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SCHISTOSOMIASIS CONTROL STRATEGIES IN NORTHERN CAMEROON: A STUDY BASED ON HOUSEHOLD SURVEY DATA FROM THE EXTREME NORTH PROVINCES

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ABSTRACT

This report builds upon work on schistosomiasis control conducted by Tulane University in northern Cameroon, including a pilot project undertaken with the Cameroonian Ministry of Public Health in 1990. The study analyzes data collected from this same pilot project and from a 1993 household survey, supported by HFS, regarding knowledge of the disease, sources of water supply, water contact behavior, and willingness and ability to pay for various control interventions.

The costs of diagnosis and treatment of schistosomiasis are explored, as well as the costs of snail control and health education programs. A household's willingness to pay for control programs depends on the subjective evaluation of costs associated with the infection, the prevalence rate, and the risk of contracting the disease. Costs associated with the disease increase with intensity. Since low-intensity infections are often ignored, only cases of moderate to severe infection will encourage participation in schistosomiasis control programs. In general, about 50 percent of the households surveyed are directly affected by the infection during a 12-month period. Since less than 50 percent of all infections are classified as moderate to severe in intensity, it is not surprising that less than 30 percent of individuals diagnosed with schistosomiasis actually sought treatment during 1991-92. The 10 percent prevalence rate obtained by the results of the 1993 survey is not sufficiently high to generate community interest in control programs. With a prevalence rate that approaches at least 18 percent, community management, financing, and implementation of schistosomiasis control programs would be politically feasible. Given the general prevalence rate of only 10 percent estimated for this region of northern Cameroon, policymakers are recommended to focus their efforts on diagnosis and treatment of the infection.

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FOREWORD

The Health Financing and Sustainability (HFS) Project provides technical assistance and training, conducts applied research, and disseminates information to developing countries in health economics, health sector policy development, and health services management. The Applied Research (AR) component of the project provides opportunities to increase knowledge of the complex issues underlying health financing problems and augments the supply of qualified individuals who can contribute to policy analysis and reform. HFS has emphasized the following policy areas for AR activities: cost recovery, productive efficiency, social financing, and private sector development in the health sector.

As part of the project's AR component, HFS will have completed almost 30 small applied research (SAR) activities between 1989 and 1994. These include studies undertaken by developing country researchers, HFS researchers, or academics at universities in the United States. The objectives of the SAR program are to carry out practically oriented research in developing countries, and to encourage the development of local capacities to undertake research.

Most SAR activities have been initiated through proposals to the HFS Project. The proposals are evaluated by HFS staff, including criteria such as: practical policy orientation, resource and time requirements, and appropriateness to the HFS research agenda. Most proposals for SAR activities accepted by HFS have undergone several revisions, as the researchers refined their research objectives, hypotheses, and methodologies based on suggestions and comments from the HFS staff. Once approved, SAR activities have been overseen by HFS task managers, who work closely with principal investigators to monitor the timeliness and quality of the work, and facilitate logistics.

Other SAR studies are completed in conjunction with technical assistance or major AR activities of the HFS Project. In these cases, the SAR contributes to the technical guidance provided to clients or adds to the body of knowledge on topics of health financing and economics.

As with all HFS research, drafts of SAR reports are reviewed by HFS staff. Drafts are then evaluated by external technical reviewers selected for their area of substantive and/or geographic expertise.

PREFACE

The present study builds upon work previously undertaken by Tulane University and the author on the disease of schistosomiasis in Cameroon. In 1990, the Cameroonian Ministry of Public Health and Tulane University began a pilot project in Kaele subdivision in northern Cameroon to develop an effective and replicable schistosomiasis control program.

Based on a cursory examination of the costs of diagnosis and treatment of schistosomiasis in northern Cameroon, the author became interested in gathering more information that could be useful to plan an effective intervention program for the diagnosis and treatment of schistosomiasis. The original design for the present study was described in a proposal submitted to the HFS Project. Following certain modifications in the economic analysis suggested by HFS staff, approval was granted for HFS's Small Applied Research (SAR) program to support a study of economic issues in controlling schistosomiasis in Cameroon.

In 1991 and 1993, Tulane University collected information on the prevalence and intensity of schistosomiasis infections among a sample of the population in Kaele. Because of recent changes in the cost of drugs to treat schistosomiasis, it was necessary to refine earlier estimates of costs related to treatment and diagnosis by separating costs for drugs and personnel. There was an interest in comparing the costs of diagnosis in cases where a microscope was used, as opposed to the short-term approach of a regent strip. The present study sought answers to the following important policy questions:

- Are user charges feasible for diagnosis and treatment of schistosomiasis, if the diagnostic services are provided free of charge? If so, what fee schedule should be developed to recover total costs? Will consumers be willing and able to pay for such services?
- If transmission probability remains high, diagnosis and treatment of the disease are not likely to be successful. Of the two approaches to reduce the probability of transmission— molluscicide and health education—which is more effective? Given that molluscicide is a costly procedure, what will be the willingness and availability of households in northern Cameroon to pay for such treatments?

Finally, a better understanding was sought of the cost of health education efforts and their possible effect on the behavior of residents in areas with wide prevalence of schistosomiasis.

The present study relied on the results of urine tests collected by Tulane University in 1991 and 1993, and a household survey on knowledge of the disease and willingness and ability to pay for treatment interventions.

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ACRONYMS

CIF	Cost, Insurance, Freight
FCFA	Franc Communauté Financière Africaine (monetary unit tied to the French franc and used throughout the former French colonies in Africa; approximately US1$=285 FCFA until devaluation in February 1994 when US1$=570 FCFA
GNP	Gross National Product
HCRP	Health Constraints to Rural Production Project
HFS	Health Financing and Sustainability Project
MOPH	Ministry of Public Health of Cameroon
KAP	Knowledge, Attitudes, and Practices
SAR	Small Applied Research program of HFS
TU	Tulane University
WHO	World Health Organization
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

Schistosomiasis is an endemic disease with more than 200 million infections per year. Given the current levels of technological development and knowledge about transmission modes, it is possible to eradicate the disease. Economic development and agricultural growth patterns in certain less developed countries, however, are creating an environment which may adversely affect the prevalence of schistosomiasis. The population exposed or newly becoming exposed to the disease should be made aware of control mechanisms. The life cycle of schistosome suggests that the infection can be controlled by adopting the following interventions: treatment, changing the water contact behavior of the population, improving water supply systems, encouraging the use of well or pit latrines, and snail control. This report examines costs of schistosomiasis control in northern Cameroon.

A pilot program for schistosomiasis control was adopted in 1990 by the Cameroonian Ministry of Public Health and Tulane University to develop an effective and replicable schistosomiasis control program. This report uses the data collected by the pilot project to provide a historical perspective on the prevalence of schistosomiasis in the project area. The Small Applied Research (SAR) Program of the Health Financing and Sustainability (HFS) Project provided additional funding to identify cost-effective intervention strategies, including a survey conducted in five villages in Kaele to collect information on prevalence patterns and related household behavior. Tulane University's pilot project conducted a urine test in all five villages, just before the household survey, to clinically ascertain the presence of the infection.

The methodology applied in this study is to examine household behavior regarding treatment, knowledge about the disease, water contact, sources of water supply, and willingness and ability of households to pay for various interventions. To estimate the costs of the interventions, the study approximates the input coefficients by interviewing the individuals responsible for implementing the intervention programs for the pilot project. The prices of the inputs were obtained either from the project documents or from the international suppliers. Throughout the five villages, 216 households were surveyed during June-July 1993, based on the sample selected for Tulane's pilot project. The total population in these five villages was 1,224. The mean size of all households surveyed is 5.67 persons. The principal economic activity in all five villages is agriculture. The number of water points in the villages varies from three (in Moutourwa) to 31 (in Guereme), but no relationship was found between the number of water points and the rate of schistosomiasis prevalence. The age group most afflicted by schistosomiasis is between 6 and 20 years. Men are more likely to have schistosomiasis than women; two-thirds of all infected individuals were men.

The 1991 urine test results indicate that the prevalence rate of schistosomiasis in the five villages varied from 10 to 27 percent. The prevalence rate of the infection declined very significantly over the two-year period from 1991 to 1993. The second urine test results indicate that in all five villages, the prevalence rate declined by at least 20 percent. Data collected from the control village, Touloum, also attested to a 43 percent decline in the prevalence rate over this same period. The prevalence rate based on these two urine test results (i.e., number infected by the 1991 test **or** by the 1993 test) was found to be about 20 percent. The persistence rate of the disease appears very low. Only 3 percent of the individuals were infected by the disease in both 1991 and 1993. Therefore, the transmission probability remains relatively high in this area, and the prevalence rate over a year will probably be less than 20 percent. The urine tests also permit a categorization of the infections by intensity. In the survey villages, only about 10 percent of infections were severe, and another 35 percent were moderate. Therefore, more than half of the infections were actually very low-intensity cases.

When asked about the major symptoms of the disease, most households correctly identified the symptoms. Almost all households could identify at least one possible mode of transmission. About 40 percent of the households, however, also mentioned one or more totally inappropriate methods of contracting the disease. Most households surveyed were also aware of consequences of the infection. About 93 percent of households thought that the infection was sufficiently serious to seek medical attention. Among common regional diseases, schistosomiasis was ranked as the second most severe, after malaria. It was noted that schistosomiasis is often confused with other prevalent diseases; such confusion can influence treatment-seeking behavior. In a region where people are exposed to many different types of infectious diseases, identifying the symptoms of schistosomiasis, especially of low-intensity cases, may be difficult. The proportion of infected individuals reporting the presence of the disease does increase with the level of intensity, but, even among the severe cases, only about a quarter reported suffering from schistosomiasis.

Three approaches can be used for the diagnosis and treatment of schistosomiasis: diagnosis and treatment within the clinic, house visits by a health worker, and treatment at a village meeting. The house-call method will become too costly an approach to follow, owing to low population density. The cost of diagnosing a case in a village meeting, including the opportunity cost of health worker's time, is estimated at 105 FCFA. The proportion of infected individuals treated usually remains less than 50 percent, if the village meeting approach is used. If the house survey approach is used, the cost may rise to as high as 250-300 FCFA per case. The total cost of diagnosing a case with a microscope is estimated at about 290 FCFA. If the fixed costs are excluded, however, the diagnosis cost drops to less than 90 FCFA. The cost of diagnosis can be reduced further if reagent strips are used instead of microscopes.

A comparison of diagnosis and treatment costs, using the percentage of all cases treated—rather than the percentage of diagnosed cases treated may identify the house-call approach as the lower cost strategy, assuming a participation rate of less than 35 percent in the village meeting. The cost of treatment is more or less constant, irrespective of the method of delivery. In general, the cost of treating a case is slightly greater than 1,000 FCFA. About 98 percent of the cost of treatment is due to the drug.

It is estimated that about 25 percent of the individuals in the villages were infected, for at least some time, during the 12-month period prior the survey. About 9 percent of the individuals sought medical attention during the period, indicating that less than 50 percent of infected individuals actually seek help from health practitioners. Men with schistosomiasis are more likely to seek medical attention than women, although there appear to be no significant gender differences in the intensity of the disease. Some reasons for low rate of treatment could be: the expense of treatment in private clinics, high transmission probabilities for school-age children and young adults, the low intensity of the infections, and low economic costs of the disease.

If the diagnosis and treatment program is strengthened through the increased supply and availability of drugs, the cost of treating the disease should decline to about 1,300 FCFA (i.e., the cost of drugs, plus profit margin) from the present market rate of about 2,000 FCFA in the area. With lower drug prices, the cost of diagnosis and treatment should be less than one percent of average household income per year. Given the relatively low prevalence rate of the disease for the target group (6-20 years of age) in this region, mass treatment will be more expensive than diagnosis and treatment approach. This is because mass treatment in the low prevalence scenario ends up supplying drugs to many who are not infected. The savings associated with the adoption of mass treatment remain the cost of diagnosis only. Due to the low cost of diagnosis, mass treatment becomes cost effective only if the prevalence rate for the target group is more than 79 percent.

The objective of the snail control program is to reduce the population of snails, one of the hosts during the life cycle of the schistosome. Thus, reduction in snail population should lower the probability of infection

transmission. A cost evaluation of snail control is based on experimental molluscicide in two villages of the pilot project area. The cost of molluscicide turns out to be about 500 FCFA per household per year. Also in this case, the chemical used for molluscicide accounts for 78 percent of total costs. The cost of molluscicide per household is also quite low, about 500 FCFA per year. This represents less than 0.2 percent of annual household income, or roughly half the daily wage rate for unskilled workers. If rural communities impose a tax to finance the snail control program, the average health sector costs—including snail control—should remain less than two percent of household income. In this sense, households in this region should be able to pay for snail control, as well as for diagnosis and treatment. The income distribution pattern in this region, however, implies that the poorest 40 percent of households will find the programs too expensive to support.

A household's willingness to pay for the control programs will depend upon the subjective evaluation of the costs associated with the infection, prevalence rate, and risk of contracting the disease. The costs associated with the disease increase with intensity. Since the low-intensity infections are often ignored, only the moderate to severe infection cases will encourage participation in the programs. In general, about 50 percent of the households are affected by the infection directly in a year. With moderate to severe cases representing less than 50 percent of all infections, only about a third of all households had at least one case of moderate to severe infection. Therefore, it is not surprising that about 28 percent of individuals diagnosed with schistosomiasis actually sought treatment in Kaele during 1991-92.

From the perspective of policymakers, the 10 percent prevalence rate for schisto obtained from the 1993 survey is not sufficiently high to generate community interest in the program. Community management, financing, and implementation of schistosomiasis control programs should be politically feasible, if the prevalence rate hovers around 17-18 percent.

Households were asked about their willingness to pay for diagnosis and treatment. Those who had never used modern drugs for the treatment of schistosomiasis reported their willingness to pay 300 FCFA per treatment, which is much lower than the actual cost of treatment. Households significantly under report their willingness to pay when asked directly, however. For example, many of the households who actually paid 1,000 FCFA or more for treatment reported a willingness to pay only 65 percent of the actual cost. If the reported willingness to pay is corrected by the rate of underreporting, the total fund generated remains about 25 percent in deficit.

When households were asked directly about the snail control program, 75 percent indicated that they want to see the efforts continued. About 70 percent of the households also reported their willingness to contribute money for a snail control program. If the underreporting rate for willingness to control snails is similar to the underreporting rate for diagnosis and treatment, a snail control program can be supported through community financing.

Cost-effectiveness comparisons, based on the impact exerted by different interventions on prevalence rates for the disease, suggest that the diagnosis and treatment approach would be much more cost effective at a lower rate of prevalence. At a high prevalence rate of 25-30 percent, snail control will become more cost effective. Since the prevalence of the disease has already declined to about 10 percent, policymakers should focus their efforts on diagnosis and treatment of the infection.

1.0 INTRODUCTION

Schistosomiasis remains an important parasitic disease worldwide for which no immunization is available at the present time. It is estimated that about 200 million schistosomiasis infections occur in tropical countries every year (Roemer, 1991). The pain and suffering associated with schistosomiasis are not the only costs of the disease. Moderate to high-intensity infections exert a significant impact on labor productivity and household incomes (WHO, 1985). In Cameroon alone, about 300,000 individuals are infected with schistosomiasis, and more than 80 percent of these cases are in the northern half of the country (Ratard, 1990).

What is more disturbing is the possible impact of agricultural development programs on the prevalence and the geographic coverage of the infection. Large-scale irrigation projects help increase the snail population, as well as the geographic migration of the snail hosts. For example, the construction of a dam in Egypt brought schistosomiasis into previously unaffected areas (Farvar, 1972). New seed varieties require much more intensive water management, which is likely to increase the prevalence of the disease, since agriculturists must come in contact with water very frequently while plowing, planting, and weeding the crops. Increased agricultural activity also attracts workers from other regions, expanding the geographic spread of the infection.

Economic development and mobility of population groups have created another significant risk for the rapid increase of the disease. Just like snails, human beings are hosts for completing the life cycle of the schistosome. Therefore, when infected individuals travel to previously unaffected places where the snail-host is present, the region immediately becomes highly vulnerable to the spread of the infection. In fact, mobility of human beings, rather than the mobility of snails, is the most important threat to the geographic containment of the disease. Given this potential for increased prevalence of the infection all over Africa and possibly in many parts in Asia, it is important to examine closely the possible methods of controlling the infection or containing its geographic extent. This research is an attempt to discuss the possible interventions feasible to reduce the prevalence of the disease by trying to create discontinuities in the life cycle of the schistosome. A schistosomiasis control program is likely to be more successful when it can be implemented in the affected areas using local resources, manpower, and management capabilities.

To develop an effective and replicable schistosomiasis control program for the northern provinces of Cameroon, the Ministry of Public Health (MOPH) and Tulane University (TU) devised a pilot control program for Kaele subdivision in the northernmost part of the country. The Tulane project emphasized medical and biologic aspects of the disease. To devise appropriate interventions for controlling the infection, a cost-effectiveness analysis must be conducted. The Health Financing and Sustainability (HFS) Project, through its Small Applied Research (SAR) program, provided support for collection and analysis of additional data on costs, prevalence rates, and household behavior to identify cost-effective approaches to schistosomiasis control. Data from the original Tulane project provided the input coefficients for various interventions.

2.0 OBJECTIVES OF THE STUDY AND ORGANIZATION OF THE REPORT

The objectives of this study are to:

- Analyze alternative interventions for the control of schistosomiasis in northern Cameroon;
- Estimate the costs associated with feasible control strategies;
- Estimate the willingness and ability of households to pay for different control strategies; and
- Carry out a simple cost-effectiveness analysis to determine the optimal mix of the feasible interventions.

The information collected by the study will assist policymakers to plan an effective intervention program to control schistosomiasis.

A brief description of schistosomiasis, including the health impact of the disease, its symptoms, how it develops, and modes of transmission in a rural community is presented in *Section 3.0*. This description permits the identification of major intervention strategies to break the life cycle of the schistosomes. *Section 3.2* provides background information on the schistosomiasis control pilot project begun in 1990 by TU, in coordination with the MOPH of Cameroon. *Section 3.1* reviews the possible interventions to control the disease, including the few interventions tested by TU's pilot project, focusing on options that would be feasible to implement and appropriate to the specific conditions found in this particular region of Cameroon. It should be noted that cost data are only available for the experimental interventions that were part of TU's pilot project. *Section 4.0* provides a description of data sources and the methodologies employed for survey and analysis of data collected. Basic survey information is summarized in *Section 5.0*. Information collected on the prevalence of schistosomiasis is presented in *Section 6.0*. The prevalence of the infection and its changes over the 1991-93 period form the basis for the information that follows in *Section 8.0* analyzing the survey's findings on willingness and ability to pay for various interventions, as well as the cost-effectiveness of these interventions. The conclusions and recommendations for policymakers are summarized in *Section 9.0*.

3.0 SCHISTOSOMIASIS: THE DISEASE

Schistosomiasis symptoms manifest themselves when adult worms migrate from the liver to blood vessels of the intestine or urinary bladder. One form of the disease infects the veins that drain the urinary bladder and, for this reason, is called "urinary schistosomiasis" or "schistosomiasis haematobium." The symptoms of the urinary variant of the infection usually include: painful and frequent urination, blood in urine, swelling and inflammation of urinary track tissues, ulcers, and obstructive uropathy. The intestinal version of the disease can result in loss of blood through stool, increased malnutrition, deficiency of micronutrients, and low worker productivity. Urinary schistosomiasis is much more prevalent than the intestinal type. In fact, some researchers believe that the presence of intestinal schistosomiasis often implies the presence of urinary schistosomiasis as well. In this research, emphasis is placed on the urinary type of the infection.

The life cycles of all schistosome, whether urinary or intestinal, are very similar. (See Greer, 1992 for a detailed description of the life cycle of the schistosome.) In short, the adult worms, living in the blood vessels of a human body, lay eggs which are excreted in urine or feces. When the eggs come in contact with fresh water, a larvae is hatched. The larvae must find an appropriate host within a few hours to survive and develop. Only a limited number of snail species can act as hosts to complete the development phase. If the larva finds itself within the appropriate species of snail, it transforms itself into a sac-like formation known as mother sporocyst. Each mother sporocyst produces many daughter sporocysts which pass through the snail's digestive gland to become transformed into what is known as `cercaria', which are released by the snail in the water. The transformation from mother sporocyst to cercaria takes about four to six weeks. If a living cercaria comes into contact with a human being, it can penetrate the skin and start its life within the human body as a schistosomulum. This new form travels through the circulatory system to the lung and then to the liver. The worms grow to adults in the liver and migrate to the veins of the intestine or urinary bladder in male-female pairs.

As indicated in the preceding description of the life cycle of schistosome, many conditions must be fulfilled for the cycle to be completed. Without the circular migration from man to snail and back to man again, the infection cannot continue to exist. Nevertheless, schistosomiasis remains an endemic disease prevalent throughout most of the world. The social and economic costs associated with the infection are not well understood and have not been estimated rigorously, but it is believed that moderate- to severe-intensity infections may be associated with a higher degree of malnutrition among children, higher morbidity, and lower labor productivity. Very severe cases may result in long-term disability, and even death.

3.1 FEASIBLE INTERVENTIONS

Based on the preceding discussion of the life cycle of the schistosome, it is clear that the interventions to reduce the prevalence of the infection must disrupt the migration from man to snail and back again to man. Theoretically, this can be done by intervening at different points of the cycle.

One straightforward approach is to provide drugs to treat the infection. Most of the problems and symptoms associated with schistosomiasis are reversible, if treated at an early stage. The drug, Biltricide, kills the worms and effectively cures the infection by a single dose. Biltricide (praziquantel), which is effective against

both types of schistosomiasis, is the drug of choice. This drug is prescribed in proportion of the patient's body weight. The recommended dosage is 40 mg per kilogram of body weight. The advantage of this particular treatment is that, in addition to curing the patient, it may have some impact on the probability of transmission, due to potentially smaller quantities of eggs being released into the environment. Since each snail produces hundreds and thousands of cercariae per day, treating a small proportion of the infected individuals may not significantly lower the transmission probability.

Population behavior in the area is an important determinant of the disease's prevalence. If individuals avoid urinating or defecating in or near water bodies, the eggs and larvae cannot come in contact with the intermediate host, the snails, and, as a result, the transmission of the infection is arrested. Alternatively, residents of the locality can avoid using water bodies, especially those known to be major transmission points. This will lower the probability that cercariae can get into the human host. In the developing world, however, expecting people not to use the water bodies located near the village, even if this request is made of them, is unrealistic. For this reason, a feasible strategy could be to introduce health education messages to raise one's consciousness about the disease and its mode of transmission. This may help modify the current risk-taking behavior of the population.

The third feasible strategy is to reduce the number of snails in the endemic regions. In the literature, two broad approaches for snail control have been mentioned. In China, mass mobilization was used as the method to reduce the snail population by encouraging people to kill snails or digging new canals to divert the water from an infested channel. Chemicals can also be used to kill the snails, a method of control referred to as molluscicide. The pilot project has used chemicals to treat the water bodies in two villages.

The fourth approach is to arrange for alternative sources of water supply for households. Shallow hand pumps can be installed to increase the supply of potable water. In most societies, people understand the need for obtaining good quality water for drinking, washing utensils, or cooking. To wash clothes or bathe, water from ponds and rivers is used, due to the high quantity requirements of such activities. Increasing the number of tube wells or hand pumps will reduce the cost of obtaining a higher volume of water and should reduce reliance on ponds or rivers as a source of water.

Another approach could be to construct well or pit latrines. The use of latrines will significantly lower the transmission of the disease. A major problem with this approach, however, is that people may not use the latrines, especially school-age children who comprise the most vulnerable group. The provision of sanitary latrine facilities must be complemented with health education messages in order to effectively lower the prevalence rate of the infection.

Although the present report reviews different strategies as independent interventions, in reality, all of these actions are related. To maximize effectiveness, a combination of all these interventions may be the most desirable strategy to adopt for combatting schistosomiasis.

3.2 THE SCHISTOSOMIASIS CONTROL PROGRAM

The present paper examines the schistosomiasis control program adopted in the Kaele sub-division of extreme north province in Cameroon. The Health Constraints to Rural Production (HCRP) Project in Cameroon was initiated with the objective of developing an effective, economical, and environmentally sound strategy for the control of endemic schistosomiasis. As part of this project, a nationwide baseline survey was carried out by TU from 1984-87 to estimate the prevalence of schistosomiasis in Cameroon. The baseline data provided regional prevalence rates for targeting purposes.

An interesting finding of the baseline survey was the high prevalence of the disease (urinary type) in the northern half of the country. Yet the water development project areas in the north, surprisingly, did not demonstrate as high a prevalence rate as expected. In fact, outside the north and extreme north provinces, only two arrondissements were found to have a prevalence of infection ranging between 5 and 19 percent among fifth-grade schoolchildren. On the other hand, a prevalence rate of more than 20 percent was noted for all arrondissements in the northern half of the country except two, one of which is situated in the Lake Chad area in the northernmost tip of Cameroon.

The baseline survey results also identified Kaele arrondissement as the region of the country where schistosomiasis is most prevalent. Different schisto control strategies were tried in this area. The project experimented with three types of interventions: health education, drug distribution, and snail control. Five villages in the arrondissement were surveyed to estimate the prevalence of infection before introduction of the interventions. This baseline prevalence rate can be compared with the rates obtained by subsequent surveys to determine the impact of interventions on these communities.

The drug distribution and health education interventions started more than two years ago in Kaele arrondissement and the effects of these interventions should now be visible. Drug therapy reduces infection rates almost immediately, but the effects of health education usually become visible only after a certain time-lag. The snail control program began only about one year ago in the pilot project area; its impact on prevalence should become visible at the end of the second year. This is because the average life span of a worm in human hosts is about one and one-half to two years. At the time of the survey, one could still have positive cases from past infections, even if the snail control program was effective.

The pilot project made various data sets available for this study, including the 1991 baseline urine test results; the 1993 repeat urine test carried out in five villages; and initial knowledge, attitudes and practices (KAP) study tables. Other relevant information was obtained from the Schistosomiasis Control Project of Tulane's School of Public Health and Tropical Medicine.

4.0 METHODOLOGY AND DATA SOURCES

The methodology applied to analyze results of the current study involves estimating the cost of providing different services in the pilot project area. The cost estimates take into account the nature of the cost-volume relationship. The two urine tests completed by the Tulane project were used to define the prevalence rate of the infection among the population. The more recent test was conducted in early 1993 and reflects, to some extent, the impact of the interventions.

With support from the HFS Project's SAR, a household survey was carried out by the study to collect information on the effects of the interventions, as well as the willingness and ability of households to pay for the control strategies. The survey was conducted in five villages in Kaele subdivision: Guereme, Mindjil, Moutourwa, Mindjivin, and Touloum. These villages were chosen because baseline information was available on their rates of prevalence. In all these villages, a number of interventions were carried out, except Touloum which served as the control. Touloum did not receive any formal interventions. Health education messages, however, may have spread to this village through the school-based health education program supported by the project.

All the villages, excepting Touloum, received some health education information on diagnosis and treatment of schistosomiasis. In mid-1991, the pilot project implemented measures to control snails in all important water bodies in two villages, Guereme and Mindjil.

The current study employed structured questionnaires as survey instruments. Two sets of questionnaires were developed: one for the village or community level, and another to be administered to households. The village/community questionnaire collected information on the locality, e.g., health centers in or near the village, the location of major water bodies, drugs sold by the pharmacies. The household questionnaire collected information from the household head or, in his absence, from an adult member of the household. Both questionnaires appear in *Appendix 2*.

The household questionnaire was developed and sent, for comments and/or suggestions, to a Health Ministry official in Maroua, Cameroon and to other researchers who have worked in this region in the past. Recommended changes were made, as appropriate, and the questionnaire was updated accordingly. The final version of the questionnaire was discussed with the enumerators in the field. The first phase of data collection began on June 14 and ended on June 28, 1993. Immediately after the collection of the data, the questionnaires were checked for consistency and missing information. A decision was made to revisit 35 households, and questionnaires originally administered to these households were sent back to Cameroon. The households were revisited to collect the missing information or ensure validity and accuracy of the previously collected data. This updated information on the household survey was received on August 15, 1993.

5.0 ANALYSIS OF SURVEY INFORMATION

In the five villages, 216 households were surveyed. A map of the surveyed villages is reproduced in *Appendix 3*. The basic characteristics of the surveyed villages and households are described in the following section.

5.1 BASIC INFORMATION ON THE SURVEYED VILLAGES

In all five villages, agriculture is the most important economic activity. Millet, sorghum, cotton, potatoes, peanuts and onions are the main crops. In Touloum, the most important crop is millet, while in Moutourwa, cotton is relatively more important, where 115 hectares were under cotton cultivation during the past one year. All villages also have a number of hand pumps, usually about three to four per village. The number of water points vary quite significantly from one village to the next. In Guereme, for example, total number of water points during the survey was 31, while in Moutourwa, it was only three. On the average, there were 15 water points in a village, eight temporary water points and seven permanent.

All villages had at least one traditional healer within the village boundary. On average, there were four traditional healers per village, two of whom provided treatment for schistosomiasis. In the surveyed villages or within a five-kilometer radius from the villages, there was no modern physician available. Trained nurses or nurses' assistants, however, provided services to the villagers from the village clinics or clinics within five kilometers from the village. Each village had an average of 3.5 nurses or nursing assistants at the time the survey was carried out.

5.2 DEMOGRAPHIC CHARACTERISTICS OF HOUSEHOLDS

As stated in the preceding discussion, 216 households were surveyed in the five villages. Individuals in these households totalled 1,224, yielding an average family size of 5.67 members. Family sizes varied quite significantly among the surveyed villages: the averages were 8.72 per household in Guereme, 5.74 in Mindjil, 4.55 in Moutourwa, 4.60 in Mindjivin, and 5.64 in Touloum.

In the surveyed villages, the sex ratio (males to females) was revealed to be about 0.94. *Exhibit 5.1* reports the age distribution of the surveyed population by sex. Note that the sex ratio approximates one in the 0-10 year age group. Among older ages, the number of females usually exceeds the number of males, probably indicating significant emigration of adult working males from the area. Another possible explanation would be the practice of polygamy in the area.

About two-thirds of all surveyed households reported their ethnicity as either Moudang or Guissiga. More than 18 percent were Toupouri, and another 13 percent were Foulbe. More than one-third of the households were Christian, with about 20 percent Muslims. The remaining 50 percent belonged to a number of indigenous religions.

EXHIBIT 5.1
AGE-SEX DISTRIBUTION OF THE SURVEYED POPULATION

SEX	AGE GROUP (years)						
	0-5	6-10	11-20	21-40	41-60	61+	TOTAL
Male	89	101	172	99	67	41	569
Female	88	102	139	152	109	24	614
Total	177	203	311	251	176	65	1,183

Among all adult members of households, farming is the most important economic activity. More than 66 percent of adults who reported participating in any productive activity (excluding home activities performed by women) mentioned farming as the principal activity. Although raising livestock is an important economic activity, only about two percent of the adults surveyed said that they were agro-pastoralists. Other minor occupations mentioned were: merchant, student, teacher, government employee, etc.

The households in the survey area are not nuclear families, in general. The head of the household, his wife, and children account for 78 percent of all members in the household. Other relatives account for another one-fifth of the members, while non-relatives living with the households comprised less than one percent of total household size. It is quite common, in this area, for adult children and their spouses to live with their parents.

The literacy rate in the region is generally low. In the surveyed households, only about 25 percent of household heads were literate. Among the literate population, more than half reported having completed primary education.

5.3 ECONOMIC AND SOCIAL STATUS

The indicators of economic and social status that can be used for this region are quite limited. The agricultural activities are very informal, especially when ownership of crop land areas is not well defined. The survey relied on some easily observable, indirect proxies to categorize households by socioeconomic status. One of these indicators was the number of houses or structures in the household's home plot. Among the households surveyed, the number of structures ranges from one to 11, with an average value of 3.81 units per household. If one considers the number of residential houses, however, the number of structures ranges from one to eight, with a mean of 2.62. If the number of houses or residential structures reflect socioeconomic status, obviously the villages are far from what can be considered relatively egalitarian communities.

An electrical connection is an important indicator of economic affluence. The household must pay a very high fee to obtain an electrical connection for residential houses, which only can be afforded by the wealthy. Among the surveyed households, only three had electricity in their home plot. Only one household reported owning a TV set, and two reported owning a car or small truck.

Since poor households are less likely to consume animal meat and fish, the frequency with which these food items are consumed over the seven days immediately prior to the survey may reflect a household's economic well-being. About 10 percent of the households reported consuming meat or fish every day, while about one-

fourth of the households consumed meat or fish only once during the preceding seven days. The data in *Exhibit 5.2* measure the frequency of fish and meat consumption by households during the seven days prior to the survey.

EXHIBIT 5.2
FREQUENCY OF FISH AND MEAT CONSUMPTION IN ONE WEEK

Number of Times Meat or Fish Consumed	No. of Households	Percentage of Households
1	50	23.2
2	73	33.8
3	35	16.2
4	34	15.7
8	17	7.9
N.D.	7	3.2
Total	216	100.0

6.0 THE PREVALENCE OF SCHISTOSOMIASIS

6.1 URINE TEST RESULTS

As part of Tulane's Project on Constraints to Rural Development in Cameroon, as indicated previously, two urine tests were carried out in 1991 and 1993 to determine the prevalence of infection in the five villages surveyed. The data in *Exhibit 6.1* report the prevalence rates of schistosomiasis in these five villages. In 1991, Guereme showed the highest rate of infection, while Mindjivin had the lowest. The 1993 test results indicate a significant decline in prevalence rates of all five villages. The prevalence rates declined by more than 50 percent in Mindjil and Guereme, while the decline in Moutourwa was relatively modest, at about 20 percent. It is interesting to note that the prevalence rate declined by more than 40 percent in the control village, as well.

EXHIBIT 6.1
PREVALENCE OF SCHISTOSOMIASIS IN THE VILLAGES SURVEYED
1991 AND 1993

VILLAGE	PREVALENCE RATE (percent)		PERCENT DECLINE
	1991	1993	
Guereme	26.74	11.66	56.39
Mindjil	11.37	4.73	58.40
Moutourwa	22.71	18.09	20.34
Mindjivin	10.44	7.09	32.09
Touloum	15.21	8.67	43.00
Average	17.29	10.05	41.87

The data in *Exhibit 6.1a* report the prevalence of the disease by age and sex, again based only on the urine test results. Results of both tests are reported in the exhibit. Note that the first test indicates a prevalence rate of about 16 percent, while the second test revealed a prevalence rate of only 9.6 percent. It appears that the schistosomiasis control program in the region has successfully reduced the rate of infection.

The schistosomiasis infection is much more prevalent in the group aged 6-20 years than in any other age category. In this age group, 27 percent were infected with the disease in 1991 and 16 percent in 1993. For the group aged 21-60 years, the prevalence rates were 9.7 and 5.6 percent, respectively, for 1991 and 1993. In this area, males are more susceptible to the disease than females. In 1991, the probability of infection among men was about 20 percent, contrasted with 12 percent for females. Almost 59 percent of all infected individuals were male in 1991; this statistic increased to about 66 percent in 1993.

EXHIBIT 6.1a
PREVALENCE OF SCHISTOSOMIASIS IN THE FIVE VILLAGES COMBINED
BY AGE AND SEX, 1991 AND 1993

AGE GROUP (years)	PREVALENCE OF INFECTION (percent)	
	1991	1993
0- 5	6.25	3.53
6-10	27.93	16.93
11-20	28.15	17.26
21-40	10.53	6.63
41-60	7.18	2.63
61 +	6.78	4.65
SEX		
Male	20.70	13.68
Female	12.44	5.67
Total	16.43	9.64

Using the results of the 1991 and 1993 survey, it is possible to determine approximately the prevalence rate of infection over the last one and one-half years, and the persistence of the infection among the surveyed individuals over the period. To define the prevalence of infection over the last one and one-half years, we have included all infected individuals in 1991 and 1993. The persistence was defined by identifying the number of individuals found infected both in 1991 and in 1993, i.e, if the individual who was infected in 1991 was also found to be infected in 1993, he/she was considered to be a persistent case. The data in *Exhibit 6.1c* report the prevalence and persistence rates over the period by age groups.

The urine test results can also be used to examine the intensity of infection among the population. The urine tests not only noted the presence or absence of eggs in the urine, they also provide the egg-count per 10 ml. The egg count is often considered an indication of the intensity of the infection. To define intensity, all infections have been classified into three intensity categories: low, moderate, and severe. Infected individuals with an egg-count less than 10 per 10 ml is defined as low-intensity infection. If the egg count is more than 50, the infection is considered severe; all other infected cases are considered of moderate intensity.

EXHIBIT 6.1c PREVALENCE AND PERSISTENCE RATES OF SCHISTOSOMIASIS INFECTION, BY AGE AND SEX BASED ON 1991 AND 1993 URINE TEST RESULTS		
AGE GROUP (years)	INDIVIDUALS INFECTED (percent)	PERSISTENCE RATE
0- 5	10.76	0.88
6-10	39.69	7.52
11-20	46.57	5.32
21-40	17.50	1.56
41-60	10.39	0.55
61 +	13.64	0.00
SEX		
Male	25.90	4.71
Female	14.50	1.73
Total	20.10	3.16

The data in *Exhibit 6.2* report the intensity of the infection by age and sex. Most infected individuals were found to be suffering from a low-intensity infection. About one-third of infected individuals were moderately infected. Low-intensity infections often are not associated with clearly identifiable symptoms and infected individuals may not seek treatment.

6.2 REPORTED PREVALENCE RATES

6.2.1 Prevalence Reported by Household Members

The households were asked to identify members who are likely to be infected with schistosomiasis. The reported prevalence rate was 9.9 percent, almost equal to the rate revealed by the urine test results. About 41 percent of households reported the presence of at least one infected person. Usually, only one household member is infected. Only 20 households reported more than one infection within the household.

Households were also asked to report the number of members infected over the last 12 months. If the household prevalence level is measured over the 12-month period, in contrast with the current infection rate, the proportion of households with at least one infection increases from 41 to about 50 percent.

EXHIBIT 6.2
INTENSITY OF SCHISTOSOMIASIS INFECTION BY AGE AND SEX
1991 AND 1993

AGE GROUP (years)	INDIVIDUALS INFECTED (percent)					
	1991			1993		
	Low	Moderate	Severe	Low	Moderate	Severe
0- 5	53.85	30.77	15.38	50.00	16.67	33.33
6-10	48.39	35.48	16.13	46.88	46.88	6.24
11-20	60.52	28.95	10.53	52.95	35.29	11.76
21-40	46.16	38.46	15.38	69.24	30.76	0.00
41-60	46.15	23.08	30.77	100.00	0.00	0.00
61 +	75.00	00.00	25.00	50.00	0.00	50.00
SEX						
Male	53.38	31.36	15.26	51.56	39.06	9.38
Female	53.95	31.58	14.47	62.96	25.93	11.11
Total	53.61	31.44	14.95	54.95	35.16	9.89

The age distribution of the reported cases of infection also indicates a much higher prevalence among teenagers and young adults than in the rest of the population. More than 50 percent of all reported infections fall within the ages of 11-20 years. The reported prevalence for this age group is 18.2 percent, compared to 9.2 percent for the 21-40 year age group, and 8.3 percent among children. More than 65 percent of all reported infections correspond to the male population, and the prevalence rate among males was about twice that of females (12.3 vs. 6 percent, respectively). The age distribution of the infection is relatively more important for women between the ages of 21-40 years; 35 percent of all infected women belong to this age group. The comparable statistic for men is 13 percent.

The households also reported that over the past 12 months, about 9.3 percent of individuals received treatment for schistosomiasis. The treatment rate was lowest for the 11-20 year age group, which is also the age group demonstrating the highest incidence of infection. The greatest proportion of people seeking treatment was noted among those aged 41 years or older. The reason that a lower treatment rate is reported for the age group with the highest infection rate may be that the rate of re-infection for this same age group is relatively high, which makes treatment a costly proposition.

6.2.2 Prevalence Indicated by Urine Test Results

It is interesting to note that the percentage of individuals reporting symptoms of schistosomiasis is almost identical to the percentage of individuals found to be infected, based on urine test results. What is surprising, however, is the relationship between the presence of infection and reporting of symptoms. About 88 percent of the individuals who were infected, according to the urine test, did not report any schistosomiasis symptoms. On the other hand, about 88 percent of those who reported symptoms were not found to be infected, based on urine test results. In other words, only 12 percent of those infected also claimed to have symptoms of schistosomiasis.

One possible explanation for this low correlation between actual and reported infection may be due to the intensity of the disease. Individuals with a low-intensity infection may not realize that they have the disease, especially when members of the same community suffer from many other similar types of infectious diseases. However, even for high-intensity cases (i.e., 51 or more egg counts per 10 ml), only 22 percent of those infected reported schistosomiasis symptoms. The percentage of infected individuals also reporting symptoms does increase with intensity, but the convergence rates remain very low. Therefore, although the population in this region is well aware of the symptoms of the disease, an understanding of the presence or absence of the disease appears much more problematical. Many of the infected individuals do not consider themselves to be infected with schistosomiasis. This finding will have significant implications for the implementation of user charges to control schistosomiasis.

7.0 THE COST OF SCHISTOSOMIASIS CONTROL

This section explores the costs associated with broad schistosomiasis control strategies: diagnosis and treatment, snail control, health education, and improved water supply. Many alternative interventions can be developed within a broad strategy to control the disease. In this section, the costs of specific intervention programs are examined. Unfortunately, it is particularly difficult to assess the cost and effectiveness of health education strategies, owing to a lack of appropriate outcome measures. Nonetheless, an attempt is made to estimate the costs associated with the health education program, and the current study explores some of the theoretical issues involved in the pricing health education and other non-patient related health services.

7.1 DIAGNOSIS AND TREATMENT

The diagnosis and treatment of schistosomiasis can be carried out at a health center or at other locations, such as schools, mosques, or churches.

7.1.1 Diagnosis and Treatment of Urinary Schistosomiasis at Health Centers

The inputs required to diagnose 90 individuals at a health center include the following:

Variable Inputs for 90 tests	
Technician's time	(3.30 hours
Reagent strips	(90 tests)
50 ml clear tubes	(90 tests)
Glass microscope slides and coverslip	(90 tests)
Maintenance of the health center	(600,000 FCFA/month)

Fixed Inputs of 90 tests	
Use of laboratory	(3.0 hours)
Use of health center	(4.5 hours)
Microscope	(1)
Hand-powered vacuum pump	(1)
Marking pens	(1)

(NOTE: These input coefficients were defined by Tulane's project as "actual" hours of work performed to diagnose and treat patients)

Economic life of a building	(30 years)
Economic life of a microscope	(10 years)
Economic life of a vacuum pump	(5 years)
Scrap value of all fixed equipment	(zero)
Number of uses of clear tubes over a lifetime	(10)
Number of uses of microscope slides and cover slips over a lifetime	(30)
Interest/discount rate	(10%)

The cost of diagnosis has been estimated using the following prices. Two sets of results are reported for total and variable costs. Total costs include both fixed and variable costs related to diagnosis and treatment of schistosomiasis. The variable cost component includes only the year-to-year costs, which must be paid to run the program once the fixed inputs are supplied.

The diagnostic procedure that was employed involved the technician receiving a urine sample from the patient and use of a reagent strip to test for the presence of blood. The specimen was then examined under the microscope to identify schistosome eggs and confirm the presence/absence of the infection. The costs of various items appear here:

Salary of technician, with benefits	(66,781 FCFA/month)
Reagent strip	(60 FCFA per test)
50 ml clear tube	(10 FCFA per test)
Glass microscope slides and coverslip	(3 FCFA per test)
Maintenance of the health center	(600,000 FCFA/month)
Microscope, annual flow 46,189 @ 10% interest rate w/ a lifetime of 10 years	(330,000 FCFA)
Marking pens	(200 FCFA)

Total Costs to Diagnose a Case (FCFA)

Salary	(per day 66,781/22 = 3,035.5 per hour 3,035.5/7 = 433.64 per test 433.64*3.3/90)	16.00
Reagent strip		60.00
Clear tube		10.00
Microscope slides		3.00
Depreciation of microscope		1.00
Health center maintenance		100.00
Health center depreciation		100.00
Marking pen		1.00
TOTAL		291.00

Variable Costs to Diagnose a Case (FCFA)

Salary	16.00
Reagent strip	60.00
Clear tube	10.00
Slides	3.00
TOTAL	89.00

The cost of treatment can be estimated using the following input coefficients:

Technician's time	3.0 hours/90 cases
Time needed to collect money (for drugs)	1.5 hours/90 cases

Cost of an Average Drug Dose (2000 mg)

Shipping, air from Europe	$16/kg
Cost of tablets	$650/6 kg package
Total cost	$666/6 kg
Assume:	
15% loss	
15% price inflation	
15% internal transportation	
15% normal profit	
Total price for 1,000 tablets will become	US $1,066
Cost/600 mg tablet	US $1.066/or 293 FCFA
TOTAL	977 FCFA

Total Cost of Treating a Case at the Clinic (FCFA)

Salary	23
Drug	977
Maintenance	150
Depreciation	150
Stationery	50
TOTAL	1,350

Variable Costs of Treating a Case at the Clinic (FCFA)

Salary	23
Drug	977
Stationery	50
TOTAL	1,050

7.1.2 Diagnosis and Treatment Outside the Health Center

The technician can also travel to the villages for diagnosis and treatment of infected individuals. Two alternative approaches can be followed to reach the desired population. The technician can ask the chief of the village to arrange a meeting of locals or a target group at a specific location for the purpose of diagnosis and treatment. Alternatively, the technician can also visit all households within the locality. House calls will be costly in terms of time inputs required and may not be feasible on a regular basis. Visiting a specific location (e.g., a school or mosque) at a pre-arranged time and date, however, should be a relatively inexpensive method, if the participation rate of the target group is high.

The diagnosis outside of the clinic can be performed using the dipstick method only, i.e. through dipping a reagent strip in the urine sample collected. The reagent strip changes color if blood is present in the urine. This method is quite specific and generally is likely to be a reliable measure to use in regions of the country plagued by endemic schistosomiasis. For a generalized treatment program, the information on the presence of infection is much more important than the intensity of the infection.

One technician or assistant nurse can test about 90 cases in half a day, if the meeting is pre-arranged. Another half-day will be needed to treat the individuals diagnosed with the disease. The total cost of treatment and diagnosis will include time and material costs, plus per diem and transport expenses for the technician.

The following costs (FCFA) are incurred to diagnose 90 cases outside the clinic:

Salary for one half-day	1,518
Per diem allowance (half-day)	1,500
Strip (90 @ 60 FCFA)	5,400
Tube + other costs	990
TOTAL	9,408
Cost/diagnosis	105

The following costs (FCFA) are incurred to treat 90 cases outside the clinic:

Salary for one half-day	1,518
Per diem allowance (half-day)	1,500
Drug	87,930
TOTAL	90,948
Cost/treatment	1,011

7.2 SNAIL CONTROL

The objective of the snail control program is to reduce the probabilities of transmission by the snail population. An effective snail control program requires careful identification of major contact points and application of a molluscoid to all contact points identified. In order to improve the effectiveness of the program, it is also necessary to determine the appropriate level of the molluscoid and the optimal time of the year for its application. At this stage, a cost analysis can be carried out to examine the feasibility of the strategy for a poor region. The efficacy of the program in reducing the probability of transmission has not yet been demonstrated, and therefore, this cost analysis does not imply an endorsement of snail control programs. The analysis presented here assumes that the snail control program will significantly lower the transmission probability.

There are certain social costs involved in using a molluscoid. If the water body to be treated is a source of fish, the chemical will kill all the fish, as well as the snails. It is likely that most of the important contact points will be temporary water bodies, thereby keeping loss of fish to a minimum. The KAP study should be able to provide some data on the economic utility of major contact points. The chemical is considered environmentally safe. It disintegrates naturally within a day without any residue.

7.2.1 Cost of Molluscicide: General Remarks

The cost assessment in this section is based on the experiment carried out by the pilot project in one test village (Lara). In this village, eight water bodies were identified as principal contact points for schistosomiasis transmission during the month of August. The total circumference of the water bodies measures 1,230 meters, with a volume of 5,688 cubic meters. Information collected on this test village will be used to estimate the cost of molluscicide in a geographic region equivalent to the average area served by health centers in the subdivision of Kaele.

In 1987, the total population of Kaele subdivision was 68,932. Applying the population growth rate estimate for entire the country of Cameroon (3.2 percent), the population in Kaele subdivision in 1993 could be estimated at 82,500. The subdivision includes approximately 100 villages. Since there are 12 health centers in the area, one health center serves, on average, 6,800 individuals residing in eight surrounding villages.

The cost of molluscicide can be divided into three components: training costs, labor costs, and material costs. The training and labor inputs required for the program are obtained from the pilot project. Obviously, the training costs were annualized to make the cost data comparable with other recurrent costs of the project. The fixed costs were discounted to match them with periodic flows of services.

An important component of the material cost is the cost of chemicals used for molluscicide. Initial experiments of the project suggest that the quantity of chemicals applied in proportion to the total circumference of the water bodies should be as effective as the World Health Organization (WHO) recommendation of chemical use per unit volume. In poor rural communities, use of the chemical in exact proportions of water body perimeter may not be feasible, especially when literacy rate is low and the village workers do not have access to reasonably accurate weighing instruments. The pilot project has proposed to make the chemical available to the consumers in packets of 50 grams each and, depending upon the circumference of the water bodies, the community will decide the number of packets to be used.

Assume that S_i is the circumference of a pond or a water body. The number of packets of chemicals needed to molluscicide the area will be X_i. If the distribution of the pond circumferences in the region is given by $f(S_i)$, and the cost of a package is P, the mean cost of chemicals used for molluscicide should be:

$$C_{chem} = P \cdot \int_{S_l}^{S_h} X_i f(S_i) dS_i$$

where S_l and S_h are the minimum and maximum sizes of the water bodies.

The total cost of molluscicide becomes:

$$C = C_{chem} + C_{train} + C_{labor} + C_{other}$$

where, the components are the costs of chemicals, labor, training, and other materials used.

In general, the salary paid to government employees in Cameroon is considered much higher than what a comparable worker can earn from any alternative sources of employment. In this exercise, one is concerned with the total financial resources needed to make the snail control program a self-sustaining community-organized activity. For policy purposes and to estimate social costs of the program, it will be useful to correct wages and salaries by using shadow wage-ratios. The author of this report does not attempt to correct the wage and salary levels for over valuation.

7.2.2 Cost of Molluscicide: Training and Site Treatment Costs

A well-structured molluscicide program consists of the following sequential stages: training of health workers, identification and measurement of the transmission points, and the application of molluscicide.

Training at the Central and Division Level

The technology for molluscicide is extremely simple. A training session for about six hours was found to be sufficient to instruct personnel on the techniques of identifying the transmission points and method of applying the molluscicide.

The number of participants at this level of training should be low enough to allow maximum interactions between trainees and the trainer. Assuming that the central-level training sessions will provide services to five participants who, in turn, will train health workers at the provincial level, the cost of training the instructors can be estimated as follows:

ITEM	COST PER ONE-DAY SESSION (FCFA)
Per diem for 5 trainees	50,000
Opportunity cost of trainees' time, 5 days (@ 334,000/mo. for local level government officers)	75,910
Per diem for trainers	45,500
Fee for trainers	54,200
Rent of training site	13,000
TOTAL	238,610

Using these input coefficients, total cost of specialist-level training per trainee at the central level becomes 47,722 FCFA. A molluscicide program will require a central level training once in every five years. Assuming an interest rate of 10 percent, the annualized cost turns out to be 11,445 FCFA. Since each trainer is assumed to offer 10 training sessions a year at the division level, and each health center will send a participant for training once in two years, per health center cost for this component of training should be approximately 575 FCFA.

A similar methodology can be used to estimate the annualized cost of training at the division level. Assuming a class size of 20 participants, the cost per year becomes FCFA 185,000. The details of the calculations follow. As assumed earlier, a health worker from each health center will attend the training session every other year. This implies a yearly cost of about 4,650 FCFA per health center for this training component.

7.2.3 Cost of Treatment of the Transmission Points

The cost, insurance, freight (CIF) price of the chemical, Bayluscide, at Douala is about US$ 2,000 per 60 kg packet. Assuming 30 percent transport and storage costs, 15 percent loss, 10 percent repackaging, 15 percent for normal profit and 15 percent for price increase to ensure availability of sufficient revolving community fund for the purchase of the chemical in the future, the cost of 50 gram packets should be:

US$ 2,000 X 270 FCFA/US$ X (1+.85)*50 grams/60000 grams = 833 FCFA

The survey of the transmission points in Kaele subdivision of Cameroon collected information on 16 water bodies. The data in *Exhibit 7.2* convey the perimeter of the water points with the number of packets of chemical needed for molluscicide. Estimating a continuous distribution function for the circumference of the transmission points was not possible, due to the small sample size. Using the distribution reported by the survey, however, it is possible to estimate packets of chemicals needed to treat one water-point on the average. The distribution of pond sizes reported in the exhibit implies the use of about 5.4 packets of Bayluscide.

EXHIBIT 7.2
POND CIRCUMFERENCES IN KAELE SUBDIVISION AND REQUIRED QUANTITIES OF BAYLUSCIDE TO TREAT TRANSMISSION POINTS

Circumference (in pace*)	Number of Ponds	Required Number of 50 gram bags	Percent of Ponds
1-35	0	1	0.00
36-70	3	2	18.75
71-105	2	3	12.50
106-140	3	4	18.75
141-175	1	5	6.25
176-210	3	6	18.75
211-245	0	7	0.00
246-280	1	8	6.25
281-315	1	9	6.25
316-350	1	10	6.25
351-385	0	11	0.00
386-420	1	12	6.25
421-455	0	13	0.00
TOTAL	16		100.00

*Pace, a unit used to measure length, is approximately equal to one meter.
Source: Field study in Kaele subdivision in Cameroon.

The field survey results also indicate that the catchment area of each health center consists of eight villages, and each village has an average of eight ponds, implying a total requirement for 350 packets of chemical per health center. In money terms, the cost of chemicals per health center will be about 292,000 FCFA. Finally, it is important to estimate the cost of mixing and applying the chemicals. If the cost components for mixing and applying the chemicals are identified, the annual cost per treatment turns out to be about 78,100 FCFA. The details of the cost components follow:

Cost of Treatment of the Water Bodies	
Time of health workers	16 days; 8 days to identify and measure the water bodies and 8 days to treat them
Salary of the workers for the period	56,750 FCFA
Transport costs	16,000 FCFA
Other materials (e.g., 50 m chord, meter measure, watering can, bucket)	5,350 FCFA

The sum of all the cost components (FCFA) identified yields a total cost (FCFA) of molluscicide, as follows:

Cost of the chemical	292,000
Training at provincial level	575
Training at the division level	4,650
Cost of applying the chemicals	78,100
TOTAL	375,325

It should be noted that the cost of molluscicide will be higher, if the WHO-recommended concentration of Bayluscide is used. WHO recommends a concentration rate about double that of the quantity of chemical applied in the current study.

7.3 HEALTH EDUCATION

There are two aspects of health education planning intended to control schistosomiasis. The first aspect relates to educating individuals about the specific symptoms of schistosomiasis, so that they can determine when to seek medical help. This aspect of health education is intended to increase the demand for health services. The objective of the second aspect is to encourage prevention of the disease by educating the community about the sources of the disease and how to avoid being infected. This aspect of health education reduces infection and reinfection probabilities even without other schistosomiasis control activities.

Due to the demand-increasing effect of the first aspect of health education, the beneficiaries can be charged a user fee built into the cost of diagnosis and treatment. The second aspect produces outputs which have "public good" characteristics, and beneficiaries of these outputs cannot be identified easily. The whole community benefits from this second aspect of the health education program. Like the snail control program, it may be financed by general community funds. Conceptually, it is possible to generate some additional funds through schistosomiasis diagnosis and treatment. Since infected individuals, however, constitute only a small proportion of the beneficiaries, this may make cost per treatment too high to adversely affect diagnosis and treatment. Since all community members benefit from this consciousness-raising aspect of health education, it should be funded from tax revenues.

7.3.1 The Cost of Providing Health Education

Health Education Materials: Cost of Development and Reproduction

The pilot project in Kaele is presently using the materials developed by a private health center in the locality. The education materials consist of a flip chart and a booklet on schistosomiasis. The cost of obtaining a chart is 6,500 FCFA. Assuming that a health center will use one flip chart and five books, total cost to a health center in procuring the materials will be: 6,500 + 2,500 = 9,000 FCFA plus cost of postage or transportation. Adding another 1,000 FCFA for other costs of procurement, and the total cost becomes 10,000 per health center.

The dissemination of messages on schistosomiasis through brochures constitutes a low-cost method of health education. Each brochure costs about 28-38 FCFA, depending upon the volume of each order. All schoolchildren can be given a brochure as an instrument of schistosomiasis-related education in the classroom. The brochures have far-reaching effects, because the students bring them home and discuss the issues they contain with family members.

The development of new health education materials will require a higher level of investment, at the initial phase of the program. Once the materials are developed, however, they can be revised and reproduced at a low cost. The projected investment cost is about US $6,000. Assuming that the materials will be used in all schistosomiasis-prevalent regions of the country for at least 10 years with no major revisions, the annualized cost

of developing health education materials will be approximately $6,000 X 275 FCFA/$/7.15 = 230,770 FCFA per year. In three northern provinces of Cameroon, the number of hospitals developed and elementary health centers in operation were 195 in 1985-86. Therefore, for a health center of the northern provinces, the cost of development of the materials will be 1,185 FCFA. Allowing for other minor expenses, the cost per health center can be estimated at 2,000 FCFA for this purpose.

7.3.2 Training of Health Center Personnel

To improve the effectiveness of the health education program, the health care center personnel need a comprehensive training about schisto, methods to be used for its diagnosis and treatment, and the mode of its transmission. A group of 24 participants has already completed a two-day workshop on schistosomiasis infection in the Kaele pilot project area. The cost of the training session follows:

The Cost of a Two-Day Training Session for 24 Participants from 12 Health Centers

ITEM	COST (FCFA)
Per diem for participants @ 3,000 FCFA/day (24 persons, 2 days each)	144,000
Salary of participants:	
12 persons @ 120,000/mo	130,910
12 persons @ 75,000/mo	81,820
Fee plus per diem for the trainer	21,000
Other costs (stationery, snacks, etc.)	13,200
Opportunity rent for the classroom	6,000
TOTAL	396,930
Training cost/health center	33,078
Cash cost/health center	14,850

7.3.3 Training School Teachers

The household survey results clearly indicate that the prevalence of schistosomiasis is highest among the school-age children. Schoolteachers can play a very important role in reducing the infection rates among the children by encouraging them to change their water contact behavior. The project proposed that schoolteachers be trained in different aspects of the infection—the life-cycle of schistosome, diagnosis and treatment, mode of transmission, and different control methods—once every three to four years. Repeating the courses should be very useful in sensitizing the school teachers, as well as the students, about the need for controlling the disease in the area. The continuing training program provides the opportunity to train new teachers, updating all educators on progress achieved, or new technological developments in this field.

An estimate of training cost for elementary schoolteachers follows. It is assumed that 75 schoolteachers will attend the half-day training session, and the sessions will be organized once every three years. The district chief for preventive medicine will serve as the trainer for the group.

The Cost of Training 75 Elementary Schoolteachers	
ITEM	COST (FCFA)
Salary of the trainer/participant @ 6,000/day	80
Salary of schoolteachers @ 75,000/mo	3,410
Rent for classrooms/participant	100
Stationery, snacks per participant	528
Per diem per participant	3,000
TOTAL	7,118
Marginal/additional cost (assuming salary and rent paid)	3,528
Total cost/participant/year	2,584
Additional cost/participant/year	1,281

Assuming that the number of schools in a health zone is three, with two teachers selected from each school participating in the training program, the total cost of training per health center will be 15,504 FCFA. The additional cost to the health center will be about 7,686 FCFA per year. The additional cost of training translates to about 7 FCFA per household per year. Note that the training cost per participant is much lower in this case, compared to the cost of training health center personnel. Therefore, training schoolteachers may be a more cost-effective approach to provide health education to the general population. The cost of arranging training sessions for elementary schoolteachers is only 7 FCFA per household per year. This additional cost can be incorporated into fee that health centers charge to schistosomiasis patients for diagnosis and treatment. Incorporating the schistosomiasis control program with the primary health care system requires avoiding creation of vertical programs, however. The health center can combine schistosomiasis control training with other health education training to make the sessions more comprehensive and useful.

The important question remains whether or not the health centers should provide continued funding for schistosomiasis-related health education efforts. It is unlikely that schistosomiasis can be eradicated from the region in the near future. Therefore, health education on schistosomiasis should be internalized, i.e., made a part of the school curricula. The MOPH should encourage the Ministry of Education to adopt a region-specific health education program.

7.3.4 Time Allocated to Health Education by Health Care Workers

A study on the use of nurses' time in health clinics found that less than one percent was spent on all preventive activities, including health education (Essomba et al., 1990). Clearly, health education is not considered a priority activity for the health workers in general. Health education materials, as well as training, will be useful only when the health center personnel use the materials effectively to improve the consciousness of the population against the disease.

In the pilot project area, one health center assigned the afternoon hours for health education, health promotion, and preventive medicine. All the health centers run by the public sector should also allocate certain days of the week for health education and preventive medicine to improve the efficacy of the health education program.

For cost accounting purposes, it may be assumed that a health center will allocate the equivalent of one full day in a week for health education. The cost of running the health education program per year can be estimated as:

ITEMS	COST (FCFA)
Salary of health center personnel	
52 days @ 120,000/mo	283,640
52 days @ 75,000/mo	177,275
Materials distributed (200 booklets)	14,000
Maintenance of the clinic	52,000
Depreciation of the building	52,000
Other costs (stationery, etc.)	10,000
TOTAL	588,915
Cash Cost	24,000

Note that the cash cost of the health education program is only four percent of the full cost. If the health clinics are willing to allocate one day a week to schistosomiasis control and other education efforts related to primary health care, the marginal cost of implementing the program will be very low. In fact, as will be discussed, health education costs can be viewed as an investment expenditure rather than as a consumption expenditure.

7.4 WATER SUPPLY

The survey asked households about their water use behavior. Alternative sources of water supply, like tube wells, exist in this region, but it appears that the provision of more tube wells will have little or no impact on the water use behavior of school-age children, the group demonstrating the highest prevalence of the infection. Water supply issues were not explored in the survey, since there does not appear any effective method of reducing prevalence of schistosomiasis related to water supply.

8.0 SURVEY RESULTS

8.1 WILLINGNESS AND ABILITY OF HOUSEHOLDS TO PAY FOR VARIOUS INTERVENTIONS: DIAGNOSIS AND TREATMENT

8.1.1 Feasibility and Desirability of User Charges

Diagnosis and treatment of a disease are patient-related services, i.e., they involve direct face-to- face contact between the patient and health care provider. The primary beneficiary of treatment and diagnosis is clearly identifiable, and the beneficiary also understands the utility of the treatment, in general. For this reason, in theory, user charges can be applied for diagnosis and treatment of schistosomiasis.

The feasibility of user charges does not necessarily imply the desirability of imposing charges to cover the total cost or the variable cost of diagnosis and treatment. The level at which price should be set depends upon the private and social benefits of the activities. It is known that maximum benefits are realized, if the activities are provided (and their services used) in the most cost-effective way.

The diagnosis and treatment of schistosomiasis produce clear results, and the patients should be well aware of the benefits they have derived from the treatment. Due to the clear private benefit of the treatment activities, bayluscide has become a highly sought-after drug in the northern region of Cameroon. For example, one clinic charges as high as 3,500 FCFA per treatment, which is more than 2.5 times the actual cost of treatment, with a 15 percent profit margin.

A reasonable drug-pricing policy implies setting the price at the international level plus the cost of transport, with allowance for loss, price inflation, and some profit. Assuming a 15 percent loss of drugs, a 15 percent price inflation, and a 15 percent profit rate, the price of the drug should be 293 FCFA per 600 mg tablet. A higher price can also be chosen, but will probably discourage many infected individuals belonging to low-income groups from seeking treatment. Setting the price at a level higher than the marginal cost reduces the total private welfare when only schistosomiasis control is considered. If the demand for the drug is inelastic, the loss of welfare will be quite small, and the funds generated can be used in another health care activity to compensate for the welfare loss in this particular program. At this point, one has no specific estimate of demand elasticity, although it is likely to be low in absolute terms.

In the preceding discussion, the benefits of the treatment have been defined in a narrow sense, i.e., in terms of the improvement in a patient's welfare due to elimination of the symptoms of the disease. The benefits of the treatment, however, go beyond the control of symptoms. The individuals with a high-intensity infection are likely to have lower productivity. Therefore, the treatment of the disease should increase worker productivity. Also, treatment of infected individuals reduces the transmission probability, thus saving some treatment cost in the future. In other words, the treatment of schistosomiasis may have important indirect and social benefits. In the current survey, however, almost all households reported that the infection has little or no impact on labor productivity in this region.

8.1.2 Cost of Diagnosis and Treatment in Relation to Income

The total cost of diagnosis of a schistosomiasis case is about FCFA 291, and the variable cost is only FCFA 89. These estimates are consistent with the health care pricing policy adopted by the Government of Cameroon in May 1993. Physician consultations are priced at around 100-200 FCFA, and this fee level should cover the variable cost component of diagnosis. The treatment of the disease costs another 1,350 FCFA. Given the average level of income of the population in this region (about 170,000 FCFA per household per year) and an average prevalence rate of less than 30 percent, the total cost for treatment and diagnosis of all infected individuals in the household should be less than one-third of a percent of yearly income.

8.1.3 Willingness to Seek Treatment

In the survey, the household head was asked about the symptoms of schistosomiasis. More than 80 percent of respondents correctly identified a number of valid symptoms. Therefore, households appear to be familiar with the effects of the disease. Although the surveyed households knew about the symptoms of the infection, this does not necessarily imply that they would be willing to seek treatment. To better understand the household's willingness to seek medical care, they were asked to indicate whether the infection is sufficiently serious to seek medical attention. About 93 percent of the households reported that the disease is serious enough to be referred to a medical practitioner.

It is estimated that about 25 percent of the village residents were infected for at least some period of time during the last year. When asked whether they sought treatment for schistosomiasis, however, only nine percent reported that they did. This low figure appears inconsistent with the evaluation of the household head that schistosomiasis is a serious disease requiring treatment. One of the most important reasons for this difference is the infection-symptom divergence. For low-level infections, symptoms may not be easy to identify, and, as mentioned earlier, more than 50 percent of the infections are actually of a very low intensity. Among those who sought treatment, about 45 percent consulted a traditional healer, and the remaining 55 percent sought help from a modern practitioner. About 64 percent of the individuals who sought treatment reported the treatment to be effective.

There appear to be some differences in the treatment-seeking behavior of men and women. Males are more likely to seek medical attention for schistosomiasis than women. Only 30 percent of females surveyed with schistosomiasis received treatment during the 12 months prior to the survey, compared to roughly 40 percent of males. When asked about the opinion of the household head regarding the relative severity of the disease among men and women, about two-thirds replied that the disease is equally severe for both men and women. Another 15 percent thought that men are more severely affected by the disease than women. The urine test results, however, indicated that the severity of the infection was not higher for males than for females.

The survey results also indicate that household heads are more than two times as likely to seek medical treatment for schistosomiasis than children or housewives. Again, this finding is not consistent with the opinion expressed by heads of the households. Most respondents reported that the disease is equally severe for both children and adults. From the preceding discussion, it appears that the demand for treatment in the region will probably remain at less than 50 percent of individuals infected. Household members could correctly identify the symptoms of the disease. They perceived schistosomiasis as a serious illness. In fact, about a third of all households ranked schistosomiasis as the most important health problem for the region. If the mean score of reported severity of diseases is used (average per household of total number for ranks, i.e., rank multiplied by the number of households reporting that rank), malaria becomes the most severe illness for the community. The ranking of other diseases in descending order of severity was: schistosomiasis, sexually transmitted diseases, intestinal worms, and diarrhoea. Since the symptoms of schistosomiasis become apparent only with relatively higher intensity of the disease, the demand for treatment will remain low, unless diagnosis for the disease is carried out in this area to let the households know about the presence or absence of the infection. In the survey, about a third of all households reported that they became aware of at least one infection within the household after the diagnosis was carried out in the village.

8.1.4 Mass Treatment of a Target Group or Treatment of Infected Individuals Only?

To save on diagnosis costs, a target group can be treated all at once with the drug. The drug has little or no side effects, and, therefore, the societal costs associated with side effects can be ignored. The decision to mass treat a target group versus infected individuals one-on-one, depends only upon the cost of diagnosis relative to the cost of treatment and the rate of prevalence of the infection in the target population.

Assuming that the cost of diagnosis per case is CD and the cost of treatment is CT, if there are N individuals in the target group, then the cost of mass treatment will be N*CT. If only the infected persons are treated, it is necessary to test all individuals in the group. The cost of diagnosis is therefore N*CD. Let "a" be the fraction of individuals in the group found to be infected. Treating all the infected individuals will cost a*N*CT. Therefore, the total cost of diagnosis and treatment will be: N(CD+a*CT). If this is less than N*CT, it is more cost effective to diagnose first and treat the infected persons only. In fact, we can find a cut-off value of "a" above which mass treatment should be more cost effective. The cut-off value can be determined by equating the total cost of the two approaches:

$$a = (CT - CD)/CT$$

Given the estimated values of CT and CD, the cut-off value of "a" turns out to be 78.5 percent in a clinic or dispensary setting (using microscope) and 89.6 percent when diagnosis is done with reagent strips only. If variable costs are used for this calculation, however, microscope-based diagnosis actually becomes less expensive than using reagent strips. In other words, if we know that the prevalence of schistosomiasis in a community or target group is more than 79 percent, mass treatment will be more cost effective than trying to identify and treat the infected persons only.

8.1.5 Fee for Treatment versus Separate Charges for Diagnosis and Treatment

Three alternative fee structures can be defined for financing the diagnosis and treatment components of a schistosomiasis control program: user charges for treatment only; user charges for diagnosis and treatment paid during the treatment phase; and user charges for treatment and diagnosis separately. If the primary health care program decides to charge for the treatment only, the cost associated with the diagnosis of the disease must be generated from other sources. The benefit of this type of fee system is that since the diagnosis service is provided free of charge, individuals are encouraged to get tested for the disease. In a community where the prevalence of schistosomiasis is very high, public health authorities would like to test as many individuals as possible, and setting a positive fee for diagnosis will be clearly inconsistent with mass diagnosis strategy. In hyperendemic areas, a simple and low-cost diagnosis can be made with relatively high specificity and reliability.

If the cost of diagnosis is added to the cost of treatment and charged to the patients at the end of treatment, this may discourage some individuals to seek treatment after diagnosis. Since the diagnosis of a disease often creates demand for medical services, however, the price cited earlier may not prevent people from seeking treatment. The third fee structure charges fee for diagnosis and treatment separately. This may discourage some individuals from getting tested for the presence of infection.

Assuming that the fee charged for treatment should not exceed 1,600 FCFA to avoid discouraging individuals from seeking treatment (at about 2,000 FCFA level, most of the infected individuals did not seek treatment), this level of fee will recover the cost of both diagnosis and treatment, if 20 percent of those who were tested for the disease actually will seek treatment. In other words, if the prevalence rate is around 20 percent, it is possible to impose the cost of diagnosis on those who seek treatment for the infection.

In low-prevalence regions, free diagnosis for all is too costly for health centers. In low-prevalence areas, it may be more cost-effective to carry out an effective health education program. If the population is aware of the basic symptoms of the disease and the consequences if it is not treated, most infected individuals may be willing to pay for the diagnosis separately. Even in poor rural communities, people do pay for the diagnosis of many common infectious diseases.

8.2 SNAIL CONTROL

8.2.1 The Feasibility and Desirability of User Charges

Molluscicide provides important benefits to the community by lowering the transmission probability. Due to the public good characteristics of the outcome, all individuals residing within the region of the program are potential beneficiaries. Since the exclusion principle does not apply, user charges, i.e., fees based on benefits received, will not be feasible for a snail control program.

Although user charges are not practical, this does not necessarily imply that community financing of the project will not be feasible at all. Most public-good provisions are financed by general tax revenue, and in this particular case, the community can impose a specific tax to finance the program. A special tax like this will be considered politically feasible, if the community members are willing and able to pay for the program.

Community financing for a health program is obviously highly desirable. The cost of molluscicide is relatively high, and not all regions of the country will show equal interest in such a control program. The benefits of snail control are strictly region-specific, and all benefits accrue to the members of the area where molluscicide has been implemented. Due to the nature of the program, a regional initiative, funded and implemented at the local or regional level, is likely to be more successful than a program initiated at the national-level.

8.2.2 Will the Community be Able to Pay for Molluscicide?

The ability of an individual or household to pay for a specific program depends upon the costs of implementing the program relative to total income. In most developing countries, about 3-5 percent of total income is spent on health care activities. If health care costs in northern Cameroon, including the cost of molluscicide, remain less than 3 percent of regional income, one will assume that the community, on average, will be able to pay for this new project.

In the study area (Kaele subdivision), a health center serves an average of 6,800 individuals. According to World Bank (1989) estimates, the country's gross national product (GNP) per capita in 1988 was US$970.00. The 1983-84 National Budget Survey estimates the mean expenditure per capita in Cameroon at 152,000 FCFA, while the per capita income in rural north was only 98,800 FCFA (Lynch, 1991). Assuming a constant interregional average income ratio for 1990-91, if the mean income in Cameroon is US$970, then the income in northern rural area should be about US$630 per capita, which is equivalent to about 170,100 FCFA per capita per year, expressed in 1991 prices.

A survey carried out in two locations of the Kaele subdivision found that the mean household size is about 5.2 in the area, implying a household income of about 884,500 FCFA per year on the average. The mean household size also suggests that about 1,200 households are served, on average, by one health center in the Kaele subdivision of the extreme north province in Cameroon.

The above mentioned cost estimates for molluscicide do not include the cost of raising funds and managing finances. Assuming that about 200,000 FCFA will be needed (i.e., the equivalent of a mid-level government official's salary for two months) to hire an administrator-cum-manager to collect the money and implement the program, the total cost per health center of molluscicide will approach 575,000 FCFA, which is less than 0.1 percent of the community's income. On average, each household must pay about 480 FCFA for cost recovery. In certain areas, it may be necessary to apply two treatments at transmission points. For two treatments, the total cost will be about 940,000 FCFA per health center, or 785 FCFA per household.

EXHIBIT 8.2
INCOME DISTRIBUTION PATTERNS IN NORTHERN CAMEROON AND
ABILITY OF HOUSEHOLDS TO PAY FOR MOLLUSCICIDING (estimates for 1991)

Quintal Groups	Income/Capita (US$)	Income/Household (FCFA)	Health Care Costs (% of income)
Poorest fifth	152	213,408	6.56
Second fifth	267	374,868	3.73
Third fifth	398	558,792	2.51
Fourth fifth	617	866,268	1.62
Richest fifth	1,765	2,478,060	0.56
TOTAL	630	884,520	1.58

Source: Regional income distribution patterns reported by Lynch, proportionally adjusted for income per capita in 1991. The 1991 income per capita for Cameroon is assumed to be US$970.

The data in *Exhibit 8.2* present estimated income distribution patterns in northern Cameroon in 1991. Note that the cost per household of molluscicide (480 FCFA), even for the poorest quintile in the rural north, was only 0.2 percent of total income, an amount equivalent to the wage or salary of an average worker for half a day. The ability to pay for a new intervention program must be evaluated by considering high priority medical cost components first. It is estimated that about 4,000 FCFA will be required to buy a desirable level of health care services in Cameroon (based on USAID data), about 4,500 FCFA for treatment of diseases, and an additional 5,000 FCFA are assumed to be spent by a typical middle-income household on other health care and sanitation-related activities. Add the cost of molluscicide per household to these costs, and the total cost of medical care is likely to be around 14,000 FCFA per household. Given income levels in this region, this estimate of medical and health sector costs implies an expenditure of about 1.6 percent of the mean household income, which is well below the 3 percent cut-off point assumed for the whole country.

The National Budget Survey provides some information about income distribution in the rural north (Baer and Ngoumou, 1993). The income distributions reported by the survey were employed to construct *Exhibit 8.2*. In the extreme north province, an average household in the poorest quintal earns an average annual income of US$152 per capita. Thus, for the poorest quintile, an expenditure of 14,000 FCFA requires an allocation of more than 6.5 percent of total income on health care, which would exclude the possibility of paying for all the health care services included in the estimate. It is unlikely, however, that the poorest quintile will spend additional 5,000 FCFA on indirect health services. In any case, if expenditures on health are assumed at 14,000 FCFA, and if 3 percent of income defines a household's ability to pay, then approximately 60 percent of households should be able to pay for the project.

To summarize, the data in *Exhibit 8.2* indicates that the poorest 40 percent of the population will not be able to pay for the snail control program if the 3 percent cut-off point is used to determine community contributions. Therefore, unless a sliding-fee scale is introduced, a tax of 500 FCFA per household per year on non-poor households will not generate enough money to carry out the snail control program. If, however, the richer households are willing to pay more than 500 FCFA, on the average, the communities in this region should be able to finance the program.

8.2.3 Willingness to Pay for Molluscicide

The argument has been made that most households in northern Cameroon should be able to pay for a snail control program. An analysis of the ability to pay, while an important step towards better understanding of the feasibility of community financing, ultimately depends upon the willingness of household members to pay. The willingness to pay for this type of intervention should be a function of the private benefit of schistosomiasis treatment and the costs associated with diagnosis and treatment. The cost of treatment of schistosomiasis in the extreme north province of Cameroon (outside the project facilities) is quite high, approximately 4,300 FCFA per household per year. The symptoms of the infection, especially of the urinary type, are also clear to individuals with infections of moderate or severe intensity. Therefore, the demand for its treatment and control should be high among the individuals with moderate- to high-intensity infections.

The infected individuals should be willing to pay for an effective snail control program, if the cost of control does not exceed the expected benefits obtained. Given that the cost per household for molluscicide will be less than 500 FCFA per year, the households with at least one moderate or severe case of infection should be willing to participate in the program.

For the Kaele subdivision as a whole, only about 28 percent of those diagnosed with urinary or intestinal schistosomiasis actually sought treatment. This does not necessarily imply that the symptoms are not clear enough to generate community interests in the program. The cost of treatment is an important determinant cited for this health-care-seeking behavior (Government of Cameroon, 1991). In the absence of snail control or other control programs to reduce transmission probability, the risk of reinfection is so high that, unless the symptoms are sufficiently severe, households may decide not to treat the infection in the short run.

Clearly, community participation in molluscicide will depend upon the prevalence and severity of infection. If the prevalence of schistosomiasis is low, many households may not be interested in taking part in the program. It is reasonable to start with the assertion that community financing will be politically feasible, if at least 50 percent of households support the program actively. Obviously, active support can be expected, if interventions directly benefit the households. In the pilot project area, as mentioned, households with at least one infected person were about 48 percent of the total surveyed. Excluding the cases of low-intensity infection, only about one-third of all households had at least one case of moderate- to severe-intensity infections. Therefore, a prevalence rate of 10 percent appears not high enough to generate community interest in a snail control program. If the relationship between prevalence rates and the numbers of households affected by moderate to severe infection is similar to what we have observed in the surveyed villages, a prevalence rate of about 17 to 18 percent should generate enough political support for the program.

The survey in Kaele found that the mean prevalence of schistosomiasis is about 23 percent in the region (Hewlett, 1992). Ratard (1990) also found a high rate of schistosomiasis prevalence among schoolchildren in northern Cameroon. In the extreme north province, the prevalence rate of urinary type was found to be 35 percent among schoolchildren, which translates to a prevalence rate of roughly 13 percent for the entire community, if all other age groups are completely immune to the infection. It should be emphasized that the school participation rate in this province is relatively low, about 33 percent, but if children who do not attend school are included, the prevalence rate is likely to increase. Clearly, for the extreme north, if the prevalence rate of schistosomiasis is similar to the prevalence observed in 1990-91, political support for the control program should be high.

The survey also asked the households directly about their willingness to participate in a snail control program. In the villages Guereme and Mindjil, where the molluscicide were carried out, about 75 percent

thought that the snail control should be continued in the villages. They reported that the use of chemicals to kill the snails does not have any significant impact on their water contact behavior. More than half of all households in these two villages mentioned that they did not see any dead fish in the water bodies treated by the chemical.

In these two villages, about 70 percent of households reported that they would pay to enable the continuation of the snail control program, even though it was treated free of charge in 1991. Among those who mentioned their willingness to pay for snail control, about 40 percent were ready to pay FCFA 400 or more. Another 52 percent mentioned that they would pay FCFA 200 per household. More than 70 percent of the households reported that even the poor households should be able to pay FCFA 200 or more for the program. Significant differences were noted among the villages in terms of their willingness to pay for the program. For example, households in Guereme reported their willingness to pay FCFA 200 per year on the average, while residents of Mindji indicated an willingness to pay, on average, FCFA 350.

It is well known that individuals often understate their willingness to pay when directly asked about financing a program. In this survey, diagnosis and treatment provide some idea of the extent of this strategic response. The households who have not spent any money on modern treatment for schistosomiasis reported their willingness to pay only about 300 FCFA per treatment. On the other hand, of those who have already paid more than 1,600 FCFA per treatment, almost all reported their willingness to pay a minimum of 1,600 FCFA. Clearly, knowledge and prior use of the intervention significantly affect the willingness to pay. In the case of snail control, the project paid for all the costs associated with the program and the households did not participate in financing at all. Therefore, their reported willingness to pay is expected to be very low.

It is interesting to note that more than two-thirds of the households who have actually paid for diagnosis and treatment of the disease in the past reported willingness to pay less than what they have already paid. If the cost per treatment in the recent past was less than 1,400 FCFA, there was a reported willingness to pay an average of 65 percent of actual costs of treatment. Including the households who paid more than 1,400 FCFA per case treated, the reported willingness was about 78 percent of total actual expenditure. Therefore, households appear to under report their willingness to pay by about 65-78 percent, if they have paid a part of the cost of the intervention before. On the average, those who actually incurred some costs for treatment in the past reported that they are willing to pay 1,000 FCFA per treatment. This exceeds by more than three times the amount that nonparticipants reported they would be willing to pay for treatment.

Assuming that the degree of underreporting is similar to what was observed for treatment of the disease, the willingness to pay for molluscicide should be around 385 FCFA, assuming that the households understand the costs and benefits associated with the intervention. If the households are not aware of the costs of the intervention, as mentioned earlier, their reported willingness to pay may remain less than one third of the amount a well-informed household will be ready to pay. In this case, a reported willingness to pay 250 FCFA per household will be equivalent to about 750 FCFA, when the individuals become aware of the real costs associated with molluscicide. If one assumes 385 FCFA as the average willingness to pay, the implementation of the program will require a subsidy of 25 percent of the total budget.

8.3 COST EFFECTIVENESS ANALYSIS

To compare the cost effectiveness of the different interventions, one shall concentrate on molluscicide and diagnosis-treatment options. Health education should improve the effectiveness of both interventions in terms of reducing the prevalence rate. To simplify the problem, a certain initial level of prevalence is assumed. In this region, each health center consists of about 1,200 households (about 6,800 individuals) on the average. If the prevalence rate of schistosomiasis is about 25 percent for a health center, the budget required to treat and diagnose all patients should be approximately 1.8 million FCFA, based on cost per treatment estimates. The experience of the villages of Mindjivin and Moutourwa, however, indicates that the treatment of cases actually reduces the prevalence rate by about 30 percent over a two-year period. This is because, in the absence of molluscicide or health education, reinfection rates remain relatively high. In other words, for an average health center in the region, cost of reducing one infection over a two-year period through treatment alone will be about 3,530 FCFA. If snail control is carried out in two consecutive years using the 1.8 million FCFA budget, about 10 ponds or water bodies can be treated, which should be able to reduce the prevalence rate by about 60 percent, implying a cost of about 1,765 FCFA per individual cured over the two years. Therefore, at a relatively high level of prevalence, snail control appears a more cost-effective approach of controlling schistosomiasis in northern Cameroon.

If the current prevalence rate is low, say 10 percent in a community, the effect of snail control should be much smaller. Lower prevalence implies lower transmission probability and molluscicide the water bodies will have lower impact on prevalence. At 10 percent prevalence rate, diagnosis and treatment cost per average health center should be about 700,000 FCFA. The treatment of all infected individuals should be able to reduce the infection rate by about 50 percent, as the reinfection probability is much lower to start with and as more individuals are treated, the probability of contracting the disease declines further. Since the initial prevalence rate is now only 10 percent (rather than 25 percent assumed for the earlier case), the impact of molluscicide a pond should be about 40 percent of the earlier rate of decline of prevalence. Further, 700,000 FCFA can be used to treat only 4.7 water bodies, and if all funds are used for snail control, the cost per case cured will be about 5,500 FCFA, compared to about 2,100 FCFA for diagnosis and treatment.

9.0 CONCLUDING OBSERVATIONS

Schistosomiasis has been found to be a highly prevalent disease, and an important public health problem in northern Cameroon. The rapid spread of the disease, along with agricultural development activities and mobility of population groups, is of great concern. Thus, it has become important to closely examine the possible methods of controlling the infection or limiting its geographic spread.

To this effect, schistosomiasis control programs based on combinations of chemotherapy, changing the water contact behavior of the population, improvement of water supply, environmental sanitation, snail control, and environmental modification of snail habitats have been recommended as the most effective general approaches. A schistosomiasis control program is likely to be more successful when it can be implemented in the affected areas of the country using local resources, manpower, and management capabilities.

This report examined the cost of three different possible strategies (diagnosis and treatment, molluscicide, and health education) in the control of schistosomiasis in northern Cameroon, as well as the willingness of households to pay for diagnosis and treatment. The following observations can be made.

- The cost of interventions estimated and reported are based on input coefficients obtained through interviewing TU's research team in Cameroon. The training session costs are based on actual expenditures incurred. The time-input used by the TU project for diagnosis and treatment appears to be too low. In a field setting, without the presence of the research team, it is unlikely that the tasks can be carried out within such a short period of time. Therefore, the time-input coefficient may have been underestimated. The cost share of time inputs was not very high, however, and this should not significantly affect the relative cost of the interventions.
- The approach of diagnosis and treatment is likely to be more successful in a low-prevalence region. If the transmission probability is high, most vulnerable groups may decide not to seek treatment, owing to the relatively high cost of treating schistosomiasis. Diagnosis of a case costs about 290 FCFA in the clinic setting, assuming that all cost components are taken into account. Considering only the variable component, diagnosis of a case costs less than 90 FCFA. The salary of clinic or health center personnel is considered a variable cost for costing purposes. This is consistent with the cost-recovery policies of the Government of Cameroon, which attempt to recover a high proportion of expenditures incurred on salaries and other materials supplied.
- The cost of diagnosing a case outside the clinic is estimated at 105 FCFA, if the village meeting approach is used with a minimum participation rate of 60 percent. House visits to identify infected cases can cost as much as 300 FCFA per diagnosis. However, if the participation rate in the village meeting is low, however, the cost of diagnosis in this setting will be higher. In fact, house calls will become more cost effective for diagnosis if less than 35 percent of target groups show up in the village meetings.
- Cost of treating a case of schistosomiasis should range within 1,100 FCFA to 1,300 FCFA, irrespective of the method of delivery. This is less than half the amount some private practitioners charge in the locality. The high cost of treatment probably discourages many infected individuals from seeking treatment. If the supply of drugs expands rapidly through the cost-recovery program, the market price of treatment should fall to about 1,300 FCFA.

- The snail control program is a preventive intervention, and willingness to pay for the program in general is likely to deviate significantly from its real benefits. The cost of snail control is estimated at about 500 FCFA per household per year. Given the pattern of income distribution in the survey area, the poorest 40 percent of all households will find the program to expensive to support.
- If willingness-to-pay information is used, the households who never used modern treatment before reported only 300 FCFA as their willingness. Clearly, this is too low to make the diagnosis and treatment program sustainable through community financing. An indirect method has been used to estimate the degree of underreporting of answers to questions on willingness to pay. Using the average underreporting rate of 30 percent, willingness to pay for diagnosis and treatment should be able to generate about 75 percent of the total cost of providing the services. Therefore, at the initial few years of this intervention, the Government of Cameroon should subsidize the program by about 25 percent. As households become aware of the efficacy of the drug therapy, willingness to pay will also increase, allowing gradual elimination of governmental subsidy.
- The rate of underreporting for willingness to pay to carry out snail control should be at least as high as 30 percent, the rate observed for diagnosis and treatment. If corrected for this rate of underreporting, snail control can be supported by community financing in most cases.
- The costs of carrying out health education sessions or distributing health education materials are quite low cost. In this research, it was not possible to identify the effects of health education on the prevalence of the disease. The control village also saw significant decline in the prevalence rate, probably due to exposure to health education materials. Also, owing to the geographic location of the village, the villagers had access to the clinics where schistosomiasis control drugs were made available by the project. Further research will be needed to isolate the effect of health education on the prevalence rate of the disease.
- In the surveyed villages, the prevalence rate of schistosomiasis was found to be less than 10 percent in mid-1993. At this low rate of prevalence, the effect of snail control will be much more modest. In fact, cost per case cured through snail control should be around 5,500 FCFA, if the prevalence rate is at 10 percent. On the other hand, the diagnosis and treatment method can cure a case by spending only 2,100 FCFA at this low rate of prevalence.

APPENDICES

APPENDIX 1: SUPPLEMENTAL TABLES

EXHIBIT A3.1
AGE AND SEX DISTRIBUTION

AGE (years)	SEX	
	MALE	FEMALE
0-5	121	99
6-10	113	113
11-20	144	138
21-40	101	155
41-60	80	103
61 +	35	27
TOTAL	594	635

EXHIBIT A3.2
NUMBER OF WOMEN AND CHILDREN PER HOUSEHOLD

Number per Household	Members	Children	Women
None	0	40	24
1	34	22	108
2	18	25	44
3	27	21	18
4	15	26	2
5	20	13	4
6	20	16	2
7	14	13	0
8	11	8	1
9	14	6	
10	12	2	
11-20	22	1	
>20	4	1	

EXHIBIT A3.3
POPULATION DISTRIBUTION BY VILLAGE

VILLAGE	NUMBER OF PERSONS
Guereme	221
Mindjil	387
Moutourwa	229
Mindjivin	182
Touloum	217
TOTAL	1,236

EXHIBIT A3.4
ETHNIC DISTRIBUTION

ETHNICITY	NUMBER OF HOUSEHOLDS
Moudang	58
Guissiga	84
Guidar	1
Toupouri	40
Foulbe	29
Dourou	1
Bulu	2

EXHIBIT A3.5
RELIGIONS OBSERVED IN THE REGION

RELIGION	NUMBER OF HOUSEHOLDS
Protestant	9
Catholic	42
Muslim	38
Pagan	55
Christian	31
Don't know	1
Other	2

EXHIBIT A3.6 LITERACY OF HEADS OF HOUSEHOLD	
Read French	
Yes	58
No	155
Write French	
Yes	56
No	156
Read Fulbe	
Yes	32
No	181
Write Fulbe	
Yes	26
No	185

EXHIBIT A3.7 LEVELS OF INFECTION		
	1st Urine Test (1991)	2nd Urine Test (1993
Not infected	993	856
Low	111	53
Moderate	54	29
Severe	29	9
TOTAL	1,187	947

EXHIBIT A3.8 DEGREE OF INFECTION IN 1991 BY VILLAGE				
Village	1st Urine Test (1991)			
	Not infected	Low	Moderate	Severe
Guereme	126	27	14	5
Mindjil	343	34	10	0
Moutourwa	177	20	16	16
Mindjivin	163	8	9	2
Touloum	184	22	5	6
TOTAL	993	111	54	29

EXHIBIT A3.9 DEGREE OF INFECTION IN 1933 BY VILLAGE				
Village	2nd Urine Test (1993)			
	Not infected	Low	Moderate	Severe
Guereme	144	12	5	2
Mindjil	282	8	4	2
Moutourwa	154	21	9	4
Mindjivin	118	3	5	1
Touloum	158	9	6	0
TOTAL	856	53	29	9

EXHIBIT A3.10 DEGREE OF INFECTION IN 1991 BY AGE				
Age in years	Ist Urine Test (1991)			
	Not infected	Low	Moderate	Severe
0-5	195	8	3	2
6-10	160	34	18	10
11-20	194	47	21	8
21-40	221	13	9	4
41-60	168	6	3	4
61 +	55	3	0	1
TOTAL	993	111	54	29

EXHIBIT A3.11 DEGREE OF INFECTION IN 1933 BY AGE				
Age in years	2nd Urine Test (1993)			
	Not infected	Low	Moderate	Severe
0-5	164	4	0	2
6-10	157	16	14	2
11-20	163	18	12	4
21-40	183	10	3	0
41-60	148	4	0	0
61 +	41	1	0	0
Total	856	53	29	9

EXHIBIT A3.12
REPORTED SYSTEMS AND TREATMENT BY VILLAGE

	Guereme	Mindjil	Moutourwa	Mindjivin	Touloum
Have symptoms now?					
Yes	22	24	44	14	7
No	247	294	162	161	213
Total	369	318	206	175	12
Schisto Rx in last 12 months?					
Yes	20	30	41	13	6
No	250	296	166	162	214
Total	270	326	207	175	220

EXHIBIT A3.13
HEAD OF HOUSEHOLD KNOWLEDGE OF SCHISTOSOMIASIS

	YES	NO	Don't know
Do you know about schistosomiasis?	179	32	
Do you know the symptoms of schistosomiasis?	172	33	
Is schistosomiasis serious enough to need treatment?	192	12	1
Can you get schistosomiasis from walking in the sun?	96	89	15
Can you get schistosomiasis from drinking dirty water?	121	65	18
Can you get schistosomiasis from swimming in the mayo?	159	23	25
Can you get schistosomiasis from witchcraft?	8	152	36

EXHIBIT A3.14
SICK MEMBERS OF THE HOUSEHOLD

Number of sick members per household	Number of households
None	16
1	67
2	21
3	9
4	2
5	1
7	1
8	1

EXHIBIT A3.15
SICK MEMBERS PER HOUSEHOLD BY VILLAGE

No. of sick members	Guereme	Mindjil	Moutourwa	Mindjivin	Touloum
None	0	7	9	0	0
1	12	18	22	6	9
2	7	8	3	1	2
3	1	2	5	0	1
4	1	0	0	1	0
5	0	1	0	0	0
7	0	1	0	0	0
8	0	1	0	0	0
Total # of sick	21	60	43	12	16

EXHIBIT A3.16
REPORTED SYMPTOMS OF SCHISTOSOMIASIS BY AGE

Symptoms of schistosomiasis	Age in Years						
	0-5	6-10	11-20	21-40	41-60	61 +	Total
Yes	5	17	57	23	7	4	113
No	176	188	256	227	168	61	1,076

EXHIBIT A3.17
REPORTED SYMPTOMS OF SCHISTOSOMIASIS BY SEX

Symptoms of schistosomiasis	Male	Female	Total
Yes	70	37	107
No	499	578	1,078

EXHIBIT A3.18
RELATIONSHIP OF INDIVIDUAL TO HEAD REPORTING SYMPTOMS

	Reported symptoms of schistosomiasis now	
Relation to Head of Household	Yes	No
Head of Household	17	188
Spouse	15	170
Son or Daughter	44	511
Father or Mother	0	7
Son or Daughter-in-law	0	8
Grandchild	1	12
Other Related	9	69
Other Members of Household	1	7
Don't know	2	5
Total	89	177

EXHIBIT A3.19
TREATMENT FOR SCHISTOSOMIASIS BY AGE

Schisto Rx in the last 12 months	Age in years						
	0-5	6-10	11-20	21-40	41-60	61 +	Total
Yes	3	19	51	24	10	5	112
No	179	189	265	228	166	60	1,087

EXHIBIT A3.20
BUILDINGS PER HOUSEHOLD

Number of buildings per household	Number of households
1.0	37
2.0	31
3.0	46
4.0	26
5.0	23
6.0	17
7.0	16
8.0	6
9.0	3
10.0	6
11.0	1

EXHIBIT A3.21
NUMBER OF RESIDENTIAL BUILDINGS PER HOUSEHOLD

Number of residential buildings per household	Number of households
1.0	58
2.0	52
3.0	49
4.0	30
5.0	11
6.0	9
7.0	1
8.0	2

EXHIBIT A3.22
HOUSEHOLDS WITH ANY TYPE OF ELECTRICITY

	Generator in all buildings	Generator in one building	Connection to Electricity
Yes	7	7	3
No	191	193	209

EXHIBIT A3.23
HOUSEHOLDS WITH RADIOS

None	1 radio	2 radios	3 radios	4 radios	9 radios
150	45	11	3	2	1

EXHIBIT A3.24
MAJOR CROP GROWN BY VILLAGE

Crop largest area cultivated	Guereme	Mindjil	Moutourwa	Mindjivin	Touloum
Millet	24	40	16	24	26
Cotton	0	9	2	2	0
Onion	4	0	0	0	0
Sorghum	0	0	25	8	11
Beans	0	1	0	0	0
Other	0	1	0	0	0

EXHIBIT A3.25
LIVESTOCK PER HOUSEHOLD

Number of households	Livestock per household							
	None	1	2	3	4	5-10	11-20	20 +
With cows	169	8	9	7	3	10	3	2
With sheep	147	10	11	13	9	20	1	0
With goats	94	22	19	15	14	39	8	1
With donkeys	204	5	2					
With horses	206	5	2					
With oxen	176	10	10	2	7	5		

APPENDIX 2: QUESTIONNAIRES

QUESTIONNAIRE DOMESTIQUE DU CAMEROUN
(pour les chefs ou un adulte membre de la concession)

NOM DE L'ENQUETEUR _____

Date de l'Interview _____
Heure de l'Interview _____

Nom du village _____
Numero de la concession _____
Localisation de la concession _____
Nom du chef de la concession _____

(INTERROGER LE CHEF OU UN ADULTE MEMBRE DE LA CONCESSION)

V001. Quel est votre nom de famille _____
et votre prénom? _____
V002. Quelle est votre ethnie? _____
V003. Quelle est votre religion? _____
V004. Combien d'enfants habitent dans la concession? _____
V005. Combien de femmes habitent dans la concession? _____
V006. Combien de personnes (comprenant vous-même) habitent dans votre concession? _____

V007. Est-ce que votre famille a participé à la cotisation des fonds dans le passé pour des activités communautaires?
Oui _____ Non _____ Ne sait pas _____

V008. Quand est-ce que votre famille a contribué pour la dernière fois? _____

V009. Combien est-ce que votre famille a contribué la dernière fois? _____ CFA

V010. Savez-vous comment cet argent a été depensé? _____
_____
_____

V011. S'il vous plait, dites-moi le nom, l'âge, l'occupation, et la relation qui existe entre le chef de concession et toutes les personnes qui y habitent, y compris vous-même. (SI CE SONT DES ENFANTS, DEMANDEZ S'ILS VONT A L'ECOLE; S'ILS ONT MOINS DE DEUX ANS, DEMANDEZ L'AGE EN MOIS ET EN JOURS, DONNEZ L'UNITE)

CODES POUR LA QUESTION #11: LES MEMBRES DE LA CONCESSION
LE SEXE: 1. masculin 2. feminin

L'OCCUPATION:

1. agriculteur
2. eleveur
3. commercan
4. artisan
5. manoeuvre
6. religieux
7. fonctionnaire
8. élève (étudiant)
9. autre _____
10. professeur
98. ne sait pas

LA RELATION AVEC LE CHEF DE LA CONCESSION:

1. Le chef de la concession
2. L'épouse du chef
3. la fille ou le fils du chef
4. la mère ou le père du chef
5. Beau-parent du chef
6. Beau fils ou belle fille
7. Petits-fils du chef
8. D'autre relations
9. Domestiques
10. D'autres membres de la concession
98. Ne sait pas

Membres de la concession

# ID	Nom des Membres de la concession	Age	Sexe	Occupation 1ere	Occupation 2eme	Relation au chef

I. L'INFORMATION SOCIODEMOGRAPHIQUE

V101. Combien de bâtiments avez-vous dans votre shoé? _____

V102. Lesquels d'entre eux sont habités? _____

Ces bâtiments ont-ils:

V103. Electricité Oui ___ Non ___ NSP___

Une Génératrice

V104. .....Personnelle Oui ___ Non ___ NSP___

V105. .....Pour toute la shoé Oui ___ Non ___ NSP___

(DEMANDEZ OU PAR L'OBSERVATION, SI C'EST AUTRE, SPECIFIEZ)

V110 BATIMENT 1:	PLANCHER _____	TOIT _____
V112 BATIMENT 2:	PLANCHER _____	TOIT _____
V114 BATIMENT 3:	PLANCHER _____	TOIT _____
V116 BATIMENT 4:	PLANCHER _____	TOIT _____
V118 BATIMENT 5:	PLANCHER _____	TOIT _____
V120 BATIMENT 6:	PLANCHER _____	TOIT _____

Materiel du plancher:
terre . . 1
ciment . 2
autre . . 3

Materiel de la toîture:
la paille . . 1
l'étain . . . 2
la boue . . . 3
autre 4

Est-ce que votre concession posséde:

				Quantité possédée
V130.	Pousse	oui ___	non ___	_____
V131.	Vélo	oui ___	non ___	_____
V132.	Moto	oui ___	non ___	_____
V133.	Voiture (camion) . .	oui ___	non ___	_____
V134.	Radio	oui ___	non ___	_____
V135.	TV	oui ___	non ___	_____
V140.	Vaches	oui ___	non ___	_____
V141.	Moutons	oui ___	non ___	_____
V142.	Chèvres	oui ___	non ___	_____
V143.	Anes	oui ___	non ___	_____
V144.	Chevaux	oui ___	non ___	_____
V145.	Boeufs	oui ___	non ___	_____

V150. Pendant les derniers 7 jours, combien de fois avez-vous consommé de la viande, du poisson, ou de la volaille?
1. aucune fois
2. une ou deux fois
3. trois ou quatre fois
4. plus que quatre fois
8. ne sait pas

V151. Etes-vous allé à l'école?
Oui ____ Non ____

V152. Si oui, quelle classe avez vous atteint?_____

V153. Pouvez-vous lire le français? Oui ____ Non____
V154. Pouvez-vous écrire le français? Oui ____ Non____
V155. Pouvez-vous lire le Foulbé? Oui ____ Non____
V156. Pouvez-vous écrire le Foulbé? Oui ____ Non____

V160. Combien de fois écoutez-vous la radio?
a. chaque jour
b. une fois par semaine
c. une fois par mois
d. jamais

V161. Combien de fois regardez-vous la Télé?
a. chaque jour
b. une fois par semaine
c. une fois par mois
d. jamais

ACTIVITE D'AGRICOLE

V165. Pour les récoltes suivantes, quelle est la superficie cultivée maintenant par la concession? **(SPECIFIER UNITE: HECTARE, PIQUET, ETC.)**
a. le mil ..... unité de mesure .....
b. le coton ..... unité de mesure .....
c. l'oignon ..... unité de mesure .....
d. autres (spécifier l'élément et l'unité de mesure)

_____
_____

DONNEZ LES INFORMATIONS SUIVANTES POUR CHAQUE PRODUIT DE RECOLTE CULTIVE PAR VOTRE CONCESSION

Récolte	date de la dernière moisson (mois, an)	superficie cultivée (unité)	superficie irriguée (unité)	nombre de terrains cultivés	travailleurs embauchés (oui/non)	quantité totale du produit	quantité de produit vendu

V180. Vous avez mentionné que la récolte de _____ avait la plus grande superficie cultivée l'année derniére. Pour quelle raison avez-vous utilisé la plus grande partie de votre terre pour cette récolte? _____

_____

V181. Si la saison de pluies vient en retard, quelle récolte est la plus affectée? _____

V182. Si la saison de pluies commence comme d'habitude, mais avec peu de pluies, quelle récolte est la plus affectée? _____

II. LES MALADIES DANS LA CONCESSION

V201. Y a t'il quelqu'un dans votre concession qui a été malade durant le derniers 15 jours? Oui____ Non____

V202. Combien de personnes ont été malades?_____

V203. Combien avez-vous dépensé pour le médicament indigène ou moderne pendant les derniers 15 jours? _____ CFA

V204. Combien avez-vous dépensé pour la consultation? _____

V205. Est-ce que votre concession avaient d'autres frais medicaux pendant les derniers 15 jours? Oui____ Non____ NSP____

V206. D'habitude, combien payez-vous pour une visite générale chez le guérisseur? _____ CFA

V207. Quel est le mode de transport qu'on utilise d'habitude pour aller chez le guérisseur?
1. marche (à pied)
2. vélo
3. autre
8. ne sait pas

POUR LA MALADIE LA PLUS RECENTE

V210. Quelle a été la maladie la plus récente dans votre concession?
Maladie _____ Quand _____

V211. Quel est le nom et l'âge de la personne qui était malade?
Nom et prénom_____ Age____

V213. Pour cet épisode de maladie, qu'est-ce que vous avez fait:	CODE
le premier jour?	....
le deuxième jour?	....
le troisième jour?	....
le quatrième jour?	....
le cinquième jour?	....

CODES POUR LA QUESTION #V212:
1. rien fait, seulement observé
2. traité à la maison avec les médicaments indigènes
3. traité à la maison avec les médicaments modernes
4. consulté un guérisseur indigène
5. consulté un médecin moderne
6. traité selon la prescription du guérisseur
7. traité selon la prescription du médecin moderne
8. ne sait pas
9. autre (spécifiez)
10. suivi un traitement prescrit par les deux (le guérisseur et le médecin)

V214. Si vous avez suivi un traitement, préciser chez qui êtes-vous allé?
(ENCERCLEZ LE CHIFFRE QUI CORRESPOND A LA REPONSE DONNEE)
1. chez le guérisseur
2. chez le médècin moderne
3. à l'hôpital/à la clinique
4. à l'infirmière/au agent sanitaire
5. autre (spécifiez) _____
8. ne sait pas

V220. Combien de spirales contre les moustiques ont été utilisés pendant les derniers 15 jours? _____

III. LA BILHARZIOSE

V301. Connaissez-vous la maladie appelée bilharziose? Oui ____ Non ____

V302. Comment attrape-t-on cette maladie?
(POSEZ CHAQUE QUESTION SEPAREMENT)
a. en marchant dans le soleil Oui ___ Non ___ NSP ___
b. en buvant de l'eau sale Oui ___ Non ___ NSP ___
c. en nageant ou en se lavant dans les mayos ou mares Oui ___ Non ___ NSP ___
d. par la sorcellerie Oui ___ Non ___ NSP ___

V303. Connaissez-vous les symptômes qui charactérisent la bilharziose? Oui ____ Non ____

V304. Quels sont les symptômes?
(ENCERCLEZ TOUTES LES REPONSES DONNEES)
1. maux de tête
2. fiévre élevée
3. sang dans l'urine
4. difficulté à uriner
5. enflement généralisé
6. autre _____
7. autre _____
8. ne sait pas

V310. Pensez-vous que la bilharziose est une maladie serieuse qui necessite un traitement? Oui ____ Non ____

V311. Quelqu'un de votre famille a-t-il souffert de la bilharziose durant les 12 derniers mois? Oui ____ Non ____ NSP ____

V312. Si quelqu'un a souffert des symptômes de la bilharziose, cela l'a-t-il empêché de travailler autant que d'habitude? Oui ____ Non ____ NSP ____

V313. Les effets de la bilharziose, sont-ils plus sévères pour les hommes que pour les femmes?
Plus sévères pour les hommes ____
Plus sévères pour les femmes ____
Même pour les deux ____ Ne sait pas ____

V315. Les effects de la bilharziose, sont-ils plus sévères pour les enfants que pour les adultes?
Plus sévères pour les enfants ____
Plus sévères pour les adultes ____
Même pour les deux ____ Ne sait pas ____

V317. Pendant l'année, y a t'il une saison pendant laquelle les gens souffrent plus des symptômes de la bilharziose? Oui ____ Non ____ NSP ____

V318. Si oui, quelle est la saison? _____

IV. LA SOURCE D'EAU

V401. Quelle est la source de l'eau potable pour la concession en fin de saison des pluies?
Mayo ____ Puit ____ Forage ____ Marres ____

V402. Quelle est la distance de cette source de chez vous?_____

V403. Quelle est la source de l'eau de cuisson pour la concession en fin de saison des pluies?
Mayo ____ Puit ____ Forage ____ Marres ____

V404. Quelle est la distance de cette source de chez vous?_____

V405. Quelle est la source de l'eau de nettoyage et des autres usages en fin de saison des pluies? _____

V406. Quelle est la distance de cette source de chez vous?_____

V407. Est-ce que quelqu'un de votre concession nage dans des mayos/mares dans cette région? Oui ____ Non ____ NSP ____

V408. Y a t'il des poissons dans les mayos/mares proches de votre concession?
Oui ____ Non ____ NSP ____

V409. Si votre famille pèche dans les mayos/mares, à quel(s) mois attrapez-vous le plus grand nombre de poissons de ces mayos/mares? _____

V410. Est-ce que quelqu'un de votre concession utilise les mayos/mares pour les raisons suivantes:
(ENCERCLEZ TOUTES LES REPONSES DONNEES)
1. Pour nager
2. Pour laver les vêtements/utensils
3. Pour laver les animaux
4. Pour se laver
5. autre (spécifiez) _____
8. ne sait pas

INTERVENTIONS

V. LE TRAITEMENT AVEC LE MEDICAMENT

V501. Est-ce que vous, ou quelqu'un de votre concession a les symptômes de la bilharziose maintenant?
Oui ____ Non ____ Ne sait pas ____

V502. Combien de personnes ont les symptômes? _____

V503. Quel sont leur(s) nom(s) et leur(s) âge(s)?
(S'IL Y A PLUS QUE QUATRE, AJUSTEZ LES LIGNES)

Nom Age

a. _____
b. _____
c. _____
d. _____

V504. Est ce que quelqu'un de votre concession, y compris vous-même, a utilisé le médicament indigène, moderne, ou les deux pour traiter la bilharziose pendant les 12 derniers mois?
Oui ____ Non ____ Ne sait pas ____

V505. Si non, pourquoi est-ce que personne n'a reçu le traitement?
(ENCERCLEZ TOUTES LES REPONSES DONNEES)

1. personne n'était malade dans la famille
2. ne savait pas qu'elle pouvait être traitée
3. le traitement coûte cher
4. la bilharziose n'est pas serieuse et elle disparait sans le médicament
5. le traitement n'est pas efficace
6. même si on la traite, elle revient encore
7. autre _____
8. ne sait pas

V510. Si oui, combien de membres ont été traités dans les 12 derniers mois? _____

V511. Qui a reçu le traitement? **(SI QUELQU'UN A RECU LE TRAITEMENT DEUX FOIS, MENTIONNEZ LE NOM DEUX FOIS)**

	NOM	Age	Sexe	Type de Médication	# Mois passés	Résultat du traitement
a.						
b.						
c.						
d.						

SEXE: 1 MASCULIN
2 FEMININ
8 NE SAIT PAS

TYPE DE MEDICATION: 1 INDIGENE
2 MODERNE
3 LES DEUX
8 NE SAIT PAS

MOIS PASSES: PRECISEZ NOMBRE DE MOIS DEPUIS LA PRISE DU TRAITEMENT

RESULTAT: 1 GUERI
2 SANS CHANGEMENT

V515. A propos du traitement le plus récent, pourquoi le traitement par médicament a-t-il été utilisé?
(CHOISISSEZ LES DEUX MEILLEURES REPONSES)

1. c'est moins cher que les autres types de traitement
2. le centre de santé est plus proche de la concession
3. les heures de soins étaient plus convenables
4. le traitement est plus efficace
5. autre _____
8. ne sait pas

V520. Etes-vous satisfait avec le médicament que vous, ou le membre de votre concession, avez pris pour traiter la bilharziose?
Oui ____ Non ____ Ne sait pas ____

V521. Si le médicament moderne n'a pas été utilisé, pourquoi? **(CHOISISSEZ DEUX OU PLUSIEURS REPONSES)**
1. la personne ne savait pas qu'elle pouvait être traitée avec le médicament moderne
2. trop cher
3. pas efficace
4. même si on la traite, elle revient encore
5. la clinique/l'hôpital est loin
6. les heures de la clinique/d'hôpital ne sont pas convenables
7. le docteur/ l'infirmière n'est pas disponible la plupart du temps
8. autre (spécifiez) _____

V525. Connaissez-vous des effets secondaires, des réactions, ou d'autres problèmes causés par l'utilisation du médicament indigène contre la bilharzoise?
Oui ____ Non ____ Ne sait pas ____

V526. Quels sont-ils?
_____ _____
_____ _____

V530. Connaissez-vous des effets secondaires, des réactions, ou d'autres problèmes causés par l'utilisation du médicament moderne contre la bilharzoise?
Oui ____ Non ____ Ne sait pas____

V531. Quels sont-ils?
_____ _____
_____ _____

Si le traitement moderne était utilisé, à propos du traitement moderne le plus récent:

V540. Quel est le prix de la visite? _____ CFA
V541. Quel est le prix du médicament? _____ CFA

V542. Acheteriez-vous le médicament si le prix est: **(LISEZ LA LIGNE PROCHAINE SEULEMENT SI LA REPONSE EST NON; ARRETEZ CETTE PARTIE SI LA REPONSE EST OUI)**

1. CFA 1600	Oui ____	Non ____	NSP ____
2. CFA 1400	Oui ____	Non ____	NSP ____
3. CFA 1200	Oui ____	Non ____	NSP ____
4. CFA 1000	Oui ____	Non ____	NSP ____
5. CFA 800	Oui ____	Non ____	NSP ____
6. CFA 600	Oui ____	Non ____	NSP ____
7. CFA 400	Oui ____	Non ____	NSP____
8. CFA 200	Oui ____	Non ____	NSP____

V550. D'habitude, à quelle heure du jour allez-vous, (vous ou les membres de votre concession), au centre de santé local pour des raisons quelconques?
1. tôt le matin
2. au milieu de la matinée (avant midi)
3. l'après-midi
4. autre _____
8. ne sait pas

V551. D'habitude, quel est le maximum de temps que vous passez au centre ou au centre mobile? _____
(de l'heure d'arrivée jusqu'à l'heure du départ)

VI. EDUCATION A LA SANTE

V601. Est-ce que quelqu'un dans votre concession a assisté à la séance d'éducation de santé dans cette région? Oui ____ Non ____ NSP ____

V602. Avez-vous, ou votre concession, a-t-elle profité des séances d'éducation de santé? Oui ____ Non ____

V603. Si oui, quels bienfaits avez-vous reçus?
_____

V604. Si non, pourquoi n'avez-vous pas bénéficié de cette education? _____
_____

V605. Avez-vous vu les affiches ou les boites d'images sur la lutte contre la bilharziose? Oui ____ Non ____ NSP ____

V606. Si oui, où avez-vous vu ces affiches ou boites d'images?
_____

V608. Seriez-vous réceptif à l'idée de discuter la bilharziose avec les personnels de santé? Oui___ Non____

V609. Seriez-vous réceptif à l'idée que les personnels de santé vous visitent? Oui ____ Non ____

V610. Savez-vous plus de choses au sujet de la bilharzoise maintenant, que l'année passée? Oui ____ Non ____

V611. Qu'avez vous appris sur la bilharziose dans les 12 derniers mois?_____

V612. Comment l'avez-vous appris?
_____
_____

V613. Que pouvez-vous dire aux membres de votre concession pour les aider à éviter la bilharziose? _____
_____

VII. LUTTE CONTRE LES ESCARGOTS

V701. Est-ce que les escargots des mayos/mares sont impliqués dans la transmission de la bilharziose? Oui____ Non____

V702. Pensez-vous que la destruction des escargots des mayos/mares est nécessaire pour contrôler la bilharziose?
Oui _____ Non _____ NSP _____

(SEULEMENT POUR MIDJIL AND GUEREME)

V703. Couramment, le gouvernement a un programme qui tue les escargots avec les produits chimiques, pensez-vous qu'il devrait continuer ce programme?
Oui _____ Non _____ NSP _____

V704. Pensez-vous qu'on peut nager dans les mayos/mares en securité s'ils ont été traités avec les produits chimiques?
Oui _____ Non _____ NSP _____

V705. Pensez-vous qu'on peut boire l'eau des mayos/marres qui a été traitée avec les produits chimiques?
Oui _____ Non ___ NSP _____

V706. Avez-vous vu des poissons morts dans les mayos/marres traités avec des produits chimiques?
Oui _____ Non _____ Jamais vu _____ NSP _____

V707. Y a t'il quelque chose que vous n'aimez pas dans ce programme qui tue les escargots?

_____

_____

V708. Si sans votre aide, le programme qui tue les escargots ne pouvait pas être exécuté, seriez-vous disposé à cotiser une partie du prix chaque année?
Oui _____ Non _____ NSP _____

(PASSEZ D'UNE LIGNE A L'AUTRE SI LA REPONSE EST NON)

V709. Seriez-vous disposé à cotiser CFA 1000? Oui _____ Non _____

V710. Seriez-vous disposé à cotiser CFA 800? Oui _____ Non _____

V711. Seriez-vous disposé à cotiser CFA 600? Oui _____ Non _____

V712. Seriez-vous disposé à cotiser CFA 400? Oui _____ Non _____

V713. Seriez-vous disposé à cotiser CFA 400? Oui _____ Non _____

V714. Quelle somme d'argent pourrait depenser une concession pauvre pour détruire les escargots dans votre région?
_____ CFA

VIII. APPROVISIONEMENT EN EAU POTABLE

V801. Y a t'il un point d'eau protégé ou une pompe à main proche de chez vous?
Oui ____ Non ____ Ne sait pas ____

V802. Si oui, lequel est:
Puits ____ Forage ____ Autre _____

V803. L'utilisez-vous? Oui ____ Non ____

V804. Si non, pourquoi? _____

V805. Si une pompe à main est installée près de chez vous, l'utiliseriez-vous?
Oui ____ Non ____ Ne sait pas ____

V806. Si oui, pour quel usage utilisez-vous le plus souvent son eau?

	CODE POUR L'USAGE
1. pour boire	_____
2. pour se laver	_____
3. pour la vaiselle	_____
4. pour le nettoyage de maison	_____

CODES: 1. déjà utilisé
2. utilisé tout le temps
3. utilisé la plupart du temps
4. utilisé de temps en temps
5. n'utilise jamais
6. autre (spécifiez) _____

V808. Si non, pourquoi n'utilisez vous pas?
_____

V810. Si l'on vous demandait de cotiser CFA 1000 pour acheter la pompe à main, seriez-vous disposé à le faire? **(SI NON, DEMANDEZ:)** Oui ____ Non ____

(PASSEZ D'UNE LIGNE A L'AUTRE SI LA REPONSE EST NON)

V811. Seriez-vous disposé à cotiser CFA 800? Oui ____ Non ____

V812. Seriez-vous disposé à cotiser CFA 600? Oui ____ Non ____

V813. Seriez-vous disposé à cotiser CFA 400? Oui ____ Non ____

V814. Seriez-vous disposé à cotiser CFA 200? Oui ____ Non ____

Merci beaucoup pour votre franche collaboration.

QUESTIONNAIRE DU VILLAGE -- SCHISTOSOMIASIS COST-ANALYSIS SURVEY

ENQUETEUR:.....DATE:.....[VILL-#:.....]

Enquéteur: ce questionnaire est à remplir par vous au niveau du village.
SVP, fournir une carte du village avec la location des points d'eau, ainsi que de la (ou des) rivières, cliniques, dispensaires, pharmacies, hopital, et concessions.

V I L L A G E

V001. NOM DU VILLAGE:.....
V002. Superficie:..... (ha.: ..... ou:.....)

ENVIRONEMENT ET ECONOMIE

V004. Nombre des points d'eau (y compris mares) après la pluie:
temporaires..... V005. permanents.....
V006. Nombre des points d'eau dans le village à present:.....
V007. Distance du village a la rivière:..... en Km,..... ou:.....
V009. Nombre de pompes de forages dans le village:.....
V010. Hectares cultivés avec le mil:.....
V011. Hectares cultivés avec le coton:.....
V012. Etendue cultivée avec les oignons:.....
V013. Nom des autres plantes cultivées pour la récolte.....
.....
----. Quelle est la récolte normale de la culture par hectare, pour:
V014. le mil..... (unité de mesure:.....)par ha.
V016. le coton..... (unité de mesure:.....)par ha.
V018. les oignons:.....(unite de mesure:.....)par ha..... ou:.....

----. Quels sont les prix au marché pour les produits agricoles suivants:

V020. le mil: ..... CFA par .....
V022. le coton: ..... CFA par.....
V024. les oigons:..... CFA par.....
V026. le lait: ..... CFA par.....
----. Quel est le prix au marché pour les animaux suivants:
V028. une chèvre: ..... CFA
V029. un mouton: ..... CFA
V030. un boeuf: ..... CFA
V031. une vache: ..... CFA
V032. un chameau: ..... CFA
V033. un cheval: ..... CFA
V034. Salaire des travailleurs agricoles:..... CFA par jour
V035. Salaire des bergers: ..... CFA (par: jour..... saison .....)
V036. Quel est le prix d'une spirale contre les moustiques?.....CFA

SOINS DE SANTE

V037. Nombre de guérisseurs dans le village:.....
V038. Nombre d'entre eux qui savent traiter la bilharziose:.....
V039. Nombre de guérisseurs dans les environs jusqu'à 5 km:.....
V040. Nombre des médecins dans le village:.....
V041. Nombre des médecins dans les environs, jusqu'à 5 km:.....
V042. Nombre des infirmières dans le villge:.....
V043. Nombre des infirmières dans les environs, jusqu'à 5 km:.....
V044. Nombre des sages-femmes dans le village:.....
V045. Y-a-t-il une clinique dans le village? oui..... non.....
V046. Nombre de cliniques dans les environs, jusqu'à 5 km:.....

FETE DU VILLAGE

V047. Dans le passé, est-ce que le village a observé la fête du village?
oui..... non..... NSP.....
V048. Quand a eu lieu la dernière fête du village? .....
V049. A-t-on obtenu de l'argent pour le village durant la fête?
oui..... non..... NSP.....
V050. Combien d'argent?.....CFA
V051. Comment a-t-on fait pour obtenir cet argent? Expliquez en détail:
.....
.....
.....
.....

V071. Comment le village a-t-il depensé l'argent obtenu?
.....
.....
.....
.....

V091. Est-ce que toutes les concessions du village ont cotisé?
oui..... non.....
V092. Avec quelle fréquence generalement, a lieu la fête du village?
.....
V093. Si quelqu'un veut aller a MAROUA, décrivez en detail comment il y ira a partir du village (par ex.: "en partant du milieu du village, marcher pendant 15 minutes dans la direction au nord de la route, ...prendre le bus ou le taxi... le bus prend 20 minutes et le taxi 10 minutes pour arriver a Maroua, le tarif du bus pour l'aller seulement est de 300 CFA, le tarif du taxi, pour l'aller seulement, est de 500 CFA, etc...)
.....
.....
.....
.....
.....
.....

C L I N I Q U E

(ALLER A LA CLINIQUE DU VILLAGE, S'IL Y EN A UNE, OU A LA CLINIQUE LA PLUS PROCHE; INTERROGER LE DIRECTEUR SI POSSIBLE)

V110. Nom de l'informateur de la clinique:.....
V111. Position.....
V113. Nom de la clinique:.....
V114. Est-ce qu'elle est: (Encercler la réponse):
privée.....1 gouvernementale.....2 communautaire.....3.
----. Donnez le compte du Personnel de la clinique pour chaque categorie:
V115. Docteurs..... V116.Infirmier(e)s d'Etat,.....
V117. Infirmier(e)s, ... V118. Aides soignants.....
V119. Autres: (spécifiez).....
----. Utilization journalière de la clinique:
V120. Nombre de patients traités généralement, par jour, en cette saison.....
V121. Dans quelle saison y a-t-il le plus grand nombre de patients dans votre clinique?.....
V122. Nombre de patients traités, par jour, durant la saison d'intense activité médicale (saison de pointe):.....

----. Maladies majeures: donner les symptômes dans la saison présente:

	Maladies:		Symptomes:
V123A.	.....	V124A.	.....
V123B.	.....	V124B.	.....
V123C.	.....	V124C.	.....
V123D.	.....	V124D.	.....

----. Maladies majeures: donner les symptômes dans la saison de pointe:

	Maladies:		Symptomes:
V125A.	.....	V126A.	.....
V125B.	.....	V126B.	.....
V125C.	.....	V126C.	.....
V125D.	.....	V126D.	.....

Renseignements concernant les gens cherchant le traitement pour la bilharziose et pour le traitement général: --- ANNEE 1993 ---

		Nombre pour le traitement de la bilharziose en particulier:	Nombre total à la clinique (pour n'importe quel traitement, y compris la bilharziose)
V127A.	Mai 1993	.....	.....
V127B.	Avril 1993	.....	.....
V127C.	Mars 1993	.....	.....
V127D.	Février 1993	.....	.....
V127E.	Janvier 1993	.....	.....

Renseignements concernant les gens cherchant le traitement pour la bilharziose et pour le traitement général: --- ANNEE 1992 ---

	Nombre pour le traitement de la bilharziose en particulier:	Nombre total à la clinique (pour n'importe quel traitement, y compris la bilharziose)
V129A. Decembre 1992	.....	.....
V129B. Novembre 1992	.....	.....
V129C. Octobre 1992	.....	.....
V129D. Septembre 1992	.....	.....
V129E. Août 1992	.....	.....
V129F. Juillet 1992	.....	.....
V129G. Juin 1992	.....	.....
V129H. Mai 1992	.....	.....
V129I. Avril 1992	.....	.....
V129J. Mars 1992	.....	.....
V129K. Février 1992	.....	.....
V129L. Janvier 1992	.....	.....

Renseignements concernant les gens cherchant le traitement pour la bilharziose et pour le traitement général: --- ANNEE 1991 ---

	Nombre pour le traitement de la bilharziose en particulier:	Nombre total à la clinique (pour n'importe quel traitement, y compris la bilharziose)
V131A. Decembre 1991	.....	.....
V131B. Novembre 1991	.....	.....
V131C. Octobre 1991	.....	.....
V131D. Septembre 1991	.....	.....
V131E. Août 1991	.....	.....
V131F. Juillet 1991	.....	.....
V131G. Juin 1991	.....	.....
V131H. Mai 1991	.....	.....
V131I. Avril 1991	.....	.....
V131J. Mars 1991	.....	.....
V131K. Février 1991	.....	.....
V131L. Janvier 1991	.....	.....

----. Heures de la clinique: Quand est-ce que la clinique est ouverte?
(Encercler les jours, et écrire les heures ci-dessous:)

	Jour:	Heures: Le Matin:	Heures: de Midi jusqu'a la nuit:
V140.	Lundi...1	.....	.....
V143.	Mardi...2	.....	.....
V146.	Mercredi...3	.....	.....
V149.	Jeudi...4	.....	.....
V152.	Vendredi...5	.....	.....
V155.	Samedi...6	.....	.....
V158.	Dimanche...7	.....	.....

V161. La clinique peut-elle accepter des patients pour la nuit?
oui..... non.....
V162. Combien de patients en tout peuvent passer la nuit? .....
V163. Prix de la visite chez le docteur ou l'infirmière, a la clinique:.....CFA
V168. Y-a-t-il un laboratoire à la clinique? oui..... non..... NSP.....
V169. Si oui, nombre de microscopes:.....
----. Autre équipement de laboratoire: (type, quantité):

	équipement:	quantité:
V170A.	.....	.....
V170B.	.....	.....
V170C.	.....	.....
V170D.	.....	.....

V180. Y-a-t-il une pharmacie dans la clinique? oui..... non..... NSP.....
V181. Y-a-t-il une pharmacie dans le village? oui..... non..... NSP.....
V182. Si oui, est-elle privée ou possedée par la communauté?
priveé..... communautaire..... NSP.....
V183. Si non, distance du village à la pharmacie la plus proche:.....km

P H A R M A C I E

(ALLER A CELLE DE LA CLINIQUE DU VILLAGE, S'IL Y EN A UNE, OU, A LA PHARMACIE LA PLUS PROCHE; INTERROGER LE PHARMACIEN)

V184. Nom de la pharmacie:..... Location:.....

V186. Si elle ne se trouve pas dans votre village, a quelle distance est-elle du village?..... km.

V187. Est-elle privée ou communautaire? (encercler la reponse):
privée.....1 communautaire.....2

----. SVP nommez les médicaments les plus importants que l'on vend dans votre pharmacie, et donnez le prix d'unité (spécifier l'unité)

	Médicament:	Prix (CFA):	Unité de quantité:
V190A.	.....	.....	.....
V190B.	.....	.....	.....
V190C.	.....	.....	.....
V190D.	.....	.....	.....

V200. Est-ce que la pharmacie vend des médicaments pour traiter la bilharziose?
oui..... non..... NSP.....

V201. Nombre de comprimés du médicament pour la bilharziose achetés ou obtenus par la pharmacie durant la dernière anneé?.....

V202. Où, ou de qui, est-ce qu'on a obtenu le médicament?
.....
.....

V203. Quel prix a payé la pharmacie pour le médicament la dernière fois qu'elle en a obtenu?.....CFA

V204. Pour quelle quantité?.....

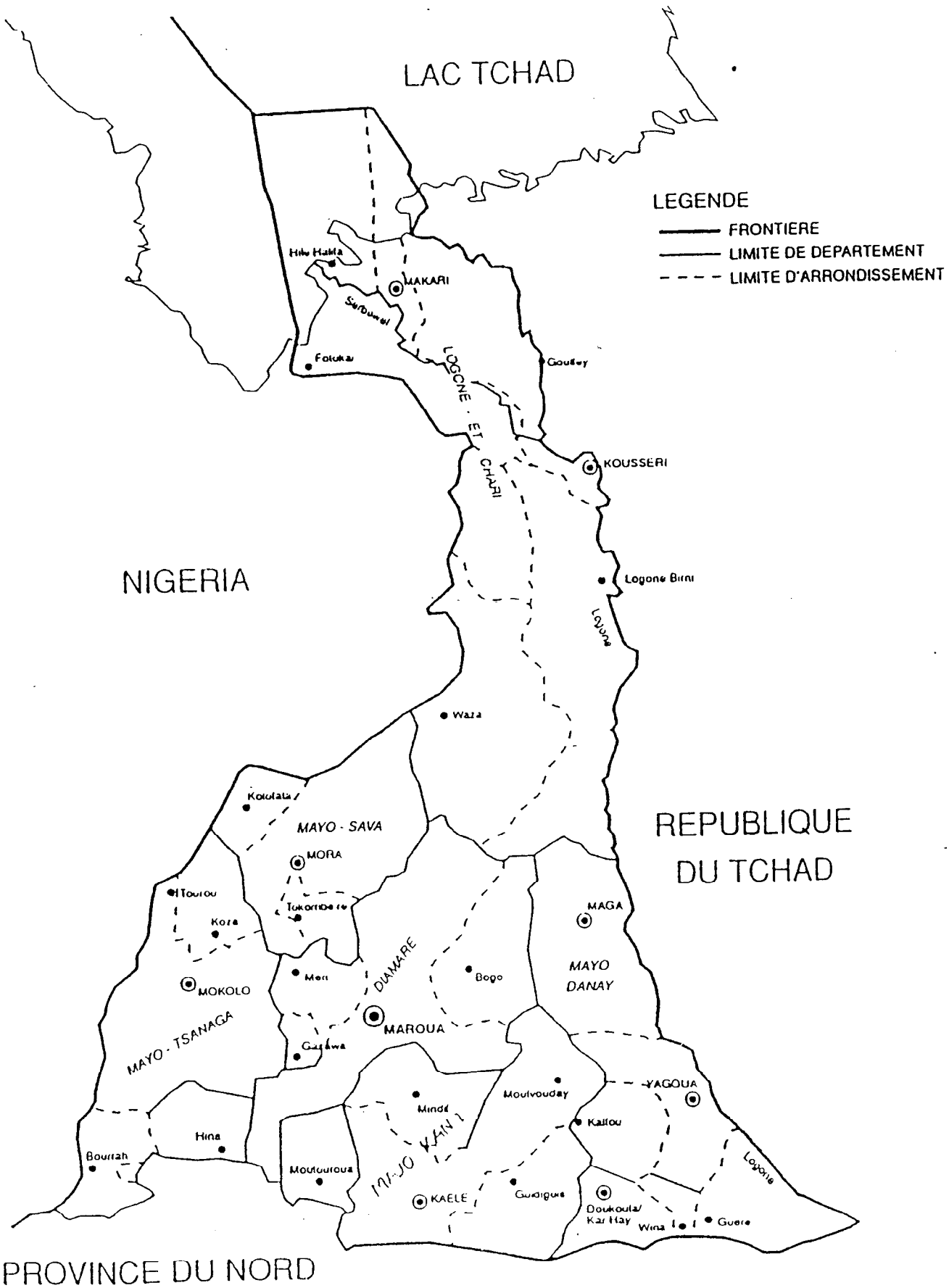
V205. Quelle quantité du médicament a été vendue durant les derniers 12 mois?.....

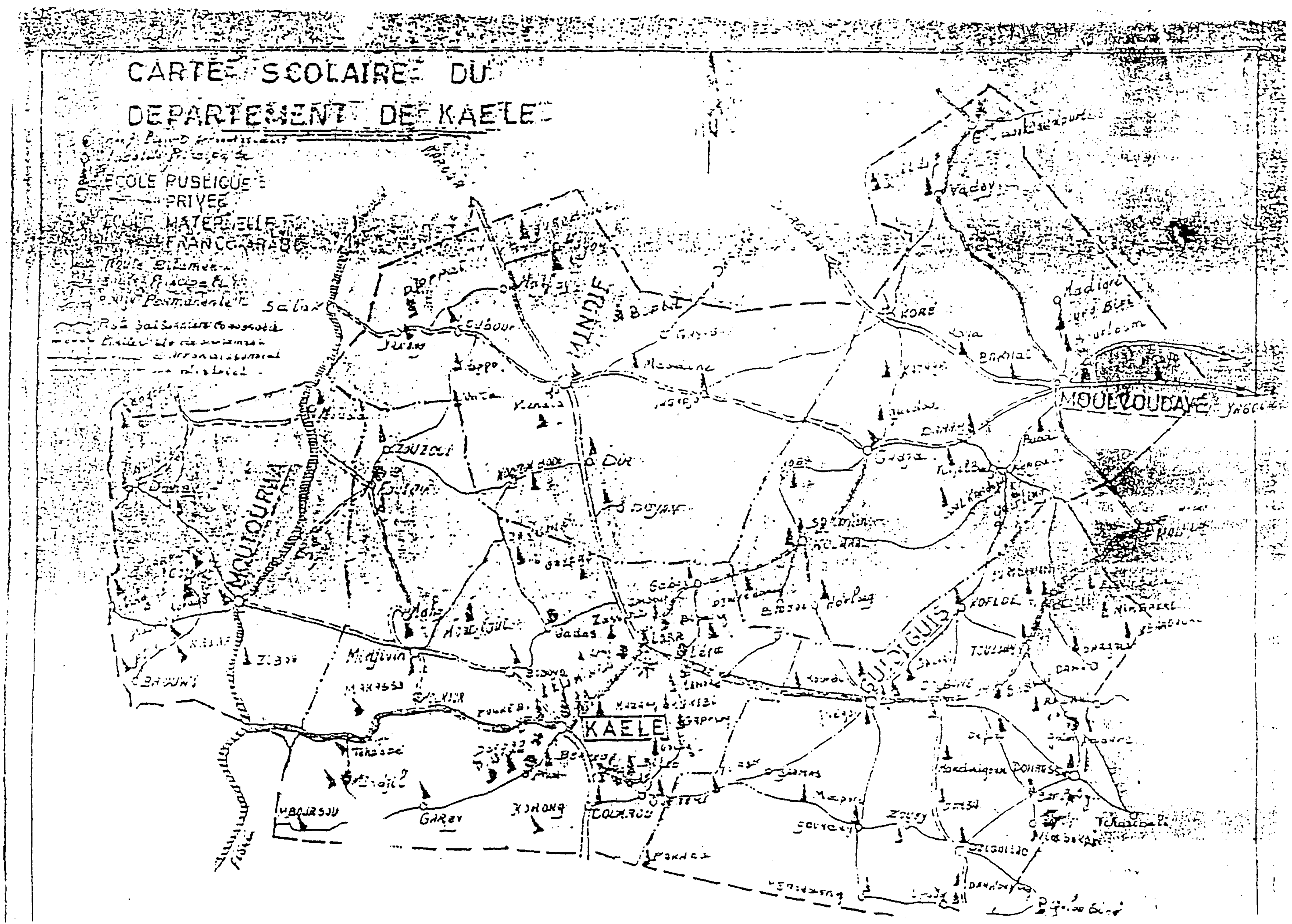
--- FIN DU QUESTIONNAIRE: ---

--- Merci beaucoup ---

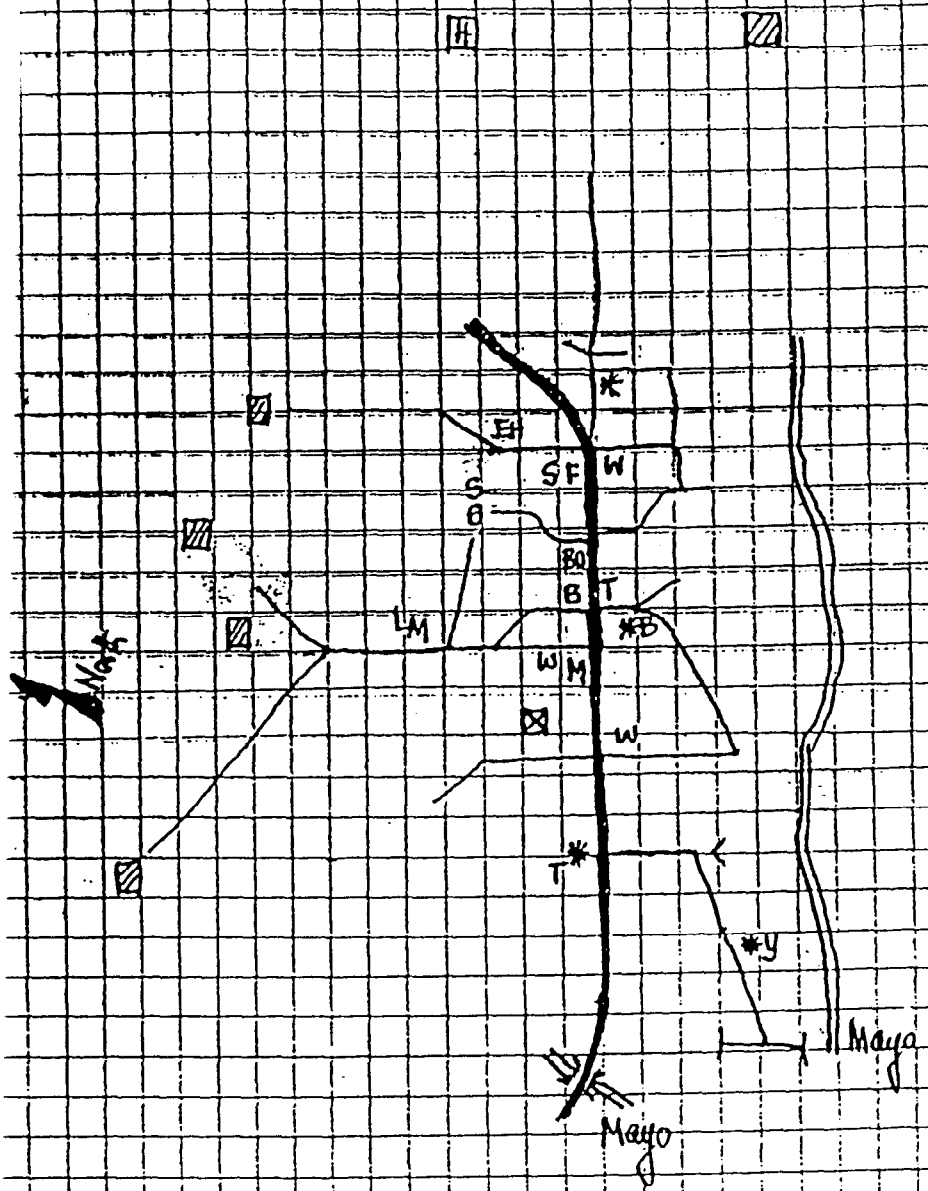
APPENDIX 3: MAPS

SITUATION GEOGRAPHIQUE DE LA PROVINCE DE L'EXTREME NORD (PEN)




CARTE SCOLAIRE DU
DEPARTEMENT DE KAELE
ECOLE PUBLIQUE
PRIVEE
ECOLE MATERNELLE
FRANCO-ARABE
MOUTOURWA
MINDIF
MOULVOUDAYE
GUIDIGUIS
KAELE

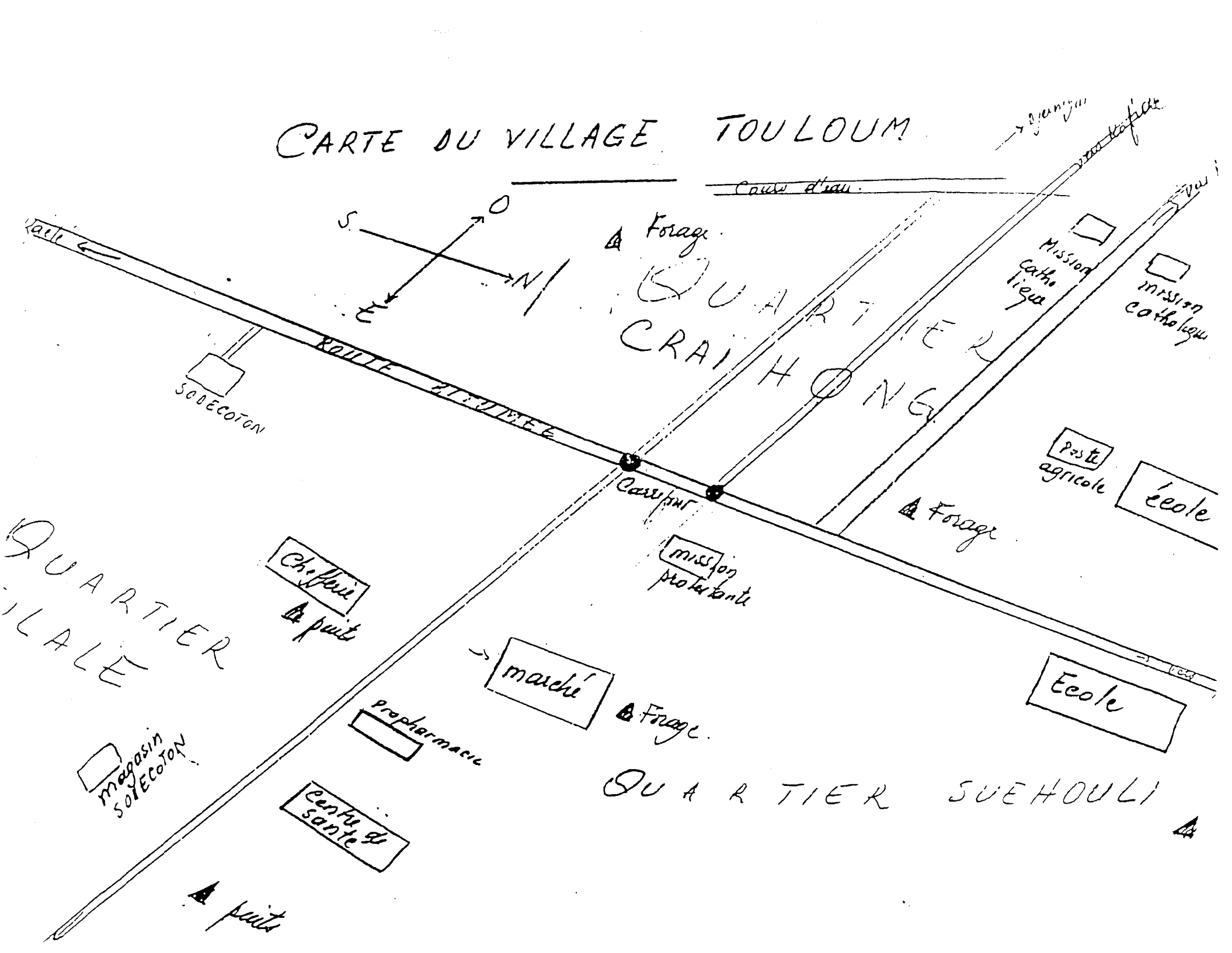
SMALL SCALE MAP Guéréné



* Tree
Bs Baobab
T Tchaski
P Palm tree

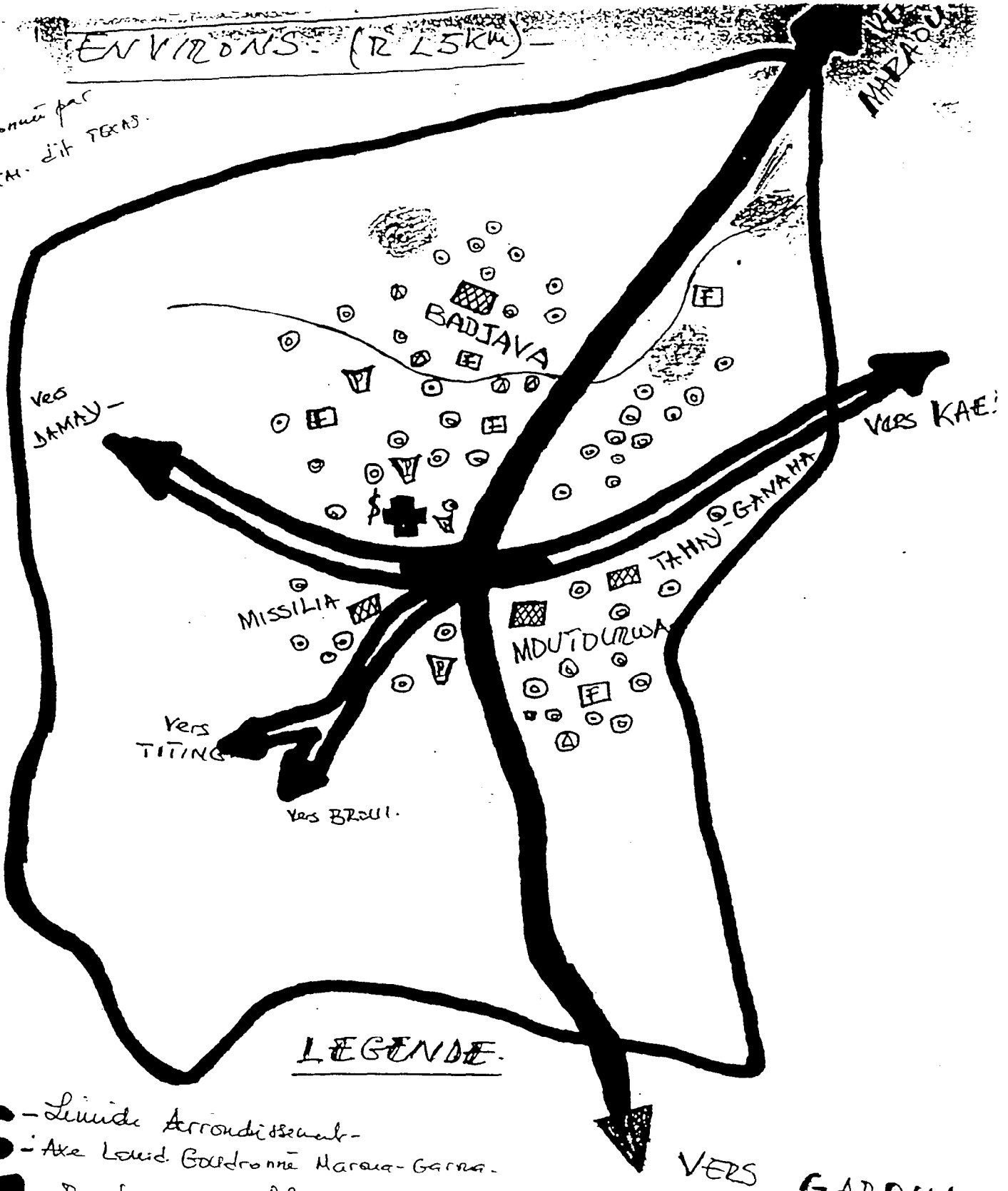
Gares

W Well
M Mosk
LM Leatherman
F Flag
S School
EH Health
B Butcher
BO Butcher Dumaroo
T Tailor
H Health Center


CARTE DU VILLAGE TOULOUM
Cause d'eau
S
O
E
N
Forage
QUARTIER CRAIHONG
Route Nationale
SODECOTON
Mission catholique
mission catholique
poste agricole
école
Forage
Carrefour
mission protestante
Chefferie
puit
QUARTIER ILALE
marché
Forage
Ecole
Pharmacie
magasin SOTECOTON
centre de santé
puits
QUARTIER SUEHOULI

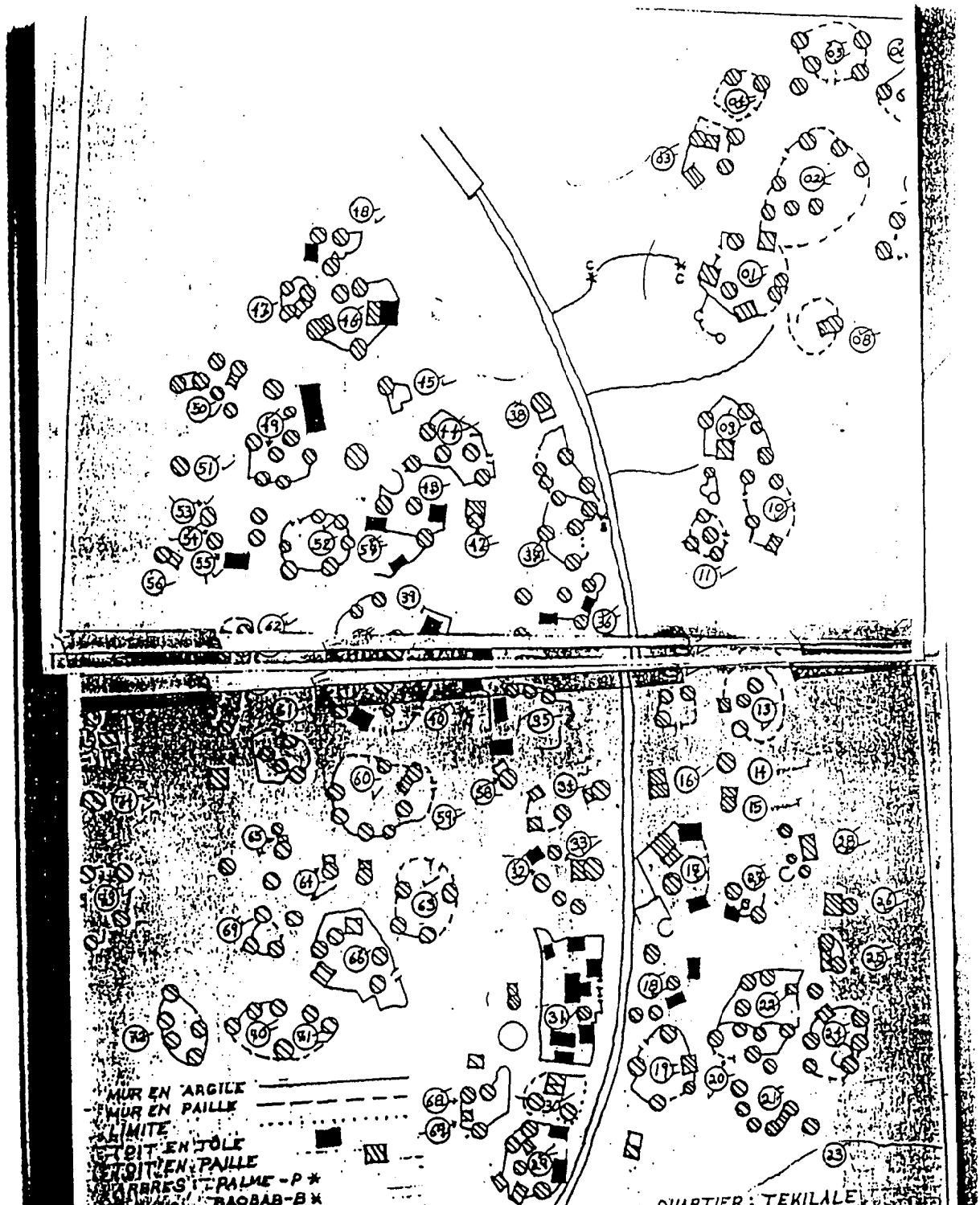
ENVIRONS (R 25km)

carte confectionnée par VANKAM dit TEXAS.



LEGENDE.

- Limite Arrondissement.
- Axe Land. Goudronné Maroua-Garoua.
- Routes Carossables.
- F. — Forages.
- P — Puits.
- Centre de Santé Developpé. (CSD)
- Chef-lieu d'Arrondissement.
- Villages Environnants.
- Concession du Laisser.
- Concessions cloturées.
- $ — Pharmacie.
- Mares d'eau temporaires.
- Rivière


MUR EN ARGILE
MUR EN PAILLE
LIMITE
TOIT EN TÔLE
TOIT EN PAILLE
ARBRES : PALME - P
BAOBAB - B
QUARTIER : TEKILALE

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