AN ABSTRACT OF THE THESIS OF

Yuri Hiraiwa for the degree of Master of Science in Pharmacy presented on February 7, 1985 .

Title: Variables Influencing the Level of Drug Knowledge Among Village Practitioners in Bangladesh

Abstract approved: Redacted for privacy

Doug Ried

In this study, the level of drug knowledge was assessed among a sample of village practitioners in three villages of Bangladesh by means of interviews using questionnaires over a period of three months. The objective was to find out how the type of training, medical registration, source of background drug knowledge, years of formal education, and years of work experience of the practitioners were related to their level of drug knowledge. In this respect an important outcome was that the government training programs have a positive influence upon the village practitioners' level of drug knowledge. The impact of formal education on drug knowledge appears to be relatively weak in comparison to the large impact of the medical training experience that follows it. Finally, an increase in work experience was found to be related to an obsolescence in drug knowledge among village

practitioners or to have no relation to how knowledgeable they were about drugs. Major policy implications based on this study relate to the need for more emphasis on developing training programs for village practitioners in order to increase their level of drug knowledge. It is presumed that these village practitioners will be able to utilize drugs more effectively and efficiently for the people in rural Bangladesh and bring about improvement in the country's health care delivery.

Variables Influencing the Level of Drug Knowledge Among Village Practitioners in Bangladesh

by

Yuri Hiraiwa

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Science

Completed February 7, 1985

Commencement June 1985

To Him who is able to do exceedingly abundantly
beyond all that we ask or think,
according to the power that works within us.

Ephesians 3:20

APPROVED:

Redacted for privacy

Professor of Pharmacy in charge of major

Redacted for privacy

Dean, School of Pharmacy

Redacted for privacy

Dean of Graduate School

Date thesis is presented February 7, 1985

Typed by Yuri Hiraiwa

ACKNOWLEDGMENTS

I wish to express my appreciation to Dr. Doug Ried whose guidance, encouragement, and patience supported me throughout this project. I am also indebted to Ms. Freya Hermann and Dr. Murray Wolfson for their invaluable help in the revision of this thesis.

At the same time, my sincere appreciation is extended to the many people in Bangladesh who gave me helpful suggestions and provided a wealth of information. I especially wish to thank Dr. Nobukatsu Ishikawa for his contribution at the earlier stages of the project that took place during my stay in Bangladesh.

Despite all this, the thesis itself would never have materialized without the tremendous support from my parents and brother and their never ending love from afar. Just knowing that they were there made a big difference.

I wish to finally express my deepest gratitude to my closest friends who have been a source of great joy and comfort during my years in the United States. I particularly want to thank Rose Mijares (soon to be Rose Bate) for helping me during the difficult times and for so generously allowing me to make considerable use of her computer system. I am also grateful for Jim and Judy Long for sharing the warmth of their home and for always welcoming me as part of the family. The continuous patience, understanding, and prayers of all my friends have meant much more to me than words can ever describe.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

VARIABLES INFLUENCING THE LEVEL OF DRUG KNOWLEDGE AMONG BANGLADESH VILLAGE PRACTITIONERS

I. INTRODUCTION

This chapter first focuses on the health status in the Third World. It examines the role of medical manpower and of pharmaceuticals and ascertains the degree to which these factors are relevant to the health care of the developing nations.

Secondly, the chapter focuses on Bangladesh as a typical Third World nation. It discusses the health situation and the delivery of health care in Bangladesh. Finally, the role of village practitioners as health care providers to the rural population is closely examined.

HEALTH STATUS IN THE THIRD WORLD

Most of the human race is concentrated in Third World countries--parts of the world that are generally characterized as "underdeveloped" or "less developed" in a socio-economic sense. The extent of economic disparity between the developed nations and those of the Third World is depicted by a number of comparisons. Those comparisons in the area of health-care, however, often exhibit a particular poignancy.[1] Some health and related socio-economic indicators are shown in Table 1. The infant mortality rate is higher, and the average life expectancy at birth is lower in Third World countries.

Table 1

Health and related socioeconomic indicators calculated by the WHO

	Least developed countries	*Other developing countries*	*Developed countries*
Number of countries	31	89	37
Total population (millions)	283	3,001	1,131
Reported infant mortality rate (per 1,000 liveborn)	160	94	19
Life expectancy (years)	45	60	72
% birth weight 2,500 grams or more	70	89	93
% coverage by safe water supply	31	41	100
% adult literacy rate	28	55	98
Population per doctor	17,000	2,700	520
Population per nurse	6,500	1,500	220
Population per health worker (any type including traditional birth attendant)	2,400	500	130

Figures in the table are weighted averages, based upon estimates for 1980 or for the latest year for which data are available.

WHO (1981). Summary Report of WHO/ICC Conference held in July in Paris.

People in these countries also fall behind those in developed countries in access to safe water supply as well as to medical personnel. It is evident that many health needs are not being met for the people of the Third World countries.

Socio-economic conditions in these countries are related to these health needs. Poverty often leads to illiteracy, unhygienic conditions, and malnutrition. Malnutrition, which may often enhance susceptibility to infective agents, will lead to recurrent diseases and high mortality rates. Repeated attacks of diseases will lead to weakness and low productivity causing physical and mental disability. This disability gradually contributes to unemployment and low incomes, and so once again poverty results. This is the so called "perpetual cycle" of life in Third World countries.[2]

The inadequacies in the health-care delivery system in developing countries have been typically described in terms of insufficient medical and paramedical staff, unequal access to services, emigration of trained personnel to other countries, and the concentration of skilled manpower in the cities. The rural population, which often represents more than 80% of the population of a typical developing country, is thus left with inadequate access to modern medical care creating a large need for doctors, nurses, hospitals, medical equipment, and pharmaceuticals.[3,4]

MEDICAL MANPOWER IN DEVELOPING COUNTRIES

There are basically three types of health-care providers in the densely populated, rural areas of the developing countries.[5-7] Each type is briefly discussed below.

1. Qualified, allopathic (Western) practitioners - those with formal medical training and medical school degrees.

2. Unqualified, allopathic practitioners - those without medical degrees who practice Western medicine on the basis of self-taught knowledge, apprenticeship, or family training.

3. Traditional practitioners - those without medical degrees who practice on the basis of self-taught knowledge and family training. They include traditional midwives, spiritual healers, and others.

Recently the unqualified, allopathic practitioners of the Third World countries have been the object of renewed attention.[5,6,8] These unqualified, allopathic practitioners or "village practitioners", as they will be called from now on, hold a respected position among the rural inhabitants.[3] They live in the communities and

thus are aware of local beliefs and customs of their patients. Usually lacking proper medical training, these village practitioners outnumber the qualified, allopathic practitioners, or doctors, and are more accessible to the overall population. Because of their accessibility to the rural inhabitants, village practitioners have been considered to be influential health care providers in areas where qualified practitioners and other forms of modern medical care are not easily available.

Several studies have directed attention to involving these village practitioners in the implementation of health-care delivery programs.[5,6,8] Health-care delivery in the rural areas must include the provision of pharmaceuticals to those who are in need of them.[9] Further examination has thus focused upon the utilization of village practitioners in the effective distribution of pharmaceuticals.[10-13]

PHARMACEUTICALS IN DEVELOPING COUNTRIES

Pharmaceuticals play a significant role in the health-care system of the developing countries. Due to the low number per capita of available doctors and hospital facilities, drugs in developing countries are relied upon more heavily than any other resources for health therapy.[14] Drugs comprise a large portion of total health-care costs since they reduce costly physician time and use of high-priced hospital facilities. Because

of their potential to provide the least expensive and most widely available health treatment in areas of the greatest needs, drugs can produce extensive changes in the development of health-care delivery.[1,15,16] In general, the lower the socio-economic and technological profile of a country the higher the physician's reliance on drugs as a compensatory factor.[14]

However, there is an inequitable distribution of pharmaceutical products in the developing countries, and many people are not getting the drugs they need.[16,17,18] Third World countries contain a majority of the world's population; consumers in these countries, however, account for only about 15% of the total world-wide pharmaceutical market.[19] Yet, pharmaceuticals--most of which are imported from the developed countries--typically account for a substantial share of the health budget in the developing nations.[20] Pharmaceuticals in these nations are available only for a small proportion of the population, mainly concentrating in major urban areas.[1,3] Major efforts are being made by many health organizations for pharmaceuticals to be more available for the large population in the Third World who have no access to modern medical care.

Some researchers of the drug distribution system have issued a barrage of charges against the large multinational corporations that supply pharmaceuticals to Third World countries.[21-23] The studies accuse the corporations of disclosing wrong product information,

utilizing misleading advertising, and maintaining heavy promotional methods for unnecessary drugs. Other studies have given attention to the further development of pharmaceutical industry in the Third World to enable the manufacture of its own drugs.[13,18] Still others have identified the high cost of imported drugs as the major barrier inhibiting the drugs from efficiently reaching the people.[6,17,19] Finally, a few studies have focused upon the village practitioners as primary drug distributors in rural areas and have questionned their effectiveness in the dispensing of drugs.[5,7,24,25]

In addition to the proper distribution of pharmaceuticals, the proper utilization of them by the patients must also be insured. The dissemination of drug information to the rural population is of prime importance in the utilization of drugs for maximum benefit and minimum risk. However, there is a short supply of "needed drug information" in these countries. This term refers to information that is relevant to each nation's particular needs and customs. It is also based on the nation's health status, its current approaches to health care, and its economic situation.[26,27] In the face of illiteracy, word of mouth seems to be the most important route of communication. The successful dissemination of drug information transmitted in this fashion depends upon the health-care providers.

In the developing countries, village practitioners

are in the best position to transmit drug information and to efficiently distribute drugs to the rural inhabitants.[28] These practitioners predominate in the rural communities and are accessible to the majority of the population. Through verbal instructions, they can ensure that the patient understands how and when to administer the drugs dispensed to them. Only a few studies have described the role pharmaceuticals play in village practitioners' treatment of their patients. It has been found that their use of modern, Western drugs is widespread.[5,29] Unfortunately there is also evidence that in order to get quick results, they often use the most powerful drugs inappropriately. As a consequence, some serious side effects may result.[22,30] The danger may lie in the fact that these village practitioners lack adequate medical training, cannot easily inform themselves about drugs from journals, rely on drug companies' salesmen for drug information, and have no system of continuing medical education.[23,31,32]

A rapprochement at this point with the existing medical system of village practitioners and the needs in the rural areas for an efficient drug delivery system is highly desirable.[6,33] This rapprochement must begin with a clear understanding of the existing system in medical and sociological terms. Evaluation of the drug knowledge among the village practitioners is a first step.

HEALTH STATUS IN BANGLADESH

The health problems in Bangladesh are similar to those found throughout the Third World. Preventable and communicable diseases abound. Limited observations indicate that diarrhea and gastro-intestinal diseases, internal parasites, and respiratory infections account for about 60% of diseases that are prevalent in the country.[24] Infections of the skin, ears, eyes, and throat account for another 15% of the diseases. Most of the deaths in the country are attributable to infectious diseases and malnutrition.[24]

Bangladesh, like many other developing countries, is an essentially rural country. About 92% of its inhabitants live in rural areas. The majority of these inhabitants experience severe poverty and malnutrition; more than 75% of rural families subsist on below acceptable calorie intake.[34]

The gravity of the problem is also reflected in the health indicators. The average life expectancy at birth in Bangladesh is less than 50 years (in U.S., 73 yrs); infant mortality is about 140 per 1,000 live births (U.S., 15/1,000); and 40% of all deaths occur in the 1-4 age group (U.S., 2%).[19,35]

HEALTH-CARE DELIVERY IN BANGLADESH

The stipulated pattern for government-sponsored health-care in a thana* is one health

*thana - an administrative unit; pop. about 250,000.

administrator(doctor), a medical officer and other staff for a 25-bed hospital, two or three health inspectors, and a family welfare worker for vaccination and preventive care, all serving 250,000 people. This unit constitutes a thana health complex . There is one thana health complex in each of the 376 major thanas in Bangladesh. Curative services and supplies of Western medicine are provided free of charge in the thana health complex. The utilization of government health facilities by rural people is low due primarily to the poor availability, access, and quality of their medical services.

As in other developing countries, village practitioners have been identified as constituting the largest category of non-government health-care providers that utilizes Western drugs in the rural regions. Qualified, allopathic doctors, those with medical school degrees, on the other hand are rarely found in rural Bangladesh. About 90% of these doctors are employed in major cities and towns.[36]

The remainder of the private health-care providers in the rural areas are the traditional practitioners. Western medicine is not commonly used by them.[6]

Despite the seemingly large variety of health-care providers in rural Bangladesh, the status of health-care delivery is certainly grave as is depicted below.

> "There are too few doctors and even fewer nurses and medical technicians. Hospital beds are grossly insufficient. Even these scarce services and facilities are unevenly distributed. Nearly 90% of all doctors and 80% of hospital beds are in urban

areas, leaving the rural population with very little coverage. The rural health complexes are generally short of drugs and medicines and the quality of medical care available is not satisfactory. The condition of preventive health services is equally unsatisfactory, and there is very little activity in normal times. Inoculation and vaccination is usually carried out only in the events of floods, cyclones, epidemics, and famine."(p.177) [37]

THE ROLE OF VILLAGE PRACTITIONERS IN BANGLADESH

A severe shortage of professionally trained health manpower exists in Bangladesh. The doctor to population ratio is 1:29,000 and village practitioner to population ratio is 1:1,000.[6] The village practitioners are most consulted and most accepted by the people; they are also most accessible to those living in the rural communities. These practitioners or palli-chikitshoks practice Western medicine without medical degrees or registration. They provide most of the Western drugs available to the people in the rural regions.[25]

Recently health officials of Bangladesh have speculated on the possibility of developing a network of village-based health workers, namely the village practitioners, to correct the numerous health-care related insufficiencies of the rural population.[38,39] The provision of pharmaceuticals in the rural areas has also been identified by these officials as one of the main insufficiencies. The share of health budget accounted for by the expenditure for such drugs is in the order of 40% in Bangladesh.[30] However, a large proportion of these

drugs are consumed by those in the urban sectors comprising less than 10% of the country's population.[32] Despite the uneven distribution, pharmaceuticals occupy a very strong position in the rural areas. They are potentially one of the most widely available and least expensive health resources in rural Bangladesh. That is, as long as they are utilized correctly by the patients.[40,41] At the present time antacids, anthelmintics, and antimalarials are the drugs that are consumed the most.[42] In addition, Tetracycline as well as various steroids and combination drugs are being heavily used.[43]

In 1982, a national drug policy was instituted for the purpose of confining the drugs employed to a limited number of basic products needed to treat the more commonly encountered forms of illness in Bangladesh. Guidelines put forward by the WHO's Expert Committee on the selection of essential drugs were used.[44,45] Although it is still too early to come to any conclusions regarding the success or failure of such a policy, the coordinating role of the government is likely to improve the distribution of pharmaceuticals. The cooperative role of the village practitioners can then be to work with government health officials in distributing the drugs to those in the rural areas who really need them. The two roles are therefore mutually supportive in providing the most cost effective possible forms of health-care.[9]

Some studies have questionned the feasibility of

involving this particular group because of its reported misuse of drugs, lack of medical training, and lack of formal education.[25,46] A clearer understanding of the level of drug knowledge among the village practitioners is thus necessary. In addition, the identification of some factors that are related to the practitioners' level of knowledge can lead to the assessment of areas for potential change and improvement.[47]

Few descriptive studies have been conducted that focus upon the village practitioners of Bangladesh and their characteristics. Some of the investigations have evaluated the practitioners' knowledge of oral rehydration while others have studied their knowledge of family planning methods. However, their knowledge of drugs has not yet been investigated.

STATEMENT OF THE PROBLEM

Health in developing countries is poor as is indicated by infant mortality rates and average life expectancy. The health needs of the people in these countries are not being met mainly due to the inaccessibility to modern medical care. Bangladesh is a typical developing country with the type of cultural mix and health problems found in most developing countries where Western and native medical systems co-exist. About 90% of its population lives in rural areas with limited accessibility to Western medical care and professionally

trained medical personnel.

Village practitioners predominate in these areas and are the most available and accessible health-care providers. Pharmaceuticals are commonly used by them in treating their patients. It has been speculated that these practitioners do not have adequate drug knowledge and as a result do not utilize the drugs appropriately.

GOAL OF THE STUDY

The goal of this study is to examine the level of drug knowledge among the Bangladesh village practitioners and the factors that are related to this level of drug knowledge. The findings will enhance the currently limited understanding of village practitioners' potential capabilities and aid in the present efforts of determining the potential for utilizing these practitioners in the distribution of pharmaceuticals to the rural inhabitants.

HYPOTHESIS

The hypotheses which this study will test are:

1. There is a significant relationship between village practitioners' level of drug knowledge and their type of training.
2. There is a significant relationship between village practitioners' level of drug knowledge and whether or not they are registered to practice medicine.
3. There is a significant relationship between village

practitioners' level of drug knowledge and the source of background drug knowledge that the practitioners utilized the most at the start of their medical career.

4. There is a significant relationship between village practitioners' level of drug knowledge and the number of years of their formal education.

5. There is a significant relationship between village practitioners' level of drug knowledge and the number of years of their work experience.

II. METHODOLOGY

Survey methods were chosen as the most suitable research tool among other social scientific research methods. In this chapter, a brief discussion of the survey method is followed by discussions of sampling, data collection, variables, and survey instruments.

SURVEY METHODS

Survey research is appropriate in the examination of many social topics that involve detailed counting and describing. It provides empirical verification to support scientific inquiries.[48] Survey methods are suitable for investigations into variables which are sociological facts such as socio-economic status and education or psychological facts such as opinions, attitudes, and behavior.[49] Since the national mass communications system (e.g. postal and telephone services) is extremely inadequate in Bangladesh, personal interviews were determined to be the best means of reaching the target population in order to make generalizable conclusions. Finally, survey methods are best suited for studies comprised of purposes that are basically explorative and descriptive, such as those of this study.

SAMPLING

For the purpose of hypothesis testing a purposive sample of the target population was used.

Bangladesh is divided into four divisions and one of them, Khulna Division, was chosen. A division is composed of several districts, and three among the five districts of the Khulna Division were selected--Barisal, Jessore, and Khulna Districts. These were considered to be amongst the most accessible and also the most densely populated districts in the Division. Since a number of thanas comprise a district, two were selected from Barisal and one each from the two other districts. This sample design is shown in Figure 1. A map of the country is presented in the Appendix.

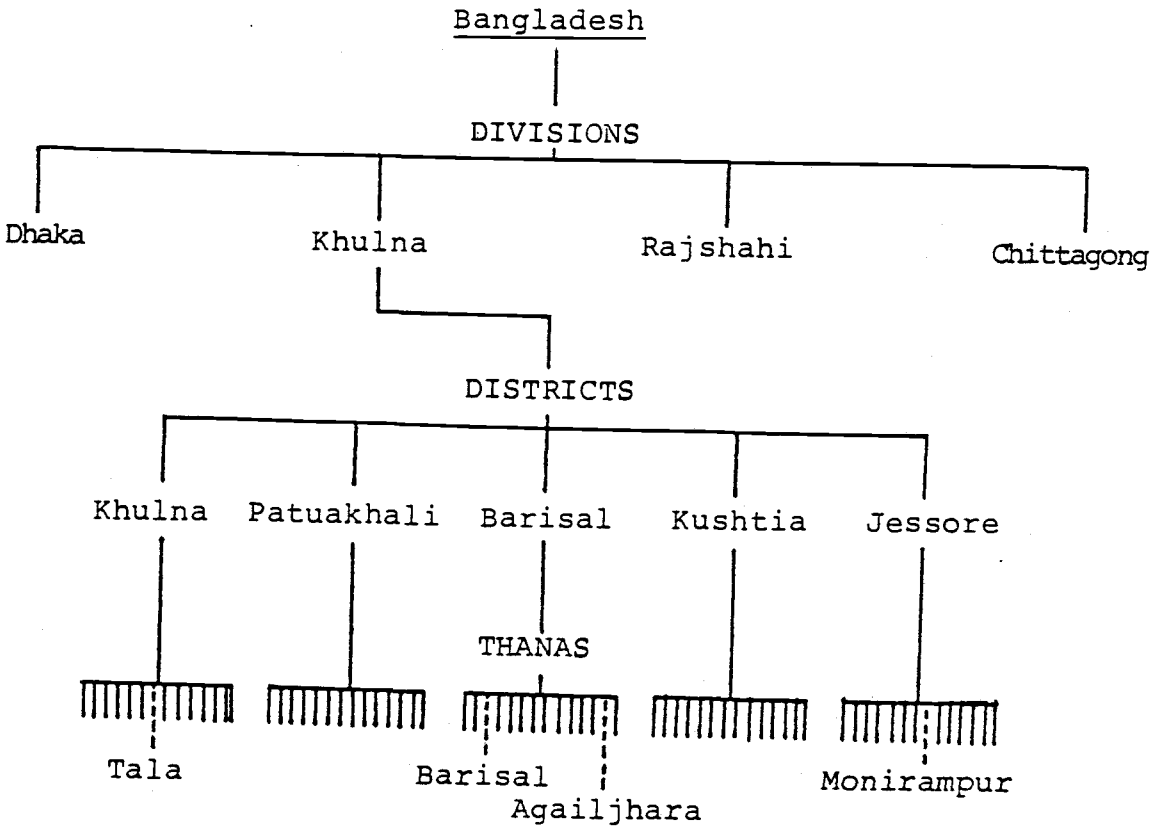
DATA COLLECTION

Personal interviews with government health care officials of Bangladesh took place during the author's stay in Bangladesh in the summer of 1983 during which time various aspects of the role of village practitioners in health care delivery were discussed. These interviews aided in determining the factors that were considered to be influential on the village practitioners' drug knowledge. The major content of the questionnaire utilized in the survey was developed from these interviews.

Respondents were village practitioners interviewed at

Figure 1

SAMPLE DESIGN OF THE STUDY



their places of occupation by local researchers. Interviews with the village practitioners took place in the Jessore and Khulna Divisions during the months of September and October, 1983 and in the Barisal Division during November, 1983. All the interviewers were males because they have greater credibility among the practitioners who are also predominantly males. There were no females in the sample population of this study.

In the four thanas selected, a union* based list of village practitioners was prepared from the information obtained at the thana health complexes. This list was supplemented by the information from village leaders, field level family planning workers, and the village pratitioners themselves. The interviewers visited each practitioner at his place of occupation. After an explanation of the nature of the study, the village practitioner was interviewed for about 15-20 minutes. Cooperation from the respondents was very high in that all practitioners visited agreed to be interviewed.

Every effort was made to insure that the respondents understood that any information they gave would remain confidential. They were also given the option of withdrawing at any point during the interview.

VARIABLES

In this study, the type of training, type of

*union - a lower administrative unit; pop. about 20,000.

registration, sources of background drug knowledge, years of work experience, and years of formal education are the independent variables.(Appendix A: Q.4-8) These variables were chosen on the basis of government as well as non-government health workers' and officials' assessment of factors that were thought to be influential on the drug knowledge among village practitioners.[10-12,43] The level of drug knowledge, the dependent variable, is a composite index constructed by summing the number of correct answers given to items which questioned the respondents about their knowledge of the proper usage of drugs.(Appendix C) These items were chosen on the basis of common concerns among the interviewed health care officials and personnel about how knowledgeable the village practitioners were of certain drugs. The drugs selected were those that were relied upon most heavily by the village practitioners.[13,41,42,50] The questionnaire items were constructed to test the basic minimum knowledge village practitioners should have to safely dispense these drugs. It must be noted, however, that the knowledge scores reported here do not reflect their overall drug knowledge in an exhaustive manner. The items included surveyed the village practitioners': 1). knowledge of indications for the most frequently used antihelmintics; 2). knowledge of appropriate antibiotics for pregnant women; and 3). overall knowledge of the appropriate use of Tetracycline, a heavily used drug in Bangladesh.[11] Three items

originally contained in the questionnaire (Appendix A: Q.21-23), were omitted because a high percentage of village practitioners misinterpreted their meaning.

SURVEY INSTRUMENT

The wording and format of the questionnaire items were simplified for use with the undereducated. The survey was first prepared in English (Appendix A), and later in Bengali (Appendix B)in the final revision.

Pretesting of the questionnaire was conducted on village practitioners who were not included in the final sample between July and September of 1983. Items in the preliminary questionnaire were developed on the basis of consultations with health care personnel and statisticians as to the kind of information these persons deemed essential in the understanding of the village practitioners' drug knowledge. Through the two pre-tests the questionnaire was refined and ultimately finalized to be utilized for the study sample.

This particular survey instrument was designed to provide demographic information as well as attitudes, opinions, and behavior of the village practitioners. A mixture of open and closed ended response formats was used.

III. DATA RESULTS AND ANALYSIS

In this chapter, results from the data and corresponding analysis are discussed. Using the SPSS computer package the effects of these variables on the level of drug knowledge, the dependent variable, were examined using the ANOVA subprogram and its regression option.[51] The first section of the chapter covers the general distribution of each variable among the sample population of village practitioners. In the second section, results of the bivariate analysis are presented and discussed. A brief examination of a multivariate analysis of the data is also included in the latter section.

GENERAL DISTRIBUTION

Level of Drug Knowledge

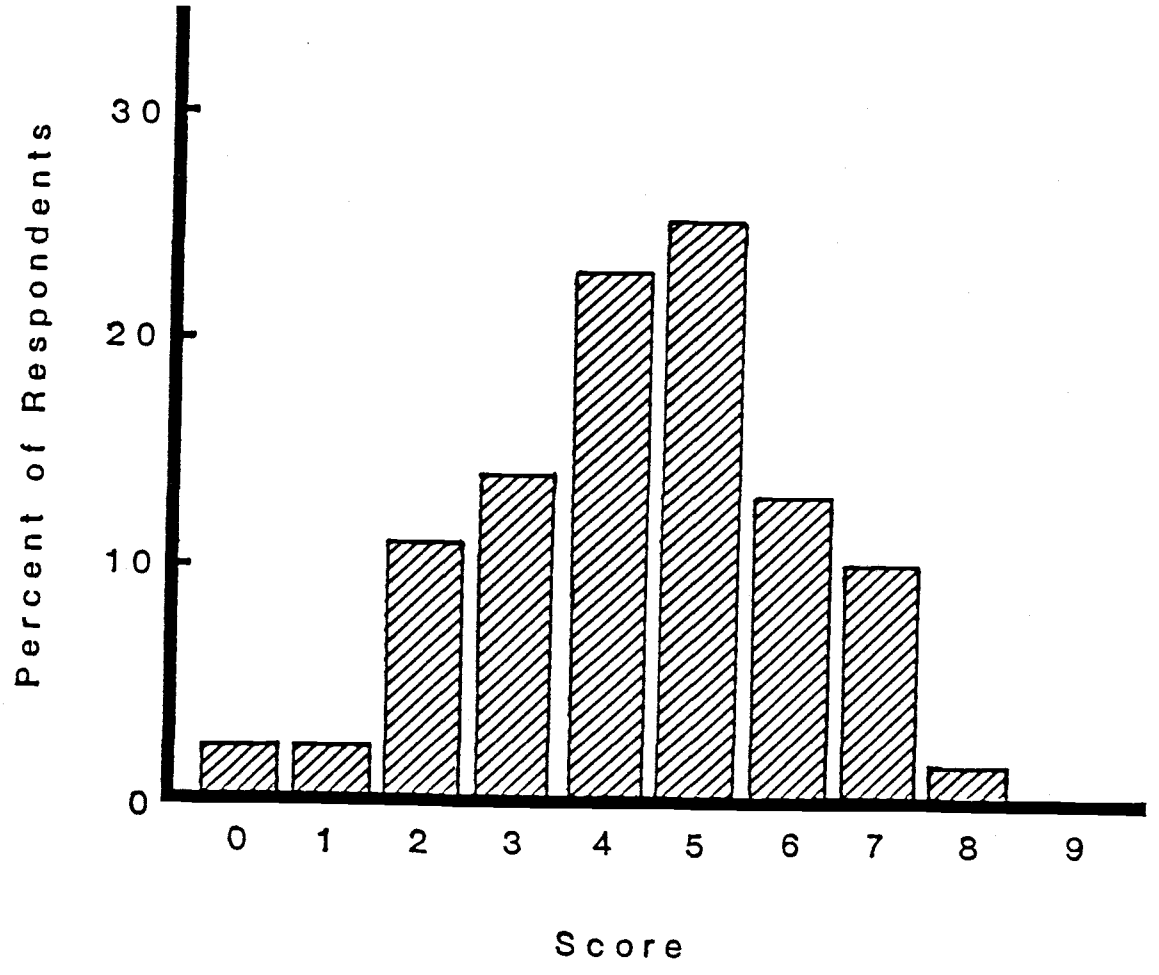
The level of drug knowledge was determined by a knowledge score. The items in the questionnaire were coded so that a high score was indicative of a high level of drug knowledge.

As can be seen from Figure 2, the scores range from 0 to 8 and the mean is 4.35. Almost half of the sample of practitioners (43%) have scores of 4 or 5. The the questions that were asked pertained to basic drug information concerning frequently dispensed drugs. The score of 4.35 (48% of 100%=perfect score) indicates a

Figure 2

OVERALL DISTRIBUTION

OF DRUG KNOWLEDGE SCORES



seemingly low level of drug knowledge.

Type of Training

The village practitioners were asked to identify the type of training they received in preparation for their medical practice. Table 2 shows the most frequently mentioned type of training to be the government training program. Government training refers to the training programs carried on especially for village practitioners by the Bangladesh government in an attempt to satisfy the needs of rural areas for more health care providers.[52] Nearly 40% of the practitioners considered their prior experiences as a compounder to be their main source of training. Compounders in Bangladesh are usually self-taught and work with village practitioners or occasionally in institutions. Approximately 10% of the repondents indicated that their main source of training was through medical colleges or through apprenticeships with a qualified medical doctor. Finally, training received from the practitioner's own family was the least frequently mentioned type of training. This is a modality of training where knowledge and skills are transferred from an older to a younger member of a family.

These findings are consistent with the findings of Rahman et al concerning the large number of village practitioners who had been trained as compounders prior to practicing.[39] However, the relatively large number of practitioners that were found to have received government

TABLE 2

Type of Training among
Bangladesh Village Practioners

Type of training	Frequency	%
Medical coll./apprenticeship	11	10.9
Gov't training program	46	45.5
Compoundership	40	39.6
Family training	4	4.0
	101	100.0

training is not consistent with previous studies. Some studies do not even mention the existence of this particular type of training.[25,46] Most of these prior studies are dated. Since government health policies and programs have been intensified only within recent years, it is possible that the influence of the Bangladesh government training programs is greater today than it was before among the village practitioners. Assessment of this possiblity is done in the latter part of this chapter.

Type of Registration

In Bangladesh, as in most other countries, all types of medical practitioners are required to register with the government in order to practice legally. This involves a thorough screening of the applicant's training and background.[42] In order to avoid screening, many with weak medical training simply choose to practice without any license.[6] Furthermore, these non-registered practitioners continue to treat the sick because of the lack of an effective government control system.[53]

Until a few years ago, those practitioners that successfully completed an intensive form of a government training program were automatically registered to practice primary health care. In this particular program, village practitioners were recruited from selected villages and trained for one year at the thana health complexes. Here, the practitioners were taught basic treatment of common

illnesses and proper usage of drugs required for the treatment. Village practitioners, completing the training, were to return to their own villages and practice medicine there. This program has recently been terminated.[12]

In an effort to determine the type of registration held by the sample population, the village practitioners were asked to identify their registration, if any. About half of the respondents were registered to practice medicine; nonregistered practitioners composed the remaining population. Once again this finding of the large number of registered practitioners, shown in Table 3, was not in accordance with findings of earlier studies that indicated a predominance of non-registered practitioners in rural Bangladesh. [25,29] This discrepancy is not surprising considering the high proportion of government trained practitioners.

At this point, it is necessary to note the small proportion (11%) of practitioners that possessed a registration for the selling of drugs. This is significant because 97% of all the respondents indicated they owned and/or ran a drug store. That is, due to the lack of proper government control and supervision, a substantial proportion of the respondents were freely, but illegally, treating the sick and selling them the drugs at the same time.

TABLE 3

Type of Registration among
Bangladesh Village Practitioners

Type of registration	Frequency	%
Practice medicine	51	50.5
Sell drugs/practice med.	11	10.9
No registration	39	38.6
	101	100.0%

Source of Background Drug Knowledge

Respondents were asked where they had obtained most of their background drug knowledge used as the basic foundation in their daily practice. Results, shown in Table 4, indicate that 40% of the practitioners acquired their drug knowledge from their respective professional training. This training refers mainly to training obtained from medical colleges, apprenticeships, or government training programs. About 30% attributed their knowledge to other village practitioners. Others, about 26% of the respondents, identified the medical literature as their main source of drug knowledge. Medical literature sources consist of commercial compendia, drug therapy texts, and other literature sources. In view of the educational background of the majority of these practitioners (see next section), this finding was quite unexpected.

The small proportion that indicated medical representatives as the main source of basic drug knowledge was the other finding that was also somewhat surprising. Medical representatives are salesmen of drug companies who have been described as supplying most of the drug information available to practitioners in the rural areas of developing countries.[54] Results of this study, however, suggest that medical representatives were not utilized in such a way by the village practitioners of Bangladesh. The practitioners were asked to estimate the number of medical representatives typically seen each

TABLE 4

Source of Background Drug Knowledge among Bangladesh Practitioners

Source	Frequency	%
Medical representatives	4	4.0
Professional training	41	40.6
Other practitioners	30	29.7
Medical literature	26	25.7
Pharmacists	0	0.0
	101	100.0%

month. Responses indicated that contact with medical representatives never occurred for almost half of the respondents as shown in Table 5. Only 27% of the respondents reported that they were visited once or twice a month by the representatives. Subsequent interviews with other local doctors confirmed this low figure by indicating that medical representatives rarely made lengthy trips into the villages.[11]

Finally, none of the respondents identified pharmacists as sources of their basic drug knowledge.

Years of Formal Education

Village practitioners were asked to identify the number of years of formal education they have completed. The results are presented in Figure 3 and show an average of 10 years of formal education. It should be noted at this point that the educational system of Bangladesh is comprised of: primary level=1-5th grade, intermediate level=6 & 7th grade, secondary level=8-10th grade, college level=11 & 12th grade, and university=above 12th grade.

Since 75% of the respondents indicated an educational background of 10 years, it may be assumed that most practitioners have had an education up through the secondary level.

Years of Work Experience

Village practitioners were asked to identify the number of years they had been practicing their profession.

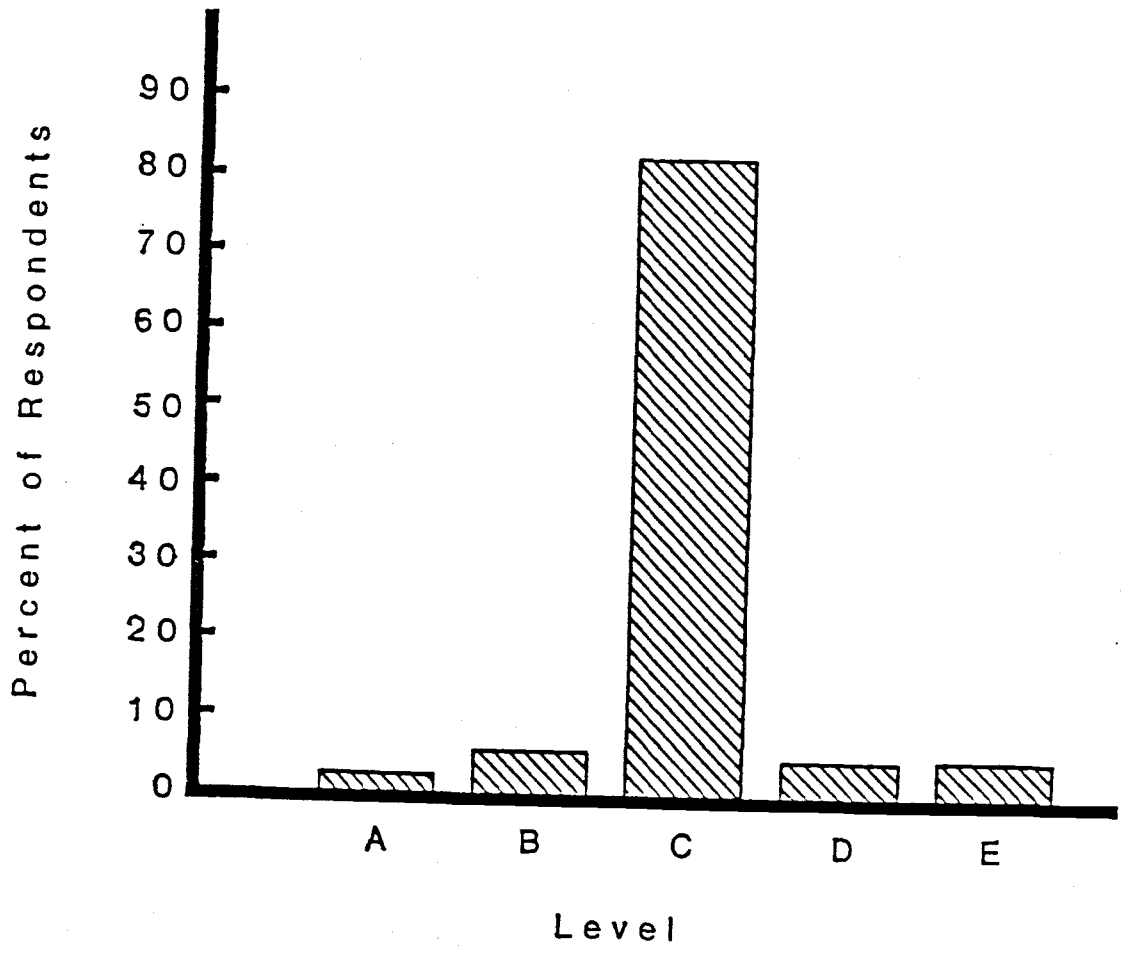
TABLE 5

Frequency of Visits made by Medical Representatives to Bangladesh Village Practitioners

Visits per month	Frequency	%
0	50	49.9
1 or 2	28	27.4
3 or 4	11	10.9
5 or above	12	11.8
	101	100.0%

Figure 3

LEVELS OF EDUCATION
AMONG BANGLADESH VILLAGE PRACTITIONERS



LEVEL

A =Primary, 1-5 years
B =Intermediate, 6 & 7 years
C =Secondary, 8-10 years
D =College, 11 & 12 years
E =University, >12 years

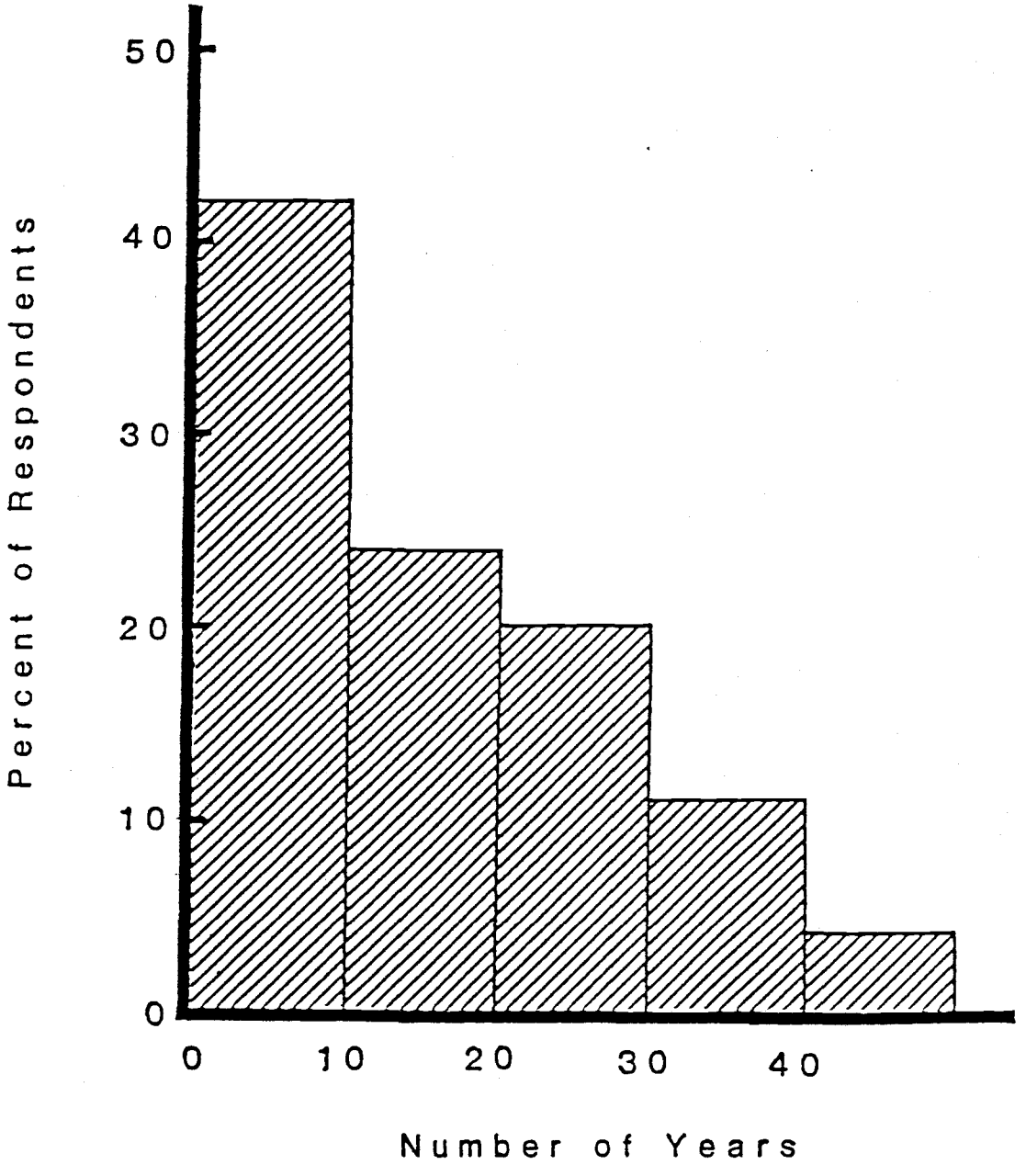
The results, shown in Figure 4, indicate that the average village practitioner has 16 years of work experience, with about 65% of the practitioners working for less than 20 years. The proportion of newcomers in practice, 0-10 years, was relatively high, representing about 42% of the total sample.

When comparing the average age of the practitioners, 41 years old, to the average number years of work experience it would appear that that these men began practicing when they were still quite young, about 25 years old.

These results, as well as results in the previous section depicting the average number of years of formal education correspond closely to earlier studies.[38,39]

Figure 4

YEARS OF WORK EXPERIENCE
AMONG BANGLADESH VILLAGE PRACTITIONERS



BIVARIATE ANALYSIS

Type of Training

It was found that the type of training that the village practitioners received was related to a statistically significant degree with their levels of drug knowledge (Table 6). The mean scores of each group are presented in Table 7. Medical college training can be assumed to be the highest form of training, followed by government training program, compoundership training, and finally family training. Table 7 shows that as the form of training rises, the drug knowledge of the practitioners increases.

It must be noted that while medical college trained practitioners comprised only about 11% of the sample population, the government trained practitioners, who were the second most knowledgeable, comprised the largest group. An *a posteriori* contrast analysis using a Scheffe's test showed that the difference in knowledge between these two groups was not statistically significant. A possibility exists in which the questions used in determining drug knowledge scores were not sensitive enough to measure the difference in the level of drug knowledge between medical college and government trained village practitioners. The *a posteriori* contrast did show, however, that the compoundership and family trained village practioners' drug knowledge was

TABLE 6

One-way Analysis of Variance Reflecting Drug Knowledge versus Type of Training

Sources of variance	d.f.	SS	MS	F	p
Between groups	3	49.168	16.389	6.921	.000
Within groups	97	229.703	2.368		
Total	100	278.871			

TABLE 7

Differences in Drug Knowledge according to Type of Training (N=101)

Type of training	Score	%
Medical coll./apprenticeship	5.45	10.9
Gov't training program	4.78	45.5
Compoundership	3.70	39.6
Family training	2.75	4.0
		100.0

significantly lower than the medical college and government trained practitioners. This result suggests that the drug knowledge level of medical college and government trained practitioners, as a whole, can be distinguished from practitioners with the other types of training--compoundership and family training.

Medical college training is not easily accessible to the village practitioners because of the concentration of medical colleges in major cities. Government training programs, on the other hand, are easily accessible to village practitioners and do appear to have an impact upon the practitioners' drug knowledge. Findings show that a reinforcement of training is beneficial to the village practitioners. And an increase in government training programs is more practical and feasible than to increase the number of medical college graduates.

Almost half of the responding village practitioners were not very well trained--they had their training through compounderships or through their families. These practitioners were also least knowledgeable about drugs. Compounders are usually found working with other village practitioners as their partners. These partners are usually practitioners trained through the government training programs. The drug knowledge compounders receive from this type of an informal "training" is certainly limited.

Even lower in their level of drug knowledge were those trained by their families. Knowledge that is

received in this case is typically that which is handed down through the generations, and therefore tends to be more of the traditional nature. Specific drug information concerning Western drugs is not commonly included in this knowledge. These types of training through families, as well as through compounderships, do not involve provision of the specific knowledge about drugs, and therefore, do not appear to have an impact upon village practitioners' overall drug knowledge.

Type of Registration

There was a statistically significant relationship between registration and the level of knowledge, (Table 8). Table 9 indicates that the village practitioners that were registered--to practice medicine and/or sell drugs--were more likely to be more knowledgeable about the correct use of drugs than those without registration. The difference in knowledge between the group with registration to only practice medicine and the group with registration to both sell drugs and practice medicine was not statistically significant after an *a posteriori* contrast analysis using a Scheffe's test. The difference between the group with registration and the group with no registration, however, did remain significant. Village practitioners in the sample population can therefore, be distinguished between "registered" or "non-registered" practitioners.

It is important to realize that the observed

TABLE 8

One-way Analysis of Variance Reflecting Drug Knowledge versus Registration

Source of variance	d.f.	SS	MS	F	p
Between groups	2	44.197	22.099	9.228	.000
Within groups	98	234.674	2.395		
Total	100	278.871			

TABLE 9

Differences in Drug Knowledge according to Type of Registration (N=101)

Type of registration	Score	%
Practice medicine	4.88	50.5
Sell drugs/practice med.	4.82	10.9
No registration	3.51	38.6
		100.0%

relationship of registration with the level of drug knowledge is not a function of the mere act of registering. Instead it is the training that is required before one is eligible for registration that seems to be significant in the particular relationship. As in the previous section, training through medical colleges and through government training programs seem to be influential in increasing the drug knowledge among the village practitioners.

The registration process, as indicated earlier, requires village practitioners to meet certain qualifications. Since medical training--either through medical colleges or through the government training programs--constitutes one of these qualifications, registered practitioners are assumed to have undergone either type of medical training. This assumption is confirmed in Table 10 which shows the distribution of types of training among the registered practitioners. Only 6% of the registered village practitioners have undergone compoundership training; 94% of them have either medical college or government training. None of the registered practitioners have family training.

Registered practitioners, in addition to achieving relatively high scores, also comprised 51% of the sample population. Various literature sources, however, have described the village practitioners as those usually without any form of registration.[25,33,46] A possible explanation for this discrepancy could be the recent

TABLE 10

Type of Training of Practitioners Registered to Practice Medicine (N=101)

Type of training	%
Medical coll./apprenticeship	11.8
Gov't training program	82.3
Compoundership	5.9
Family training	0.0
	100.0%

efforts of Bangladesh health officials to increase in the number of practitioners completing the intensive government training courses by enforcing regisration--a phenomenon that earlier literature sources may have been unable to record. Based on this explanation, the requirement to register can be regarded as instrumental in attracting more village practitioners to government training programs. The training of village practitioners will be influential in increasing their level of drug knowledge.

Literature sources have also cited the malpractices and incompetence of the non-registered practitioners. Low levels of drug knowledge may be responsible for these findings. Further efforts must, therefore, be made to train these practitioners and increase their drug knowledge.

Source of Background Drug Knowledge

The relationship between how knowledgeable about drugs the village practitioners were and the sources from which they obtained their background drug knowledge was found to be statistically significant (Table 11). The most knowledgeable about drugs was the group of practitioners receiving their background drug knowledge from medical representatives (Table 12). In contrast, those who identified medical literature as their main source were the least knowledgeable about drugs.

These results were, for the most part, unforeseen.

TABLE 11

One-way Analysis of Variance Reflecting Drug Knowledge versus Source of Background Knowledge

Sources of variance	d.f.	SS	MS	F	p
Between groups	3	25.933	8.644	3.306	.024
Within groups	95	248.390	2.615		
Total	98	274.323			

TABLE 12

Differences in Drug Knowledge according to Source of Background Drug Knowledge (N=101)

Source	Score	%
Medical representatives	5.00	4.0
Professional training	4.82	40.6
Other practitioners	4.30	29.7
Medical literature	3.58	25.7
		100.0%

Medical representatives are frequently described as supplying biased and inaccurate information; medical literature is generally regarded as being accurate and reliable. As seen earlier, access to medical representatives was not equal among the village practitioners. Almost 50% of the respondents never had contact with a medical representative (Table 5). No reliable conclusions, therefore, could be made from the above findings relating to the relationship of medical representatives with village practitioners' drug knowledge. Similar constraints were put upon the usage of findings relating to the relationship of medical literature with village practitioners' drug knowledge. Medical literature available among the responding practitioners was extremely varied and ranged from authorized medical compendia to unofficial medical guides. Further examination of the medical literature distributed among the village practitioners in relation to the practitioners' drug knowledge is necessary. Only then can conclusive statements be made regarding medical literature as an adequate source of background drug knowledge.

Table 12 shows that the practitioners who obtained their background drug knowledge from their professional training were the second most knowledgeable about drugs. Among these practitioners, the majority (74%) had their training through the government training programs, as shown in Table 13. These government training programs appear to be most important as a source of drug knowledge.

TABLE 13

Association of Source of Background Drug Knowledge and Type of Training

Type of training	Source of background drug knowledge			
	Pro train.	Med reps.	Other VP	Med lit.
Medical coll.	13.2 (5)	20.0 (1)	12.5 (4)	3.8 (1)
Gov't training	73.7 (28)	60.0 (3)	25.0 (8)	27.0 (7)
Compounder	10.5 (4)	20.0 (1)	53.1 (17)	69.2 (18)
Family	2.6 (1)	0.0 (0)	9.4 (3)	0.0 (0)
	100.0% (38)	100.0% (5)	100.0% (32)	100.0% (26)

χ^2=43.5041, d.f.=9, p=.0001

Since government training programs were also shown earlier to influence the level of drug knowledge among village practitioners (Table 7), greater emphasis must be placed on such training programs.

The majority of village practitioners relying upon other village practitioners as a source of drug knowledge had their medical training working as compounders. Practitioners with compoundership training were also shown earlier to have relatively low knowledge scores (Table 7). This relationship should be examined further. It is necessary to determine whether the practitioners, who relied upon "other practitioners" as a source of drug knowledge, were less knowledgeable because of their inadequacy in medical training as compounders or because of inadequacy of "other practitioners" as their knowledge source. The findings from this examination will be important in directing efforts of improvement appropriately--either towards training or towards the source of background drug knowledge.

Years of Formal Education

A cross tabulation analysis (Table 14) showed that there was no significant relationship between the number of years of formal education and the level of drug knowledge of the village practitioners. (In Table 14, the "low" scores are those between 0 and 4, and "high" scores are those between 5 and 8). It is important to note that these categories have been combined for the purpose of

TABLE 14

Level of Drug Knowledge according to Years of Formal Education

Years of formal education	Drug knowledge: Low ≤ 4.00	High ≥ 5.00	Total
Primary (<5th gr.)	75.0 (3)	25.0 (1)	100.0% (4)
Intermediate (6, 7)	0.0 (0)	100.0 (6)	100.0% (6)
Secondary (8-10)	54.3 (44)	45.7 (37)	100.0% (81)
College (11, 12)	60.0 (3)	40.0 (2)	100.0% (5)
University (>12)	40.0 (2)	60.0 (3)	100.0% (5)

χ^2=38.538, d.f.=32; p=N.S.

clarity, and the degrees of freedom of the chi square statistic is 32.

As was shown in Fig. 3, village practitioners who had formal education were not normally distributed among the sample population. Findings of the study concerning formal education could be attributed to the lack of variance in the number of years of formal education among the respondents. The finding of the insignificance of formal education must, therefore, be further verified by a cross tabulation analysis of all village practitioners in the sample population excluding those with secondary(8-10 years) education. Results of the analysis still showed no significant relationship between years of formal education and level of drug knowledge among the practitioners(χ^2 =4.375, d.f.=3; p=N.S.). Furthermore, comparisons of the education data of this study with those of other studies indicate similar patterns of distribution exist in other rural regions, with the majority of village practitioners educated at the secondary level. It is possible to assume that the finding of no association of drug knowledge with years of formal education may be valid and representative of village practitioners in many rural regions in Bangladesh.

This finding suggests that the knowledge used by the respondents in their practice is not dependent upon their formal education. The lack of formal education among village practitioners is not necessarily a barrier to the effort of improving their drug knowledge. If these

practitioners are to be trained for the appropriate delivery of pharmaceuticals, a high formal education may not be required of them.

Based on the above observations, one might reasonably conclude that while education may have a significance as a status symbol, its relationship with the level of drug knowledge held by village practitioners is insignificant. Training the practitioners in the medical skills used in the rural areas is more important in increasing their drug knowledge than equipping them with formal education.

Some studies have inferred that the low level of drug knowledge of the village practitioners is due to the fact that they lack formal education (as defined in the earlier chapter).[46] This argument is not supported by the findings of this study.

Years of Work Experience

A negative Pearson's coefficient, r=-.2946, from a zero-order correlation analysis indicated a negative correlation between the years of work experience and level of drug knowledge (Table 15). In other words, the fewer years of work experience the practitioners have, the more knowledgeable they will be about the drugs they use. Since this finding seems paradoxical, further explanation is needed.

The sample population contained a group of registered and a group of non-registered practitioners. Findings so far seemed to suggest that the two groups were distinct

TABLE 15

Zero-order Correlation Between Drug Knowledge and Registration and Work Experience

	Drug know.	Work exp.	Reg.
Drug knowledge	1.0		
Work experience	-.2946	1.0	
Registration	.4101	-.3868	1.0

$p<.002$

from each other mainly in terms of training. It was reasonable to expect that the two groups may also be different in the effect of years of work experience upon their drug knowledge. Table 15 shows that there is a strong relationship between work experience and drug knowledge of the practitioners when no control for the influence of registration is made. This table also shows that the two variables, work experience and registration, have a joint relationship with each other (r=-.3868). When registration is controlled, as shown in Table 16, this relationship remains relatively strong among the registered practitioners. There was only a slight change from r=-.2946 to r=-.251. Those with more work experience seem to be less knowledgeable about drugs. There was no difference in the degree of drug knowledge among non-registered practitioners with different lengths of work experience. There was a substantial change from r=-.2946 to a statistically non-significant value of r=.064.

Earlier, registered practitioners were mostly found to be those who were medically trained--through medical colleges or through government training programs. According to the above findings, practitioners receiving training most recently through the training programs and subsequently beginning their medical practice, have a higher level of drug knowledge than others working for many years but having gone through such training less recently. For example, village practitioners with five

TABLE 16

Correlations Between Drug Knowledge and Work Experience according to Type of Registration among Practitioners

	Work experience	
	Registered	Non-registered
Knowledge	r=-.251 (51) p=.038	r=.064 (39) p=N.S.

years of work experience will not know as much about the drugs commonly used today as those practitioners with one year of work experience. The drug knowledge that the latter practitioners initially had at the start of their practice may not be as usable as it originally was in view of the fast-moving pace of medical innovations. It may be postulated that this initial drug knowledge becomes obsolete with time.

In contrast to registered practitioners, non-registered practitioners were presumed to be inadequately trained from the beginning--they had either compoundership or family training. These practitioners are not under a systematically organized training program. The limited training they do receive has probably been of the same nature for the past several years. Such observations may explain the findings that work experience had no significant effect upon the non-registered practitioners. The initial drug knowledge possessed by these practitioners has remained inadequate regardless of their work experience.

The findings suggest that more work experience among registered (or trained) village practitioners will not compensate for the lack of a continuing education program. Current drug information, through such a continuing education program, can be transmitted to the village practitioners to update their drug knowledge. Registered practitioners who have been practicing for several years must be provided with training designed to upgrade their

level of drug knowledge that presently appears to be obsolete. Findings also suggest that the presently non-registered (or inadequately trained) village practitioners clearly are in need of a training system that would provide them with basic drug knowledge.

MULTIVARIATE ANALYSIS

Table 17 shows the relationship of all the variables with the village practitioners' drug knowledge. In this analysis of covariance, the term covariate is used to designate continuous variables that cannot be experimentally manipulated. The rest of the variables are categorical, independent variables or factors.

Most commonly, covariates are inserted into a design to remove extraneous variation from the dependent variable, thereby increasing measurement precision. The block of independent factors are then processed with the covariates held constant. The effects of these independent factors are of primary concern. Each factor receives credit only for the incremental sum of squares that it adds to the effects of the other factors. It is important to note that if there is a strong association between the factors, it is possible to have a result in which the additive effects as a whole are significant while the individual main effects are not significant.

Table 17 shows that the independent factors are type of training, registration, and source of background drug

TABLE 17

Association of Training, Registration, Source of Background Drug Knowledge with Drug Knowledge after accounting for Education and Work Experience

	F-ratio prob.
Covariates	.003
Education	.850
Work Experience	.001
Independent variables	.007
Training	.057
Registration	.618
Source of background drug knowledge	.462

R^2=.281

$F_{(2,99)}$

knowledge. The covariates are years of formal education and years of work experience. These two variables were selected to be entered first into the analysis because they were considered to be attribute variables and thus, not experimentally manipulable. The dependent variable is adjusted for these covariates, and the effect of the independent factors, the experimentally manipulable variables, can then be observed more clearly. The findings indicate that the three independent factors have an overall significant additive effect upon the village practitioners' drug knowledge when extraneous variation is removed through the prior insertion of the two covariates. Although the additive effect is significant, the individual main effects of the independent factors are not statistically significant. This observation demonstrates a strong association between these factors.

The type of training is shown to be most important among the independent factors in influencing the level of drug knowledge. Emphasis on medical training, namely government training programs, in Bangladesh would be beneficial for village practitioners in increasing their drug knowledge. Registration and source of background knowledge, on the other hand, appear to have no statistically significant effect on drug knowledge. This result can be explained by the association, shown earlier, of these two variables with type of training. The source of background drug knowledge is associated with training. Recall that professional training was found to be most

important as a source of background drug knowledge. Whether one is registered or not is primarily determined by his training background--only those with well-qualified medical training are registered. The association with training causes registration to have no statistically significant impact upon the effects already made by the other factors (Table 17). Registration, however, is significant in terms of policy implications. It is found to be closely associated with training which, according to the findings, is the most important factor in influencing village practitioners' drug knowledge. The training required to be eligible for registration, coupled with the enforcement of registration itself, will motivate a larger number of practitioners to participate in government training programs. Since more practitioners will be better trained, the availability of village practitioners with adequate drug knowledge will be greater in the rural areas.

Table 17 gives a R^2 value of .281 indicating that the net effect of all the variables used in the study account for 28% of the total variance in drug knowledge. The practical utility of these variables for programs in medical training must be assessed based on this finding. The ability to account for 28% of the variance means that 72% of the variance remains to be explained. Attempts to identify additional variables indicative in influencing the village practitioners' drug knowledge should be pursued.

LIMITATIONS

Surveys of the type employed in this study possess some obvious limitations.

First is the size of geographic coverage. One rural division in the deltaic heartland of Bangladesh may not be necessarily representative of other regions in Bangladesh. Comparisons between the findings of this study and the socio-demographic data in other rural regions indicate that some similarities exist among the rural regions. Extrapolation of the findings of the study to the entire population of village practitioners in Bangladesh, or the Third World as a whole, should be made with caution.

Second is the validity of response on the part of the practitioners. Examination of the validity of these responses was done by comparing the data of this study with socio-demographic data of other studies. Although certain aspects of the data are probably accurate (eg. years of work experience, years of formal education), other types of information may not be so mainly due to the practitioners' unfamiliarity with interviewing processes. An effort was thus made to insure the respondents of the confidential nature of the interview.

Third is the utilization of the reported knowledge scores as measures of the village practitioners' level of drug knowledge. Because of the limited number of questions used in evaluating them, these knowledge scores

do not reflect the practitioners' overall drug knowledge in an exhaustive manner. Caution must, therefore, be taken in the interpretation of the scores.

Fourth is the incapability of the current survey to generate an in-depth understanding of the nature of practice among the village practitioners. It would have been necessary to spend more time in the village themselves, and that at the time of data collection was not feasible.

IV. SUMMARY AND POLICY IMPLICATIONS

SUMMARY

The results of this study indicate that the level of drug knowledge among the village practitioners is seemingly low and inadequate. Medical training is important in influencing the level of drug knowledge among Bangladesh village practitioners. The practitioners with medical college training were few in number and were found to be most knowledgeable among all the other practitioners. The level of drug knowledge itself of these medical college trained practitioners, however, was found to be low. Findings suggest that an emphasis upon government training programs may be the most feasible and practical means of influencing the level of drug knowledge of village practitioners. Government training programs seem to be routinely available to practitioners in the rural areas. A greater availability and development of such programs is beneficial to the village practitioners.

Findings also show that those registered to practice medicine had some type of medical training and were much more knowledgeable about drugs than those with no registration. This difference in drug knowledge between the registered and non-registered village prqactitioners arises because of the underlying difference of the two groups of practitioners in training. Certain standards of training must be met to be eligible for registration.

Registered practitioners are most likely to have met these standards by undergoing medical college or government training in contrast to non-registered practitioners, most of whom are not equally well-trained. The importance of government training programs is reaffirmed in this finding concerning the training background of registered practitioners. In view of these findings, the requirement to register may be regarded as instrumental in increasing the number of practitioners participating in the government training programs. More medically trained village practitioners, according to earlier postulation, imply more village practitioners with high level of drug knowledge.

Results further indicate that government training programs are a significant source of background drug knowledge and provide village practitioners with basic know-how of drug usage. These programs appear to be important in influencing the level of drug knowledge among village practitioners. A more in-depth study and understanding of the government training program must be made as it provides knowledge specifically related to basic drug utilization.

The finding of no association of drug knowledge with years of formal education suggests that any impact of formal education is relatively weak in comparison to the large impact of the medical training experience that follows it. Training the village practitioners in the medical practices applicable to the rural areas is more

important for increasing their drug knowledge than giving them formal education that is unrelated to medical practice. These findings suggest that village practitioners need not be highly educated. Furthermore, their lack of formal education is not necessarily a barrier to the success of government training programs.

The number of years of work experience was found to have distinct effects upon registered and non-registered practitioners. These distinct effects are mainly based on their underlying differences in training. Among registered practitioners, those who had been trained and practicing for a long time were more likely to have drug knowledge that had become obsolete since the start of their practice. These practitioners are in need of a medical training that will upgrade their drug knowledge. On the other hand, the drug knowledge possessed by non-registered practitioners was inadequate or obsolete regardless of their work experience. No attempts in the past were made to upgrade their drug knowledge. These practitioners have generally remained to be inadequately trained. A basic medical training that will provide them with the fundamentals of drug utilization is needed for them.

According to the findings, an increase in work experience will not necessarily compensate for the lack of a continuing education program that focuses upon transmitting current drug information to the village practitioners. A continuing education program seems

essential in updating and maintaining the village practitioners' level of drug knowledge.

Finally, a multivariate analysis of variance reaffirms the importance of medical training in influencing the village practitioners' drug knowledge. This observation again implies that providing village practitioners with adequate medical training is one way of increasing their level of drug knowledge.

POLICY IMPLICATIONS

The findings from this study suggest that the training of the village practitioners must be the first and main step in bringing about increases in village practitioners' drug knowledge. Despite the recent termination of an intensive government training program, renewed emphasis needs to be made upon such programs aimed specifically at training village practitioners. A high degree of formal education may not be necessary for them to be trained effectively. The main focus of the government training programs should be upon non-registered practitioners as well as the registered practitioners who have been practicing for a large number of years. These village practitioners need to have basic medical knowledge since their current drug knowledge was found to be inadequate. Finally, the enforcement of registration can be used to attract more village practitioners to register. These practitioners will be motivated to meet the

standards for registration and consequently participate in the government training programs.

Once the village practitioners complete the government training programs, the drug knowledge that they acquired must be updated with current drug information. A continuing education program is, therefore, needed for all village practitioners who have (or will have) participated in the government training programs. Such a program must focus on transmitting current drug information concerning new drugs, latest changes in therapeutic approaches, and new indications to these practitioners in a clear and concise manner.

The emphasis put upon training programs will have several, potential effects. The number of trained practitioners will increase making themselves more available in the rural communities. These practitioners will have greater rationality in their drug utilization in treating patients. They will be more knowledgeable about effective drugs that are currently available.

These effects, in the long-run, will lead to increased efficiency in health-care delivery. Rural inhabitants will have greater accessibility to medical care through the village practitioners. It is presumed that drugs will be utilized more effectively and will be made more available to those who need them in the rural communities.

REFERENCES

1. Griffin Jr., R.J. (1982). Pharmaceuticals in Third World markets: special opportunities, special problems. American Pharmacy , NS 22:3 , 18-21.

2. Van Praag, E. (1983). Selective Primary Health Care . Seminar Paper. Dhaka: National Institute of Preventive and Social Medicine (NIPSOM).

3. Levin, F. (1983). Role of pharmacy in health for all by the year 2000. Pharmaceutical Journal. Feb. 19, 186-187.

4. Van der Geest, S. (1983). Non-information for patients: selling drugs in developing countries. Pharmacy International , February, 42-44.

5. Leslie, C. (ed.) (1976). Asian Medical System. Berkeley: Univ. of California Press.

6. Claquin, P. (1981). Private health care providers in Bangladesh. Social Science & Medicine , 15B , 153-157.

7. Sidel, V.W. (1972). The barefoot doctors of the People's Republic of China. New England Journal of Medicine, 286, 1292.

8. Lindsey, L.L. (1982). Pharmacy and health care in India. American Pharmacy , NS22:9 , 14-17.

9. Mahler, H. (1982). Essentials drugs for all. Speech presented at the 11th IFPMA Assembly. Wash., D.C.: IFPMA.

10. Kawasa Ara. Asst. Licensing Officer, Bangladesh Drug Administration. Personal communication: June 21, 1983.

11. Dr. N. Ishikawa. T.B. specialist, Christian Health Care Project (CHCP). Personal communication: June 26, 1983.

12. Dr. S. Rahman. Director, Bangladesh Fertility Research Program (BFRP). Personal communication: June 3, 1983.

13. Dr. Z. Chowdhury. Head, Gonoshastra Kendra (a Bangladesh pharmaceutical firm). Personal communication: June 19, 1983.

14. Smith, M.C. (1983). Principles of Pharmaceutical Marketing . Philadelphia: Lea & Febiger.

15. McDermott, W. (1980). Pharmaceuticals: their role in developing countries, Science , 209 , 240-245.

16. Office of Health Economics (1982). Need for new medicines in the Third World. Pharmaceutical Journal, 228 , 497.

17. Piachaud, D. (1980). Medicines & the Third World. Soc. Sci. & Med. , 14C , 183-184.

18. Yudkin, J.S. (1978). Provision of medicines in a developing country. Lancet , Apr. 15, 810-812.

19. Taylor, D. (1982). Medicines, Health, and the Poor World . London: Office of Health Economics.

20. Seneviratne, G. (1982). Can statistics lie? World Health , June, 13-15.

21. Lancet (1983). Pharmaceutical policies for the Third World--whose responsibility? July 10, 144.

22. Melrose, D. (1982). Bitter Pills: Medicines & the Third World . Oxford: Oxfam.

23. Silverman, M., et al (1982). Prescriptions for Death: Drugging of the Third World . Berkely: Univ. of California Press.

24. Coombs, P.H. (ed.) (1980). Meeting the Needs of the Rural Poor . New York: Pergamon Press.

25. Sarder, A.M., et al (1981). Distribution and characteristics of non-government health practitioners in a rural area of Bangladesh. Soc. Sci. & Med. , 15A , 543-550.

26. Smith, C. (1983). Pharmacy law: a global look at drug approvals. U.S. Pharmacist , March, 28-30.

27. Blum, P., et al (eds.) (1981). Pharmaceuticals and Health Policy . New York: Holmes & Meier.

28. Agarwal, A. (1978). Drugs & the Third World . London: Earthscan.

29. Van der Geest, S. (1984). Anthropology & pharmaceuticals in developing countries. Medical Anthropology Quarterly , 15:3 , 59-62.

30. Van der Geest, S. (1981). 'Under-the-counter' medicines in developing countries. Pharmacy

International , 2 , 280-283.

31. DeMaar, B., et al (1983). An Asian perspective on drug and related health care information. Drug Information Journal , 17 , 263-269.

32. Gish, O. & Feller, L.L. (1979). Planning Pharmaceuticals for Primary Health Care: the Supply & Utilization of Drugs in the Third World . Wash., D.C.: American Public Health Association.

33. Briscoe, J. (1980). Are voluntary agencies helping to improve health in Bangladesh? International Journal of Health Services , 10:1 , 47-69.

34. Chen, L.C. (ed.) (1973). Disaster in Bangladesh . Oxford: Oxford Univ. Press.

35. Bangladesh Bureau of Statistics (1981). The Preliminary Report on Bangladesh Population Census . Dhaka: Bangladesh Bureau of Statistics.

36. Gish, O. (1981). Health & family planning services in Bangladesh: a study in inequality. Int'l Jour. of Hlth. Services , 11:2 , 263-281.

37. Samad, A. (1983). Bangladesh: Facing the Future . Dhaka: A. Samad.

38. Rahman, A.S.M.M. (1981). Village Practitioners of Bangladesh: Their Characteristics & Role in an Oral Rehydration Program . Thesis & Dissertation Series No. 2. Dhaka: International Center for Diarrhoeal Disease Research, Bangladesh (ICDDR,B).

39. Rahman, S., & Mahmood, T. (1982). Role of Village Practitioners in Family Planning Service Delivery System . Technical Report. Dhaka: National Institute of Population Research & Training (NIPORT).

40. Hartman, B. & Boyce, J. (1979). Needless Hunger: Voices from a Bangladesh Village . San Francisco: Institute for Food & Development Policy.

41. Bangladesh Ministry of Health & Population Control (1979). Annual Report on the Activities of Health Division , July 1977-June 1978 . Dhaka: Health Division.

42. Dr. Huq. Asst. Director, Bangladesh Drug Administration. Personal communication: June 21, 1983.

43. Dr. Humayun Hye. Ex-Drug Administrator & Director, Bangladesh Health-Manpower. Personal communication:

June 18, 1983.

44. World Health Organization (1977). The Selection of Essential Drugs . Technical Report Series. Geneva: WHO.

45. Bangladesh Ministry of Law & Land Reforms (1982). The Drugs Ordinance, 1982 . Dhaka: Law & Parliamentary Affairs Division.

46. Ashraf, A., et al (1982). Health, disease, and health care in rural Bangladesh. Soc. Sci. & Med. , 16 , 2041-2054.

47. Djurfeldt, G. & Lindberg, S. (1975). Pills Against Poverty . London: Curzon Press.

48. Babbie, E. (1973). Survey, Research Methods . Belmont: Wadsworth Publishing Co.

49. Parten, M. (1950). Surveys, Polls, & Samples . New York: Harper.

50. Minister of Health (1982). National drug policy & elimination of harmful, useless, and unnecessary drugs. Speech. Dhaka: Health Division.

51. Nie, N.H., et al (1975). Statistical Package for the Social Sciences (SPSS) . New York: McGraw-Hill.

52. Bangladesh Ministry of Health & Population Control (1978). Bangladesh Health Profile, 1977 . Dhaka: Health Division.

53. Dr. Ali Ahmed. Chief Epidemiologist, Bangladesh Health Information Unit. Personal communication: July 20, 1983.

54. Richter, R. (1981). Pesticides & Pills: For Export Only, Pt. II: Pharmaceuticals . New York: Public Broadcasting Service.

APPENDIX

APPENDIX A

Questionnaire in English

No: _____
Date: _____
Time: _____

PREAMBLE

We are studying about the drug information in rural Bangladesh to see what kind of information is now available. This study is being performed as part of a university requirement and for no other purposes. All information obtained is absolutely confidential. You will not be in any trouble.

A number of questions will be asked. Please listen carefully to them and answer each as accurately as possible. If, for any reason, you do not want to answer a question, feel free to say so. There are no right or wrong answers. If you are not clear about a question please say so, and we will try to clarify it.

You are free to choose to participate or not to participate in this study. Please indicate your choice.

Thank you for your time and your cooperation.

X). Will you participate? (Check one) ( )Yes ( )No

1). Name: _____

2). Address: _____

3). Age: _____

BACKGROUND

4). What is your academic education? _____ years

5). How did you study for your present profession? (Check one or more)

( ) 1. From family

( ) 2. By working as a compounder

( ) 3. Through government training

( ) 4. Through apprenticeship with a doctor

( ) 5. Through medical college

( ) 6. Other, please specify:

_____

6). How long have you been working as a village practitioner? _____ years

7). What kind of government registration do you have? (Check one)

( ) 1. To practice medicine

( ) 2. To sell drugs

( ) 3. Both 1 & 2

( ) 4. No registration

( ) 5. Other, please specify:

_____

DRUG INFORMATION SOURCES

8). Where did you get most of your background drug knowledge that you use now to treat patients? (Check

one)

( ) 1. Professional training

( ) 2. Medical representatives

( ) 3. Other village practitioners

( ) 4. Pharmacists

( ) 5. Medical books and journals

( ) 6. Other, please specify:

_____

9). a. Estimate the number of times per day you need to seek out an answer regarding drug therapy?

_____ times per day

b. If you are seeking out an answer regarding drug therapy, what do you do most frequently? (Check one in the left below)

( ) 1. Ask a medical representative ( )

( ) 2. Consult other village practitioners ( )

( ) 3. Refer to medical books ( )

( ) 4. Consult a pharmacist ( )

( ) 5. Other, please specify: _____ ( )

_____

10). You hear about a new drug through the newspaper, magazine, or radio. If you want to get more information about it what will you most probably do? (Check one in the above right)

11). What textbooks or handbooks about drugs do you have? Specify English or Bengali for each.

SETTING OF PRACTICE

12). Estimate the number of patients in each group you treat each day.

a. _____ Children (0-12 years)

b. _____ Adult males

c. _____ Adult females

13). How often do medical representatives visit you?

_____ week, month, year (Circle one)

14). Name 3 illnesses you treat most often?

1. _____

2. _____

3. _____

MODE OF PRACTICE

15). a. About how much do you charge a patient for a treatment including injections, drugs, etc.?

_____ taka

b. How do most of your patients get the drugs they need? (Check one)

( ) 1. From other drugshops by the prescription you write

( ) 2. From your own shop

( ) 3. Both 1 & 2

( ) 4. Other, please specify:

_____

16). How often do you sell/prescribe drugs according to the description of illness by the patient's family or friend? (Check one)

( ) 1. Never

( ) 2. Seldom

( ) 3. Sometimes

( ) 4. Frequently

( ) 5. Very frequently

17). a. How many injections do you usually give in one day?

_____

b. Name 3 drugs you inject most frequently.

1. _____

2. _____

3. _____

18). What types of drugs did you sell/prescribe most frequently last week? (Check three)

( ) 1. Drugs to reduce acids in stomach

( ) 2. Drugs to cure diarrhea

( ) 3. Drugs to reduce allergy

( ) 4. Drugs to cure fever & pain

( ) 5. Drugs to cure worm infestation

( ) 6. Anti-biotics

( ) 7. Other, please specify:

_____

KNOWLEDGE OF DRUGS

19). a. Which drug for worm infestation do you sell/prescribe most often?

_____

b. What kind(s) of worms is it for? (Check one or more)

( ) 1.	Whipworms	( ) 5.	Threadworms
( ) 2.	Hookworms	( ) 6.	All worms
( ) 3.	Roundworms	( ) 7.	Other:
( ) 4.	Pinworms		_____

20). A pregnant woman has a urinary tract infection and needs an anti-biotic. What will your choice of anti-biotics be? (List two)

1. _____ , 2. _____

21). a. What kind(s) of steroids do you use?

_____

b. Which of the following drugs have you used? (Check appropriately)

Uses

( ) 1. Oradoxon_____

( ) 2. Delta Cortisol_____

( ) 3. Betnilan_____

c. If you have used any of the three drugs, state the uses of only those that you have used. (Use the blank lines above)

22). A child has diarrhea and needs to be treated. What will you do? (Check one or more)

( ) 1. Exam, diagnose, and treat

( ) 2. Give anti-diarrheal drug

( ) 3. Give oral salt

( ) 4. Give IV salt

( ) 5. Givd anti-biotic

( ) 6. Other, please specify:

_____

23). a. A child has sudden fever with chills. He is also suffering from chest pain & cough. State a prescription for him.

1. _____ 4. _____

2. _____ 5. _____

3. _____ 6. _____

b. Will you give him any injection?

( ) 1. Yes ( ) 2. No ( ) 3. Sometimes

If 1 or 3, what kind of injection(s)?

24). a. In what cases should you not use Tetracycline?

_____

b. A patient has pneumonia and has begun to take Tetracycline tablets. The symptoms he had gradually subside, but now he has diarrhea. Will you continue to give him Tetracycline?

( ) 1. Yes ( ) 2. No

How will you treat him? _____

_____

25).* (Ask only if the village practitioner is working in a drugshop)

a. Do you own this drugshop? ( ) 1. Yes

( ) 2. No

b. How often does your shop or the shop in which you work sell drugs <u>without</u> a prescription? (Check one)

( ) 1. Never ( ) 4. Frequently

( ) 2. Seldom ( ) 5. Very frequently

( ) 3. Sometimes

APPENDIX B

Questionnaire in Bengali

গ্রাম্য ডাক্তারের কাছ থেকে ঔষধ ক্রয়ের প্রশ্নমালা

১। আপনার নাম কি?.....

২। ঠিকানা :-
থানা ..... ইউনিয়ন ..... গ্রাম.....

৩। আপনার বয়স কত?.....

৪। আপনার শিক্ষাগত যোগ্যতা কি? .....

৫। আপনার বর্তমান পেশা কি ভাবে শিক্ষা লাভ করিয়াছেন?.....

(ক) পরিবার হইতে (খ) কম্পাউন্ডার হিসাবে কাজ করিয়া (গ) সরকারী প্রতিষ্ঠানের মাধ্যমে (ঘ) গ্রাম্য ডাক্তারের শিষ্য নবীস হিসাবে কাজ করিয়া (ঙ) চিকিৎসা মহাবিদ্যালয় হইতে (চ) অন্যান্য (নাম উল্লেখ করিয়া) ।

৬। আপনি কতদিন যাবৎ গ্রাম্য ডাক্তার হিসাবে কাজ করিতেছেন? ..... বৎসর

৭। আপনি কি ধরনের সরকারী (Registration) তালিকাভুক্ত হইয়াছেন :
(ক) চিকিৎসা করার জন্য (খ) ঔষধ বিক্রয়ের জন্য (গ) ১ এবং ২ উভয়ই (ঘ) তালিকাভুক্ত নই (ঙ) অন্যান্য (নাম উল্লেখ করিয়া)

ঔষধ সম্পর্কিত তথ্যের উৎস

৮। বর্তমানে আপনি রোগীর চিকিৎসার জন্য যে ঔষধ ব্যবহার করেন সে জ্ঞান কোথা হইতে পাইয়াছেন? :
(ক) পেশাগত প্রতিনিধির নিকট হইতে (খ) ঔষধ কোম্পানীর প্রতিনিধিকে জিজ্ঞাসা করিয়া (গ) গ্রাম্য ডাক্তারের সংগে আলোচনা করিয়া (ঘ) ঔষধ প্রস্তুতকারকের পরামর্শ লইয়া (ঙ) চিকিৎসা বই হইতে (চ) অন্যান্য (নাম উল্লেখ করিয়া)

৯। (ক) আপনি দিনে গড়ে রোগীর ঔষধ নির্ণয় করিবার জন্য কতবার জানতে চান? .....
(খ) কোন ঔষধ সম্বন্ধে আপনি যদি কিছু জানতে চান তাহলে আপনি সাধারণত কি করেন? .....
(১) ঔষধ কোম্পানীর প্রতিনিধিকে জিজ্ঞাসা করিয়া (২) গ্রাম্য ডাক্তারের সংগে আলোচনা করিয়া (৩) চিকিৎসা বইয়ের সাহায্য লইয়া (৪) ঔষধ প্রস্তুত কারকের পরামর্শ লইয়া (৫) অন্যান্য ।

১০। আপনি রেডিও, ম্যাগাজিন, সংবাদপত্রে কোন কার্যকরী ঔষধের বিজ্ঞাপন দেখে এ ব্যাপারে বিস্তারিত ভাবে জানতে চান তবে সম্পাদক কি পদ্ধতি অবলম্বন করেন.....
.. ..

১১। কি ধরনের চিকিৎসার বই ব্যবহার করেন? বাংলা অথবা ইংরাজী.....
.....

১২। সাধারণত এক দিনে কত জন রোগী চিকিৎসা নেন?
(ক) শিশু (০-১২ বৎসর) .....
(খ) বয়স্ক পুরুষ ..... (গ) বয়স্ক মহিলা.....

১৩। গত সপ্তাহ / মাসে / বৎসরে কতজন ঔষধ কোম্পানীর লোক আপনার নিকট আসিয়াছিলেন .....

১৪। আপনি সর্বদা যে সব রোগের চিকিৎসা দেন তাহার তিনটি নাম বলেন ?

(১).....(২).....(৩).....

১৫। (ক) ঔষধ, ইনজেকশান এবং চিকিৎসা বাবদ প্রতি রোগীর নিকট হইতে কত টাকা নেন ?.....

(খ) আপনার রোগীর প্রয়োজনীয় ঔষধ কিভাবে সংগ্রহ করেন ?

(১) আপনার দেওয়া ব্যবস্থাপত্র লইয়া অন্য দোকান হইতে (২) আপনার নিজস্ব দোকান হইতে (৩) ১ এবং ২ উভয়ই (৪) অন্যান্য (নাম উল্লেখ করিয়া) ।

১৬। রোগ সমন্ধে রোগীর সাথুক্তি বা বন্ধুর দেওয়া বর্ণনা অনুযায়ী সাধারনত রোগীর ব্যবস্থা পত্র / ঔষধ লিখিয়া করেন ?

(ক) কখনওনা (খ) খুব কম (গ) মাঝে মাঝে (ঘ) সর্বদাই (ঙ) সর্বদা ।

১৭। (ক) সাধারনত আপনি দিনে কতগুলি ইনজেকশান দেন ?.....

(খ) সাধারনত যে সব ইনজেকশান আপনি দেন তাহার তিনটি নাম বলেন :

(১).....(২).....(৩).....

১৮। গত সপ্তাহ আপনি কি ধরনের ঔষধ প্রেসক্রিপশান বা লিখিয়া করিয়াছিলেন ?

(ক) পেটের গ্যাস (এসিড) কমানোর জন্য (খ) খাওয়া খাওয়ার ভাল হওয়ার জন্য

(গ) এ্যালার্জি কমানোর জন্য (ঘ) ব্যাথা ও জ্বর কমানোর জন্য (ঙ) ক্রিমির জন্য

(চ) Anti-biotics (ছ) অন্যান্য (নাম উল্লেখ করিয়া) ।

ঔষধ সংক্রান্ত জ্ঞান

১৯। (ক) কোন ধরনের ক্রিমির ঔষধ আপনি সাধারনত লিখিয়া এবং প্রেসক্রিপশান করেন .....

(খ) ঐ ঔষধ সাধারনত কি ক্রিমির জন্য ব্যবহার করা হয় :

১। Whipworms	৫। Threadworms
২। Hookworms	৬। All worms
৩। Roundworms	৭। Other, Please
৪। Pinworms	

২০। গর্ভবতী মহিলাদের মূত্রাশয়ে যদি ব্যাথা ও পর পর প্রস্রাব হয় এবং দরকার হয় তাহলে কি ধরনের Anti-biotics লিখেন ? (১) (২)

২১। (ক) সাধারনত কি ধরনের Anti-biotics ব্যবহার করেন ?.....

.....

অনুঃ পৃঃ.....৩

২১। (ক) নিম্নলিখিত তিন ধরনের ঔষধ ব্যবহার করিয়াছেন

	ঔষধের নাম	ব্যবহার
১।	Oradexon	
২।	Dolla Corbinol))	
৩।	Bolnilon	

(খ) উপরে বর্ণিত কোন ঔষধ পাইবার পরে ব্যবহার করিয়া থাকেন তাহা হইলে কি কোন ধরনের পরিবর্তন লক্ষ্য করেছেন ?.....

২২। শিশুর পাতলা পায়খানা হইলে কি করেন ?

(ক) পরীক্ষা করিয়া রোগ নির্ণয় করে চিকিৎসা দিবেন (খ) পাতলা পায়খানা বন্ধ করার ঔষধ দিবেন (গ) জলে, চিনি ও পানি দিবেন (ঘ) কোনটিই দেওয়া দিবেন না

(ঙ) Anti-biotic দিবেন (চ) অন্যান্য ব্যবস্থা গ্রহণ করিয়া)

২৩। (ক) একটা শিশুর হঠাৎ করিয়া সর্দির সহিত খুব সামান্য যে বুকের ব্যাথা এবং কাশিতে ভুগিতেছে আপনি তাহার জন্য কি ধরনের ব্যবস্থা দিবেন ?

(খ) আপনি তাহাকে ইনজেকশান দিবেন ? হাঁ / না / মাঝে মাঝে

(গ) হাঁ হইলে কি ধরনের ইনজেকশান দিবেন ?

২৪। (ক) কোন কোন ক্ষেত্রে টেরামাইসিন ব্যবহার করা উচিৎ নয়

(খ) একজন নিউমিউনিয়া রোগী টেরামাইসিন ঔষধ খাইতেছেন এবং তাহার অবস্থা ক্রমশ ভালোর দিকে যাচ্ছে কিন্তু পাতলা পায়খানা হইতেছে (আপনি টেরামাইসিন আরও দিবেন) হাঁ / না

তাহাকে কি চিকিৎসা দিবেন , যদি চিকিৎসা দেন তাহা হইলে ঔষধের নাম বলেন .....

.....

২৫। শুধুমাত্র ঔষধের দোকানে চিকিৎসা করেন তাহাদের জন্য

(ক) আপনি কি এই ঔষধের দোকানের মালিক ?

(খ) আপনি কি প্রেসক্রিপশান ছাড়া ঔষধ বিক্রি করেন ?

(১) কখনও না

(২) খুব কম

(৩) মাঝে মধ্যে

(৪) সর্বদাই

(৫) সর্বদা

গবেষকের নাম.....

তারিখ:- .....

APPENDIX C

Measuring the level of drug knowledge

Measuring the Level of Drug Knowledge

The level of drug knowledge score was measured in the following way. Points were assigned to each of these questions.

Q.19). a. Which drug for worm infestation do you sell/prescribe most often?

_____

b. What kind of worms is it for? (Check one or more)

( ) 1. Whipworms ( ) 5. Threadworms

( ) 2. Hookworms ( ) 6. All worms

( ) 3. Roundworms ( ) 7. Other:

( ) 4. Pinworms _____

Scoring

$$A = \begin{cases} 2, \text{ if all correct} \\ 1, \text{ if partially correct} \\ 0, \text{ if all incorrect} \end{cases}$$

Q.20). A pregnant woman has a urinary tract infection and needs an antibiotic. What will your choice of antibiotic be? (List two)

1. _____, 2. _____

Scoring

$$B = \begin{cases} 2, \text{ if both correct} \\ 1, \text{ if one correct} \\ 0, \text{ if both incorrect} \end{cases}$$

Q.24). a. In what cases should you not use Tetracycline?

_____

Scoring

$$C = \begin{cases} 3, \text{ if all three correct contraindications} \\ 2, \text{ if two correct contraindications} \\ 1, \text{ if one correct} \\ 0, \text{ if all incorrect} \end{cases}$$

Q.24). b. A patient has pneumonia and has begun to take Tetracycline tablets. The symptoms he had gradually subside, but now he has diarrhea. Will you continue to give him Tetracycline?

( ) 1. Yes ( ) 2. No

How will you treat him? _____

_____

Scoring (first part)

$$D = \begin{cases} 1, \text{ if correct} \\ 0, \text{ if incorrect} \end{cases}$$

Scoring (second part)

$$E = \begin{cases} 1, \text{ if all correct} \\ 0, \text{ if partially or all incorrect} \end{cases}$$

Evaluation of drug knowledge scores

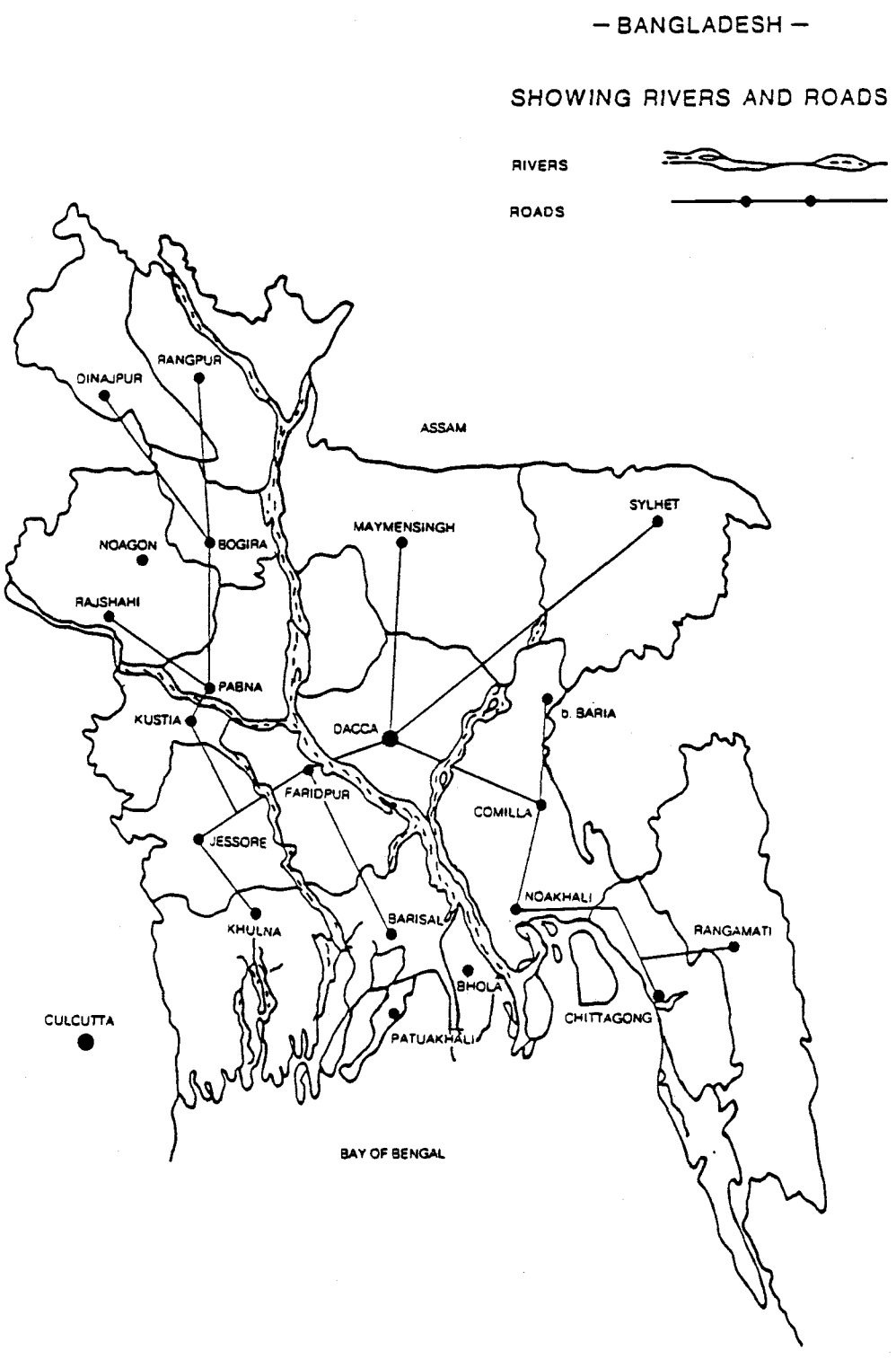
Drug knowledge score = A + B + C + D + E

= 2 + 2 + 3 + 1 + 1 = 9

(maximum)

APPENDIX D

Map of Bangladesh


— BANGLADESH —
SHOWING RIVERS AND ROADS
RIVERS
ROADS
RANGPUR
DINAJPUR
ASSAM
SYLHET
MAYMENSINGH
NOAGON
BOGIRA
RAJSHAHI
PABNA
KUSTIA
DACCA
b. BARIA
FARIDPUR
COMILLA
JESSORE
NOAKHALI
KHULNA
BARISAL
RANGAMATI
BHOLA
CULCUTTA
CHITTAGONG
PATUAKHALI
BAY OF BENGAL