

FACTORS AFFECTING COMPLIANCE:  
TREATMENT FOR ANEMIA IN PREGNANT PHILIPPINE WOMEN

by

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(ABSTRACT)

The primary objective of this research is to explore the determinants of compliance to iron supplement medication among a sample of pregnant women. The data is based on a larger research project on Nutritional Anemia collected by the Nutrition Center of the Philippines, from 1980 to 1982.

The focus of analysis is on compliance as a dependent variable. Also, three sets of factors are used to explain compliance behavior. These are: socio-demographic, treatment, and social psychological factors.

The sample consists of 377 pregnant women who were interviewed to explore the research problem. Data are obtained from a survey, and are analyzed using zero-order correlations and multiple regression techniques.

Results of the zero-order correlation analysis show that the socio-demographic and treatment factors have weak relationships with compliance rate. Moreover, among the social-psychological factors, three are found to have

significant positive correlations with compliance rate; and these are, folk health beliefs, perceived knowledge about the benefits of vitamins, and mothers' health practices.

The results of the multiple regression analysis indicate that, with controls, all the potential determinants are not significantly related to compliance rate.

The study results are then evaluated in the light of the literature on compliance in the United States. A compliance model is then suggested which serves as a guideline for future research. However, even with the establishment of this compliance model, a question concerning the operationalization of the variables remains. Some suggestions on measures of the variables are provided.

DEDICATION

To My Parents:

and

whose memory unfailingly  
sustains and inspires:

This work is a fruition of  
their commitment to family  
and to scholarship. They  
live in this and future  
endeavors.

"Though nothing can bring back the hour  
Of splendor in the grass, of glory in the  
flower;  
We will grieve not, rather find  
Strength in what remains behind;  
In the primal sympathy  
Which having been must ever be."

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## CHAPTER 1

### INTRODUCTION AND LITERATURE OVERVIEW

#### Background of the Study

Patients frequently fail to comply with the recommendations of health practitioners. This problem of non-compliance creates negative effects on the patient's health and poses a serious challenge to medical practice. In the past decade, therefore, patient compliance has become an active research area involving medical and behavioral scientists (Bruer, 1982).

Studies on compliance have been conducted on such diseases as diabetes, hypertension, and obesity. On the average, one-third to one-half of all patients studied are classified as non-compliant (Sackett and Snow, 1979). However, although numerous studies have investigated the problem of non-compliance of patients with different diseases, those receiving treatment for anemia have been given little attention. This is unfortunate because anemia is considered a highly deleterious condition.

Nutritional anemia is "a condition or a syndrome in which the hemoglobin content of the blood is lower than normal" (WHO, 1968). According to Royston (1982), it is the end-result of severe nutrient deficiency of one or more hematopoietic (substances that assist in the production of blood cells) factors usually iron, less

frequently, folate (a member of the vitamin B complex necessary for the normal production of red blood cells) or vitamin B12 (red, crystalline substance essential for the formation of red blood cells). Low hemoglobin concentration due to nutrient deficiencies is caused mainly by an imbalance between the absorption of nutrient factors and the body's needs. This imbalance arises in a number of ways - most frequently, a low iron intake and poor absorption of iron. In the Third World, iron intake is low because of low total food intake, and where food intake is adequate, the diet may be deficient in iron (Royston, 1982). In addition, it is not only important to consider the amount of iron ingested, the imbalance may also be caused by the inability of the body to absorb iron. Iron in foods of animal origin is much more readily absorbed than iron in vegetables and cereals. Studies have shown that iron absorption is inhibited by a number of substances present in such diets, including phytates, calcium phosphate (Foy et al. 1959 and Bjorn, 1974) and tannins in tea (Disler et al., 1975). Among third world countries where diets are made up of cereals which are high in iron content, absorption of iron can be a problem. Moreover, not all folate is in a form which is absorbable by the body. Finally, in the third world, absorption is impeded by diseases of the intestines particularly celiac disease (intestinal malabsorption characterized by

intolerance to gluten, a protein present in grains), tropical sprue (disease occurring in tropical areas, characterized by malabsorption but caused by vitamin deficiencies), and the widely prevalent parasitic enteropathies (intestinal diseases caused by parasites).

As mentioned earlier, anemia can be a deleterious disease. It decreases productivity and work capacity and in pregnancy, severe anemia is associated with an increased risk of maternal and fetal morbidity and mortality (Llewellyn, 1965). Moreover, even mild anemia has been shown to be associated with an increased risk of premature delivery (Ratten & Beischer, 1972), low birth weight (Yusufji et al., 1973), increased abortions and postpartum hemorrhage (Devi, 1966). Thus, being such a harmful condition, the need for compliance with treatment for anemia cannot be overemphasized.

Compliance with treatment for anemia is important not only because of the seriousness of this disease but also because the disease is recognized to be prevalent worldwide. Anemia is considered to be a global problem (Aykroyd, 1970) commonly afflicting certain groups like pregnant women who have greater demand for iron to be absorbed daily (5 mg. or more) than non-pregnant women (2.7 mg.), and adult men (0.9 mg.) It occurs with great frequency in developing countries (International Nutritional Anemia Consultative Group, 1977), where it is

seen as a major health problem (Cook, 1983). In the Philippines, for instance, 48.6% of pregnant women are anemic (Flores et. al., 1982). Hence, compliance with the treatment for anemia is a problem worthy of further investigation. The urgency of such study becomes clear when we consider what the medical literature indicates: that lack of patient cooperation is an important consideration in the treatment and prevention of iron-deficiency anemia of pregnancy (Bonnar et. al., 1969).

To date, the only research on compliance in the Philippines was the Nutrition Center of the Philippines (NCP) Research Project on Anemia (1980-1982). The primary purpose of this research project was to investigate the effectiveness of iron supplements in improving hemoglobin levels of pregnant women. The project sponsors agreed that compliance was a critical determinant of differences in hemoglobin response. Consequently, they were interested to know what social factors would affect compliance.

The present study uses data from the NCP project to explore a number of socio-demographic, social-psychological, and treatment-related factors and their relationship to compliance. An exploratory data analysis will identify variables that are associated with compliance behavior. This analysis will then be used as a basis for developing a compliance model which suggests

avenues for future empirical testing. Specification of the model will also be guided by a review of the literature on American compliance data.

#### Statement of the Problem

This study aims to examine exploratory data obtained from a previous research project, evaluate and critique the results in the light of existing literature, and suggest components of an integrated model of compliance focusing on pregnant women in the Philippines. Specifically, the study will examine the pregnant women's compliance with the doctor's recommendations for the treatment of nutritional anemia and will address the following research questions:

1. Are socio-demographic variables associated with compliance?
2. What is the relationship between treatment factors and compliance?
3. Are the attitudes of pregnant women toward health workers associated with compliance?
4. Are mothers' health behaviors (special health practices, use of health services) associated with differences in compliance?
5. Are mothers' health beliefs associated with differences in compliance?

6. Is mothers' knowledge about the benefits of vitamins related to compliance?

The evaluation, critique and development of a compliance model will begin with a review of the literature on compliance in the United States. From this comparative review, components of an integrated model of compliance will be suggested. This model will also be guided by the results of the exploratory data analysis. Thus, although this is an exploratory effort, the objective is to isolate crucial variables for a model of compliance which will be of use in Third World countries.

#### Significance of the Study

This study is important for several reasons:

1. It is an issue of concern to women in the Philippines and in Asia. Pregnant women in the Philippines comprise an "at risk" group in terms of nutritional anemia (Flores, 1982). The problem is even more widespread in other countries in Asia. A recent review of available information on anemia worldwide, reports that the proportion of anemic pregnant women is highest in Asia (Royston, 1982).
2. International organizations (socio-economic and health) as well as national governments could benefit from an analysis of the factors affecting

compliance. The resulting information contributes to compliance-improving strategies and may help to reduce the cost of health care.

3. The research is an attempt to explore the problem of non-compliance from several perspectives: medical, socio-demographic, social-psychological. Di Matteo and Di Nicola (1982) suggest the need to conduct compliance studies that are multidimensional, that is, he argues against the validity of approaches to patient behavior that posit a single diagnosis, cause and treatment of non-compliance.

#### Literature Overview

In seeking to account for variations in compliance with medical treatment, researchers have utilized a wide variety of approaches. The first examines differences in compliance in terms of medical factors (Becker et al., 1972). For example, Haynes et al. (1979) contend that the complexity of the prescribed treatment will reduce compliance. Other medical factors examined in terms of their influence on compliance are: classes of medications, duration of treatment, dose-effects, and side-effects. The medical approach constitutes the bulk of early research on compliance.

The second approach consists of socio-demographic predictors such as age, sex, marital status, education and socio-economic status (Haynes et al., 1979; Becker, 1974). Some investigators also call this approach the structural model (Salloway et al., 1978). While a substantial amount of research has been done on the influence of socio-demographic factors on compliance, results of these studies show that these variables are weak predictors of compliance.

The third approach that is used to explain variations in compliance is the Health Belief Model (HBM) (Rosenstock, 1966; Hochbaum, 1958; Becker et al., 1974; and Kirscht et al., 1966). This model postulates that an individual's compliance is a function of a person's health motivation, perceived susceptibility to the disease, perceived seriousness of the consequences of the disease, and perceived beliefs in the cost versus the benefits of treatment.

While empirical tests of the HBM show that this set of variables explains the differences in compliance, it is not clear if all these variables contribute to a linear relationship. For instance, Berkanovic (1977) contends that little is known about the joint effects of the HBM variables on compliance behavior. Despite this limitation, the HBM's contribution to compliance is its excellent delineation of the important role of the

patient's subjective perceptions on compliance with medical treatments (Di Matteo and Di Nicola, 1982).

The fourth approach deals with the quality of the interaction between the physician and the patient. The two aspects of this interaction most frequently focused on by researchers are: 1) the effectiveness with which the information (kind and amount) given enable the patient to carry out the prescribed treatment (Friedman et al., 1979; Hulka et al., 1976); and 2) the interpersonal communication between the practitioner and the patient (Hall et al., 1981; Korsch et al., 1968; Caterinicchio, 1979). While both of these aspects are shown to influence compliance, more empirical work is needed to examine the specific measures of these variables as well as the complex interactions among them.

Finally, researchers have also examined the influence of social support on compliance. There are three main sources of social support: the family, the peer group and mutual-help groups. A number of investigators have shown that family support is a factor that may either enhance (Haynes et al., 1979) or hinder (Alpert, 1964; Diamond et al., 1968) compliance. Other studies show that peer group support shows a primarily positive relationship (Bewley and Blend, 1977; Gray et al., 1966). Moreover, Caplan's (1976) study of adherence to high blood pressure medication indicates that mutual-help groups provide

continuing support for a patient to maintain a life-long commitment to a prescribed treatment.

This summary literature overview is far from comprehensive; additional material will be presented in Chapter 4 where the exploratory data results will be evaluated in the light of these existing approaches. The next section outlines the thesis chapter-by-chapter and serves as an introduction to the analysis that forms the body of the study.

#### Organization of Subsequent Chapters

Chapter 2 describes the research methods and procedures. It includes a statement of the larger research project objectives, the research setting, respondents, research design, data collection method, the measurement of variables and data analysis techniques.

Chapter 3 presents the results of the exploratory data analysis.

Chapter 4 evaluates the results of the exploratory data analysis in relation to the relevant literature in the field of compliance research in the United States. The evaluation suggests components of an integrated theoretical compliance model based on the exploratory data and the literature review. This chapter also presents suggestions for future compliance research and addresses potential applications of the model in developing countries and the Philippines in particular.

Chapter 5 presents a summary of the study, conclusions and implications for future research.

## CHAPTER 2

### METHODS AND PROCEDURES

The data to be analyzed in this study were part of a larger research project conducted in the years 1981 to 1982. The project was titled, "Pilot Study on Iron Supplementation for Pregnant Mothers in the Philippines" (Florentino, 1983). The main objective of this research was to determine the effects of iron supplementation on hemoglobin levels of pregnant women under ordinary field conditions without strict supervision.

More specifically, the objectives were:

1. Biochemical
  - a. to compare the effect of 60 mg. vs. 120 mg. in improving hemoglobin levels;
  - b. to compare the effect of slow-release preparations and a standard fast release preparation in increasing hemoglobin levels;
2. Clinical - to compare the side-effects of different types of iron supplements;
3. Social - to determine socio-demographic, social-psychological factors, and their relationship to compliance.

It is this third objective that is the concern of this study.

### Research Setting

The project study site was the province (state) of Bulacan, a geographical area of 2,625 square kilometers located in the Central Luzon Region, Philippines. Bulacan is some 21 kilometers north of Manila and has a total population of 1,096,046 as of 1980 (Republic of the Philippines, National Census and Statistics Office, 1980).

In the past, the people were primarily engaged in farming and fishing, but in recent years, an increasing proportion of the population has engaged in industries such as leather tanning, cement and chemical manufacturing. As of 1980, the province is now predominantly urban with an urban population of 577,578 as compared to the rural population of 518,468 (Republic of the Philippines, National Census and Statistics Office, 1980).

There were nine municipalities (counties) surveyed and these consisted of 157 barangays (villages); of these villages, 40 were included in the study. The language spoken in these areas is Tagalog.

The province of Bulacan was selected because in the past, it has extended the necessary logistics to various nutrition programs. In this project, for instance, the province has offered a laboratory to provide a place for the immediate examination of blood samples.

### Selection of the Sample

After the nine municipalities were selected, a census of each household was conducted in all the villages to identify the number of pregnant women. There were a total of 2789 pregnant women identified and these women were asked to go to the health center on a given time and date for their blood extraction and interview. From this, 1255 pregnant women actually reported to the health center for patient screening.

Pregnant women were eligible to participate in the iron supplementation project if they satisfied all of the following criteria:

1. their stage of pregnancy was between the 18th and 24th weeks;
2. at the time of the study, they were not taking iron and vitamin C preparations;
3. their initial hemoglobin values (Hb) were not lower than 8 g/ml; and
4. they voluntarily expressed willingness to participate.

After the initial screening, 508 pregnant women qualified to participate in the project. Although all agreed to participate in the study, six pregnant women were eliminated because they could no longer be located for the interview or they did not want to have further blood extraction.

A total of 502 pregnant women represented the eligible number of patients who were given iron supplements. A list of these mothers was made and this was considered as the sampling frame. Before the iron tablets were given, this cohort of mothers were interviewed to gather data on the socio-demographic and social-psychological factors related to compliance. The subjects were then followed throughout the period of supplementation, i.e., at 30, 60, and 100 days, during which the doctor interviewed them to collect data on compliance.

Of the 502 eligible subjects who were started on treatment, 52 subjects dropped out immediately after they were given iron supplements; some mothers were prohibited by husbands or relatives from further participation in the project. For these women, the compliance rate is zero. In addition, 101 subjects complied but only for part of the time; they quit at various points during the period of supplementation. Another 57 complied but delivered before the end of 100 days. Thus, only 292 pregnant women completed iron supplementation for a full 100 days. Compliance rates (defined below) are available for all 502 women.

#### Experimental Design

The research project used a stratified, restricted, randomized experimental design (Tan R, 1980). Subjects

were first stratified according to their initial hemoglobin levels; that is, either as anemic (8.0 to 10.9 g/ml.) or normal (11.0 and above g/ml.). After the subjects were stratified, they were then sequentially assigned to one of the eight treatments. This procedure was done randomly and provided for a balance in the number of anemic and normal subjects per treatment group.

### Treatments

The subjects in the research project were randomly assigned to one of eight treatment groups, as listed below.

#### Treatment

1 UNICEF, 60 mg., single dosage, fast release,  
unsupervised

2 UNICEF, 120 mg., double dosage, fast release,  
unsupervised

3 UNICEF, 60 mg., single dosage, fast release, supervised

4 UNICEF, 120 mg., double dosage, fast release, supervised

5 Prep.A, 100 mg., single dosage, slow release,  
unsupervised

6 Prep.B, 50 mg., single dosage, slow release,  
unsupervised

7 Prep.C, 100 mg., double dosage, slow release,  
unsupervised

8 Placebo (control) single dosage, unsupervised

These different treatment groups were classified according to certain criteria: amount of elemental iron, frequency of dosage, types of iron preparations and method of supplement distribution.

The amounts of iron range from 60 to 120 mg. The different treatments represent different amounts of iron that are needed to achieve a desired increment in hemoglobin levels.

Frequency of dosage refers to the quantity of iron supplements to be taken in a day, i.e. single dosage (1 tablet a day) or double dosage (1 tablet 2 times a day).

Types of iron preparations are distinguished according to the rate at which iron in the tablets is dissolved in the intestines.

Finally, the method of supplement distribution may either be supervised or unsupervised (ordinary field conditions). The supervised group of subjects included those who were closely watched everyday to ensure that they took the prescribed tablets. On the other hand, the unsupervised group consisted of mothers who were given one month's supply of iron tablets, and were instructed on how and when to take the tablets.

Of these criteria, the frequency of dosage and the types of iron preparations are elsewhere observed to have a relation to compliance. Studies suggest that as dosage increases, there is a fairly steep decline in compliance

(Gatley, 1968 and Brand et al., 1977). In addition, research indicates that the type of iron preparations influence the prevalence of side-effects (International Nutritional Anemia Consultative Group-INACG, 1977). Fast release preparations are associated with more upper gastrointestinal side-effects (nausea, epigastric pain, vomiting) than slow release preparations. Side-effects in turn reduce compliance (Richels et al., 1964 and Nelson et al., 1977).

The method of supplement distribution and the amount of iron are not included as predictors in this analysis. It is expected that supervised mothers will have higher compliance than unsupervised ones. Thus a decision was made to include only the unsupervised mothers (n=377) in the data analysis. This establishes a control for the possible influences of level of supervision on compliance, and reduces the possibility that other relationships will be confounded by the level of supervision variable.

The different amounts of iron were all expected to have the potency of reducing the prevalence of anemia, although the degree of potency varied according to the number of milligrams (mgs.). The greater the milligrams, the greater the potency to reduce anemia. Expectedly, the greater the potency of the tablet in reducing anemia, the higher the rate of compliance for that amount. It is difficult, however, to use this factor as a determinant of

compliance. There are several reasons for this. First, the NCP research project has shown that the effectiveness of the amount of iron contained in the iron preparation is in itself influenced by compliance (Florentino et al., 1983). Second, an examination of the influence of the amount of iron on compliance is an intricate clinical problem which is outside the venue of this socio-cultural study. Third, the interaction effects between the amount of iron and side-effects is an involved relation which requires medical expertise.

#### Data Collection Method

Two kinds of interview schedules were used to collect data.

##### 1. Interview schedule on factors which affect compliance.

These interviews consisted of socio-demographic and social-psychological variables and were administered only at one point in time, at baseline, before the iron tablets were given to the pregnant women.

The interviewers were mostly college graduates except for one local interviewer who reached only the second year of college. All were experienced in conducting field interviews. Also, the interviewers attended a one-week training on interviewing techniques. The instrument was also pre-tested in another village. On the average, the interview of each pregnant woman took one hour. This was conducted in Tagalog, the native language.

2. Another interview schedule was used to solicit information on the number of iron tablets taken. The interview was conducted by the doctor at 30, 60, and 100 days of supplementation.

### Measurement of the Variables

#### Compliance

The dependent variable used in this study was mothers' compliance, which was defined as the percentage of the prescribed number of tablets actually taken by the pregnant women during a given period. The data were obtained through : (1) pill count and (2) self-report of the pregnant women.

For the pill count, the process is summarized as follows. The nurse verified the number of tablets that were prescribed to the women from the medical record. After this, the nurse requested the women to show their bottles of iron tablets. The number of tablets was then determined and recorded. She/he informed the doctor of the pill count. This number was checked against the number when the bottles were first given.

Mothers were then interviewed. Data were obtained by asking the following questions:

1. Do you take your iron tablets everyday as prescribed?
2. If the response is yes: then they are asked,  
How many tablets per day do you take?

How many tablets have you taken throughout the 30, 60, and 100 days?

3. If the response is no: then they are asked,  
How many tablets did you actually take?  
What were your reasons for taking only  
this number of tablets?

Reasons for not taking the tablets were then recorded.

The process which was described above allowed for a counter check of data obtained from mother's self-report and the pill count. The final measure of the total number of tablets taken was based on the pill count, which was however, corrected according to the mother's self-report data. Compliance was then operationalized in terms of a compliance rate. The estimation for the compliance rate is given below:

$$\text{CRATE} = \frac{T}{N \times D} \times 100$$

where: CRATE is the compliance rate in percent

T is the total number of tablets taken, as  
indicated by a pill count

N is the total number of days of iron  
supplementation

D=1 for single dose

=2 for double dose

## Independent Variables

The independent variables examined in this study consisted of the following variables.

### Socio-Demographic Variables

1. Age: Mother's age was recorded in years and were checked for accuracy by asking the exact birthdate.
2. Education: Mother's education was coded into five categories.
  - (0) less than sixth grade (0-5 years);
  - (1) elementary school completed (6 years);
  - (2) some high school (7-10 years);
  - (3) high school graduate (11 years); and
  - (4) college level (12-15 years).
3. Occupation: Information on mother's occupation was obtained by asking her occupation within the last twelve months. Mother's occupational classification included four categories.
  - (0) housekeeper
  - (1) unskilled worker
  - (2) semi-skilled worker
  - (3) skilled
4. Number of children living with parents

5. Number of pregnancies
6. Weeks of pregnancy (age of gestation)

#### Treatment-Related Factors

Two treatment-related variables were included. The first referred to the type of iron tablets prescribed and were categorized as: (0) fast release preparations (1) slow release preparations, and (8) placebo or control. The second referred to dosage of iron tablets and were classified as (1) single or (0) double dosage. In this analysis, mothers who belong to the control group will be considered in the single dosage group.

#### Social-Psychological

##### 1. Attitudes of Pregnant Women Toward Health Center Workers

A Likert-scale was used to measure mothers' attitudes toward health center workers. It consisted of five items.

1. adequacy or inadequacy of staff to attend to patients' needs;
2. ease or difficulty in asking questions from health center workers;
3. sufficient or insufficient concern for the health of the mothers;
4. equal or unequal treatment of patients; and
5. whether or not workers lose their temper with patients.

Respondents were measured on a scale of 0 (least) to 4 (most) favorable. The five items which comprised the total attitude scale had a score ranging from 0, indicative of a very negative or unfavorable attitude towards health workers, to 20, indicative of a very positive or favorable attitude.

## 2. Health Behavior

This factor refers to the mothers' use of special health practices and their use of the health services during pregnancy. Special health practices were measured in terms of two items: 1) intake of medications after childbirth; and 2) help-seeking during an illness. Responses for both items were scored as either 1 (yes) or 0 (no). Moreover, the mothers were further probed on the sources of information on the medications taken and were also asked the reasons for taking these medications. In regard to seeking medical advice during an illness, the mothers were also asked the type of health practitioner from whom they asked medical assistance. The two items were then combined into a two-item Health Behavior variable which was created to have a better measure of health practices.

The use of health services during pregnancy were measured in terms of three indicators: 1) whether or not mothers asked for help during the present pregnancy; 2)

the month of pregnancy during which help was asked; and 3) frequency of assistance.

### 3. Health Beliefs

This factor consists of two variables: 1) traditional health beliefs about the causes of illness; and 2) traditional health beliefs about pregnancy. These variables were measured by asking the mothers whether or not they had folk beliefs about the causes of illness as well as folk beliefs about pregnancy. Answers were coded 1 (yes) and 0 (no). Moreover, in order to gain more insight into such folk beliefs, examples of these beliefs were also gathered.

### 4. Knowledge About the Benefits of Vitamins

This variable was measured with the question, "Is there a need to take vitamins during pregnancy? Why?". Why "vitamins" was used instead of "iron supplements" needs clarification. The reason for this is that in general, the sample of pregnant women has no prior experience with iron supplements as treatment for nutritional anemia. Few respondents understood the term "iron supplements" as a form of mineral supplement; similarly, only a few understood the diagnosis called anemia. Thus, the term "vitamins" was used because it is a generic name for any health-improving intervention with which most mothers were familiar.

## Data Analysis

Several statistical techniques will be employed in the analysis of data.

1. Univariate analysis. Percentages, means, and standard deviations will be used to describe the sample on the variables being measured.
2. Bivariate analysis. The relationship between each independent variable and the dependent variable will be examined. This will be accomplished by first categorizing the variables and then performing the bivariate analysis.
3. Multivariate analysis. Multiple regression techniques will be used in the analysis in order to determine the extent to which the dependent variable is explained by the independent variables. As a first step, the zero-order correlations among the independent variables will be examined. This procedure will suggest whether problems of multicollinearity exist. Then, stepwise multiple regression techniques will be employed. The stepwise analysis will include six variables classified as socio-demographic factors, four social-psychological variables, and two treatment-related variables. Stepwise

procedures utilizing the selection parameters available in SPSS will permit the identification of a subset of predictors that have significant independent relationships with compliance rate. These predictors will constitute the final model for explaining variations in compliance. Given that the current study is exploratory, a significance level of  $p < .10$  was used in evaluating the statistical significance of all relationships between variables. Such a significance level keeps the probability of Type I error at a reasonably low level, while also going some way toward minimizing the probability of Type II error.

## CHAPTER 3

### RESULTS

The purpose of this chapter is to present the findings in answer to the research questions posed in Chapter 1. Descriptive statistics, means, standard deviations and frequencies of each variable will be presented in the first section of the chapter. In addition, the means and standard deviations of the dependent variable, compliance rate, among subgroups in the sample will be provided using the breakdown procedure. In the second section, findings will be reported regarding the zero-order relationships between the socio-demographic, social-psychological, treatment factors, and compliance rates. The third section will deal with testing for the relationship of fourteen independent predictors on compliance rate using regression analysis.

The presentation and discussion of results apply to 377 pregnant women who were classified as unsupervised, that is, the mothers were given one month's supply of iron tablets, and were instructed on how and when to take the tablets. This number represents 75 percent of the sample of pregnant women surveyed. Although complete data were obtained for 502 subjects, the remainder of the sample (125 women) were not included in the analysis. This group of 125 were subjects who were closely supervised every day

to ensure that they took the prescribed tablets. Their exclusion creates a control for the possible effects of level of supervision on compliance behavior, and ensures that the results will not be confounded by this extraneous variable. The mean compliance rate for the unsupervised group (n=377) was 56.09, while the mean compliance rate for the supervised group (n=125) was 68.49.

Chapter 2 defined the measures used for the variables in the study. Tables 3.1 through 3.15 give a general profile of the sample, that is, present results of the data analysis for each of these variables. The means of the continuous variables are shown in Table 3.1, while the rest of the tables present the frequencies of the dichotomous and ordinal level variables used in the study.

#### Socio-Demographic Variables

The data in Table 3.1 suggest that at the time of interview, the mean age of the pregnant women was 26.89 years. Additional data further suggest that our sample of pregnant women is still in the beginning of their child-bearing years: the average number of pregnancies for the sample is 3.51, and the average number of children staying with parents is 2.51. Finally, at the time of interview, most of the women were in their second trimester of pregnancy, i.e., 21.13 weeks.

Table 3.1: Descriptive Statistics for Study Variables

Variable	Description	Mean	S.D.	Number of Cases
CRATE	Compliance Rate	56.09	31.68	377
VA12	Age of Mother	26.89	6.33	376
VB6	Children Staying with Parents	2.51	1.90	313
VD11	No. of Pregnancies	3.51	2.36	377
VG5	Weeks of Pregnancy	21.13	2.09	377
ATTHCTR	Attitude Towards Health Center Workers	3.10	.48	228

In Table 3.2 the mother's low education attainment reflects a pattern typical among women in the rural areas. The combined categories of mothers who are elementary school graduates and those who had less than six years of education composed 68 percent of the sample. The high percentage of women in this education category is found for the country as a whole. In 1973, the average wife had about 5 years of formal education (Castillo, 1979).

Table 3.3 presents the data on the mothers' employment classification. For the total sample of 377 unsupervised women, slightly over two-thirds (68.4 percent) indicated that they were housekeepers. Of those who were classified as gainfully employed, a little less than a fourth were skilled workers who performed jobs classified as craftsmen, production process workers and laborers. For example, some of the women were sewers, embroiderers and tailors. Semi-skilled workers who comprised 7 percent were classified as small entrepreneurs of such businesses as variety stores, fish-stalls, woodcraft, shellcraft, bamboocraft and other home enterprises. The rest of the women performed unskilled labor consisting of farm work usually seasonal in nature.

#### Compliance

Compliance was assessed by the pill count and the mothers' self-report. A compliance rate calculated the

Table 3.2: Number and Frequency Distribution of Pregnant Women by Education.

---

Education	N	%
Elementary School Uncompleted	83	22.0
Elementary School Graduate	175	46.4
High School Uncompleted	48	12.7
High School Graduate	59	15.6
College Level	12	3.2
Total	377	100.0

---

Table 3.3: Number and Frequency Distribution of Pregnant Women by Occupation.

Occupation	N	%
Housekeeper	258	68.4
Unskilled Worker	6	1.6
Semi-Skilled Worker	27	7.2
Skilled Worker	86	22.8
Total	377	100.0

percentage of the prescribed number of tablets actually taken by the women for a specific length of time. As shown in Table 3.1, of the 377 unsupervised pregnant women, the mean compliance rate is 56.09. Comparative data for the supervised group of women (n=125) shows a mean compliance rate of 68.49. The median compliance rate for the supervised group was computed as 85.50, compared to 58.00 for the unsupervised group.

#### Treatment-Related Factors

Table 3.4 shows data on dosage of iron tablets, which was defined in Chapter 2 as the quantity of iron supplements to be taken in a day. Sixty-seven percent of the pregnant women were prescribed single dosage tablets, that is one tablet a day. According to the INACG Report (1981), the high prevalence of iron deficiency anemia especially found in developing countries influenced this dosage schedule. The amount of elemental iron contained in the single dose tablet, however, differs; the greater the amount, the more side-effects are expected to occur. Thus, the large amounts of elemental iron needed in a single dose and the associated side-effects led to the development of slow or controlled-release iron preparation as alternate forms of iron supplements.

Table 3.5 presents data on the percentage of women who were prescribed different types of iron preparations.

Table 3.4: Number and Frequency Distribution of Pregnant Women by Dosage of Iron Tablets

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<u>Dosage</u>	<u>N</u>	<u>%</u>
Single	252	66.8
Double	125	33.2
Total	377	100.0

---

Table 3.5: Number and Frequency Distribution of Pregnant Women by Type of Iron Preparation (Release Rate).

Release Rate	N	%
Fast	128	34.0
Slow	185	49.1
Placebo	64	17.0
Total	377	100.0

Among the 377 unsupervised women, 49 percent were prescribed slow-release preparations, 34 percent were given fast release preparations, and 17 percent were given placebo tablets.

### Social Psychological Variables

#### 1. Attitudes Toward Health Center Workers

The five-item scale which measured attitude toward health center workers was responded to in terms of a 5-point interval, ranging from 0 to 4. High scores on this variable indicated a favorable attitude. Table 3.1 shows data on the variable ATTHCTR; the 3.10 mean suggests that, in general, the sample of pregnant women hold favorable attitudes toward the health center workers. The items included were:

25. Do you think the health center is adequately staffed to attend to patients' needs?
27. Do you find it difficult to ask medical information/advice from health center workers?
29. Do you think the health center workers show sufficient concern for the health of the patients?
31. Do the health center personnel always treat patients equally?
33. Are there health workers who lose their temper over the patients?

The scale has a reliability coefficient of .51, which is low by the usual standards of hypothesis-testing research, but is perhaps more acceptable in an exploratory study of this type.

## 2. Health Behavior

Several variables measured health behavior. Item 38 refers to the intake of medications after childbirth and, as Table 3.6 shows, 71 percent of the women took some form of medication. Sources of information about these medications are family members and relatives, or neighbors and friends. Note that when further probed on reasons for taking medications, responses are suggestive of both folk remedies and medical treatment prescribed by doctors and nurses. For instance, women use herbal preparations to remove "dirty blood from the body," for "bathing purposes," "to facilitate drying of the fresh uterus," for the "treatment of stomach ache," or to "induce mother's milk." On the other hand, responses which indicate modern treatment include: "to prevent an infection," "to prevent a hemorrhage," "to improve mother's health," and "to prevent a relapse."

Item 50 concerned help-seeking behavior during illness. As Table 3.7 indicates, a little less than half, 46 percent, sought the advice of a health practitioner during an illness. However, although the medical doctor

Table 3.6: Number and Frequency Distribution of Pregnant Women by Intake of Medications After Childbirth

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Intake of Medications	N	%
Yes	218	70.6
No	91	29.4
Total	377	100.0

---

Table 3.7: Number and Frequency Distribution of Pregnant Women by Help-Seeking Behavior During an Illness

Help-Seeking Behavior During an Illness	N	%
Yes	172	45.7
No	204	54.3
Total	376	100.0

is popularly sought for advice concerning illness, a few women still prefer to ask medical advice from a folk practitioner.

A variable called HBEHAV was then created from items 38 and 50. Table 3.8 shows that only 15 cases or 17 percent did not take any medications after delivery and did not seek advice from a health practitioner. Conversely, about a third, 32.5 percent, engaged in both types of health behavior.

Assessments of help-seeking behavior during the present pregnancy included items 10, 12, 13 and are listed as follows:

10. Have you asked help from the Center for this present pregnancy?
12. In your present pregnancy, at what month did you first ask for medical help?
13. How often do you ask for medical help?

Table 3.9 shows that almost 60 percent of the pregnant women asked medical help for their present pregnancy. Of those who did, 143 (38 percent) asked medical advice from the health center.

Moreover, Table 3.10 shows data on the month in which medical help was sought. Of 196 women who responded to the question, 56, or 29 percent, asked medical help during their fifth month of pregnancy.

Table 3.8: Number and Frequency Distribution of Pregnant Women by Certain Types of Health Behavior.

Health Behavior	N	%
No	15	16.6
Either used medicines after delivery or asked help from a medical practitioner	157	51.0
Used medicines after delivery and asked help from a medical practitioner	100	32.5
Total	308	100.0

Table 3.9: Number and Frequency Distribution of Pregnant Women by Help-Seeking Behavior (Present Pregnancy).

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Did you seek help from health center during the present pregnancy?	N	%
Not yet	153	40.6
Yes, private medical practitioner	81	21.5
Yes, health center	143	37.9
Total	377	100.0

---

Table 3.10: Number and Frequency Distribution of Pregnant Women by Help Seeking Behavior (Month of Pregnancy)

	N	%
First	9	4.6
Second	26	13.3
Third	47	24.0
Fourth	42	21.4
Fifth	56	28.6
Sixth	16	8.2
Total	196	100.0

Table 3.11 shows that of 196 women, 56 percent sought medical advice twice during the present pregnancy.

### 3. Folk Health Beliefs

Pregnant women were said to hold "folk" beliefs about health if they answered yes to the questions: "Do you have (folk) beliefs about the causes of illness?", and, "Do you have (folk) beliefs about pregnancy?." A total of 229 (61%) had "folk" beliefs about the causes of illness, and 189 (50%) had "folk" beliefs about pregnancy. Tables 3.12 and 3.13 shows the results for these variables. A look at the responses for examples of beliefs about the causes of illness shows that pregnant women associate illness with natural and supernatural factors. Based on unstructured interviews with the women, some examples of folk health beliefs about the causes of illness were gathered. Some of these are:

1. If one comments on the healthiness of the child, she/he invites the curse of evil spirits and the child will become sick.
2. If one takes a bath when tired then she/he will have muscle pains or influenza.
3. If "bad air" blows on a person, then she/he will be sick.
4. If one envies another, then she/he gets a stomach ache.

Table 3.11: Number and Frequency Distribution of Pregnant Women by Help Seeking Behavior (Frequency)

Frequency	N	%
Irregular	11	5.6
Once During Pregnancy	28	14.3
Twice During Pregnancy	110	56.1
Once Per Month	36	18.4
Once Per Week	11	5.6
Total	196	100.0

Table 3.12: Number and Frequency Distribution of Pregnant Women by Folk Beliefs About the Causes of Illness

Frequency	N	%
Yes	229	60.9
No	147	39.1
Total	376	100.0

Table 3.13: Number and Frequency Distribution of Pregnant Women by Folk Beliefs About Pregnancy

Frequency	N	%
Yes	189	50.3
No	187	49.7
Total	376	100.0

In general, the data suggests that pregnant women tend to believe in both natural and supernatural causes of illness.

Similarly, folk health beliefs which relate to pregnancy show the combined influence of natural and supernatural factors. Based on unstructured interviews with the pregnant women, the following insights on folk health beliefs regarding pregnancy were obtained. For example:

1. If a pregnant mother lingers by the doorway, then she will have a difficult labor.
2. If a pregnant mother takes a walk at night, then the "aswang" (witch) will bring harm to the baby.
3. If a pregnant mother sits on a "bilao" (a large bamboo tray generally used for threshing rice) then her placenta will be stretched.
4. If a pregnant mother wraps a towel around her head like a scarf, then her umbilical cord will likewise be twisted around the child's neck.
5. If a pregnant mother has a house constructed or repaired while she is pregnant, then she will have a difficult labor.

These statements indicate that although the women sought medical advice from modern health practitioners, a large number still retain traditional attitudes toward health.

Finally, a variable called HBELIEFS was then created from the variables folk health beliefs about the causes of illness and folk health beliefs about pregnancy. Table 3.14 shows that only a fourth of the mothers do not have folk beliefs about pregnancy. A large number, 38%, possess one of these folk beliefs, either folk beliefs about the causes of illness or folk beliefs about pregnancy. Moreover, an almost equal proportion of mothers possess both types of folk beliefs.

#### 4. Knowledge about the Benefits of Vitamins

In addition to "folk" health beliefs, mothers were also asked about the benefits of vitamins during pregnancy. They were asked, "Is there a need to take vitamins during pregnancy?" Table 3.15 shows that three-fourths of the mothers believe that vitamins are needed during pregnancy.

#### The Independent Variables and Compliance

Table 3.16 presents the mean compliance rates of the respondents by age. Note that as the mothers' ages increase, there is a slight increase in the mean compliance rate. Pregnant women who belonged to the age group of 35 to 49 years had the highest mean compliance rate, that is, 58.02. The differences in compliance rate between age groups however, is low; the analysis of variance gives an F value of .204 with significance level

Table 3.14: Number and Frequency Distribution of Pregnant Women by "Folk" Belief (Illness, Pregnancy).

Health Beliefs	N	%
None	96	25.5
Yes, have folk beliefs about the causes of illness or pregnancy	142	37.8
Yes, have both folk beliefs about the causes of illness or pregnancy	138	36.7
Total	377	100.0

Table 3.15: Number and Frequency Distribution of Pregnant Women by Knowledge About the Benefits of Vitamins During Pregnancy

Benefits of Vitamins During Pregnancy	N	%
Yes	281	74.7
No	95	25.3
Total	376	100.0

Table 3.16: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Age Group.

Age Group	COMPLIANCE RATE		
	Mean	S.D.	N
14-24	55.09	31.31	156
25-34	56.80	31.59	174
35-49	58.02	33.09	46
Total	56.24	31.59	376

F = .204

Significance = .8159

equivalent to .8159. Thus, there is very little relationship between compliance and age.

Table 3.17 reports the relationship between the mothers' education and compliance rate. The relationship is weak, as indicated by the analysis of variance procedure. The F value = .437, and the given significance level is .6461. Examination of the table shows that there is no consistent result; the mean compliance rate for women with less than elementary education (58.23) is highest among the three subgroups. However, the next highest compliance rate is reported among women with high school education and above (56.89). Finally, the lowest mean compliance rate is found among elementary school graduates (54.53). Thus compliance and education are not related.

Table 3.18 presents data on occupation and compliance rate. There is little relationship between these two variables. In comparison with the other two groups, housekeepers and skilled workers, unskilled and semi-skilled workers have the highest compliance rate, which is 61.53. The analysis of variance gives an F value of .535 with significance level equivalent to .5862, suggesting that there is very little relationship between these two variables.

The results for the relationship between number of children staying with parents and compliance rate is shown

Table 3.17: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Education.

Education	COMPLIANCE RATE		
	Mean	S.D.	N
Less than elementary	58.23	29.07	83
Elementary school graduate	54.53	32.57	175
High school and above	56.89	32.23	119
Total	56.09	31.68	377

F = .437

Significance = .6461

Table 3.18: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Occupation.

Occupation	COMPLIANCE RATE		
	Mean	S.D.	N
Housekeeper	55.49	31.97	258
Unskilled and semi-skilled	61.53	29.43	33
Skilled	55.78	31.79	86
Total	56.09	31.68	377

F = .535

Significance = .5862

in Table 3.19 There is little relationship between these two variables; the analysis of variance gives an F value of .581, and a significant level of .4464. However, compared to mothers with 0 to 3 children, the mean compliance rate (59.64) is higher for women who have 4 to 11 children. Thus the number of children staying with parents and compliance rate are not related.

Table 3.20 indicates that the number of weeks pregnant and compliance rate are weakly related. The analysis of variance procedure gives an F value of 1.255 and the given significance level is .2634. Comparing the compliance rates of the two subgroups, women early in their pregnancy (18-21 weeks) tend to have a slightly higher level of compliance (57.81). Therefore, number of weeks pregnant and compliance rate are not related.

The two treatment-related factors were similarly tested and the results are shown in Tables 3.21 and 3.22. The F value is 2.036 and the statistical significance level is .1545. It should be noted that the mean compliance rate for those who were prescribed double dosage (52.79) was lower than those who took single dose tablets (57.73). On the other hand, the release and compliance rates show a low relationship with an F value of .147 and a significance level of .8630. An examination of the means show that of those who took fast release preparations, the compliance rate is slightly lower

Table 3.19: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Number of Children Staying With Parents.

Children Staying With Parents	COMPLIANCE RATE		
	Mean	S.D.	N
0-3	56.35	31.99	243
4-11	59.64	30.89	70
Total	57.09	31.73	313

F = .581

Significance = .4464

Table 3.20: Means and Standard Deviations of Compliance Rate of Pregnant Mother by Number of Weeks Pregnant.

---

Number of Weeks Pregnant	COMPLIANCE RATE		
	Mean	S.D.	N
18-21	57.81	32.06	200
22-24	54.15	31.22	177
Total	56.09	31.68	377

---

F = 1.255

Significance = .2634

Table 3.21: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Dosage.

---

Dosage	COMPLIANCE RATE		
	Mean	S.D.	N
Double	52.79	33.59	125
Single	57.73	30.62	252
Total	56.09	31.68	377

---

F = 2.036

Significance = .1545

Table 3.22: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Release Rate.

---

Release	COMPLIANCE RATE		
	Mean	S.D.	N
Fast	54.85	30.77	128
Slow	56.75	32.98	185
Placebo	56.64	32.74	64
Total	56.09	31.68	377

---

F = .147

Significance = .8630

(54.85) as compared to those who took either slow-release (56.75) or placebo (56.64) tablets. Hence, there is little relationship between on the one hand, dosage and compliance, and release rate and compliance.

In Chapter 2, the variable attitude towards health center workers, ATTHCTR, was described. Table 3.23 presents the relationship between this variable and compliance rate. The original five-point scale was collapsed into two categories (i.e., unfavorable and favorable). Women who had an overall attitude score above the mean which is 3.17 were placed in the "favorable" category and those with scores below, in the "unfavorable" category. Test of significance using analysis of variance showed little relationship between these two variables. The F value was computed with a value of .422 and the significance level was equivalent to .5166. Thus, there is no relationship between attitudes toward health center workers and compliance.

Health behavior was measured in terms of (1) help-seeking during the present pregnancy, (2) use of medications (traditional or modern) after delivery, and (3) help-seeking from a medical practitioner for feelings of illness in general. Table 3.24 presents the results of the first item. Those who had asked help from the health center for the present pregnancy were the high compliers (60.17). On the other hand, those who asked for medical

Table 3.23: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Attitude Towards Health Center Workers.

Attitude Towards Health Center	COMPLIANCE RATE		
	Mean	S.D.	N
Unfavorable	57.68	32.10	101
Favorable	60.44	31.66	127
Total	59.21	31.82	228

F = .422

Significance = .5166

Table 3.24: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Help-Seeking Behavior During Pregnancy.

---

Did you seek medical help during the present pregnancy	COMPLIANCE RATE		
	Mean	S.D.	N
Not yet	54.26	32.36	153
Yes, private medical practitioner	52.34	31.32	81
Yes, health center	60.17	30.92	143
Total	56.09	31.68	377

---

F = 2.018

Significance = .1344

help from private practitioners were the low compliers (52.34). The non-seekers of medical help, however, had a compliance rate which does not differ greatly from the rest of the group. A test of the relationship between help-seeking behavior during pregnancy and compliance rate using analysis of variance shows an F value of 2.018 and a significance level equivalent to .1344. Thus, little relationship is found between help-seeking behavior during pregnancy and compliance.

In addition, help-seeking behavior for the present pregnancy was measured in terms of the month in which medical assistance was sought. Table 3.25 shows little relationship between these two variables. The analysis of variance calculated an F value of .001, and a significance level of .9812. Moreover, when the means of the two subgroups are compared, there is no discernible difference observed. Thus, the month in which medical assistance was sought and compliance are not related.

Another item used to measure help-seeking behavior was the frequency of assistance and the results are presented in Table 3.26. The mean compliance rates of mothers in the two categories do not differ significantly. The analysis of variance gives a very low value,  $F=.001$ , and the significance level is equivalent to .9790.

Table 3.27 shows the results of both the second and the third measures. (health practices). Compared to the

Table 3.25: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Month of Medical Help.

---

Month of Medical Help	COMPLIANCE RATE		
	Mean	S.D.	N
first to fourth	56.02	32.81	124
fifth to sixth	55.91	29.17	72
Total	55.98	31.44	196

---

F = .001

Significance = .9812

Table 3.26: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Frequency of Medical Help.

Frequency of Medical Help	COMPLIANCE RATE		
	Mean	S.D.	N
Irregular	55.95	30.98	149
Regular	56.09	33.21	47
Total	55.98	31.44	196

F = .001

Significance = .9790

Table 3.27: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Medication-Taking and Medical Help-Seeking (Illness).

Take Medications/Asked Medical Help	COMPLIANCE RATE		
	Mean	S.D.	N
No	55.46	33.91	51
Either used medicines after delivery or asked help from a medical practi- tioner	54.48	31.28	157
Both	62.78	30.75	100
Total	57.33	31.68	308

F = 2.222

Significance = .1102

other two groups (those who did not engage in medication taking or help-seeking during an illness and those who engaged in either one), the women who used some form of medication after a delivery and who sought the help of a medical practitioner concerning a health problem had a higher mean compliance rate (62.78). The analysis of variance indicates a trend towards statistical significance,  $F=2.222$  and the significance level is .1102. Hence, there is a slight relationship between health practices and compliance.

Health beliefs consisted of two measures. Mothers were asked if they had (folk) beliefs about the causes of illness, and if they had (folk) beliefs about pregnancy. Interestingly, women who had both (folk) beliefs about the causes of illness and pregnancy were better compliers (60.71) in comparison with either of the two other groups. The analysis of variance test shows a trend towards statistical significance, with  $F=2.32$  and the significance level is .0996. Thus, there is a slight relationship between health beliefs and compliance. Table 3.28 presents data on health beliefs held by the pregnant women.

Knowledge about the benefits of vitamins was measured in terms of the question, "Is there a need to take vitamins during pregnancy?" Table 3.29 presents the results. As expected, women who answered yes tended to be

Table 3.28: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Health Folk Beliefs (Causes of Illness, Pregnancy).

Health Folk Beliefs	COMPLIANCE RATE		
	Mean	S.D.	N
None	53.67	31.53	96
Yes, have folk beliefs about causes of illness or pregnancy	53.26	32.53	142
Yes, have folk beliefs about causes of illness and pregnancy	60.71	30.69	138
Total	56.10	31.72	376

F = 2.32

Significance = .0996

Table 3.29: Means and Standard Deviations of Compliance Rate of Pregnant Mothers by Knowledge About the Benefits of Vitamins During Pregnancy.

---

Need Vitamins During Pregnancy	COMPLIANCE RATE		
	Mean	S.D.	N
No	50.74	30.02	95
Yes	57.91	32.12	281
Total	56.10	31.72	376

---

F = 3.657

Significance = .0566

better compliers (57.91) compared to those who said no (50.74). Note that the analysis of variance test shows a significant relationship between these two variables, with an F value of 3.657 and significance level equivalent to 0.05666. Thus, perceived knowledge about the benefits of vitamins during pregnancy and compliance are related.

#### Zero-Order Correlations Between Study Variables

Table 3.30 presents the zero-order correlations among the socio-demographic and treatment variables, and the dependent variable, compliance rate. The inter-correlations between the independent variables are low except for the correlations between number of children staying with parents and age of the pregnant mother ( $r=.664$ ), and the number of pregnancies and age of mother ( $r=.667$ ). Similarly, the number of pregnancies and the number of children staying with parents are highly correlated ( $r=.923$ ). These high correlations may contribute to multicollinearity problems in the subsequent regression analysis.

The correlations of the socio-demographic predictors with compliance rate are also low, and none of these correlations are statistically significant. While the correlations are low, the direction of the relationships is important to note. Of the six independent variables, only two of these, education and number of weeks pregnant, correlate negatively with compliance rate.

Table 3.30: Pearson Correlations Between Socio-Demographic Variables, Treatment-Related Factors, and Compliance Rate.

	1	2	3	4	5	6	7	8	9
1. Age of Mother	-----								
2. Education	-.18	-----							
3. Occupation	.03	.03	-----						
4. Number of children	.66**	-.22	-.11	-----					
5. Number of pregnancies	.67**	-.20	-.13	.92**	-----				
6. Number of weeks pregnant	.07	-.05	.08	.09	.04	-----			
7. Dosage	.06	-.02	-.01	.03	.05	-.06	-----		
8. Release	.01	-.00	-.07	.04	.02	.03	.34	-----	
9. Compliance rate	.05	-.01	.02	.01	.05	-.07	.07	.01	-----

\*p < .10; \*\*p < .05 (two-tailed test)

Table 3.30 also shows correlations between the two treatment factors, dosage and release rate, and compliance rate. Both treatment factors have weak positive relationships with compliance rate. The correlations are .07 and .01 for dosage and release rate respectively.

Table 3.31 shows the intercorrelations among the social-psychological variables as well as their relationship with compliance rate. All of the seven social-psychological variables have positive relationships with compliance rate. Of the seven correlations, three are statistically significant. The correlations between the combined variables, medication-taking and help-seeking during an illness, and compliance rate is .10 ( $p < .10$ ); that between perceived knowledge about the benefits of vitamins during pregnancy and compliance rate is .10 ( $p < .10$ ); and that between the combined variables, "folk" health beliefs about the causes of illness and "folk" health beliefs about pregnancy, and compliance rate is .09 ( $p < .10$ ). All the other variables have lower, non-significant correlations with compliance rate.

#### Regression Results

Table 3.32 presents the results of the regression analysis. The unstandardized and standardized regression coefficients for each of the fourteen independent variables are shown in columns one and two respectively.

Table 3.31: Pearson Correlations Between Social-Psychological Variables and Compliance Rates.

	1	2	3	4	5	6	7	8
1. Asked medical help (present pregnancy)	-----							
2. Medical help (month)	.16**	-----						
3. Medical help (frequency)	-.02	-.09	-----					
4. Health practices	.05	-.01	-.07	-----				
5. Knowledge about the benefits of vitamins during pregnancy	.13**	-.02	.01	-.07	-----			
6. Health beliefs	.05	.03	.03	.08	.07	-----		
7. Attitude towards health center workers	.08	-.02	.00	-.06	-.08	.00	-----	
8. Compliance rate	.08	.05	.01	.10*	.10*	.09*	.02	-----

\*p < .10; \*\*p < .05 (two-tailed test)

Table 3.32: Regression of Compliance Rates on Fourteen Independent Variables.

Variable	B	Beta
Age of mother	-.0130 (.5855)	- .003
Education	-.3196 (2.632)	-.0109
Occupation	.8087 (2.2042)	.032
Number of pregnancies	.5080 (1.5858)	.038
Number of weeks pregnant	-1.3369 (1.3786)	-.088
Dosage	5.5642 (6.2729)	.083
Release rate	-.2368 (1.0356)	-.021
Help-seeking during pregnancy	1.8056 (3.1513)	.050
Help-seeking (month)	1.9007 (2.2267)	.080
Help-seeking (frequency)	.2992 (3.1556)	.008
Medication-taking and help-seeking (illness)	3.0285 (4.084)	.065
Need for vitamins during pregnancy	6.4593 (6.5374)	.089
"Folk" beliefs about the causes of illness; "folk" beliefs about pregnancy	2.8382 (3.5222)	.070
Attitude towards health center workers	2.3545 (5.7354)	.035

$$R^2 = .046$$

Note: The values in parentheses are the standard errors of the B's.

While the zero-order correlations of the combined variables (medication-taking and help-seeking during an illness) perceived knowledge about the benefits of vitamins during pregnancy, and the combined variables ("folk" health beliefs about the causes of illness and "folk" health beliefs about pregnancy) with compliance rate were statistically significant, the regression results show that none of the three independent variables has a significant relationship with compliance rate. The likely explanation is that indirect relationships mediated through other variables contributed to the significant zero-order correlations. When these indirect relationships were factored out through statistical controls in regression analysis, the regression coefficients for medication-taking and help-seeking during an illness, knowledge about the benefits of vitamins during pregnancy, "folk" health beliefs about the causes of illness and "folk" health beliefs about pregnancy, became non-significant. All the other regression coefficients in Table 3.32 indicate non-significant relationships with compliance rate, which is consistent with the earlier zero-order correlation results. The  $R^2$  statistic indicates that about 5% of the variance in compliance rate is explained by the set of fourteen independent predictors.

In summary, the data analysis has revealed that all the potential determinants (socio-demographic, treatment, and social-psychological) were not significantly related to compliance rate. The next chapter will discuss the study results in the light of the literature on compliance in the United States, and will suggest a compliance model which is intended as a guide for future research.

## CHAPTER 4

### RELATED LITERATURE AND A PROPOSED MODEL OF COMPLIANCE

The purpose of this chapter is to present components of an integrated model of compliance with medical treatment. In doing so, it will evaluate the study in the light of existing models, in particular the health belief model. This is not to say that the health belief model is the only useful model for compliance. Obviously, an evaluation of a study cannot be made in a vacuum; it must be viewed against a certain set of criteria. As indicated in the literature overview in Chapter 1, the health belief model is the most empirically researched model. It is a useful point of reference. Other models, however, will also be considered in generating the proposed model of compliance.

The first section will attempt to integrate the study results with certain elements in the health belief model (HBM) which are hypothesized to be predictors of compliance behavior. It will consist of the following parts:

1. The health belief model factors, and the study result factors as these relate to compliance behavior;
2. The health belief model factors excluded from the study;

3. The study result factors which were not touched upon by the health belief model; and
4. Other factors not touched upon by either the study results or the health belief model.

This section ends with explanations on the inadequacies of the study results and the health belief model.

The second section will briefly summarize elements of the proposed model on compliance behavior as inferred from the discussion in the previous section. It is hoped that this model will contribute to a better understanding of compliance behavior in the Philippines.

#### The Health Belief Model Factors and the Study Result Factors: Relationship to Compliance

One important determinant of compliance proposed in the health belief model is health motivation; a substantial amount of literature has dealt with health motivation as a predictor of compliance behavior. As defined in the model, health motivation refers to the value of health to the individual. This definition, however, can have multiple interpretations. Such a definition of health motivation may have reference to health behavior and some investigators tend to believe that the two are distinct concepts. Fishbein and Ajzen (1975) make a distinction between health motivation and

behavior. However, even these authors assert that there is a clear connection between these constructs. Health motivations shape or influence intentions to perform behaviors and are good predictors of overt action. A number of studies have supported this latter possibility. For instance, in a study of mothers' compliance with medication regimen for their asthmatic children, Radius et al. (1978) refer to health motivations in terms of: worries about the child's health, giving the child vitamins, and owning a fever thermometer. Becker et al. (1979) defines health motivation as the mothers' concern about their children's health and their engagement in special health practices. Thus, the different studies' operational definitions of health motivations indicate a thin line between motivations and behavior. It is almost impossible to define motivations without some reference to their behavioral manifestations. In this study, health motivations of mothers is gauged in terms of certain health practices noted also by Becker et al. (1979). These health practices refer to the intake pattern of medications after a childbirth and help-seeking behavior during an illness.

### Result 1

The regression results show that, with controls, health motivation (inferred in this study in terms of

health practices) has no significant relationship with compliance rate. This result differs from the findings of a previously mentioned study of obese children (Becker et al. 1979). Health motivation was measured here in terms of several items listed as follows: (1) concern about the child's health compared with her other children and concern about the chance of illness, (2) concern index, (3) children get well without doctor's help, (4) take to doctor versus wait, (5) special health practices index, (6) concern about one's own health index, and (7) chance to keep the child on a diet. Becker et al. (1979) used multiple regression analysis where the weight change measures were regressed against belief indexes and items. Results showed levels well above the zero-order correlations obtained by any single study item, and the regression analysis showed that health motivation is a significant predictor of compliance behavior.

Likewise, Radius et al. (1978) used a multiple-item measure of health motivation such as: (1) worries about the child's health, (2) giving the child vitamins, and (3) owning a fever thermometer. He then used multivariate analysis and regressed health motivation measures against the children's compliance with the prescribed medical treatment for asthma. He found that mothers' general health motivation correlated significantly and positively with compliance.

The insignificant relationship between health motivation and compliance obtained in this study may be due to the use of only two-items (taking medications after a childbirth, and help seeking during an illness) to measure the construct health motivation. It is observed that a common denominator of the Becker et al. (1979) and Radius et al. (1978) studies is the use of multiple-item measures. The reliability of a measure can be improved by using a scale or a multiple item index of a construct. The study results and those obtained in the studies of health motivation suggest the need to more adequately operationalize health motivation and to improve reliability of the measure of this construct by using multiple items.

A second important dimension of the health belief model studied in relation to compliance is perceived beliefs about the benefits of the treatment regimen. Such beliefs on the benefits of treatment are of two types: prospective and retrospective. In general, prospective studies refer to what the mothers believe the treatment regimen or medication will do for them at the beginning of the therapy and then, how such a belief affects compliance. On the other hand, retrospective beliefs in benefits refer to belief in the efficacy of the medication during the therapy.

The anemia study used the prospective definition. It refers to perceived beliefs in the benefits of treatment in terms of perceived understanding or knowledge about the benefits of vitamins during pregnancy.

## Result 2

The regression results show that, with controls, the mothers' perceived knowledge about the benefit of vitamins during pregnancy is not predictive of compliance.

This result, except for one, contradicts the findings of existing studies on perceived knowledge of benefits and compliance. Taylor (1979) contends that health beliefs on perceived benefits measured before and after treatment are not predictive of compliance behavior. On the other hand, a number of retrospective studies show that perceived benefits from treatment is significantly related to compliance. For instance, beliefs in the ability of penicillin to prevent the occurrence of rheumatic fever, are found to be predictive of compliance (Elling, et al., 1960; Heinzelmann, 1962). Becker et al. (1979) also notes that perceptions related to benefits of the diet shows a significant relationship to weight loss. Kirscht et al. (1977) found that perceived efficacy or benefit of the anti-hypertension regimen is significantly associated with compliance. Overall, a large number of studies indicate that perceived benefit is a significant predictor of compliance.

As in the case of health motivation, the insignificant results found in the anemia study are partly due to the use of a single item measure. It is observed that measures of perceived benefit of the treatment consist of multiple item questions. A significant feature of the studies mentioned earlier is the use of multiple items to measure the construct. Thus, it is suggested that perceived benefit of treatment be measured in future studies as a multiple item variable.

The third and fourth components of the health belief model are additions to the model included by Becker (1974) and colleagues (Becker and Maiman, 1975). These are called "modifying" factors, that is, factors which alter or indirectly affect compliance.

The third determinant of compliance included in the health belief model and likewise used in this study is the category of factors called socio-demographic predictors. The use of socio-demographic factors as determinants of compliance has been considered by early investigators as a distinct approach to the study of compliance but in this study, it will be considered as a component of the health belief model.

### Result 3

The regression results show that, with controls, the socio-demographic factors are not significantly related to compliance behavior.

Haynes et al. (1979) comprehensive review (a total of 324 studies) of socio-demographic predictors of compliance behavior confirm to a large extent the results of the study. Among the socio-demographic variables examined in this review which are pertinent to the anemia study's findings are age, education, and occupation. While some studies show that such variables are found to be either positively or negatively related to compliance, a large number of studies point to the non-significant relationship of this set of determinants and compliance. For instance, Haynes et al. (1979) review a list of 77 studies which show no relationship between age and compliance; in contrast, 29 citations report a positive correlation, and 14 give a negative correlation.

This is also true of education. Forty-nine studies show no relationship with compliance, 24 studies report a positive relationship, and 3 studies point to a negative relationship.

Similarly, 22 research studies show no significant relationship between occupational status and compliance, 14 give a positive association, and only 1 shows a negative association. Moreover, studies conducted after the Haynes et al. (1979) review (Becker et al., 1979) confirm the same non-significant results.

The non-significant results found in the studies reviewed by Haynes et al. and the anemia study's results

demonstrate that differences in compliance and non-compliance occur among patients of all demographic types. The studies reviewed by Haynes et al. (1979) suggest that the use of socio-demographic variables as an explanation for compliance is not useful. Becker (1976) supports this view and states that socio-demographic variables do not present a unified conceptual explanation of, or hypotheses about differential compliance.

The fourth set of determinants of compliance described in the health belief model as another modifying factor which indirectly influence compliance is the patients' attitude towards care. This factor includes such elements as the patients' evaluation of the physician (or other health workers) and evaluation of the treatment facility. In this study, attitude towards care refers to the pregnant mothers' perceptions of the personal qualities of the health workers, their beliefs about the ability of health workers to provide medical advice or information, and their perceptions of the adequacy of the treatment facilities. As mentioned in Chapter 3, this factor consists of five Likert-type statements such as: 1) Do you think the health center is adequately staffed to attend to patients' needs?; (2) Do you find it difficult to ask medical information/advice from health center workers?; (3) Do you think the health center workers show sufficient concern for the health of the patients?; (4) Do

the health center personnel always treat patients equally?; and (5) Are there health center workers who lose their temper over the patients?

#### Result 4

The regression results show that, with controls, the scale which measures attitudes toward medical care is not predictive of compliance behavior.

The major reviews of the health belief model have not discussed the relationship between attitudes toward medical care and compliance. As noted earlier, this component has been included in the revised health belief model; however, research on attitudes toward care has originally been done in relation with health services utilization. For instance, Becker et al. (1977) examined mothers' opinions about the physicians' role in a child's medical care. This role refers to the physician's diagnosis of the child's complaint. It was concluded that a mother's agreement with the physician's diagnosis was a strong predictor of the use of well child services.

Moreover, previous studies investigated attitudes toward care in relation to patient satisfaction with the physician. Segall and Burnett (1980) studied the criteria by which patients evaluate their physicians. Of the criteria, patients' perception of the physicians affective, procedural, and administrative behavior and the

relationship of these to patient satisfaction seem to be most relevant to this study. The findings indicate that perceived physician conformity to patients' affective expectations is related to patient satisfaction more strongly than perceptions of the physician's conformity to procedural or administrative expectations.

Finally, research on attitudes toward care was used in past studies as determinants of patients' decision to continue with a physician-patient therapeutic relationship. The findings indicate that the physicians' socioemotional behavior is strongly related to the patients' decision to continue the relationship.

At present, only a few studies have examined the relationship of the patients' attitudes toward care and compliance. For example, Hulka (1979) designed a scale to measure patient satisfaction with the physician and then used this scale to predict compliance. The study findings show that among congestive heart failure patients, satisfaction with the physician is not significantly related to compliance. Overall, these studies indicate the importance of examining attitudes toward care as determinants of health behavior.

While the health belief model has identified the importance of attitudes toward care as a determinant of compliance, it is unfortunate that few investigations have suggested empirical measures of this variable. The

studies discussed above, however, suggest that the doctor-patient relationship is as critical to an understanding of compliance as the patients' health beliefs. In view of such urgency, the doctor-patient relationship will be discussed later as one of two alternative approaches to the study of compliance behavior.

Health Belief Model Factors Excluded from the Study:  
Relationship to Compliance

A determinant of compliance discussed in the health belief model which was not touched in the study is perceived susceptibility to an illness. This term refers to an individual's belief regarding the likelihood of a particular condition occurring. For instance, one would raise a question like, "What chance is there of your child getting the flu during this next year?". This definition of perceived susceptibility, however, seems to overlap with the earlier discussed concept of perceived benefit from undertaking a required health behavior. Perceived susceptibility, upon further examination, is a term which occurs prior to one's experience about the benefit of treatment. For instance, patients are asked about their perceived susceptibility to an illness even before a diagnosis is made. Taylor (1979) clarifies that a subject's perceived susceptibility to developing hypertension could be made only before the diagnosis of

hypertension is made. The prospective definition of perceived benefit suggests that once a certain health action is taken (e.g., take penicillin), there is a chance that certain benefits will be experienced (e.g., a person will not get rheumatic fever). It is, however, evident that a person's likelihood of complying (taking penicillin) is influenced by his/her prior subjective estimate that he is likely to develop a particular illness or condition (e.g., family members have had such illness).

In addition, while the health belief model has originally used the term perceived susceptibility, it later introduced the concept resusceptibility, which is employed where a diagnosis of illness has already been made. The reasoning here is that a person complies, not only because of the expected benefits from such a behavior, but also because the patient is aware of his susceptibility to the illness (where a diagnosis has been made). Thus, Heinzelmann (1962) demonstrated that college students took continuous penicillin prophylaxis (compliance behavior) in order to prevent another rheumatic fever attack (perceived benefits); but such a behavior is influenced by the fact that they have a history of contracting rheumatic fever (perceived resusceptibility).

In this study, perceived susceptibility to an illness was not examined. As was earlier pointed out, the sample

of women have little, if any, scientific knowledge of anemia as a condition which has serious consequences for the mother during pregnancy. Perhaps perceived susceptibility to anemia should have been included as a determinant of compliance if there were an experimental group of mothers who were given a certain amount of health education (i.e., booklet or lectures concerning anemia and its unfavorable consequences) as compared to a control group who have little or no such knowledge.

Moreover, perceived susceptibility as a factor which explains compliance could not be used in the study, for there seems to be an interplay of and sometimes conflicting ideas about the medical concept of anemia and mothers' ideas of anemia. A few examples of such misconceptions will clarify this point. First, mothers do not think of nutritional anemia as a condition in which the hemoglobin content of the blood is lower than normal; rather, they view anemia as "mababa ang dugo" or as a condition in which a person has low blood pressure. Because of this misconception, mothers then believe that vitamins are needed to improve their blood pressure. Second, mothers believe that anemia is a condition during pregnancy which is characterized by loss of appetite, and this view makes them believe that vitamins increase one's appetite. However, other perceptions about anemia are somewhat related to the medical concept. For example, the

medical literature reports that severe anemia increases the risk of maternal and fetal morbidity and mortality (INACG, 1977). During field interviews, it was observed that mothers refer to the dangers of anemia in terms of "pagdurugo" or severe hemorrhage during childbirth. Another example is the idea that even mild anemia has been shown in the medical literature to be associated with low birth weight; the women are aware that anemia will have serious effects on the baby's health. This condition is referred to by the mothers as "kulang sa timbang" or low birth weight. Finally, previous studies in the medical field indicate that anemia reduces work capacity (INACG, 1981); the women believe that anemia tends to make the mother physically weak, tired and unable to do household work. These examples indicate that the women do have some perceptions about the medical basis of anemia.

Furthermore, a few mothers have a medically accurate opinion about nutritional anemia. For instance, while the medical literature indicates that iron deficiency anemia is caused by an imbalance between the absorption of nutrient factors and the body's needs, and that this imbalance can arise because of low nutrient intake (Royston, 1982), some of the women believe that anemia is a result of poor nutrition. Moreover, there is also a good deal of medical evidence which suggests that iron deficiency decreases resistance to infection (INACG,

1981). Mothers suggest that anemia decreases one's resistance to infection and this in turn makes a mother sickly during pregnancy.

Similarly, another determinant of compliance described in the health belief model but which was not used in this study, is perceived severity of an illness. This variable refers to an individual's belief that the occurrence of a condition would have a moderately serious impact on one's life. Some examples of questions used to measure perceived severity of an illness are: "How seriously do you think hypertension can actually lead to a stroke?", and "How much does the child's weight problem disrupt his or her normal activities?." As mentioned in the discussion on perceived beliefs about one's susceptibility to an illness, the reason for this exclusion is partly due to the mothers' inadequate knowledge about anemia as a serious condition prevalent among pregnant women. Moreover, the insidious nature of anemia is not understood, that is, anemia does not easily become apparent until pregnancy advances.

Finally, a component of the health belief model examined in relation to compliance but which was not used in this study is perceived cost associated with following the medical regimen. This construct refers to an individual's belief in the costs associated with compliance; cost may mean not only financial cost but also

involves the notion of pain, discomfort and risk. Examples of questions which measure this variable are: "Did you ever miss taking your prescribed phosphorus medicine because it cost you a lot of money?" or "How difficult is it to solve this overweight problem?". Sometimes measures of this variable involve beliefs about the safety of a drug; patients are asked to agree or disagree with the statement, "Sometimes I worry that using this drug can cause negative side-effects."

Overall, Haynes' et al. (1979) review of the relationship between perceived costs and compliance shows that financial cost and perception of negative side-effects of the prescribed treatment are significantly related to compliance. While these predictions are generally supported in the literature, the anemia study did not consider financial cost because the iron tablets were given free to pregnant women. Similarly, the perception of negative side-effects was not studied because this aspect is being examined in the clinical aspect of the Nutrition Center of the Philippines research project.

In sum, the above discussion indicates that the women have some knowledge and attitudes about anemia, but these are not medically accurate. Thus, perceived susceptibility cannot be used as a predictor of compliance.

### Study Result Factors Not Touched Upon by the Health Belief Model

While the health belief model is concerned with the patient's subjective perceptions, another approach to compliance focuses on the disease and the mechanics of treatment. This approach, also called the medical model, involves an investigation of the features of the referral process, features of the clinical setting, and features of the treatment regimen. Of these components, only the features of the treatment regimen are pertinent to the anemia study.

Previous studies (Haynes et al., 1979) have dealt with a variety of aspects related to the treatment regimen such as: complexity (the number of medications prescribed and frequency of dosage), classes of medications given, duration of the treatment, dose-effects, and side-effects among others. In this study, the first two factors are used as determinants of compliance. Complexity of the regimen more specifically refers to the frequency of dosage (one tablet a day or twice daily) and classes of medications refer to the types of iron tablets used, that is, fast or slow release preparations.

### Result 5

The regression results obtained in this study reveal that, with controls, certain features of the prescribed

treatment regimen (frequency of dosage and classes of medications by release rate) are not predictive of compliance. Previous research on the relationship between the frequency of dosage and compliance partly support the results of this study. McInnis (1970), Lima et al. (1976) and Parkin et al. (1976) failed to find any correlation between the number of daily doses and compliance.

Some other studies, however, report a negative relationship between these two variables. Gatley (1968) and Brand et al. (1977) report that compliance declined as the frequency of dosing increased from once a day to four times a day.

Clinite and Kabat (1969) found a similar result; their study indicates that compliance is reduced but only after eight or more doses were prescribed daily. While these studies strongly suggest that multiple daily dosage (more than twice a day) is associated with low compliance, such a relationship remains to be further tested.

Some other investigations report that frequency of dosage is predictive of compliance, but its explanatory power is weak. For instance, Porter (1969) shows that dosage frequency is the second of nine factors contributing to compliance; however, its contribution is only 21 percent and is not statistically significant.

Overall, Haynes et al. (1979) summarizes in his review of these factors, that the influence of the number

of times per day that medications are to be taken on compliance remains unclear. In general, therefore, while some studies indicate a relationship between the frequency of dosage and compliance there is no clear consensus regarding the link between these two variables.

We shall now be concerned with a discussion of the relationship between the types of iron preparation and compliance. Chapter 2 describes the types of iron tablets used in this study. It also notes that certain oral iron preparations influence the prevalence of side-effects (INACG, 1977). Moreover, these side-effects are also influenced by the amount of elemental iron contained in both types of iron-preparations, and, in turn, these side-effects tend to adversely affect compliance (INACG, 1981). One research question which is raised in this study is to examine whether the slow-release iron preparations (associated with fewer negative side-effects) tend to increase compliance as compared to the fast release iron preparations.

The results of the anemia study, however, show that there are no discernible differences in the compliance rates of the pregnant women who were prescribed either fast release or slow release iron preparations. Such a finding is supported by Haynes et al. (1979) in their review of studies which investigate the relationship between classes of medication and compliance. They report

that in general, alternative oral medications for the same condition do not produce substantial differences in compliance. A possible explanation is that differences in the compliance rates of the women are dose-related (INACG, 1981). Thus, different doses of elemental iron contained in both fast release and slow release oral iron preparations will contribute to differences in negative side-effects experienced, and these differences will lead to variations in compliance. Therefore, it is important to study not just the type of iron preparation in relation to compliance. Attention should be given to the complex interactions among the three factors and their influence on compliance.

In addition to the features of the treatment regimen, two other variables (folk health beliefs about the causes of illness and folk health beliefs about pregnancy) were used as determinants of compliance in this study but were not included as elements of the health belief model. The questions asked were: "Do you have 'folk' health beliefs about the causes of illness? Why?" and "Do you have 'folk' health beliefs about pregnancy? Why?". These variables were included in this study since it was expected that such folk theories about illness and about pregnancy will influence why people comply or refuse to take their treatment medications.

The medical anthropology literature provides support for this contention. For instance, Kleinman (1977) suggests that each member of a culture carries an "explanatory model" of illness which is typical of the culture and which defines the nature of the illness and its appropriate treatment. Such an explanatory model can be rooted in both medical and folk theories of illness. The view proposed by Kleinman suggests that patients seek medical help equipped with their own system for classifying and understanding substances. Harwood's (1971) study of Puerto Ricans' hot-cold theory gives a good illustration of this point. The theory refers to the way in which food, medicines and bodily states are classified according to whether these are hot or cold. Patients who believe in this theory may be resistant to certain types of medical advice. For example, in pregnancy, according to Harwood, women avoid hot substances which are believed to irritate the fetus; some of these hot substances are vitamins and iron.

It is therefore important to understand that compliance is a result of the consistency between the patients' already established and highly meaningful belief system and the doctor's persuasive explanations on the need for a particular regimen.

### Result 6

The regression results show that, with controls, the combined variables, "folk" health beliefs about the causes of illness and "folk" health beliefs about pregnancy were not predictive of compliance behavior.

This study's non-significant regression results may be due to the need for a different conceptual and methodological approach to the study of compliance. The literature which deals with the socio-cultural anthropology of compliance and medication refusal supports this explanation. Amarasingham (1980) asserts that the various approaches to the study of compliance has provided only a limited understanding of the phenomenon. According to this author, compliance can best be understood by looking at the social and cultural meaning of medication outside and within the treatment. This requires a conceptual and methodological approach different from the often used survey techniques such as the constant comparative method (Shifflett, 1980).

The constant comparative method is a method of "discovering theory," that is, theory is used as a guide to control the process of data collection. The researcher constantly identifies theoretically relevant data, and at the same time, points out significant variables crucial to the emerging theory. This method limits the amount of data collected because only theoretically relevant data

are included. The process is accomplished through systematic coding and constant analysis. In short, it aims to develop a theory which is close to the data, and which permits clear operationalization of the variables for use in quantitative research.

Explanations on the Inadequacies of the Study Results and the Health Belief Model

The health belief model's contention that beliefs bring about health-related behaviors needs to be further examined. In this study, certain components of the model have been used to explain compliance behavior. These health beliefs were assessed before the iron tablets were administered. The findings show that health beliefs are not predictive of compliance. An explanation for this result is that health beliefs may develop as a patient takes a prescribed treatment (behavior), and then these concurrent beliefs further influence compliance behavior. Thus, beliefs measured before the prescribed treatment are not predictive of compliance. This argument is supported by the increasing theoretical and empirical evidence that behaviors may bring about changes in beliefs (Ajzen and Fishbein, 1977).

While a great deal of empirical research has been supportive of the prediction made by the health belief model, a few studies (Taylor, 1979) have questioned the

view that health beliefs occur prior to compliance. In comparison, health beliefs expressed after treatment were found to be consistent with compliance measured at the same point in time and these beliefs were also found to be predictive of subsequent compliance.

The anemia study represents only a preliminary effort in which general pretreatment health beliefs are used to predict compliance. There is a need to focus on pretreatment health beliefs as well as those which develop as a result of the treatment. This suggestion calls for a shift from descriptive, exploratory to longitudinal and experimental types of studies.

The non-significant regression results obtained in this study indicate the need to further examine the problem of constructing the operational measures of the different components included in the health belief model. In this study, belief variables are generally defined in terms of single-item measures. For instance, a question about whether vitamins are needed during pregnancy was used to represent a general health-belief construct perceived knowledge about the benefits of treatment. In comparison, measures of the components of the health belief model found in the literature are generally represented by multiple item scales. In order to obtain more reliable measures, the questions pertinent to a given dimension are combined into a scale. In the construction

of such a scale, several points need to be considered in order to test for adequacy. These steps include testing for the validity of the items relative to the component being measured, testing for the interrelationship among the items and then a check for internal consistency.

The Role of the Physician and Other Practitioners:  
Relationship to Compliance

Because of the limitations of the study and of the health belief model, future research should consider alternative approaches to the understanding of compliance. For instance, preceding discussions have focused on the patient's responsibility for compliance. However, current literature on compliance gives considerable attention to the fact that responsibility for compliance is also shared by others such as the doctor and social support groups. The following paragraphs will briefly summarize the key concepts and measures mentioned in the literature regarding these two. The review does not aim to be exhaustive but will point out components of the relationship between: 1) compliance and the doctor; 2) compliance and social support groups. These components will be considered in the proposed integrated model of compliance.

The idea that the doctor-patient relationship affects compliance stems from the view that it is not only the

responsibility of the patient. Such responsibility is likewise determined by the expert or the physician. He or she must share in affecting compliance from the patient through a harmonious interaction with him or her. The principal means by which the doctor promotes a harmonious interaction with the patient is through effective communication.

Investigators have typically analyzed the influence of effective communication in terms of: what kind and how much information best promotes compliance, and how communication in the practitioner-patient relationship is enhanced by the practitioner's interpersonal behavior towards the patient.

Studies which look into the relationship between the kind of information offered by the practitioner and compliance behavior indicate a positive trend. In these studies, the kind of information refers to a number of aspects. For instance, Francis et al. (1969) report that in a study of outpatient pediatric clinic, the parent's failure to receive an explanation of the diagnosis and cause of the child's illness results in noncompliance. Friedman (1979) gives a similar finding in another pediatric study. In both of these studies, concern with the etiology and meaning of the child's symptoms are found to be critical in promoting compliance. Other investigators suggest that a lack of information

concerning the problematic consequences of inadequate treatment results in poor compliance, or may even lead to dropping-out from treatment. Baekeland and Lundall (1975) report that in long-term medical care for illnesses such as hypertension and diabetes, poor instruction brings about noncompliance. The studies reviewed above suggest the importance of looking into the kind of information required to improve compliance. This area of research is however, relatively new and investigators agree that there is a need for more empirical work to support it.

In addition to the kind of information, studies have also been done on the influence of the amount of information and compliance. Previous research points to a positive relationship between these variables. An often cited study by Hulka et al. (1976) involved 357 chronically ill patients who were afflicted with diabetes and congestive heart failure. The aim of the study was to investigate the actual amount of information transmitted from the physician to the patient, and then, to examine this factor in relation to compliance with treatment. This amount of information was calculated in terms of a communication score, and compliance was measured in terms of drug error rate (a measure of the discrepancy between the patient's behavior and what was prescribed for him or her). A significant result obtained in this study is that the less information communicated, the lower the patient's accuracy in taking the prescribed medication.

While Hulka's research findings showed a positive correlation between the amount of information and compliance with treatment, the study done by Freemon (1971) found no relationship between these factors. However, no concluding statements can be given since there have been few studies done on this factor. More empirical investigations may shed light on this problem.

But it is not only what and how much medical information is communicated to the patient which affects compliance. The doctor's interpersonal profile or how he communicates with the patient, in both verbal or non-verbal forms, could also significantly affect compliance. The following discussion will consider the literature regarding such interpersonal factors and their effects on patient compliance with medical treatment.

A review of the literature regarding the processes of interaction that occur between the doctor and the patient and their influences on compliance indicates that research in this area is complex, but limited. However, certain aspects of this problem have been given more research attention than others.

The first aspect frequently studied concerns the affective tone of the physician-patient encounter. Affective tone refers to the emotional cues communicated by the doctor to the patient regarding the value placed on the patient's care. Such emotional cues may be

communicated in terms of form (non-verbal or verbal), and content (positive or negative). Examples of non-verbal cues are touch, gaze, facial expressions and voice tone, and bodily postures and movements. These cues are interpreted as positive or negative depending on the situation. An example of a negative non-verbal cue is when a physician frowns at a patient who talks at length during a physical exam; the negative facial expression may indicate to the patient that his behavior is inappropriate. Also, non-verbal cues may interact with the verbal communication. These non-verbal and verbal cue combinations are found to be important influences on the doctor-patient relationship, particularly patient compliance. For instance, Hall et al. (1981) studied such verbal and non-verbal cue combinations in physician-patient interaction. The data used in this study are 50 tape-recorded physician-patient interactions that occurred during clinic visits. The tape-recorded interactions were rated by judges on expressions of anger, anxiety, dominance, sympathy, assertiveness, and businesslike manner. The research questions aims to find the relationship between patient compliance and non-verbal and verbal forms of communication. The results showed that patient compliance was associated with the simultaneous combination of positive verbal and negative non-verbal communication from the physician. Voice tone, for

example, may be used to emphasize a particular point made to a patient about his treatment.

The study conducted by Davis (1968) obtained similar results, that is, a physician who is virtually antagonistic towards the patient tends to promote non-compliance. Also, Davis and Eichhorn's (1963) study shows that a physician who has a businesslike orientation (firm and serious but kind) was most effective in promoting compliance.

In addition to the non-verbal and verbal cues which affect compliance, certain qualities of the physician influence the affective tone of the physician-patient relationship. These qualities are warmth and friendliness. Warmth has not been adequately defined in the literature, but warmth is often referred to in terms of the positive effects it has on patients such as feelings of being cared for and supported. Warmth and friendliness can be communicated verbally and non-verbally. While the literature suggests that most studies on this factor are based primarily on patients' perceptions, a few investigations have attempted to measure objectively the constructs warmth and friendliness, and then test for their relationship to compliance. A significant study which shows the influence of the physician-patient verbal communication of warmth and friendliness on compliance is reported by Korsch et

al. (1968). The study focused on physician-patient verbal communication in a pediatric clinic and emergency room setting. The data consisted of conversations between mothers and pediatricians which were tape-recorded and coded according to specific behaviors demonstrated. There were two measures of warmth and friendliness: one measure consisted of the mothers' subjective perceptions of the physician's friendly behavior, while the other measure consisted of their objective ratings of the physician's behavior. The findings showed that both measures of the physician's warmth and friendliness correlated significantly and positively with compliance for the treatment, that is, the greater the friendliness and warmth expressed by the physician to the mother during the interaction, the more likely was the mother to be highly compliant in following recommendations for the child's care.

In sum, while the study demonstrated that practitioner warmth and friendliness are found to be significantly related to compliance, there has been little attention given to this research problem. More theoretical and empirical studies are needed in future research efforts.

The second aspect in which the physician's interpersonal profile affects compliance concerns the role of the physician in the care of the patients. Medical

research has documented that psychological and social factors in the physician-patient relationship affect the patient's psychological and physical status. For example, Jarvinen (1955) reports that there is a significant increase in the sudden deaths of coronary patients during or shortly after ward rounds. This result suggests that the manner in which ward rounds are conducted increases patients' fear and anxiety to dangerously high levels. This research points out that there is a need for the physician to provide support and reassurance to the patients.

Reassurance is defined as the physician's general optimistic attitude expressed in terms of statements which aim to allay unfounded fears of the patient. Within the context of physician-patient relationship, research has shown that the physician's reassurance reduces the patient's fears regarding the treatment. A classical illustration of such an influence is the "placebo-effect." A placebo is an inert substance which may have psychological effects on the patient; such effects (positive or negative) are called "placebo-effects." Like the "placebo-effect," research has shown that the practitioner who provides reassurance to the patient tends to bring about positive effects on the substance administered. Moreover, research has shown that the practitioner may have the interpersonal power to reduce

patients' perceptions of negative side-effects, and this in turn is expected to promote compliance (Beecher, 1959; Shapiro, 1960). Thus, the literature indicates that the practitioner's reassuring role is an important factor which fosters compliance with medical treatment.

Finally, a review of the literature on the practitioner-patient relationship suggests that the kind and amount of information, and the reassuring role of the practitioner are not the only factors to be considered in promoting effective communication, and hence better compliance. Effective communication must be built and maintained on trust between the practitioner and the patient.

Trust is frequently defined in terms of the patient's belief that one can rely on the support of other people. Caterinicchio (1979) gives a more specific operational definition of trust; he refers to trust as the intensity of the patient's confidence and reliance in the physician's capacity and intention to provide psychological and/or physical relief from an illness. This definition leads one to raise the question regarding the manner in which this confidence of the patient in the physician is developed and maintained in the course of their interactions. Although little is known about this problem, some answers are, however, available. For instance, Waterman (1981) contends that trust is

established when a person has a sense of personal control over the behaviors that one must enact. This means that the practitioner must encourage in the patient an acceptance of personal responsibility for following their prescribed therapy. When trust of the physician by the patient is achieved in this manner, it is suggested that compliance to treatment will increase.

Another explanation is offered in the study made by Caterinicchio (1979), who was mentioned earlier. This author endeavored to provide an empirical answer to the question of how trust is achieved and how trust fosters compliance. Caterinicchio (1979) used recursive path analysis and found that the development of trust in the physician is brought about by an explanation of successful treatments during previous interactions between the practitioner and the patient. Moreover, according to the author, once a history of successful treatments takes place, the practitioner tends to be perceived as an important source of both instrumental and socio-emotional care. This perception then becomes important in the patient's positive value attached to continued medical treatment. With reference to how trust relates to compliance, the author reports that patients who demonstrate a high degree of trust in the practitioner will comply with a regimen even if compliance demands considerable personal cost in terms of time and resources.

From the above discussion it is evident that little empirical or theoretical attention has been given to this problem. Caterinicchio (1979) states that there is not only a dire lack of theoretical work done on this problem but there is also a substantial data void. Thus, trust in the practitioner and how this trust influences compliance to medical treatment remains a topic in need of theoretical and empirical attention.

In sum, this section has been concerned with the idea that the practitioner shares with the patient the responsibility for compliance with medical treatment. Also, a harmonious interpersonal relationship between the practitioner and the patient promotes a more effective communication, and better compliance. While it has been argued that the kind and amount of information, the reassuring role of the practitioner, and the patient's trust of the practitioner are found to significantly affect compliance, little research attention has been given to these factors. An important goal for future research therefore is to include these factors as components of a new model on compliance behavior.

#### Social Support and Compliance

The previous section has proposed one alternative approach to the understanding of compliance; this approach

concerns the idea that responsibility for compliance is shared with the patient by the health practitioner. This discussion has demonstrated that effective communication and trust between the practitioner and the patient foster compliance with medical treatment.

However, practitioners would still need to go beyond the doctor-patient encounter in the medical clinic. They would have to look into the social and cultural factors which affect health and illness. Such social and cultural influences are transmitted to individuals through the process of socialization which occurs in social groups like family and peer. These social groups then, influence the behaviors of the members by means of social norms (commonly occurring patterns of behavior). These norms can then be examined in terms of their effects on health behavior such as compliance. A number of investigators report such normative influences on compliance. For instance, Becker and Maiman (1980), and Cummings et al. (1980), indicate that the practitioner's consideration of the norms of the patient's culture can be critical to understanding the patient's response to medical advice. Furthermore, not only does the family and peers provide normative influences on behavior; these groups also provide social support needed for compliance.

This section of Chapter 4 will deal with the literature on the influence of social support on

compliance behavior. More specifically, it aims to examine how social support, as provided by: 1) the family; 2) peers; and 3) social support groups affect compliance.

The term social support is referred to by researchers in a number of ways. Haynes (1979) defines social support as help which patients receive from their families and friends; furthermore, he says that this help is important in order that patients can carry on their prescribed treatment. This assistance, on the other hand, is more distinctly defined by Caplan (1979), who has done a large amount of research on social support and adherence in the treatment of hypertension. Caplan (1979) classifies social support into two dimensions (tangible or psychological), each of which may be objective and subjective.

Objective tangible support refers to behavior which outside observers provide the patient such as goods or services. For example, providing medication is a form of objective tangible support. Subjective tangible support on the other hand, refers to the patient's perception that such resources are being given.

Objective psychological support refers to behavior which provides the patient with cognitions (values, beliefs, and perceptions) which aim to promote feelings of well-being. Some examples are: words of praise and

encouragement to take the prescribed medications. Subjective psychological support refers to the patient's perception of the objective psychological support. Caplan's (1979) definition of support is somewhat complex and is mainly psychological in orientation.

Finally, another clear concept of social support is provided by Thoits (1984); social support consists of the patient's perception of the presence or absence of an intimate, confiding relationship.

From the definitions given above, it is observed that a common feature of these definitions is the patient's subjective perception of social support. An important implication regarding the subjective nature of social support is that the patients' perceptions of social support may vary from culture to culture. For instance, in American society, where independence is highly valued, the patient may perceive family involvement as a restriction on one's autonomy. In contrast, in Philippine society, where dependence on a group is valued, the patient will look upon social support as a form of family involvement and concern about one's illness.

Thus, these differences suggest the importance of a patient's perception of social support, that is, what is perceived by a patient as social support in one culture may be perceived as interference in another. Social support, as a theoretical approach to the study of

compliance, may provide future researchers with an approach to the understanding of compliance in the Third World.

We shall now examine the literature which deals with the different sources of support and their relationship with compliance. As mentioned earlier, a key source of social support is an individual's family. There is a great deal of evidence that the family has a tremendous influence on the health and illness behavior of its members. For instance, the family provides some consensus on whether certain symptoms are defined as illness, whether such a condition needs the attention of a health practitioner (Richardson, 1970; Knapp et al. 1966), and whether it is appropriate to use various remedies such as medications (Osterweis et al., 1979). Research has also shown that in times of illness, most people turn first to their families for physical assistance and emotional support (Croog et al., 1972). The literature also points out that the social support from the family is significantly correlated with a patient's recovery from illness and this recovery is achieved by fostering patient compliance with medical advice (DiMatteo and Hays, 1981).

Various studies have investigated the influence of family support on compliance with medical treatments. The relationship observed between family support and compliance are of two types. The first type shows a

significant positive effect of family influence on compliance. For instance, Haynes et al. (1979), in their review, cited 21 studies that examined family support; 15 of these studies showed a significant positive effect of family influence on compliance. The second type suggests that family cohesiveness and mutual obligation can interfere with the fulfillment of the treatment regimen. A number of researchers have shown that family instability is detrimental to compliance (Alpert, 1964; Diamond et al., 1968). Also, the concurrent illness of another family member has been cited by patients as one reason for their non-compliance (Alpert, 1964).

In sum, these studies indicate that family support is a factor that may either enhance or hinder compliance behavior. These results, however, need to be further studied in future work, particularly as these apply to a variety of illness conditions and research settings.

In addition to the family, other groups which provide support are friendship groups and special types of peer groups called social support groups. Although little research has been done on the role of friendship groups on compliance, studies which investigate this problem show a primarily positive relationship (Bewley and Bland, 1977; Gray et al., 1966; Parkes et al., 1962). Moreover, there is also some evidence that social participation and integration of the patients positively predict compliance

(Pam et al., 1973; Vertinsky et al., 1976; Williams and Lee, 1975). In contrast, the literature reports that social isolation is a barrier to patient compliance (Baekeland et al., 1973; Nelson et al., 1975; Schwartz et al., 1962).

Overall, while the review of the literature regarding the influence of friendship networks on compliance indicates some correlation between these two factors, certain questions remain unanswered. Pilisuk and Froland (1978) indicate that the role of friendship networks on compliance is still unclear. Also, DiMatteo and DiNicola (1982) point out that research on these two factors has not defined which aspects of friendship networks (e.g., frequency of contacts, intensity and intimacy of friendship) are important to compliance. It is therefore hoped that future research will shed light on this problem.

Finally, there are special types of peer groups which provide social support to individuals and are found to be effective in enhancing compliance. Such a group, sometimes called mutual help groups, consists of individuals who have similar treatment regimens as the patient. Some examples of these groups are: Weight Watchers weight-control groups, Alcoholics Anonymous, and groups of individuals quitting smoking.

Some useful insights in regard to the value of such mutual help groups in fostering compliance with the medical treatment in the study of adherence to a regimen for high blood pressure suggests that such mutual help groups provide continuing support for a patient to maintain a life-long commitment to a prescribed regimen. Moreover, while Caplan (1976) asserts the potential influence of group social support on compliance, he argues that there might not always be a direct link between these two factors. That is, social support might simply enhance the effects of certain skills like self control of the patient.

Finally, a theoretical view is given by Di Matteo and Di Nicola (1982). These authors suggest that mutual help groups supplant the brief and limited support available to the patient from the busy health professional. This is achieved because the group helps to facilitate social processes involved in the patient's adjustment to the medical treatment.

Overall, the literature suggests that mutual help groups foster compliance with medical treatment. There is however a need to conduct more empirical work which will identify the specific variables that will be useful in assessing the influence of such group social support on compliance.

The previous sections have dealt with the study results and the literature regarding the factors that have a potential impact on compliance behavior. In the final section of this chapter, the proposed integrated model of compliance to medical treatment will be presented and summarized. Then, certain implications on the applicability of the model in the Third World setting will be discussed.

The proposed model is presented in Figure 4.1. Specifically, the model identifies four classes of variables related to compliance behavior. The first class of variables relates to factors which explain compliance in the preceding discussion, and can be categorized as health beliefs. Among the variables included in this group are: 1) health motivation; 2) beliefs about the benefits of treatment; 3) attitudes toward care; 4) perceived susceptibility to an illness; 5) perceived severity; 6) perceived costs; and 7) traditional health beliefs.

The second class of variables has to do with the treatment factors among which are: 1) type of medication; 2) dose effects; 3) side-effects; and 4) frequency of dosage.

The third class of variables focuses not only on the patient's perspective, but also recognizes the important role of the health practitioner in fostering the patient's

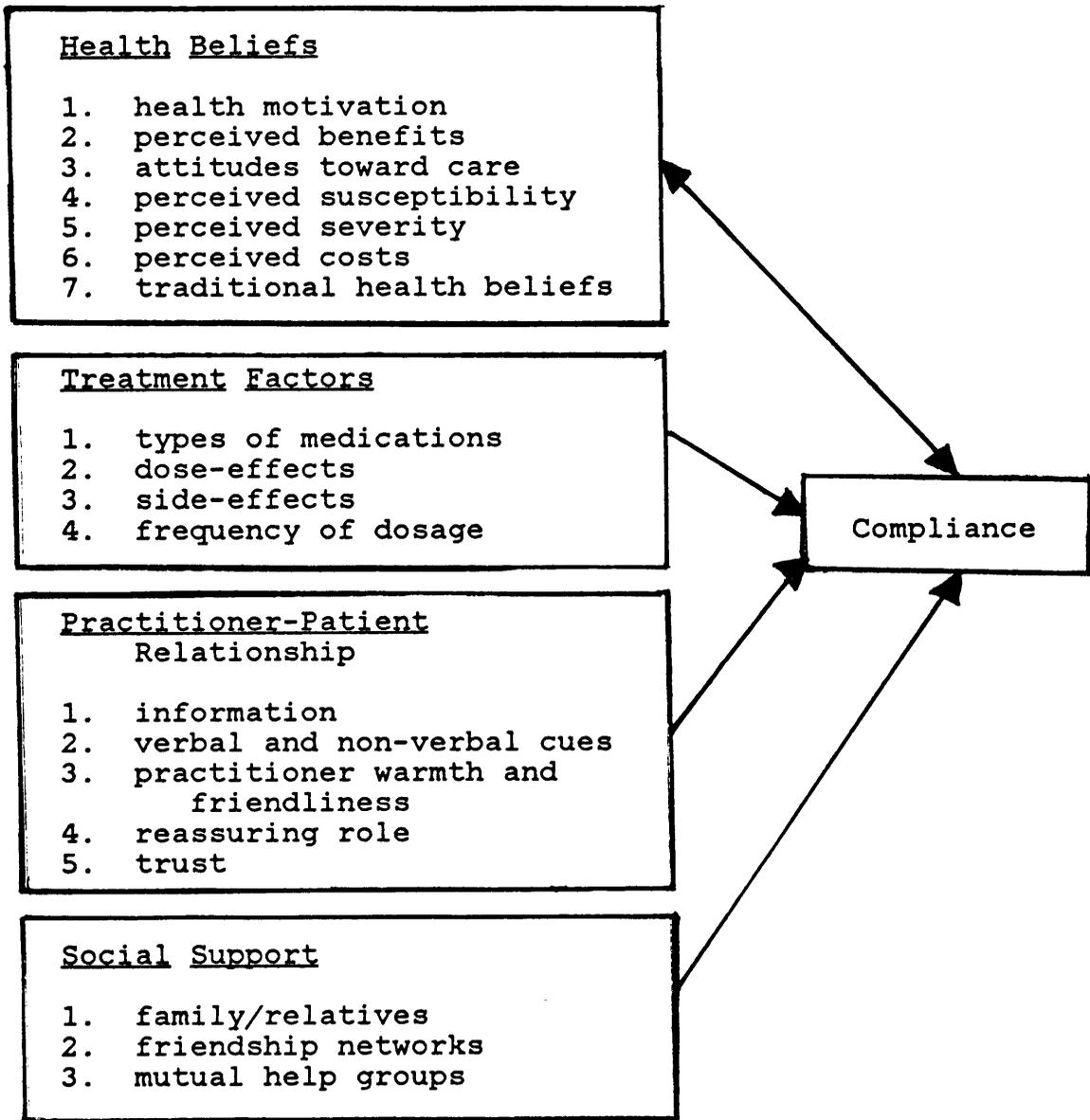


Figure 4.1

A Proposed Model of Compliance to Medical Treatment

compliance. The variables that are included in this group are: 1) kinds and amount of information; 2) verbal and non-verbal cues; 3) practitioner warmth and friendliness; 4) practitioner's reassuring role; and 5) trust between the practitioner and the patient.

The fourth category of variables that are potential determinants of compliance concern the influence of social groups such as: 1) the family; 2) friendship networks; and 3) special types of social support groups.

Overall, the model proposes these four sets of variables as potential factors which impact on compliance behavior. As suggested in the preceding sections of this chapter, there is a cumulative body of research evidence that supports the proposed model. There is, however, a need to develop empirically derived hypotheses on the variables that comprise each of the four components of the model.

It should be noted that socio-demographic variables are not included as predictors in the proposed model. This is because of their lack of relationship with compliance behavior in the present study. The fact that socio-demographic factors are not related to compliance to anemia medication among Filipino women is an important finding. This is especially so in the light of past studies which have highlighted the predictive role of socio-demographics in health behavior.

A final issue that remains crucial centers on the applicability of the model in a Third World setting like the Philippines. This model is based on the results of past studies in American settings plus current findings from a sample of Filipino women. Given this, the model may have more generalizability to Third World contexts than others derived solely from Western data. Still, there are a number of contingencies that could be considered in future research as determinants of the model's fit to Third World countries. One of these is the prevailing organization of the health care system of the country, which could create an environment more or less conducive to compliance behavior. A second is the social class structure which would determine the status differences between the patient and the health provider, and also influence the environment of compliance. A third is the role expectations assigned to women in regard to health matters, which may either enhance or impede compliance. Future researchers might profit from exploring these and other contingencies, in an effort to develop models that explain compliance behavior accurately in particular Third World settings.

## CHAPTER 5

### CONCLUSIONS

The purpose of this study was to investigate the determinants of compliance to iron supplement medication regimens among a sample of Filipino women. The research problem consisted of six questions.

1. Are socio-demographic variables associated with compliance?
2. What is the relationship between treatment factors and compliance?
3. Are the attitudes of pregnant women toward health workers associated with compliance?
4. Are mothers' health behaviors (special health practices, use of health services) associated with differences in compliance?
5. Are mothers' health beliefs associated with differences in compliance?
6. Is mothers' knowledge about the benefits of vitamins related to compliance?

Results of zero-order correlational analysis showed that the socio-demographic variables and the treatment factors have weak relationships with compliance. These relationships are not statistically significant. On the other hand, the health belief variables have significant positive correlations with compliance. The correlation

between compliance and traditional beliefs about the causes of illness and pregnancy is .09 ( $p < .10$ , two-tailed). Also, the correlation between compliance and perceived knowledge about the benefits of vitamins during pregnancy is .10 ( $p < .10$ , two-tailed). Finally, mothers' health practices also showed a significant positive correlation with compliance; the correlation is .10 ( $p < .10$ , two-tailed).

The results of the multiple regression analysis indicated that all the potential determinants were not significantly related to compliance rate. The  $R^2$  statistic indicated that only 5 percent of the variance in compliance rate is explained by the set of fourteen independent predictors.

Based on the findings of this exploratory study and an examination of the various approaches to compliance behavior, a theoretical model was constructed. The model is intended as a guide for future research, and identifies four sets of variables that are potential predictors of compliance. These sets of variables are: 1) health beliefs, which consist of health motivation, beliefs about the benefits of treatment, attitudes toward care, perceived susceptibility to an illness, perceived severity, perceived costs of treatment, and traditional health beliefs; 2) treatment factors which include types of medications, dose-effects, side-effects, and frequency

of dosage; 3) practitioner-patient relationships, which focus on the kind and amount of information provided to the patient, the practitioner's warmth and friendliness, and degree of mutual trust; 4) social support provided by the family and relatives, peers, and mutual-help groups.

Even with the establishment of the model another major concern remains. That is, the problem of operationalizing the variables. Although such a task is clearly beyond the scope of the present report, some beginning guidelines will be provided.

In the category of health beliefs, scales have been developed in previous studies to measure health motivation (Kirscht et al., 1978), perceived benefits from the treatment (Salloway et al., 1978), perceived susceptibility to an illness (Cummings et al., 1982), perceived severity of an illness (Nelson et al., 1978), and perceived costs of an illness (Cummings et al., 1982).

Some examples of these scales or questions which comprise these scales are:

1. health motivation

This consists of a scale to measure "concern about one's health" combined with a "special health practices" scale.

2. perceived benefits from treatment

This variable can be measured by a Likert-type item such as, "Some home remedies are still better

than a medicine a doctor gives you for curing illness." Another example is, "How much do you think X medication helps to prevent you from developing X disease?"

3. attitudes toward care

One possible dimension of this variable is the mothers' attitudes toward the physician's role in medical care. For instance, at the start of the treatment, one may ask how certain the doctor was about his diagnosis of the illness, and ask whether the patient did or did not agree with the doctor's diagnosis.

4. perceived susceptibility

An item in the susceptibility scale is, "What chance do you think there is that you would develop X disease?"

5. perceived severity of an illness

An example of an item in the severity scale is, "This illness often prevents me from doing things I need to do." Another example is, "How serious do you think the consequences of non-compliance would be?"

6. perceived costs

One question is, "Did you ever miss taking your X medications because the medicine was costing you a lot of money?"

While most of these scales have been shown to be reliable and valid in American samples, any research involving their use in a Third World context should reconfirm their psychometric properties.

The other variable in the category of health beliefs is the extent of traditional health beliefs. In order to develop specific measures of this variable, a pilot study consisting of in-depth interviews with a small sample of respondents is recommended. This would serve as a basis for identifying items or dimensions of the variables that capture traditional health beliefs in the particular region or nation being studied. These items could then be employed in large-scale survey research, and combined into a scale which would measure prevalence of traditional health beliefs in the survey respondents. The use of exploratory factor analysis might be of benefit in identifying dimensions of traditional health beliefs and constructing reliable indices that access these dimensions.

In the category of treatment factors, the measurement of the types of medication, dose-effects, side-effects, and frequency of dosage would be fairly straightforward. If the study is examining compliance with treatment for different types of disease, the specific drug prescribed would be an important dimension of the type of medication variable. A second dimension of this variable is the rate

at which medication is released into the intestines: for example, fast release vs. slow release. In measuring dose-effects, the major characteristic of importance is the size of dosage. For example, in the current study, doses of anemia medication were 60, 50, 100, or 120 milligrams. Measurement of side-effects might include a categorization of possible side-effects specific to the particular drug(s) being administered--e.g., nausea, vomiting, dizziness, diarrhea, etc. It might even be possible to classify side-effects in terms of their physical severity and psychological trauma for the patient. This could improve the predictive ability of the side-effects variable in explaining compliance behavior. Finally, frequency of dosage would be measured by the number of times per 24-hour period the patient is required to take the medication--two, three, four times, etc.

In the category of the practitioner-patient relationship, measures of certain variables have been developed in previous research. One variable, information provided by the practitioner, was measured by asking a question such as, "Does the doctor explain your medical condition to you so that you understand it perfectly (3); or did he/she explain only a little (2); or not explain anything at all (1)?" (Di Matteo et al., 1979).

The second dimension of the doctor-patient relationship refers to verbal and non-verbal cues that are

part of the interaction process. Hall (1981) has identified verbal expressions of anger, dominance, sympathy, and assertiveness as important cues that might influence the future compliance behavior of the patient. Non-verbal cues, such as facial expressions and body language (posture, touch, gaze, etc.) might also be important influences on compliance. Videotapes or other visual recording devices could be used to record non-verbal cues in a sample of doctor-patient interactions, and such cues could then be classified to form nominal or ordinal measures of non-verbal behavior.

Degree of practitioner warmth and friendliness was measured by Korsch et al. (1968) in terms of both observers' and patients' perceptions of these attributes. An example of a question that might be asked of patients to measure perceived practitioner warmth and friendliness would be: "Is the doctor very serious (3); or does he joke with you a little (2); or a lot (1)?"

The final two variables in the category of the practitioner-patient relationship are degree of patient reassurance and trust. Degree of reassurance refers to behavior by the practitioner that is designed to reduce patient fears about the negative consequences of compliance to the medical regimen. One example of an item that might be used to measure this would be: "To what extent did the doctor relieve your worries about

undesirable side-effects of the medication?" Responses to this item could be scored in a Likert-type response format, from "very much" to "very little."

Trust refers to the degree of patient confidence in the competence of the practitioner. Trust could be measured by items such as: "I feel that this physician has a successful record of medical practice."; "This physician exhibited knowledge about the symptoms and causes of my illness."; "I would hesitate to return to this doctor because of his lack of knowledge about medical procedure." Again, the appropriate scoring scheme for such items would be a Likert format, with possible responses ranging from "agree" to "disagree." Reverse scoring could be used at the data analysis stage to ensure that all items are unidirectional with respect to the dimension of trust.

The final category of variables in the proposed model refers to social support from family and relatives, friendship networks, and mutual help groups. Caplan et al. (1980) have developed scales to measure social support for compliance behavior from health providers, nurses, and physicians in hospital settings. These scales could easily be adapted to measuring social support from relatives and friends. Examples of items that might be useful are the following: "My relatives (friends) make me feel confident I can take my medicines in the prescribed

manner."; "My relatives (friends) help me fully understand when and how to follow my treatment." The appropriate response format for these items, adapted from Caplan et al. (1980) is: "none or very little"; "a little"; "some"; "a lot"; "a great deal".

In order to measure social support from mutual help groups, it would be necessary to ascertain the respondent's knowledge of and involvement in such groups. Examples of formal self-help groups that deal with particular medical problems are Alcoholics Anonymous, ALANON, Weight Watchers, and Reach to Recovery (a self-help group for recovering mastectomy patients (see Di Matteo and Di Nicola, 1982:222). Sometimes informal neighborhood groups (for example, groups of hypertensive patients) exist that could be a source of support for compliance to medical regimens. The respondent could be asked whether he/she belongs to any such groups, the frequency of contact with group members, and the degree of support offered by the group for compliance behavior. Examples of items to measure the latter characteristic might be: "I receive advice and encouragement from group members on following my prescribed treatment."; "The experiences of group members are a help in knowing how and when to take my medication." Likert-type scoring and the combination of items into multi-item indices would help improve the reliability and validity of the mutual-help group social support scale.

It is hoped that this brief review of possible measures of independent variables in the proposed compliance model will be a helpful guide to future researchers attempting to use the model.

In conclusion, the current study has contributed to the compliance literature in the following ways. First, it has integrated a number of different approaches to explaining compliance behavior. Previously these approaches had been treated in separate studies, with little attempt at integration in a multivariate framework. Second, this is one of the few studies which provides a multidisciplinary perspective since it draws from literature in medicine, social psychology, sociology and medical anthropology. Third, by examining determinants of compliance in a Third World setting (the Philippines), it has provided a basis for comparing compliance behavior in Western and Third-World settings. Fourth, it underscores the importance of investigating compliance behavior among pregnant, rural Filipino women, who are a rather neglected group. There is little doubt that the problem of compliance to medical treatment regimens is important in medical sociology and also in clinical practice. If this problem is to be more fully understood, additional research is needed on the factors influencing compliance behavior in international contexts. This study represents a tentative step in that direction.

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APPENDIX

STRUCTURED INTERVIEW SCHEDULE

NUTRITION CENTER OF THE PHILIPPINES  
IRON SUPPLEMENTATION OF PREGNANT MOTHERS  
SOCIO-ECONOMIC CULTURAL INTERVIEW SCHEDULE

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FORM NUMBER

CARD NUMBER

HOUSEHOLD NUMBER

MOTHER'S IDENTIFICATION

MUNICIPALITY NUMBER

BARANGAY NUMBER

---

II. GENERAL HOUSEHOLD INFORMATION

A. FAMILY SIZE

1. How many children are living with you?
2. Do you have children who are not living at home?
  1. yes
  2. no
3. If yes, how many are not living with you?
4. Therefore you have \_\_\_\_\_ number of living right?

B. MIGRATION

5. Where were you born? \_\_\_\_\_  
MUNICIPALITY  
\_\_\_\_\_  
PROVINCE
6. Where were you married? \_\_\_\_\_  
MUNICIPALITY  
\_\_\_\_\_  
PROVINCE
7. How many years have you been married?

8. After marriage, how many places have you resided in?
9. What places are these and how long have you stayed in each place?

	MUNICIPALITY	PROVINCE	YEARS (NO)
After Marriage	_____	_____	_____
Next Residence	_____	_____	_____
Next Residence	_____	_____	_____
Before the current Residence	_____	_____	_____

10. How many years have you settled in your current residence?
11. What is the most important reason for transferring to this municipality?

C. LAND OWNERSHIP

12. Do you own a piece of land?
  1. yes
  2. no
13. If yes, do you till this?
  1. yes (land is productive)
  2. no (land is residential), probe further
  3. yes and no (both productive and residential)
  4. n/a

D. HOUSING

14. Housetype
  1. bamboo hut
  2. one story (wood)
  3. apartment/accessoria
  4. bungalow
  5. two storey (wood/wood and concrete)
  6. two storey (concrete)
  7. mansion
  8. others \_\_\_\_\_
15. Ownership
  1. free

2. rented
3. owned

E. SANITATION

16. From where does your water supply come from?
  1. MWSS
  2. rainwater
  3. deep well
  4. spring
  5. others
  
17. How is water delivered to your homes?
  1. faucet
  2. collect water
  3. water is delivered
  4. others
  
18. Do you have any problems with your water supply?
  1. yes
  2. no
  
19. If yes, specify:
 

---
  
20. Do you pay for your water?
  1. yes
  2. no
  
21. If yes, what are the terms of payment?
  1. NWSS rate
  2. per pail/drum container
  3. pays to neighbor
  4. others \_\_\_\_\_
  
22. If no, why?
 

---
  
23. Do you have your own toilet?
  1. yes
  2. no
  
24. If yes, what type of toilet is it?
  1. pit
  2. antipolo
  3. manual
  4. flush
  5. others \_\_\_\_\_
  
25. If not, where do you dispose your waste?
 

---

26. How do you dispose of your garbage?

1. garbage collector
2. burning
3. dumping
4. others \_\_\_\_\_

NUTRITION CENTER OF THE PHILIPPINES  
IRON SUPPLEMENTATION OF PREGNANT MOTHERS  
SOCIO-ECONOMIC CULTURAL INTERVIEW SCHEDULE

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III HEALTH CARE DELIVERY SYSTEM

AWARENESS OF HEALTH CENTER

1. Are you aware that there is a health center in your village?
  1. yes
  2. no
2. If yes, where is your center located?  

---

barangay  

---

municipality
3. How did you learn about your health center?  

---
4. How far is the center from your home?
  1. 5-10 minutes
  2. less than 30 minutes
  3. almost one hour

UTILIZATION OF HEALTH CENTER DURING PREGNANCY

5. How many pregnancies have you had? If first pregnancy, proceed to question 10.
6. Did you ask help from the center during your last pregnancy?
  1. yes
  2. no
7. If no, why?  

---
8. At what month of your last pregnancy did you first ask for medical help?  

---
9. How often did you ask for medical help during your last pregnancy?
  1. once a week
  2. once a month
  3. once

4. twice  
5. others \_\_\_\_\_
10. Have you asked help from the Center for this present pregnancy?  
1. yes  
2. no
11. If not yet, please explain:  
\_\_\_\_\_
12. In your present pregnancy, at what month did you first ask for medical help?  
\_\_\_\_\_
13. How often do you ask for medical help?  
1. once a week  
2. once a month  
3. once  
4. twice  
5. others \_\_\_\_\_
14. In your last pregnancy, what services of the Center did you avail of?  
1. free medicines  
2. free vitamins  
3. prenatal check-up  
4. delivery  
5. medicine prescribed for illness  
6. family planning  
7. nutrition  
8. others \_\_\_\_\_
15. Which among the services mentioned did you prefer? (Rank the first three most preferred)  
\_\_\_ free medicine  
\_\_\_ free vitamins  
\_\_\_ prenatal check-up  
\_\_\_ delivery  
\_\_\_ recovery from illness  
\_\_\_ family planning  
\_\_\_ nutrition  
\_\_\_ others
16. In your present pregnancy, what services did you avail of?  
1. free medicine  
2. free vitamins  
3. prenatal check-up  
4. medicines prescribed for illness  
5. nutrition  
6. others \_\_\_\_\_

17. Which among the services mentioned did you like most? (Rank the first three most liked.)
- free medicines
  - free vitamins
  - prenatal check-up
  - medicines prescribed for illness
  - nutrition
  - others
18. Aside from pregnancy, do you bring your children to the health center for consultation?
1. yes
  2. no
19. Why don't you ask help from the Center regarding your children's health?
- 
20. What services of the Center were made available to your children?
1. free medicines
  2. free vitamins
  3. injection
  4. immunization
  5. check-up
  6. medicines prescribed for illness
  7. others \_\_\_\_\_
21. Are you satisfied with the prenatal check-up schedule for pregnant mothers?
1. yes
  2. no
22. If no, what day is most satisfactory for you?
1. Monday
  2. Tuesday
  3. Wednesday
  4. Thursday
  5. Friday
  6. Saturday
  7. Sunday
23. What time is most satisfactory for you?
1. a.m.
  2. p.m.
24. Why do you prefer clinic hours to be in the morning/afternoon?
-

25. Do you think the health center is adequately staffed to attend to patients' needs?
1. very adequate
  2. adequate
  3. uncertain
  4. inadequate
  5. very inadequate
26. Why?
- 
27. Do you find it difficult to ask health information/advice from the health center workers?
1. very difficult
  2. difficult
  3. uncertain
  4. easy
  5. very easy
28. Why?
- 
29. Do you think the health center workers show sufficient concern for the health of patients?
1. very much concern
  2. much concern
  3. uncertain
  4. little concern
  5. very little concern
30. Why?
- 
31. Do the health center personnel always treat patients equally?
1. always
  2. often
  3. uncertain
  4. sometimes
  5. never
32. Why?
- 
33. Are there health workers who lose their temper over the patients?
1. never
  2. sometimes
  3. uncertain
  4. often
  5. always

34. Why?

---

SOURCES OF MEDICAL INFORMATION

35. From where or from whom do you usually obtain health information?

- 01-radio
- 02-television
- 03-comics
- 04-newspapers
- 05-magazines
- 06-books
- 07-families/relatives
- 08-friends/neighbors
- 09-professional health workers (doctors, nurse, midwife)
- 10-paramedics (trained community workers)
- 11-folk practitioners (Hilot, Arbularyo)

EXPECTATION FOR CHILDBIRTH:

36. Whom do you expect to deliver your baby?

- 1. rhu midwife
- 2. non-rhu midwife
- 3. folk midwife
- 4. rhu doctor
- 5. private doctor
- 6. others

37. What is the most important reason for your choice?

- 1. personal traits: specify
  - 2. assigned in this barangay
  - 3. always available
  - 4. popular
  - 5. usually delivers
  - 6. free delivery
  - 7. others: specify
- 

38a. What kinds of medicines or vitamins did you take during your last pregnancy?

---

b. Who prescribed these medicines or vitamins?

---

- c. What was your reason(s) for taking these medications?  
\_\_\_\_\_
- d. Did you buy these medications or did you obtain these without any cost?  
\_\_\_\_\_
- 39a. What kinds of medicines or vitamins did you take after your delivery?  
\_\_\_\_\_
- b. Who prescribed these medicines or vitamins?  
\_\_\_\_\_
- c. What was your reason(s) for taking these medications?  
\_\_\_\_\_
- d. Did you buy these medications or did you obtain these without any cost?  
\_\_\_\_\_
- 40a. What kinds of medicines or vitamins are you taking at present?  
\_\_\_\_\_
- b. Who prescribed these medicines or vitamins?  
\_\_\_\_\_
- c. What was your reason(s) for taking these medications?  
\_\_\_\_\_
- d. Did you buy these medications or did you obtain these without any cost?  
\_\_\_\_\_
41. Do you think a pregnant mother needs to take vitamins?  
1. yes  
2. no
42. If yes, why must a pregnant mother take vitamins?  
\_\_\_\_\_
43. If no, why is it not necessary to take vitamins?  
\_\_\_\_\_

CONCEPT OF HEALTH AND ILLNESS

44. When you feel tired and weak do you consider yourself sick?  
1. yes  
2. no
45. If no, what could be the possible cause of this?  
\_\_\_\_\_
46. What do you feel when you are sick?  
\_\_\_\_\_
47. When you feel tired and weak do you take medicines?  
1. yes  
2. no
48. If yes what are the three most common medicines that you take?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
49. If no, why are you not taking any medication?  
\_\_\_\_\_
50. If you really feel sick, do you immediately see a doctor, a midwife or a folk practitioner?  
1. yes  
2. no
51. If yes, whom do you usually see first?  
1. Doctor  
2. Midwife  
3. Folk Practitioner  
4. Others \_\_\_\_\_
52. If no, what do you usually do?  
\_\_\_\_\_

MEDICAL BELIEFS:

53. Do you have any beliefs about the causes of illness?  
1. yes  
2. no
54. If yes, can you mention one belief?  
\_\_\_\_\_  
\_\_\_\_\_

55. If no, why don't you have any beliefs about the causes of illness?

---

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56. Do you have any beliefs about pregnancy?  
1. yes  
2. no

57. If yes, can you mention one such belief?

---

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58. If none, why don't you have any beliefs about pregnancy?

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