

Systems Effects on Family Planning Innovativeness

I. INTRODUCTION

1. Distinctiveness of the Present Study

Analysis of data pertaining to family planning behavior conventionally is confined primarily to analysis of individual characteristics associated with such behavior. The focus on the individual as the unit of analysis results from an assumption commonly held in behavioral science research that since the individual is the unit of response, he must perforce be the unit of analysis as well.¹⁾ The fact is that an individual is inevitably a member of a group of one kind or another and does not exist in isolation. His thoughts, attitudes, and actions are interwoven with those of other individuals in a community. A full understanding of his behavior, be it family planning or otherwise, must therefore include analysis from the perspective of the larger context in which he interacts.

In recent years, some social scientists have shown that various techniques of data gathering, problem conceptualization, measurement, and data analysis can be utilized to provide a focus on the relational aspects of individuals within a group rather than on the individuals *per se*.

However, few studies have attempted to predict the fertility or family planning behavior of individuals or couples by taking community characteristics into account. Basically, however, the theories of behavioral change in family planning have not included the "community" in which individual is lodged as a possible source of influence on such behavior. This deal with the relational aspects of individuals in a

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1) Coleman, J., "Relational Analysis: The Study of Social Organizations with Survey Methods." *Human Organization*, Vol. 17, No. 4, 1958, p. 28-36.

group and, as such, have theoretically a status as an intervening variable between the community and the individual. Our basic assumption is, therefore, that community-level variables influence individual family planning behavior. The present study should provide some insight on this premise.

2. Past Studies of the Impact of Community-Level Variables on Fertility Behavior

Several empirical studies have attempted to predict the fertility behavior of individuals or couples by taking community variables into account. So far, however, the findings are only suggestive at best. Further research is badly needed to develop this important new direction in family planning and fertility research.

Many research have found that formal education is negatively related to fertility and positively related to contraceptive practice at individual level. But fertility behavior appears to be affected also by the overall educational level of others in the community that the reproductive behavior of a couple is affected by both their personal characteristics and social context in which they live and especially by some interaction between the individual and group characteristics.²⁾

Anker³⁾ examined the relationship between the place of residence and reproductive behavior in households of rural India. His hypothesis was that couples in more developed villages would prefer smaller families. To measure the level of village development, a system variable, he considered the availability of domestic electricity, the type of approach road leading to the village, the availability of water taps outside village houses, and the number of college graduates living in the village. The villages were then grouped into three categories according to these system-level characteristics: least developed, middle developed, and highly developed. He found that the level of village development had a strong independent effect on such individual-level variables as family size preference and family planning acceptance. The level of village development was related positively to acceptance of family planning and negatively to family size preference.

Other studies by Duncan (1964) and Rhodes (1971) are relevant to effects of community-level variables on individual fertility. Duncan examined the effects of residential area (whether urban or rural) along with socio-economic characteristics of the individual couple. Rhodes' study was concerned with a comparison of the relationship between fertility and individual and census tract characteristics. Both studies

2) Freedman, R., *Community-level Data in Fertility Survey*, WFS Occasional Paper, No. 8, 1974.

3) Anker, R.B., *Socio-economic Determinants of Reproductive Behavior in Households of Rural Gujarat, India*, Ph.D. Thesis, the University of Michigan, 1973.

demonstrated that the education of the individual couple and the overall educational level of the census tract in which they lived were related to their individual fertility. Srikantan (1967) investigated the effects of the reproductive behavior of neighborhoods in Taichung, Taiwan on that of the individual residents living in those neighborhoods. He demonstrated independent effects of "environmental" and "individual" factors in explaining individual characteristics relating to family planning attitudes and behavior.

The studies I have mentioned so far differ from each other in their nature, design and method of analysis. However, their findings on the importance of community effects on the dependent variables are fairly consistent. They support the view that community effects may be as important in explaining individual innovativeness as individual characteristics.

II. OBJECTIVES OF THE PRESENT STUDY

The principle aim of the present study is to explore with data from Korea the importance of community-level variables in explaining family planning adoption at the individual level. An open system concept (Miller, 1965; Katz and Kahn, 1966; Von Beertalanffy, 1968) is applied, and, therefore, it is assumed that individual family planning behavior is influenced by environmental factors as well as by individual factors. The environmental factors in this study are measured at the village level and are designated as community characteristics. A new dimension that is introduced in this study is what we refer to as the communication network variables. Each individual is characterized in terms of the degree of her involvement, in family planning communication with others in her village. Our assumption is that the nature of the communication network linking individuals with each other affects family planning adoption at the individual level.

Our specific objectives are as follows:

1. To determine the relative importance of the specific independent variables in explaining family planning adoption.
2. To determine the relative importance of the community-level variables in comparison with the individual-level variables in explaining family planning adoption at the individual level. In short, to answer the question: are there any system effects on family planning adoption at the individual level?

III. DATA AND VARIABLES

1. Data

The data used in this study were originally gathered in 1973 in a research project on Korea's mothers' clubs,⁴⁾ conducted by the School of Public Health, Seoul National University. A total of 1,047 respondents was interviewed, comprising all married women in 25 sample villages having mothers' clubs.⁵⁾

2. Variables

A. The Dependent Variables

The dependent variable in the present study is family planning adoption behavior, defined as current use of any of the modern methods of family planning, including the condom, IUD, oral pill, sterilization, injection, foam tablet, jelly and diaphragm.

Each respondent in the present study sample is classified as either "practicing" or "not practicing" any of the methods listed.

B. The Independent Variables

The independent variables in the present study are defined at three levels: individual, community, and at a level intermediate between them involving communicating links between individuals.

1) Individual-level independent variables

We include in the present study 25 independent variables at the individual level. They are grouped under four categories: (1) Demographic variables, (2) Family planning and birth control variables, (3) Family planning communication variables, and (4) Socio-cultural variables. As is apparent from the list

4) This study was conducted by Dr. H.J. Park and others with support from the Asia Foundation. Preliminary results have been reported in Park and others (1974).

5) In 1968, village womens' clubs were reorganized into a nationwide system of family planning mothers' clubs, aimed at promoting the acceptance of contraception among rural women. In addition to their function in promoting information and communication regarding family planning, many of the clubs sponsor community development projects and activities designed to improve general health and welfare, and in the process help to enhance the role of women in the rapidly changing Korean society. The clubs thus make use of existing patterns of interpersonal communication and local leadership to improve the national family planning program. By 1973, there were about 22,500 such clubs in villages throughout the country. Further details may be found in Park and others (1974) and Kincaid (1974).

below, these variables related to various characteristics of the individuals.

2) Community-level independent variables

Community-level variables characterize the community in which the individuals are located. In this study, there are two general types of system variables: aggregate and global variables. Each type is described below.

a. Aggregate variables

One way to characterize a community is to get an aggregate measure of a given characteristics over all individuals in the community and use the mean to represent the community as a whole. Since for each community we can get an aggregate measure on each of the 25 individual characteristics listed above as "individual-level" independent variables, we have also 25 aggregate community-level variables to work with in this study. We would be characterizing a given individual in terms of her particular unique value with respect to each of the 25 individual characteristics and in terms of a mean value which she would share with all others in the same community with respect also to each of the 25 characteristics. The shared mean values would represent the environment which is common to each individual member of a given community.

b. Global variables

Global variables are characteristics of the community as a whole with no individual-level analogues. They are thus measured independently of the individuals who comprise the membership of the communities concerned. Communities, for example, could presumably be classified according to degree of modernization using several criteria. This is not done in this study due to lack of data along these lines.

The variables measured at the community level and designated here as global variables are the following:

- (1) Activeness of Mothers' Club
- (2) Mothers' Club leader's contraceptive behavior
- (3) Accessibility of family planning

C. Intermediate Level Independent Variables

Aspects of communication network that characterize the ways in which the individual members of the community intermediate with each other are taken as the intermediate level independent variables in this study. They are viewed as intervening between the set of variables that characterize the individual or the community and individual innovativeness in family planning.

Two aspects of the communication network will be measured: (a) connectedness and (b) in-

tegrativeness. Both are based on individual responses to the question: "With whom in this village have you discussed family planning mostly?" A communication link is defined to exist between the respondent and any individual mentioned in response to this question.

1) Connectedness

Connectedness is defined as the amount of communication links a given individual has with other members of the village and, as such, is intended to measure the scope of her communication network.

2) Integrativeness

Integrativeness is defined as the degree to which a given individual's communicatees are linked to each other and, as such, is intended to measure the strength of her communication network.

IV. RELATIVE IMPORTANCE OF INDIVIDUAL AND COMMUNITY-LEVEL VARIABLES

Two different techniques are used to evaluate the relative importance of these independent variables: (1) *zero-order correlation of each of the 60 independent variables (25 individual-level independent variables and 35 system-level independent variables) against the dependent variables, and (2) step-wise regression analysis using all 60 variables and using only the 29 selected variables (14 individual-level variables and 15 system-level variables).* The interpretation of the results from the application of these techniques is based on a determination of statistical significance at the 5 percent level. In the tables summarizing the data, statistical significance is shown at both the 1 percent and the 5 percent levels. The zero-order correlation coefficients and the step-wise regression analysis applied on the complete set of variables (60) are used to reduce the number of variables for subsequent analysis as well as to evaluate the relative importance of the two types of variables (individual and community-level variables). The criteria used to assess the relative importance of one set of variables against the other are presented as we discuss the results from the application of each technique.

1. Zero-order Correlation Analysis

Zero-order correlation coefficients were computed for 25 individual-level variables and 35 community-level variables against the dependent variables of family planning adoption. Of the 35 system-level variables, 10 are "global" variables in the sense that they are village-level characteristics with no individual-level analogues and 25 are "aggregate" variables based on the 25 individual-level variables aggregated across all individuals in each village.

The results of the computation are summarized in Table 1. Not only are more of the correlation coefficients for the individual-level variables found to be statistically significant (16 or 25), but also the coefficients themselves, though generally low, tend to be higher for the former than the latter. The weakness of the relationship between the community-level variables and the dependent variables is surprising, though it is confirmed in subsequent analysis to follow. The global variables are particularly weak, with only one of the 10 showing statistical significance.

The following individual variables have the highest correlation coefficients: Husband-Wife communication on Family Planning ($r = .362$), Family Planning Field Worker Contact Index ($r = .264$), Number of Living Sons ($r = .211$), Husband-Wife Communication on Number of Children ($r = .204$), Membership in Mothers' Club ($r = .190$), and Family Planning Knowledge Index ($r = .170$). These six individual-level variables have coefficients higher than any of the community-level variables.

At the community-level, the highest correlation is demonstrated by the aggregate variable, Husband-Wife Communication on Family Planning ($r = .161$), the same variable taken at the individual level that has the highest correlation of all the variables considered. The other community-level variables worthy of attention are: Husband-Wife Communication on Number of Children ($r = .141$), Wife's Education ($r = .114$), Husband's Occupation ($r = .111$), Family Planning Mass Communication Exposure Index ($r = .110$), Ideal Number of Sons ($r = .108$), Ideal Number of Children ($r = .086$), and Family Planning Knowledge Index ($r = .082$). These are all statistically significant at the 1 percent level. The one global variable that shows a statistically significant correlation is Mothers' Club Leader's Contraceptive Behavior ($r = .090$). Though statistically significant, the correlation coefficient itself is very low. Only five individual characteristics have correlation coefficients that are statistically significant at the 1 percent level both as an individual and an aggregated variable: Family Planning Knowledge Index, Husband-Wife Communication on Number of Children, Husband-Wife Communication on Family Planning, Family Planning Mass Communication Exposure Index, and Wife's Education. Many individual-level variables fail to reach significance when aggregated at the system level. The three demographic variables are cases in point; they are all significant at the individual level but not at the aggregate level. On the other hand, some variables are significant at the aggregate level but not at the individual level: Husband's Occupation, Ideal Number of Sons, and Ideal Number of Children.

The weakness of the community-level variables—the global variables, in particular—suggests the possibility that the appropriate community-level characteristics may not have been tapped by the variables that are included in this study. The global variables almost exclusively related to the Mothers' Club. In retrospective, perhaps, such other aspects of the village as proximity to urban centers, prevailing mode of transportation available to the villagers, availability of electricity, etc., that place the villages on some scale

of development and modernization should have been tapped also.⁶⁾

In any event, the indication here and in the rest of the present study, is that the community-level variables, as measured in this study, show only weak relationships with the individual-level dependent variable. What is more, their relationships are substantially weaker than most of the individual-level variables included in the study.

Table 1. Zero-order Correlation with Individual Family Planning Innovativeness (N = 1,003)

Variables	Indi-level Variables	Community-level Variables	
		Aggregate Variables	Global Variables
Demographic Variables			
Respondents' age	.095 **	-.008 NS	—
Number of living sons	.211 **	.014 NS	—
Number of living children	.150 **	.032 NS	—
Family Planning and Birth Control Variables			
Resp's. attitude toward family planning	.099 **	.056 NS	—
Family support index	.022 NS	.074 *	—
Number of induced abortions	.130 **	.080 *	—
Family planning knowledge index	.170 **	.082 **	—
Family Planning Communication Variables			
Husband-wife communication on number of children	.204 **	.141 **	—
Husband-wife communication on family planning	.362 **	.161 **	—
Family planning mass communication exposure index	.160 **	.110 **	—
Family planning field worker contact index	.264 **	.054 NS	—
Family planning rumor index	.075 *	.017 NS	—
Ownership of radio	.083 **	.008 NS	—
Ownership of television	.049 NS	.034 NS	—
Readership of newspaper	.051 NS	.023 NS	—
Exposure to <i>Happy Home</i>	.080 *	.033 NS	—
Readership of magazine	.042 NS	.023 NS	—

⁶⁾ See, for example, Ronald Freedman, "Community-Level Data in Fertility Surveys," *World Fertility Survey Occasional Papers*, No. 8 (May 1974), for a suggestive list of appropriate "global" characteristics that might be included.

Table 1. Continued

Variables	Indi-level Variables	Community-level Variables	
		Aggregate Variables	Global Variables
Socio-Cultural Variables			
Wife's education	.083 **	.114 **	—
Husband's education	.096 **	.071 *	—
Religion	-.002 NS	-.030 NS	—
Husband's occupation	.061 NS	.111 **	—
Membership of Mothers' Club	.190 **	.015 NS	—
Ideal number of sons	.010 NS	-.108 **	←—
Dependency in old age	.058 NS	.067 *	—
Ideal number of children	.012 NS	.086 **	—
Activeness of Mothers' Club			
Activeness of Mothers' Club and of active members	—	—	.003 NS
Attendance rate of meeting	—	—	.002 NS
Operation of credit union	—	—	-.058 NS
Regularity of meeting	—	—	.047 NS
Topics at meeting	—	—	-.003 NS
Supply of contraceptives	—	—	-.002 NS
Record-keeping index	—	—	-.019 NS
Mothers' Club Leader's Contraceptive Behavior			
Mothers' Club Leader's contraceptive behavior	—	—	.090 **
Accessibility of Family Planning Services			
Number of clinics	—	—	.059 NS
Number of drug stores	—	—	.032 NS

* Significant difference from zero at .05 at .062

** Significant difference from zero at .01 is .081

2. Step-wise Regression Analysis

The result of the step-wise regression analysis applied to the 25 individual-level variables is summarized in Table 2. The variable that explains the largest amount of the variance in family planning adoption is Husband-Wife Communication on Family Planning (adjusted $R^2 = .1304$). The adjusted R^2 rises to .1915 through the next four variables: Number of Living Sons, Family Planning Field Worker Contact Index, Wife's Education, and Number of Induced Abortions. After this, the increment is miniscule, if any, and no longer statistically significant.

Step-wise increment through the first five variables is greatest from the first to the second variable (.1637 - .1304 = 3.3 percent of the variance) followed by the increment from the second to the third variable (.1854 - .1637 = 2.17 percent of the variance). Subsequent increments through the fifth variable are much smaller.

The variables that had the highest zero-order correlation coefficients with the dependent variable show up in the step-wise regression analysis as the three best predictor variables, accounting for 18.54 percent of the total variance in the dependent variable: Husband-Wife Communication on Family Planning ($r = .362$), Number of Living Sons ($r = .211$), and Family Planning Field Worker Contact Index ($r = .264$). Also, the five best predictor variables, as shown in the step-wise regression analysis, are all significantly correlated, as we might expect, with the dependent variable in the earlier zero-order correlation analysis.

We can conclude from these results that five variables account for nearly all the variance that can be accounted for by the 25 individual-level variables examined in this study—about 20 percent. The remaining 20 variables add little to the explanatory power contributed by the five variables.

What explanatory power do the community-level variables have? We examined the 25 aggregate variables and the 10 global variables separately in order to assess not only the explanatory power of the community-level variables generally, but also that of each type of community-level variables. Table 3 summarizes the result of the step-wise regression analysis applied to the 25 aggregate variables; and Table 4, to the 10 global variables.

The 25 aggregate variables account for only about 4 percent of the total variance in the dependent variable; the 10 global variables account for even less: less than 2 percent. In fact, the step-wise regression analysis yields results only through 8 of the 25 aggregate variables and 9 of the 10 global variables. The adjusted R^2 are statistically significant only through the first three aggregate variables (adjusted $R^2 = .032$): Husband-Wife Communication on Family Planning, Wife's Education, and Wife's Age. The adjusted R^2 for the global variables are statistically significant only through the first two variables (adjusted $R^2 = .014$): Mothers' Club Leader's Contraceptive Behavior and Number of Clinics. We must concede that statistically

Table 2. Contribution to Variance Explained by Individual-level Independent Variables in Ste-wise Regression (N = 1,003)

Variables	Adjusted		T-level
	R ²	R ²	
Husband-Wife Communication on Family Planning	.1313	.1304	12.300
Number of Sons	.1654	.1637	6.390
Family Planning Field Worker Contact Index	.1879	.1854	5.260
Wife's Education	.1924	.1892	2.375
Number of Induced Abortions	.1956	.1915	1.988
Husband-Wife Communication on Number of Children	.1980	.1931	1.718
Attitude toward Family Planning	.2000	.1945	1.633
Ownership of Television	.2017	.1952	1.378
Ownership of Radio	.2026	.1954	1.253
Membership in Mothers' Club	.2032	.1951	1.441
Family Planning Knowledge Index	.2036	.1947	1.016
Religion	.2039	.1943	.897
Respondent's Age	.2044	.1939	.750
Husband's Occupation	.2048	.1935	.754
Dependency in Old Age	.2051	.1830	.804
Rumor Index	.2054	.1925	.680
Ideal Number of Sons	.2057	.1920	.676
Ideal Number of Children	.2085	.1941	.678
Exposure to <i>Happy Home</i>	.2089	.1936	.571
Family Planning Communication Exposure Index	.2090	.1929	.438
Readership of Magazines	.2092	.1922	.424
Family Support Index	.2093	.1915	.336
Readership of Newspapers	.2093	.1908	.302
Husband's Education	.2093	.1891	.105
Number of Children	.2093	.1899	.187

Table 3. Contribution to Variance Explained by Aggregate Variables in Step-wise Regression

(N = 1,003)

Variables	R ²	Adjusted	
		R ²	T-level
Husband-Wife Communication on Family Planning	.026	.025	5.215
Wife's Education	.031	.029	2.195
Respondent's Age	.035	.032	2.123
Attitude toward Family Planning	.037	.033	1.363
Exposure to <i>Happy Home</i>	.039	.034	1.322
Family Planning Knowledge Index	.040	.034	1.296
Ideal Number of Children	.042	.036	1.515
Religion	.047	.039	1.140

Table 4. Contribution to Variance Explained by Global Variables in Step-wise Regression

(N = 1,003)

Variables	R ²	Adjusted	
		R ²	T-level
Leader's Contraceptive Behavior	.081	.007	2.862
Number of Clinics	.016	.014	2.840
Regularity of Meeting	.019	.016	1.915
Record-Keeping Index	.023	.019	1.819
Number of Drug Stores	.024	.020	1.195
Attendance Rate at Meeting	.025	.018	.754
Supply of Contraceptives	.025	.016	.148
Topics at Meeting	.025	.016	.096
Operation of Credit Union	.025	.016	.110

significant association with these few system-level variables adds little to our analysis in view of the small proportion of the total variance that is explained by these variables.

The results of the step-wise regression analysis confirm our tentative observation made on the basis of the zero-order correlation analysis—namely, that the individual-level variables seem to be much more important than the community-level variables in explaining family planning adoption by individual women in Korean villages.

3. Step-wise Regression Analysis of Selected Variables

In all, 29 independent variable (14 individual-level variables and 15 community-level variables) were selected on the basis of statistically significant at 5 percent level in zero-order correlation, closely correlated with independent variables, and conceptually important, and submitted to the step-wise regression analysis. Table 5 summarizes the result. The 29 variables account for about 20 percent of the total variance in the dependent variables, with the four best predictors accounting for nearly all of it. The adjusted R^2 is statistically significant only through the first four variables: Husband-Wife Communication on Family Planning, Number of Living Sons, Family Planning Field Worker Contact Index, and Wife's Education. Only the last of the above four variables is a community-level variable. In short, the first three variables, which are all individual-level variables, account for 18.5 percent of the variance; the one system-level variable in the first four adds 1.35 percent, giving a cumulative adjusted R^2 of .1985. The increase in adjusted R^2 's beyond the first four fail to reach statistical significance and the step-wise increment after that is very small.

We find a further confirmation here of the greater importance of the individual-level variables in comparison with the community-level variables. The same three individual-level variables—Husband-Wife Communication on Family Planning, Number of Living Sons, and Family Planning Field Worker Contact Index—emerge as the most important variables here as in the earlier analysis where the full contingent of variables was included. As noted, only one community-level variables—Wife's Education (an aggregate variable)—adds anything of significance to the first four individual-level variables.

4. The Role of the Communication Network Variables

Communication network variables are introduced as another set of independent variables in addition to the community-level and individual-level independent variables we have examined so far. Our expectation is that the communication network variables will have explanatory power above and beyond the other independent variables. The main focus of the employment of two communication network variables is to see how much more of the variance in the dependent variable can be explained when the communication network variables are added to the both individual-level and community-level variables.

The 29 selected variables and two communication network variables were subjected to a step-wise regression analysis. The 31 variables account for about 28 percent of the variance, but nearly all of this is accounted for by the first 6 variables: Connectedness, Husband-Wife Communication on Family Planning, Integrativeness, Number of Sons, Wife's Education, and Husband-Wife Communication on Number of

Table 5. Contribution to Variance Explained by All Selected Variables in Step-wise Regression

(N = 1,003)

Variables	Variable*	Adjusted		
	I.D.	R ²	R ²	T-level
Husband-Wife Communication on Family Planning	Ind Va	.1309	.1300	12.28
Number of Sons	Ind Va	.1649	.1633	6.39
Family Planning Field Worker Contact Index	Ind Va	.1874	.1850	5.26
Wife's Education	Agg Va	.2017	.1985	4.22
Respondent's Attitude toward Family Planning	Ind Va	.2046	.2001	1.92
Husband-Wife Communication on Number of Children	Agg Va	.2073	.2025	1.82
Number of Clinics	Glo Va	.2095	.2039	1.68
Mothers' Club Leader's Contraceptive Behavior	Glo Va	.2120	.2056	1.76
Number of Induced Abortions	Ind Va	.2138	.2067	1.51
Husband-Wife Communication on Number of Children	Ind Va	.2155	.2076	1.49
Membership in Mothers' Club	Ind Va	.2169	.2082	1.32
Ownership of Radio	Ind Va	.2080	.2085	1.15
Family Planning Knowledge Index	Agg Va	.2187	.2084	.95
Wife's Education	Ind Va	.2193	.2083	.91
Husband-Wife Communication on Family Planning	Agg Va	.2196	.2078	.63
Family Planning Mass Communication Exposure Index	Agg Va	.2200	.2074	.68
Family Planning Knowledge Index	Ind Va	.2203	.2069	.61
Respondent's Age	Ind Va	.2205	.2062	.48
Family Planning Mass Communication Exposure Index	Ind Va	.2207	.2056	.46
Exposure to <i>Happy Home</i>	Ind Va	.2208	.2049	.36
Rumor Index	Ind Va	.2209	.2042	.35
Ideal Number of Sons	Agg Va	.2210	.2035	.35
Husband's Education	Ind Va	.2210	.2027	.33
Husband's Occupation	Agg Va	.2211	.2020	.27
Regularity of Meeting	Glo Va	.2211	.2012	.22
Dependency in Old Age	Agg Va	.2212	.2004	.22
Operation of Credit Union	Glo Va	.2212	.1996	.15
Husband's Education	Agg Va	.2212	.1988	.12
Number of Induced Abortions	Agg Va	.2212	.1980	.05

* Ind Va = Individual-level independent variable.

Agg Va = Aggregate variable.

Glo Va = Global variable.

Children. These six variables account for 28.84 percent of the variance. The significant point to note is the inclusion of the two communication network variables in the first six variables. Connectedness is the best predictor, explaining by itself as much as 16.15 percent of the variance. Integrativeness follows as the third best predictor, adding 1.53 percent beyond the second best predictor, Husband-Wife Communication on Family Planning.

Four of the 6 best predictors relate to aspects of interpersonal communication: Connectedness Husband-Wife Communication on Family Planning, Integrativeness, and Husband-Wife Communication on Number of Children. Most importantly, however, the two communication network variables and a substantial amount of the total variance explained by the 29 independent variables.

Table 6. Contribution to Variance Explained by Selected Variables After Inclusion of Communication Network Variables in Step-wise Regression (N = 1,003)

Variables	Variable*		Adjusted	
	I.D.	R ²	R ²	T-level
Connectedness	Int Var	.1624	.1615	13.93
Husband-Wife Communication on Family Planning	Ind Var	.2244	.2229	8.94
Integrativeness	Int Var	.2511	.2488	5.97
Number of Sons	Ind Var	.2670	.2641	4.65
Wife's Education	Agg Var	.2820	.2784	4.56
Husband-Wife Communication on Number of Children	Agg Vra	.2863	.2820	2.46
Family Planning Mass Communication Exposure Index	Ind Var	.2886	.2836	1.80
Number of Clinics	Glo Var	.2901	.2844	1.43
Mothers' Club Leader's Contraceptive Behavior	Glo Var	.2927	.2864	1.90
Attitude toward Family Planning	Ind Var	.2937	.2866	1.24
Ownership of Radio	Ind Var	.2946	.2867	1.07
Husband-Wife Communication on Number of Children	Ind Var	.2954	.2868	1.06
Number of Induced Abortions	Ind Var	.2961	.2868	1.01
Dependency in Old Age	Agg Var	.2966	.2867	.88
Husband's Occupation	Agg Var	.2973	.2867	.99
Regularity of Mothers' Club Meeting	Glo Var	.2984	.2871	1.25
Husband-Wife Communication on Family Planning	Agg Var	.2990	.2871	.91
Family Planning Knowledge Index	Ind Var	.2994	.2865	.68
Ideal Number of Sons	Agg Var	.2997	.2862	.68
Husband's Education	Agg Var	.3000	.2858	.69

Table 6. Continued

Variables	Variable*	R ²	Adjusted	T-level
	I.D.		R ²	
Family Planning Field Worker Contact Index	Ind Var	.3003	.2854	.71
Family Planning Mass Communication Exposure Index	Agg Var	.3007	.2850	.69
Wife's Education	Ind Var	.3009	.2845	.45
Operation of Credit Union	Glo Var	.3010	.2838	.37
Membership in Mothers' Club	Ind Var	.3011	.2832	.29
Number of Induced Abortions	Agg Var	.3011	.2825	.24
Rumor Index	Ind Var	.3011	.2818	.21
Family Planning Knowledge Index	Agg Var	.3011	.2811	.18
Respondent's Age	Ind Var	.3012	.2803	.16
Husband's Education	Ind Var	.3012	.2796	.14
Exposure to <i>Happy Home</i>	Ind Var	.3012	.2789	.12

• Ind Var = Individual-level independent variable.
 Agg Var = Aggregate variable.
 Glo Var = Global variable
 Int Var = Intermediate variable

5. Multiple Correlation Analysis

We are now ready to compute several multiple correlation coefficients between three sets of independent variables (individual-level, community-level, and communication network variables) and the dependent variable. Our aim is to compare both the multiple correlation coefficients based on each set of independent variables, the amount of variance explained by each set, and how much more of the variance is explained as we move from the individual-level variables to the community-level variables, and finally the communication network variables. Our expectation, as stated before, is that the addition finally of the communication network variables to our analysis would result in a substantial increase in the amount of variance explained by the study variables. This expectation is based on our theory that interpersonal communication network is an important intervening variable that facilitates family planning adoption by individual of varying characteristics who live in varying environments.

The relevant data, based on these computation, are summarized in Table 7. When all three sets of variables (31 variables in all) are entered into a multiple regression analysis, a multiple correlation coefficient of .5295 is obtained. Altogether, they account for about 28 percent of the total variance. Each set

taken separately, we find that the 14 individual-level variables yields a multiple correlation coefficient of .4370, explaining about 19 percent of the variance; the 15 community-level variables yield a multiple correlation coefficient of only .1590, explaining a meager 2.53 percent of the variance; and the 2 communication network variables yield a multiple correlation coefficient of .441, explaining 19.72 percent of the variance. These comparative figures highlight the strength of both the individual-level and the communication network variables in explaining family planning adoption in Korea.

The addition of the system-level variables in the multiple regression equation based originally only on the individual-level variables, yields an increment of only .72 percent in the amount of variance explained. It goes from 19.10 percent for the individual-level variables alone to 19.82 percent for the individual-level and the system-level variables together. Add to this the two communication network variables, and the proportion of variance explained goes from 19.82 percent to as high as 28.03 percent, an increment of 8.21 percent.

These findings confirm our earlier observations that the individual-level variables are much more important than the community-level variables in explaining family planning adoption in rural Korea. They further show quite convincingly, that the communication network variables are as important as the individual-level variables, and add a substantial amount of independent effect above and beyond both the individual-level variables and the community-level variables taken alone or together.

Table 7. Multiple Correlation Coefficient and Fraction of Explained Variance by Individual-level Independent Variables, System-level Independent Variables and Communication Network Variables (N = 1,003)

Variables	R ²	Adjusted R ²	Multiple Correlation Coefficient	Adjusted Multiple Correlation Coefficient
Individual-level Independent Variables Only	.2031	.1910	.4506	.4370
System-level Independent Variables Only	.0389	.0253	.1972	.1590
Communication Network Variables Only	.1988	.1972	.4459	.4441
Individual- and System-level Variables Together	.2222	.1982	.4714	.4452
Individual-level Variables and Communication Network Variables Together	.2792	.2668	.5284	.5165
System-level Variables and Communication Network Variables Together	.2390	.2266	.4889	.4761
Individual-, and System-level and Communication Network Variables Together	.3033	.2803	.5507	.5295

6. Possible Interaction Effects

We have, so far, examined the effects of the independent variables on the dependent variables as if there were no interactions between any of the independent variables. It is at least possible that the individual-level variables, in particular, might interact with the communication network variables in producing their effects on the dependent variable. We, thus, present here a test of this possibility.

Table 8. Correlations Between the Dependent Variable, Individual's Adoption Behavior, and Selected Individual-level Independent Variables Controlling for Communication Network Variables

Variables	Individual's Family Planning Adoption					
	Integrativeness			Connectedness		
	Low (N=500)	High (N=497)	Z-Value	Low (N=556)	High (N=441)	Z-Value
Respondent's Age	.077	.056	.33	.112	.056	.89
Attitude toward Family Planning	.083	.086	-.05	.116	.006	1.75
Number of Induced Abortions	.138	.110	.44	.085	.099	-.22
Family Planning Knowledge Index	.203	.088	1.95	.100	.101	-.02
Husband-Wife Communication on Number of Children	.228	.155	1.20	.166	.185	-.31
Husband-Wife Communication on Family Planning	.342	.314	.49	.326	.295	.55
Family Planning Communication Exposure Index	.191	.146	.73	.130	.105	.40
Family Planning Field Worker Contact Index	.315	.151	2.76*	.184	.138	.75
Rumor Index	.110	.047	.10	.057	.057	0
Ownership of Radio	.088	.057	.49	.098	.039	.94
Exposure to <i>Happy Home</i>	.136	.040	1.54	.080	.058	.35
Wife's Education	.085	.107	.35	.031	.114	-1.33
Membership in Mothers' Club	.227	.083	2.35*	.135	.061	1.19
Number of Living Sons	.235	.115	2.00*	.191	.179	.20
Husband's Education	.070	.112	-.67	.065	.103	.61

* Statistically significant at the .05 level

We first divided the sample into “low” and “high” on the two communication network variables: Connectedness and Integrativeness.

We then computed zero-order correlation coefficients between each of 15 individual-level variables and the dependent variables within each of the sub-samples: “low” and “high” on Connectedness and on Integrativeness. The data are summarized in Table 8.

A comparison of the correlation coefficients between the “low” and “high” groups with respect Connectedness and Integrativeness, respectively, reveals in general, no major differences between them. Statistically significant differences are found only for three variables when the comparison is between the “low” and “high” groups with respect to Integrativeness: Family Planning Knowledge Index (.208 vs. .151), Membership in Mothers’ Club (.227 vs. .083), and Number of Living Sons (.235 vs. .115). On the basis of these findings, we are probably justified in assuming, as we did, that there are no significant interaction effects between the individual-level variables and the communication network variables. This means that we can accept the interpretations that we have made from the regression analysis which assumed no interaction effects between the independent variables.

V. SUMMARY OF FINDINGS

We can summarize our findings as follows:

1. *More of the individual-level independent variables were significantly correlated with the dependent variables than the community-level variables; and, among those variables with statistically significant correlations, the correlation coefficients were consistently higher for the individual-level variables than for the community-level variables.*

In a zero-order correlation analysis, 16 of the 25 individual-level variables as against 12 of the 25 aggregate variables and only of the 10 global variables were correlated with the dependent variable at the 5 percent level of significance. Most importantly, community-level variables were found to be weak predictors of individual family planning adoption behavior as compared to the individual-level variables.

2. *More of the variance in the dependent variable was explained by individual-level variables than by community-level variables.*

In a step-wise regression analysis, individual-level variables accounted for the greatest amount of

variance in the dependent variable. Five individual-level variables accounted for nearly 20 percent of the total variance. The single most important variable was Husband-Wife Communication on Family Planning, which accounted for as much as 13 percent of the variance. The next four variables, which together increased the amount of variance explained by about 7 percent, were: Number of Living Sons, Family Planning Field Worker Contact Index, Wife's Education, and Number of Induced Abortions.

The 25 aggregate variables and the 10 global variables accounted for only 4 percent and 1.7 percent, respectively, of the variance in the dependent variable. The increment in the adjusted R^2 was statistically significant only through the first three aggregate variables (adjusted $R^2 = .0326$); Husband-Wife Communication on Family Planning, Wife's Education, and Wife's Age. The increment in the adjusted R^2 for the global variables was statistically significant only through the first two variables (adjusted $R^2 = .0141$): Mothers' Club Leader's Contraceptive Behavior and Number of Clinics.

This conclusion was confirmed by the application of step-wise regression analysis to a more limited set of variables chosen on the basis of statistical significance and/or theoretical importance. The selected variables, 29 in all including both individual-level and community-level variables, accounted for about 22 percent of the total variance in the dependent variable. The increase in the adjusted R^2 was statistically significant only through the first 3 individual-level variables and one community-level variables, however.

The first 3 variables, all at the individual-level, accounted for 18.5 percent of the variance. The one community-level variable added 1.4 percent, yielding a total adjusted R^2 of 19.9 percent. The three individual-level variables were: Husband-Wife Communication on Family Planning, Number of Living Sons, and Family Planning Field Worker Contact Index. The one community-level variable was Wife's Education.

3. *Community effects on the dependent variable were found to be weak.*

The result of a multiple regression analysis showed that community-level variables accounted for only about 2.5 percent of the total variance in the dependent variable. This was in sharp contrast to the result that showed individual-level variables accounting for as much as 19 percent of the total variance.

When both individual- and community-level variables were entered into a multiple correlation analysis, a multiple correlation coefficient of .4714 was obtained. This meant that together they explained about 20 percent of the total variance. This was virtually the same amount of variance explained by just the individual-level variables.

This finding supported our earlier observation that individual-level variables were much more important than community-level variables in explaining family planning adoption among the Korean

villagers studied. In short, system effects on individual family planning adoption appeared to be weak and negligible.

4. *The two communication network variables, Connectedness and Integrativeness, were found to be correlated with the dependent variable at much higher levels than most of the individual- or community-level variables.*

A zero-order correlation analysis, including the two communication network variables, showed that Connectedness had the highest correlation coefficient with individual family planning adoption, and integrativeness the third highest after Husband-Wife Communication on Family Planning measured at the individual level.

5. *One of the communication network variables, Connectedness, accounted for the greatest amount of the total variance.*

In a step-wise regression analysis, including the two communication network variables, we found that Connectedness was the most important variable accounting for about 16 percent of the total variance, followed by the individual-level variable, Husband-Wife Communication on Family Planning, which accounted for an additional 6.14 percent. The third most important variable was the other communication network variable, Integrativeness, which added 1.5 percent more.

6. *The communication network variables as a group explained as much of the total variance in the dependent variable as the individual-level variables and greatly more than the community-level variables.*

The results of a multiple correlation analysis showed that the individual-level variables had a multiple correlation coefficient of .4370, the community-level variables, .1590, and the communication network variables, .4441 with the dependent variables. In terms of the amount of total variance in the dependent variables explained, these coefficients meant that the individual-level variables as a group explained 19.1 percent of the variance, the community-level variables as a group, 2.5 percent, and the communication network variables as a group, 19.7 percent.

The addition of the community-level variables in the multiple regression equation which originally was based solely on the individual-level variables, yielded an increment of only .72 percent in the amount of variance explained. When further communication network variables were added, the amount of variance explained increased from 19.8 to 28.0 percent, an increment of 8.2 percent.

Not only did the communication network variables explain as much of the total variance in the dependent variable as the individual-level variables, but they also had a substantial independent effect

on the dependent variable above and beyond the effects of the individual- and community-level variables.

7. *There were no significant interaction effects between the individual-level variables and the communication network variables.*

In order to examine whether there existed any interaction between the individual-level variables and the communication network variables in producing their effects on the dependent variable, we computed correlations between each of the 15 selected individual-level variables and the dependent variable within each of four groups characterized as low or high with respect to Connectedness and Integrativeness. The comparisons showed in general no major differences between them. Statistically significant differences were found for only three variables: Family Planning Knowledge Index (.208 vs. .151), Membership in Mothers' Club (.227 vs. .083), and Number of Living Sons (.235 vs. .115). These were all between the low and high groups with respect to Integrativeness.

The results justified our concluding that there were no significant interaction effects between the individual-level variables and the communication network variables.

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