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Personal Networks and The Adoption of Family Planning in Rural Korea

One of the mainstays of social science theory must be the proposition that the behavior of individuals is affected by the social and economic environment in which they live. Based partly on this proposition, many countries participating in the World Fertility Survey (WFS) collected data using the "community module" (see Freedman 1974). This module includes measures at the community level, of such diverse areas as: transportation and communication facilities, health levels and facilities, family planning facilities, education, electricity, agricultural and/or industrial development, government structure, and community voluntary organizations. Presumably, a prevalent idea was that community level variables of the type just listed are likely to affect the fertility and family planning behavior of individuals. In the 1970s, most of us would have accepted this idea either intuitively or from some formal theoretical perspective.

Our acceptance notwithstanding, empirical work has led to mixed results. On the one hand, community variables like those in the WFS module have usually shown small (if any) relation to individual fertility and family planning behavior, once relevant individual level variables have been controlled (e.g., Mason and Palan 1978 for Malaysia). In fact, a series of papers presented at the most recent (1984) conference of the World Fertility Survey were devoted principally to explanations and speculations about why the community module data did not relate to individual fertility and family planning behavior. On the other hand, the variable "region" has important effects in several countries (for Thailand, see, for example, Cleland et al. 1979; for Indonesia see Freedman et al. 1981). "Country," when entered in multivariate analyses as indicator random

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variables and using merged WFS files for several countries, has also shown strong effects (e.g., Palmore 1984). A possible interpretation of the importance of "region" or "country" is that there are community level effects but that the community module measures failed to capture the correct variables to assess the effects.

An example of the difficulties encountered in using variables like those in the WFS community module was provided for Korea by the work of Hong (1976, 1979). She analyzed the relationship between several fertility and family planning measures, most of the usual individual level measures of social, economic, and demographic variables, and a reasonably large set of community level variables measured using a questionnaire not unlike the standard questionnaire for the WFS "community module." The data used, described in more detail later, were collected in rural Korea in the Spring of 1975. The results of her analysis, perhaps too briefly summarized, were that: (a) the community level variables were highly associated with the levels of fertility and family planning use across communities, but that (b) the community level variables, after controlling for individual level demographic and socio-economic measures, were not closely associated with individual level measures of fertility or family planning behavior. Hence, for Korea as well, the results provided yet another "failure" to document the affect of communities on the demographic behavior of individuals.

The present report relies on data from the same study used by Hong and maintains a concern for assessing the affects of community level variables on individual level demographic behavior. Instead of attempting additional quantification of the type of measures represented in the WFS "community module," however, another research tradition is called upon the provide different measures of each community. The approach used is best described as belonging to "network analysis," a phrase only recently becoming common in the demographic literature (see Retherford and Palmore 1983 and Beckman 1983).

I. NETWORK ANALYSIS AND FAMILY PLANNING BEHAVIOR

In essence, network analysis involves the construction of measures from sociometric data. As specified by Rogers et al. (1976:256):

> Network analysis is a method of research for identifying the communication structure in a system; sociometric data about communication flows or patterns are analyzed by utilizing

> interpersonal relationships... as the units of analysis... Essentially, a communication network analysis describes the individual linkages in an interpersonal communication structure.

The methodology used was well explained by Danowski (1976:279). To paraphrase some of his explanation, it is useful to think of a communication network as a set of persons linked to one another by communication relationships. A common indicator of the communication relationships is simply whether or not two persons exchange messages.

> More precise measures involve the frequency and duration of message exchange, which may be further refined by jointly considering other variables.

What is suggested by the network approach, hence, is a different conception of community level variables than measured in the WFS module or employed by Hong.

Aggregation into supra individual units is carried out not so much by geographic areas as by areas that are socially defined. Interpersonal linkages provide the basic starting point for constructing aggregates.

What made the newtork approach seem especially promising was that the demographic literature already abounds with documentation of the effects on family planning adoption of opinion leadership and individual perceptions of reference group family planning behavior. (Relevant publications by the present authors include Palmore 1967, Palmore and Freedman 1969, Palmore et al. 1976, Palmore et al. 1978, and Retherford and Palmore 1983. Recent reviews of pertinent materials are found in Rogers 1973 and Rogers and Kincaid 1981).

In the present report, family planning adoption is analyzed for a rural area in Korea as a function of network variables and selected, more "conventional," socio-demographic and program variables. The central issue addressed is whether community level effects, as measured by indicators of personal networks, explain substantial amounts of the variance in whether or not an individual had heard about contraceptive methods, knew how to use one, had ever used one, or was currently using contraception.

II. DATA

The data employed for the analysis was obtained as one part of a pilot project attempting to assess the contraceptive prevalence effects of making contraceptives totally accessible to each per-

son in an area. The Euirying Experiment, as that study has come to be known, is described in detail in Park et al. 1977 and Hong 1979. A related paper is Palmore et al. 1977. Because the study is described elsewhere, those details are not repeated here. Instead, a brief summary is presented of information relevant to the present investigation.

Euiryoung *Gun* is a rural county located in the southernmost part of South Korea. Large cities are relatively distant from Euiryong: Pusan, for example, is about 150 kilometers away. The entire area is generally mountainous, with the villages scattered through the valleys. Three *Myun* (townships) from Euiryong *Gun* were selected for the Euiryong Experiment. The area was selected because it is isolated and also because contraceptive use was low relative to national averages.

Before the Euiryong Experiment was initiated, a baseline survey was conducted in April 1975 to assess fertility levels and family planning knowledge, attitudes, and practices (KAP). The questionnaires used, reproduced in full in Hong 1976, also included many of the items now standard in such KAP surveys: age at first marriage and present age, educational attainment, contact with the existing family planning program, and the like.

Home interviews were conducted with 100 percent of the ever married women 15-49 years of age. The study design and implementation were carried out cooperatively between Dong-A University in Pusan and the East-West Population Institute, Honolulu, Hawaii. Response rates were excellent (99%), and the survey was conducted up to the highest international standards for such work.

In the present report, data are used from only one of the three *Myun* included in the original baseline survey. 905 ever married women resided in that *Myun,* but the analysis here is for 808 women (89% of the 905), since we included only women for which data were available for every variable included in the later analysis. While the percentage of respondents with missing information for any one variable was quite low, the analysis later includes some 33 variables and hence some 11 percent of the cases were missing information on at least one of the variables included in that analysis.

The analysis was restricted to only one *Myun* for practical reasons. As will become clear later, construction of the network measures required hand calculation for each case. While computer programming of the procedures is possible and ultimately necessary, the programming was not undertaken then because the research was exploratory and it was necessary to first establish which measures are useful to program.

III. OPERATIONAL DEFINITIONS

Five sets of variables were included in the final analysis. As dependent variables, the following set of six family planning adoption indicators were used:

(a) whether or not the respondent had ever heard of one or more contraceptive methods;

(b) whether or not the respondent knew how to use one or more contraceptive methods;

(c) whether or not the respondent had ever used one or more contraceptive methods;

(d) whether or not the respondent had ever had an induced abortion;

(e) whether or not the respondent had ever had an induced abortion and/or used one or more contraceptive methods; and

(f) whether or not the respondent was currently using one or more contraceptive methods.

Each of these variables was coded "1" if the respondent had achieved that stage in the family planning adoption process and "0" otherwise.

As independent variables, there were four sets of variables. The first set included six socio-demographic items:

(a) age of respondent;

(b) educational attainment of respondent;

(c) age at first marriage of respondent;

(d) whether or not the respondent wanted to have more children;

(e) the respondent's total number of live births (children ever born); and

(f) the respondent's number of male live births.

Items (b) and (d) were coded as indicator random variables (primary graduate or more = 1, 0 = otherwise; wanted to have more children = 1, 0 = otherwise). The other four variables were coded in the conventional manner—e.g., age was coded in completed years. While one might argue that additional socio-demographic variables should be added to this set, the variables included are the ones previously found by Hong (1979) to be the most highly related to family planning adoption in the Euiryong data.

Four program variables were included. There were:

(a) whether or not the respondent had ever been contacted by a family planning worker either at home or in a group meeting;

(b) whether or not the respondent knew of a place to go for family planning information;

(c) the number of mass media sources from which the respondent had heard a family planning message; and

(d) the number of personal program sources (doctors, mothers' club leaders, etc.) from which the respondent had heard a family planning message.

The first two items were coded "1" if the program contact was present and "0" otherwise.

The third set of independent variables were measures of the "social climate" for adoption. These items were as follows:

(a) whether or not anyone else had ever asked the respondent for family planning advice (this question is often used as a self-designated measure for opinion leadership);

(b) whether or not the respondent perceived that "some" or "many" of her relatives, friends, or neighbors were practicing family planning;

(c) whether or not the respondent perceived that some of her relatives, friends, or neighbors disapproved of using contraceptives; and

(d) the total number of non-program personal sources from which the respondent had heard a family planning message.

Items (a) through (c) were coded "1" if "yes" and "0" otherwise.

Since the "social climate" measures are somewhat less conventionally used than the other sets and since they overlap to a degree with the network variables to be discussed shortly, a brief justification for including the social climate measures is indicated. Several reasons can be given. First, the central issue of this research was to ascertain whether or not network measures could add appreciably to the variance explained in family planning adoption after controlling for other measures usually used to explain individual family planning behavior. While the social climate indicators overlap with network measures, the social climate measures have been used in previous Korean research (see Han et al. 1978 for one example) and they are measured at the individual level. Hence, their effects must be partialled out if one is to claim additional explanatory power for the network measures.

Second, each of the social climate measures refers explicitly to family planning. As shall be described shortly, the network measures used in this research were not based on a question about family planning communications between individuals. The social climate measures, hence, refer directly to family planning whereas the network measures are based on a broader communications area.

The difference between the two types of measures becomes clearer when the network measures are explained. Since the measures used here were partly newly constructed by the authors and partly modified from work conducted by others, a full explanation is necessary.

IV. NETWORK INDICATORS USED IN THE PRESENT ANALYSIS

The Euiryong baseline survey included the following sequence of questions that were asked of each ever married women 15-49 years of age.

D.6 Who are the five persons you have the closest contact with? Would you kindly tell me the number of their children?

	Name	Sons	Daughters
(1)	_____	_____	_____
(2)	_____	_____	_____
(3)	_____	_____	_____
(4)	_____	_____	_____
(5)	_____	_____	_____

As might be expected, many women gave such answers as: "The mother of Kim Sung Jin," "the wife of my older brother," or "my mother's neighbor." 1) To avoid ambiguity in these references, the unique sample identification number of each person referred to (e.g., the third person mentioned) was coded in the field. If unique identification was not possible from a respondent's original response, the interviewer returned to the respondent's house to establish the identity of that person. As a result of these procedures, the questionnaire number was available for each of the five "closest contacts" except when a contact did not reside in the study area.

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1) The authors have attempted to provide English Translations of questions and statements in a way that most accurately conveys both the connotation and denotation of what was said in Korean. While the Korean itself would not be useful to English-speakers, several remarks about the questions are in order. First, pre-testing revealed that a more standard socio-metric question about "best friends" elicited almost no responses. In that rural setting, it appears that the concepts was not easily understood and that "best friends" could not be easily identified by most respondents. Second, the type of data that the authors were attempting to gather referred to the respondent's daily environment. Hence, close daily interaction was perhaps a more relevant phenomenon than a feeling of shared intimacy with the other person. In a rural setting where persons living close to one another are likely to know most other people as totalities in primary group relationships, the concept of "best friends" may be less useful than in settings where persons know most other people in segmented, secondary group relationships.

Using the "closest contact" question has merit in that the question is not explicitly asking about family planning (although the question was imbedded in a questionnaire heavily weighted towards questions of that type). Presumably, the question gets at a broader range of contact than only family planning.

After coding answers to these questions, various measures were calculated based on the "directed links" between respondents. If respondent A named respondent X as one of the five closest contacts, then A had a link to X. If X also named A, then the link is both to and from A and X (it is reciprocal). Each "naming," hence, is a directed link, and one can base measures on both outgoing links and incoming links. This is made somewhat clearer by studying Figure 1, a sociogram of one village in the study *Myun*. Each circle respresents a respondent and each one-headed arrow in the diagram is an un-reciprocated naming or link. Two-headed arrows represent reciprocal naming.

Seven of the network measures used in the final analysis were calculated directly from such personal network information:

(a) the total number of links from the respondent to others (outgoing links — five is the maximum);

(b) the total number of links to the respondent from others (incoming links);

(c) the total number of links from the respondent to others who had ever used a contraceptive method;

(d) the total number of links from the respondent to others who were currently using a contraceptive method;

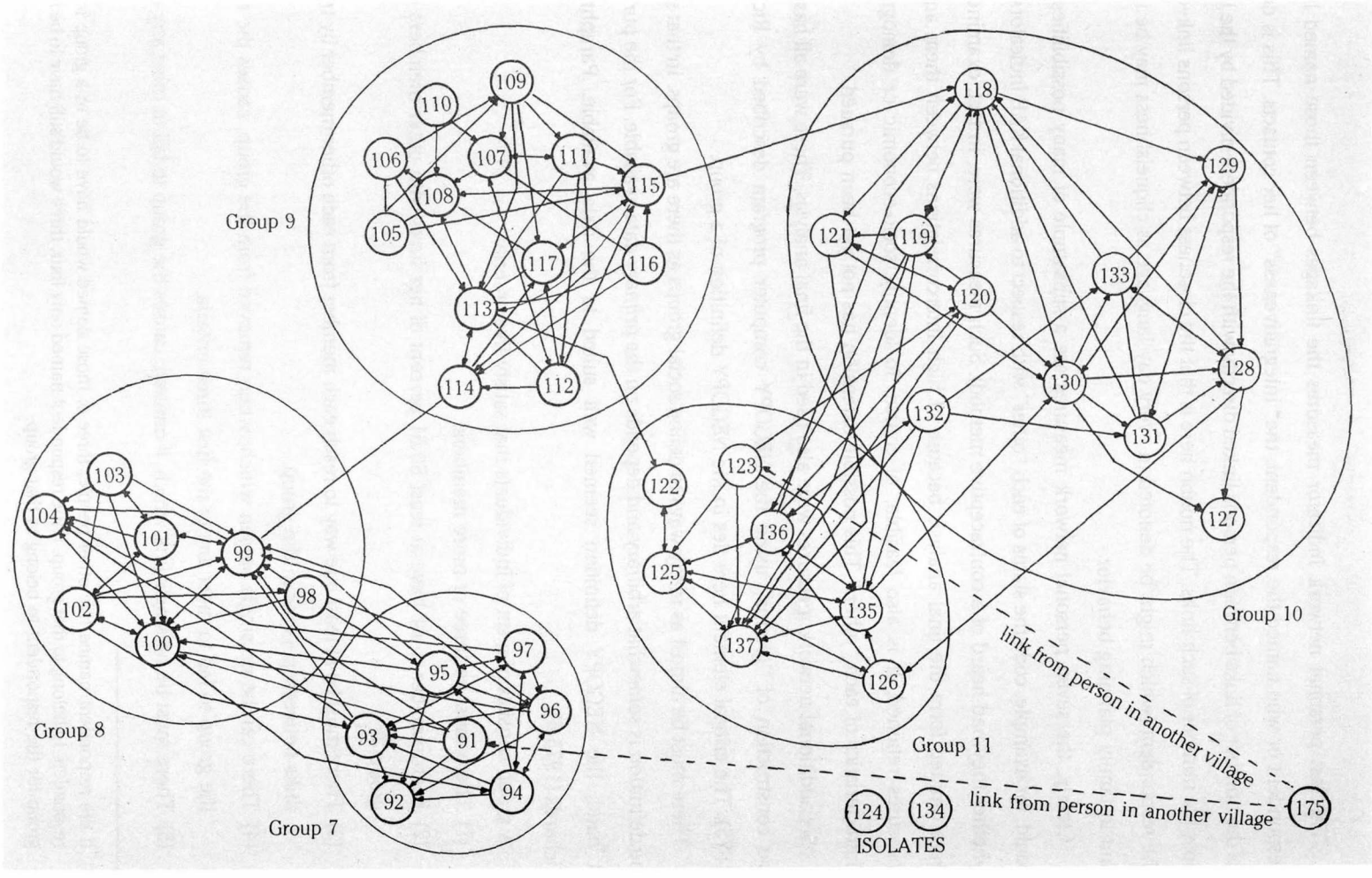
(e) the total number of links to the respondent from others who had ever used a contraceptive method;

(f) the total number of links to the respondent from others who were currently using a contraceptive method; and

(g) the respondent's "integrativeness."

For the information on contraceptive use, it was necessary to refer to the questionnaire of each "other"—it is useful to remind the reader that the basic question did not include such family planning information.

Figure 1. Personal Networks for Sangchon-*Ri*, Jungkok-*Myun*, Euiryong-*Gun*, Kyeongnam, Korea, 1975



The last personal network indicator measures the linkages between those named by the respondent or who named the respondent: the "integrativeness" of her contacts. This is defined as the number of links between persons linked directly with the respondent divided by the largest possible number of such links. The notion here is that the closeness between persons linked with the respondent (which might be denoted in every day language as cliqueishness may be important in family planning behavior.

Clearly, the seven personal network measures are a subsample of many possibilities. One could, for example, code the status of each "other" with respect to additional KAP indicators (e.g., whether they had heard of a contraceptive method). Such measures were, in fact, examined but were omitted form the final analysis because of high intercorrelations between them and the measures retained. It is also feasible, of course, to identify socio-economic or demographic characteristics of each "other." This possible extension has not yet been pursued.

Six additional network measures were also used in the final analysis. These were all based on the construction of "groups" using the NEGOPY computer program described by Richards (1975). The critical element here lies in the NEGOPY definition of a group.

There must be almost as many ways to define social groups as there are groups. In that sense, the definition is somewhat arbitrary and depends on the primary data available. For the purposes at hand, the NEGOPY definition seemed well suited to the data available. Paraphrasing Richards (1975:6):

A group consists of a set of individuals that satisfy five criteria:

(1) There must be three or more members.

(2) Each member must have at least 50.01 percent of her links with other members of the group.[2)]

(3) There must be at least one way to reach each member from each other member by tracing links between persons in the group.

(4) There can be no single person which, when removed from the group, causes the rest of the group to fail to meet any of the first three criteria.

(5) There must be no single link which, if omitted, causes the group to fail to meet any of the

2) If the respondent named five other people, three of those named would have to be in a group for the respondent to belong to that group. If the respondent named only four, three would still have to be in the group for the respondent to belong to that group.

above criteria.

These NEGOPY criteria, were used with the Euiryong data to detect groups among the respondents (see Figure 1).

Subsequently, six NEGOPY group-based network measures were calculated. While each of these measures used the NEGOPY output, few conform precisely to the measures produced by that computer program. Still, each of the six measures has in common with the others the use of the NEGOPY definition of a group.

The first was a measure closely related to the personal network measures described earlier: the number of persons in a respondent's group who had four or more incoming links (four was chosen since it was the mean). This index obviously bears similarity to locating "sociometric stars." The difference here is that this measure relates to the number of such "stars" belonging to a given respondent's group.

The remaining five NEGOPY group-based indicators are somewhat more complex and, hence, are defined in Exhibit 1. For the general reader, formulae are avoided if possible and instead a word description is presented for each index.

The first two panels of Exhibit 1 define characteristics of each respondent's group.[3] A respondent's group's "connectedness" is an indicator of the density of interaction within the group whereas "openness" refers to the density of interaction outside the group. The last three panels of Exhibit 1 provide definitions at the next level of aggregation: how the respondent's group relates to other groups. Besides the different level of aggregation, these last three measures are similar, in conception, to the measures presented earlier.

As with the personal network measures, many additional NEGOPY group-based indicators can be and were coded. Again, there were high intercorrelations among the additional measures with those retained, hence the additional indicators were not included in the final analysis. (A measure of "degree," for example, was equal to the group "connectedness" measure multiplied by a constant.)

3) Approximately one fourth of the respondents did not belong to any NEGOPY group.

V. METHODS FOR THE MULTIVARIATE ANALYSIS

In summary, 33 variables were identified for this analysis. Six of these were dependent variables. The remaining 27 variables included: six socio-demographic indices, four program measures, four social climate indicators, and thirteen network characteristics (seven personal network-based and six NEGOPY group-based). The number of variables is rather staggering.

Exhibit 1. Definitions of Five NEGOY Group-Based Network Measures Used in the Present Analysis

Panel A: Respondent's Group's "Connectedness"

= the number of directed links in the woman's group divided by the maximum number of directed links in that group.

Panel B: Respondent's Group's "Openness"

= the number of links group members have with persons outside that group divided by the number of people in the group.

Panel C: Respondent's Group's "One Step Zone Size"

= the number of other groups directly linked to the woman's group.

Panel D: Respondent's Group's "Zone Integration"

$$= \frac{X_a + X_b}{N}$$

where: X_a = the number of one step group to group links

X_b = the number of two step group to group links

N = the number of groups directly linked to the woman's group.

Panel E: Respondent's Group's "Zone Connectedness"

$$= \frac{Y_a}{5[(\sum_i n_i)+(n_\ell)]} + \frac{Y_b}{5[(\sum_i n_i)+(n_\ell)]}$$

where: Y_a = the number of links (one step) between individuals in different groups in zone.

Y_b = the number of links (two step) between individuals in different groups (but including links through non-group members) in zone.

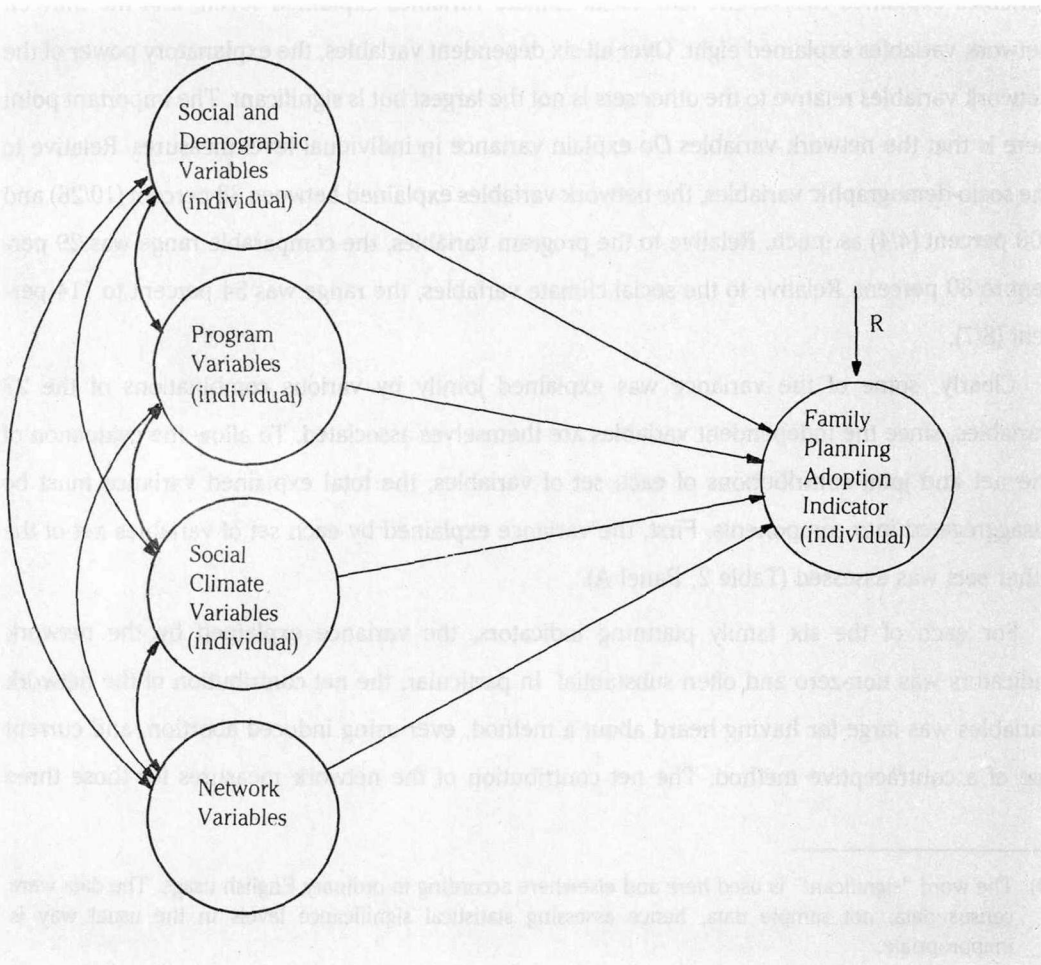
$\Sigma_i n_i$ = the sum of all of the persons in all groups in the zone.

n_ℓ = the number of persons who link groups in the zone but are not group members.

Nevertheless, the full complement seemed essential to allow a proper evaluation of the realative contribution of each set of variables to explaining the variance in family planning adoption.

The basic pattern for the analysis is diagrammed in Figure 2. Each set of variables is measured at the individual level except for the network measures, which are a special subset of community level (or group) variables. The question is: To what extent do the network measures contribute to the explanation of variance (relative to the other sets of variables) in six indicators of family planning adoption?

Figure 2. Diagram of Analysis Model for Assessing the Net and Joint Effects on Family Planning Adoption of Each Set of Independent Variables



To respond, a multiple regression analyses (ordinary least squares) were carried out and the gross and net effects of each set of variables were computed. The overall results rewarded the tedious hand calculations of the network measures, since the network measures did add significantly[4] to the explained variance in family planning adoption. For Euiryong at least, network variables do affect the behavior of individuals.

VI. THE RELATIVE EXPLANATORY POWER OF THE NETWORK VARIABLES

For each of the six dependent variables, the variance explained by each set of variables was first assessed separately (see Table 1). With current use as the dependent variable, for example, the six socio-demographic variables explained fifteen percent of the variance; the four program variables explained twelve; the four social climate variables explained seven; and the thirteen network variables explained eight. Over all six dependent variables, the explanatory power of the network variables relative to the other sets is not the largest but is significant. The important point here is that the network variables *Do* explain variance in individual level measures. Relative to the socio-demographic variables, the network variables explained between 38 percent (10/26) and 100 percent (4/4) as much. Relative to the program variables, the comparable range was 29 percent to 80 percent. Relative to the social climate variables, the range was 54 percent to 114 percent (8/7).

Clearly, some of the variance was explained jointly by various combinations of the 27 variables, since the independent variables are themselves associated. To allow the evaluation of the net and joint contributions of each set of variables, the total explained variance must be disaggregated into components. First, the variance explained by each set of variables net of the other sets was assessed (Table 2, Panel A).

For each of the six family planning indicators, the variance explained by the network indicators was non-zero and often substantial. In particular, the net contribution of the network variables was large for having heard about a method, ever using induced abortion, and current use of a contraceptive method. The net contribution of the network measures for those three

4) The word "significant" is used here and elsewhere according to ordinary English usage. The data were census data, not sample data, hence assessing statistical significance levels in the usual way is inappropriate.

Table 1. Percentage of Variance Explained ($R^2 \times 100$) in Six Family Planning Adoption indicators by Four Sets of Independent Variables

Family Planning Indicators (Dependent Variables)	R^2 ($\times 100$) for Each Set of Variables Separately			
	Social and demographic variables (S)	Program variables (P)	Social climate variables (C)	Network variables (N)
H = Heard about 1 or more contraceptive methods ($\bar{x}$=.88, S.D.=.33)*	6	14	8	5
K = Knew how to use 1 or more contraceptive methods ($\bar{x}$=.64, S.D.=.48)*	16	24	13	7
U = Had used 1 or more contraceptive methods ($\bar{x}$=.54, S.D.=.50)*	26	22	13	10
IA = Had had 1 or more induced abortions ($\bar{x}$=.10, S.D.=.30)*	4	5	5	4
UIA = Had used either contraception or induced abortion ($\bar{x}$=.54, S.D.=.50)*	25	22	13	10
CU = Currently using contraception at interview ($\bar{x}$=.32, S.D.=.46)*	15	12	7	8

* $\bar{x}$ is the mean for the dependent variable (each is a 1, 0 indicator random variable). S.D. is the standard deviation for the dependent variable.

dependent variables ranged from the largest net contribution (for induced abortion) to second largest (for the other two dependent variables). Joint contributions involving the network measures were also substantial: 17 percent for heard, 21 percent for knew, 23 percent for abortion, 23 percent for either contraception or abortion, and 22 percent for current use (see Panels B, C, and D of Table 2).

Table 2. Relative Contribution of Each of Four Sets of Variables to the Total Variance Explained in Six Family Planning Indicators

	Family Planning Indicators (Dependent Variables)*					
	H	K	U	IA	UIA	CU
Total Variance Explained (TVE) Expressed As $R^2 \times 100$	19	33	39	10	39	25
Percentage of the TVE Explained by: (TVE = 100%)**						
Panel A: S net of P, C, and N***	5	14	25	9	25	28
P net of S, C, and N	30	23	14	13	15	12
C net of S, P, and N	6	3	4	15	4	4
N net of S, P, and C	9	3	3	16	3	12
Panel B: S and P jointly net of C and N and Panel A	9	13	14	6	13	9
S and C jointly net of P and N and Panel A	1	2	6	3	6	2
S and N jointly net of P and C and Panel A	1	2	2	1	2	2
P and C jointly net of S and N and Panel A	16	13	6	8	7	6
P and N jointly net of S and C and Panel A	1	3	3	2	3	2
C and N jointly net of S and P and Panel A	3	1	1	4	2	2
Panel C: S, P, and C jointly net of N and Panels A & B	7	9	6	6	6	6
S, P, and N jointly net of C and Panels A & B	2	5	6	3	5	5
S, C, and N jointly net of P and Panels A & B	1	1	2	1	2	1
P, C, and N jointly net of S and Panels A & B	6	4	3	5	3	4
Panel D: S, P, C, and N jointly net of Panels A, B, & C	3	5	6	7	6	6

* See Table 1 row lables for definitions of H, K, U, IA, UIA, and CU.
** Totals may not add to exactly 100% because of rounding error.
*** See Table 1 column lables for definitions of S, P, C, and N.

VII. THE RELATIVE CONTRIBUTION OF EACH NETWORK MEASURE

The thirteen network variables did add appreciably to the variance explained in the six family planning indicators. Not all of the thirteen, however, contributed equally. In fact, most of the variance explained by the network measures is due to about half of them: group "connectedness" and the six personal network measures excluding "integrativeness." This subset of seven

Table 3. Percentage of Variance Explained ($R^2 \times 100$) in Six Family Planning Adoption Indicators by Three Sets of Network Variables

Family Planning Indicators* (dependent variables)	R^2 (× 100) for Three Sets of Network Variables**		
	Whole set (13 Variables)	Subset of 7 variables	Subset of 5 variables
H	5	3	3
K	7	7	7
U	10	10	10
IA	4	3	3
UIA	10	9	9
CU	8	8	8

* See Table 1 row labels for definitions of H, K, U, IA, UIA, and CU.
** See text for explanation of subsets.

variables explains almost as much variance as the full set of thirteen variables (see Table 3, column 2). Further, omitting two more measures (the number of incoming links from current users and the number of outgoing links to ever users) leaves a subset of five network variables that explain most of the variance that was explained by all thirteen measures (see Table [a], column [a]).[5] The net explained variances were also calculated, as in Table 2: for all the dependent variables except hearing of a method and current use, the net explained variance for the five network measures was equal to that for all thirteen (table not shown). For hearing a method and current use, the network explained variance declined by one percent (about 5% of the total variance explained).

Additional insight into the relative explanatory power of the separate network indices is provided by the zero order correlations between the family planning indicators and the network variables (Table 4). Two results are clear: (a) all of the correlations above .03 are positive and hence consistent with what one would hypothesize, and (b) the variables listed in the subsets (of 5 and 7 mentioned earlier) usually have the largest zero order correlations with the dependent variables.

5) This fact weakens the possible criticism that the explanatory power of the network measures is due solely to the disproportionate number of network measures (13) relative to the socio-demographic (6), program (4), and social climate (4) indicators.

Table 4. Zero Order Correlations Between Each Network Variable and Each of the Six Family Planning Indicators

Network Variables	Family Planning Indicators*					
	H	K	U	IA	UIA	CU
Number of Links From Respondent to Others	.09	.14	.19	.08	.19	.14
Number of Links to Respondent From Others	.14	.22	.26	.16	.25	.23
Number of Links From Respondent to Others Who Had Ever Used a Contraceptive Method	.12	.16	.20	.10	.19	.15
Number of Links From Respondent to Others Who Were Currently Using a Contraceptive Method	.11	.13	.16	.09	.15	.17
Number of Links to Respondent From Others Who Had Ever Used a Contraceptive Method	.14	.24	.28	.14	.27	.25
Number of Links to Respondent From Others Who Were Currently Using a Contraceptive Method	.12	.21	.23	.12	.23	.24
Respondent's "Integrativeness"	.06	.04	.09	.04	.08	.07
Number of Persons in a Respondent's Group Who Had Four or More Incoming Links	.03	.07	.10	-.02	.09	.02
Respondent's Group's "Connectedness"	.11	.12	.18	.03	.16	.11
Respondent's Group's "Openness"	-.01	.00	.05	-.02	.04	.03
Respondent's Group's "One Step Zone Size"	.02	.06	.10	-.02	.09	.02
Respondent's Group's "Zone Integration"	.03	.06	.07	-.01	.06	.00
Respondent's Group's "Zone Connetedness	.02	.00	.01	-.02	.01	-.02

* See Table 1 row labels for the definitions of H, K, U, IA, UIA, and CU.

VIII. DISCUSSION AND CONCLUSION

The two subsets (5 and 7 variables) discussed above include only one NEGOPY group-based indicator and the remainder are all personal network measures. What this suggests is that the most explanatory network variables are personal network based. It was partly for this reason that this report is titled "Personal Networks" instead of using a phrase like "group structure."[6] For

6) It was also this reason that led to relatively little importance attached to the fact that some respondents were not group members. Separate regression analyses for group members and non-group members added little new information because the NEGOPY group-based measures were not as highly explanatory (tables not shown).

Euiryong, a person's own contacts in the social environment appear to be more critical to family planning adoption than is the total social environment or characteristics of the ENGOPY group to which the person belongs. While additional data to explain this finding is lacking, it may be useful to speculate about the possible reasons.

In comparison to rural areas outside Korea or to a larger part of rural Korea, the 808 persons from the eleven villages making up this study were relatively undifferentiated by variables such as those included in the WFS "community module" (see Hong 1979). In addition, the definition of a group employed by the NEGOPY computer program may impose a rather rigorous algorithm on a situation in which most villagers know each other relatively well. (The largest of the eleven villages, after all, had only 130 respondents. The average village had 82 respondents. One village had only 47 respondents.)

The factors just described imply a relatively homogeneous situation in which only the closest contacts of a person, her own personal network, became important in family planning decisions. Since the larger social environment (her group, her community) is little differentiated, a woman may look mainly to her closest contacts for personal decisions.

A second line of reasoning has to do with the relative freedom with which rural women talk about intimate matters. If contraception or abortion are perceived as intimate topics, it may be that only close contacts discuss such matters or try to influence one another. Even when many are known in primary, non-segmented ways, some are still known better than others, and it may be those with whom a woman has the closest contact that she shares advice and influence on intimate matters.

The most difficult issue with any of the speculations above is that this research can not partial out the causal directions among the variables included. Do woman seek as close contacts others who are family planning adoptors or do adoptors influence those who had not yet adopted, hence leading to the correlations?

The authors hope that their own future work and improvements by others will begin to unravel the causality issue. The issue does not, however, detract from the major result of the present research. Our results, combined with those in the work by Lee reported in an earlier issue of this journal (Lee 1983), clearly lead to the conclusion that there is evidence that personal network measures help explain demographic behavior.

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〈國 文 抄 錄〉

農村地域內 個人的 對人接觸網의 特性과 家族計劃 受容

金 貞 任* · James A. Palmore**

本 研究의 主目的은 對人接觸網(interpersonal network)의 特性이 家族計劃受容에 미치는 影響을 考察하는데에 있다.

個人의 行動이 社會的 環境(social environment)의 影響을 받는다는 命題에 一部 基礎를 두고, 地域社會要因들이 出産力 및 家族計劃受容에 미치는 영향을 究明하고자 한 研究는 世界出産力調査(World Fertility Survey)研究들을 비롯하여 許多하다. 이들 研究文献에 의하면, 個人의 社會的 環境이라는 概念을 主로 世界出産力調査(WFS) Communiry module에 使用된 類의 地域社會變數들만으로 定義하여 分析하였을 때, 이러한 變數들은 個人의 出産力 및 家族計劃行爲에 거의 영향을 미치지 않고 있는 것으로 나타나고 있다.

이와같은 否定的인 結果의 要因의 一部로 概念的인 問題를 指摘하지 않을 수 없다. 過去의 研究에 使用된 社會的 環境이라는 概念을 살펴보면 主로 交通, 通信施設, 健康水準 및 施設, 家族計劃施設, 教育施設, 電氣施設, 農業 및 産業發展度, 行政構造, 地域社會自治組織體(community voluntary organizations)등 地域社會의 特性만이 社會的 環境의 尺度로 看做되었을 뿐이었다.

그러나 既存의 人口 및 家族計劃文献에 의하면, 家族, 親戚, 親舊, 이웃등과의 日常的인 對人接觸이, 그리고 특히 輿論指導者와 準據集團(reference group)의 가족계획 수용 態度 및 行爲에 대한 개인의 認識狀態가 개인의 가족계획수용에 미치는 영향을 무시할 수 없는 것으로 指摘되고 있다.

이러한 背景下에 本研究에서는 지금까지 주로 使用되었던 個人의 社會的 環境(social environment)이라는 개념을 再定義하기 위하여 對人接觸網(interpersonal network)

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을 包含하였다. 本研究에서는 對人接觸網의 定義(operational definition)를 다음과 같이 두 單位에서 使用하였다.

個人的 對人接觸網(personal network)의 特性:

개인이 日常的으로 親密하게 지내고 있는 사람들의 數, 그들間의 相互親和性(integrativeness), 그들의 家族計劃知識 및 實踐狀態

對人接觸網의 集團的 構造(group structure or clique structure)의 特性:

對人接觸網集團內의 輿論指導者數, 對人接觸網集團成員間의 相互連結度(connectedness), 및 그 開方度(openness), 部落內의 다른 접촉망집단과의 連結度, 連結된 다른 접촉망집단들간의 凝集力(zone integration) 및 相互連結度(zore connectedness).

本分析에 利用한 資料는 1975年 경남 의령군에서 實施되었던 家族計劃普及 極大化 研究事業(의령 Experiment)"을 위해 蒐集한 資料의 一部이다. (Park, Cho and Palmore, 1977年參照). 本研究에서는 上記 研究調査에 包含되었던 3個面中에서 1個 面만을 分析對象으로 選擇하였다. 이 面에 居住하는 15세에서 49세까지의 旣婚 婦人總數는 905名이었으나, 그 中 97名은 本分析에 사용된 33個變數들중 적어도 한개의 변수에 無應答이 있기 때문에 除外되고, 89퍼센트에 該當하는 808名의 資料만이 本分析에 使用되었다.

本分析에 使用된 33個變數들은 다음과 같이 分類된다.

從屬變數: 家族計劃受容(6個變數);

獨立變數: 社會·人口學的 特性(6個變數);

家族計劃事業要因(4個變數);

社會的 風土(social climate)(4個變數);

對人接觸網(interpersonal network)의 特性(13個變數).

對人接觸網變數들(network variables)이 家族計劃受容을 說明하는데 寄與하는 程度를 考察하기 위해서, 먼저 上記 言及된 6個從屬變數와 4種類(sets)의 獨立變數들을 利用하여 多變數回歸分析을 한다음 各變數set의 全體效果(gross effects)와 純效果(net effects)를 計算하여 比較하였다.

이렇게, 個人의 社會的 環境의 構成要因을 槪念上 再定義하는데 社會的 對人接觸網의 特性을 包含하여 分析한 結果는 매우 鼓舞的이다. 分析結果를 要約하면 다음과 같다.

1. 무엇보다도 重要한 結果는 적어도 本研究에 利用된 資料가 수집된 의령地域에서는, 對人接觸網變數들이 個人의 家族計劃受容에 영향을 미치는 것으로 나타났다는 점이다. 즉, 가족계획 現實踐行爲(current use)를 從屬變數로 볼 때 社會·人口學變數들은 15퍼센트, 家族計劃事業變數들은 12퍼센트, 社會的風土(social climate)變數들은 7퍼센트, 그리고 對人接觸網變數들은 8퍼센트의 說明力을 各各 보였다. (Table 1. 參照)

2. 對人接觸網變數들(network variables)의 說明力을 다른 獨立變數 set들의 설명력과의 相對比로 보면, 사회·인구학변수 set에 대한 比는 38퍼센트에서 100퍼센트까지의 範圍를 나타내고, 家族計劃事業變數set에 대한 比는 29퍼센트에서 80퍼센트, 그리고 사회적 풍토적수 set에 대한 比는 54퍼센트에서 114퍼센트까지의 범위를 나타내고 있다. (Table 1參照)

3. 13個의 對人接觸網變數들(network variables)이 보인 설명력과 그중 일부인 5個변수들에 의해 나타난 설명력은 거의 비슷하다. 즉, 가족계획지수들은 대부분 部落內婦人들간의 集團單位에서의 凝集力(clique level connectedness), 4個의 個人的 對人接觸網(personal network)의 特性에 의하여 설명된다(Table 3參照).