of independent variables. Since the data is not experimental, there is no control on the variance of either the independent or the dependent variables. There are undoubtedly factors which do not vary which affect all of the units of observation. All of the villages

selected, for example, are poor by international standards. The people who inhabit them are not used to the range of choices in life style which might be possible for a Western European. Thus, they may all share in a feeling that fertility, for better or worse, is not a subject of choice. Similarly, all of the PHCs that we visited were part of an administrative structure which dictates a general approach to family planning. Rules have been established for the selection of workers and for their rewards and punishments. The general pattern of staffing and of supervision are decided by the state. The kind of training which workers receive is common. Changes in these rules on a regional basis may have more impact on family planning acceptance than would changes in the type of variable dealt with in the bulk of this paper. The potential impact of these basic changes was illustrated by the relative success of the short lived massive vasectomy camps with their incentive approach to both the government staff and the client. Consequently our empirical results understate the potential gains from a careful examination of the organizational factors which affect the performance of the family planning program in Allahabad Division.

We conclude then that in some sense neither the school of thought which argues that the basic social and economic conditions are the primary determinants of fertility reduction nor the school that argues that the supply of contraceptive services is the key is vindicated by our data on the determinants of family planning acceptance in rural Uttar Pradesh. Rather the data seem to show that the actual determinants are exceedingly complex. Both the inputs into the family planning program and the general

environment into which they are introduced help to determine the response, but both are greatly affected by the manner in which the interventions are organized and implemented.
