TESTING THE EFFECTIVENESS OF ADOLESCENTS AS HEALTH PROMOTERS IN LIBERIA

A FINAL REPORT SUBMITTED

TO

P R I C O R

Primary Health Care Operations Research

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BACKGROUND

WHY A HEALTH EDUCATION CURRICULUM FOR ADOLESCENTS?

In 1982, Liberia had an estimated population of 2,024,000 with a life expectancy of fifty-two (52) years. The country had a crude birth rate of 45.4 per 1,000 population and a crude death rate of 134 infant deaths per 1,000 live births. Medical statistics from various sources reiterate that the health problems contributing most significantly to national morbidity and mortality rates are infectious diseases: malaria, diarrhea, respiratory illnesses, measles, tetanus and parasitic diseases. Other factors undermining the health status of Liberians include poor hygiene practices, inadequate sanitation facilities, malnutrition, unavailability of potable water, and an ecological environment that encourages the breeding of disease vectors and vector contacts with human beings. Available national resources cannot support even a low cost Primary Health Care System. At the same time, the individual citizen's health status continues to be negatively influenced by low income and a lack of adequate knowledge about the nature of illnesses and practices that can prevent them.

The present community-based Primary Health Care National Policy of Liberia aims at providing preventive services through community outreach prevention programs such as mass vaccination campaigns, malaria control, maternal and child care services, and the construction of both safe drinking water wells and sanitary latrine pits in rural areas. Both training programs for village health care workers and pilot projects in primary health care delivery have been launched in various counties. These projects, funded jointly by the national government, foreign governments and international organizations, are self-help in nature and are designed to provide a cost

effective, accessible network of basic health services in rural areas utilizing existing resources.

There has been little success in implementing some of the health education projects. For example, the Ministry of Health (MOH), with support from UNICEF, provided a health education program utilizing audiovisual aids and editorials to educate the public about health promotion. Many people, however, cannot afford radios, and radio transmission is either difficult or unavailable in certain areas. On the other hand, a similar project launched in Nimba County under the same auspices experienced greater success in providing health information. Using local dialects, the project trained Zoes or traditional birth attendants from the Sande or Poro Societies to bring health education directly to the children.

For ninety percent of the population targeted in the National Health Plan, primary health care facilities and human resources do not offer adequate coverage or prevented services. For example, in Bong County, the site of this PRICOR Project, the ratios of health workers to its population of 200,000 is: 1 to 15,385 for doctors; 1 to 5,405 for registered professional nurses; 1 to 5,405 midwives; 1 to 5,263 for licensed practical nurses; 1 to 7,407 for physician assistants; and 1 to 1,905 auxiliary workers e. g. public health inspectors, laboratory assistants, health educators, nurses' aides. The ratio of health facilities to the Bong County population is: 1 health center to every 50,000 people; 1 clinic/health post to every 7,407 people; 1 mobile unit to every 11,111 people; and 1 hospital to every 200,000. Given the existing paucity of health care facilities and human resources, community health education becomes an imperative (See Appendix A).

Community health education is a low cost, effective method of improving conditions in the rural areas especially as well as a method for promoting positive changes in individual behaviors and practices.

Given the prevailing health problems, the Liberian Ministry of Education (MOE) and Ministry of Health (MOH) conduct various informal health education programs throughout the Country. The MOE has revised its elementary school curriculum to include components of health, agriculture and industrial arts in addition to academic subjects. Only the elementary schools in Monrovia, the Liberian capital, have health education as a part of the formal curriculum. Although eighty percent of Liberian children live in rural areas, health education curricula have not been introduced in theses schools.

Like all other counties in Liberia, Bong County has a large population of adolescents (Ministry of Planning, 1977). Adolescent school children ages 12-20 years are a large untapped community resource. They are available, affordable and accessible. Furthermore, they already perform a variety of tasks in the home and community which, through education, could be extended into health tasks. While there have been instances of using adolescents as health promoters in the Phillipines, Sudan and Botswana (Child-to-Child Programme), the practice is not widespread.

Therefore, the herein proposed health education/training program for adolescents is intended to increase their health knowledge in relation to existing local health problems, and to promote positive health attitudes and practices.

STUDY PURPOSE

As cited above, major health problems contributing to mortality and morbidity rates in Liberia are such recurring diseases and health hazards as malaria, diarrhea, respiratory illnesses, measles, tetanus, parasitic diseases and malnutrition.

Through its Ministry of Health, the Government of Liberia has made efforts to prevent or reduce the incidence of these diseases and hazards. However, there remains the problem of delivering the health services to target communities. Furthermore, the prevailing level of health awareness is very low - especially in rural communities. Low cost health education remains an imperative to extend and enhance health awareness and to promote positive health attitudes and behaviors.

The purpose of the study is to develop a health education curriculum for adolescents based on their traditional tasks and the existing community health problems. Critical elements in the study purpose include (1) the design of health modules to constitute a health education curriculum; (2) the selection and training of the teachers; (3) the selection and training of the adolescents in the developed curriculum; and (4) the assessment of the impact of the curriculum on the adolescents as reflected in observed gain in health knowledge.

The research team, in cooperation with the Liberian Ministry of Health, designed the study specifically to:

> identify ways in which traditional roles of adolescents can be extended to include activities that would influence community and family knowledge, attitudes and practices related to the prevention of selected health problems;
>
> develop and test a health education curriculum for adolescents based on existing community health concerns and on adolescents' traditional tasks.

METHODOLOGY EMPLOYED

PHASE I: PROBLEM ANALYSIS

Prior to beginning formal problem analysis activities, it was necessary to revise the proposal and its related Plan of Work. A Gantt Chart was used to project and schedule activities for both the TU and CUC staffs. The result was a more precise Plan of Work (See Appendix B) and budget required for its implementation. A budget revision was requested later, based on emergent exigencies of the project (See Appendix C). Several budgetary and administrative problems emerged. While some were resolved, others remained throughout the life of the project, e.g. overhead rate for CUC and daily rates for some CUC project staff. A later request was made to PRICOR for a budget revision, based on emergent exigencies of the project. A time-loading chart was developed to identify specific time frames for staff activities throughout the project (See Appendix F). To facilitate monitoring budget expenditures and ensure adequate backup documentation, a set of six administrative forms was produced and used throughout the project (See Appendix D).

Based on the principle that it would be more efficient to analyze all project data at the project site in Liberia, a microcomputer was leased. On their initial visit to CUC, TU project staff brought the microcomputer to CUC, supervised its installation and provided initial training in its use for CUC staff. The limited and erratic availability of electricity and the relatively short training period limited achievement of the desired level of staff computer capability. Later, the TU staff purchased a statistical package, Microstat, and forwarded it to the project site.

Adequate health statistics had already been compiled by the Government of Liberia. The staff reviewed the archival health data and agreed upon

additional data needs: household perceptions of prevailing health problems, household experiences with diseases, and environmental sanitation practices. Knowledge of traditional tasks which adolescents perform in their homes and communities was a critical element in the research design. These data would need to be collected also. A field instrument was developed to survey the four target communities.

The results of the survey are presented in Appendix I, Tables 1-7. With respect to environmental sanitation practices, most of the families procure their drinking water from a well and store it in covered containers. Household pit latrines are present in sixty percent of the households. Over ninety percent of the households do not boil or filter their water before drinking it.

Between fifty-eight and ninety-seven percent of the households reported having had experience with malaria, intestinal worms, diarrhea, insects bites, measles, lice, pneumonia and eye/ear infections. Less than forty-eight percent of the households reported having had experience with dental problems, scabies, asthma, malnutrition, cholera, snake bites, dog bites, tetanus, accidents and food poisoning.

Most of the households do not take their children to traditional healers (81%). Only thirty-six percent take their children to the village health worker, and twenty-eight percent give their children salt/sugar solutions for diarrhea.

Less than fifty percent of the households reported having problems with bites, fractures, accidents, burns, head injuries, automobile accidents and food poisoning. Most households (98%) would go to Phebe Hospital for health care; only thirty-one percent would go to trained midwives. Between sixty to eighty-six percent of the households would not go to Zoes/herbalists,

bonesetters and traditional midwives for health care. Almost all households reported that more village health workers would be useful, that sanitary latrines promote good health, and that everyone should wash their hands after toileting.

With respect to adolescent cultural tasks, less than fifty percent of the households reported that the following tasks were customarily performed by adolescents: gathering wood, selling food at the market, scrubbing floors, farming, clearing the bush, repairing roads, hunting, digging wells and latrines and building houses were tasks which adolescents usually perform. On the other hand, over fifty percent of the households reported that these were common tasks for adolescents: cooking, cleaning the home, cleaning the yards and surrounding area, washing clothes, fetching water, and disposing of waste were common tasks for adolescents.

PHASE II: SOLUTION DEVELOPMENT

During this phase, project activities focused on the following decision variables:

What modules will be taught?
Who will teach them?
Who will learn them?
How will they be taught?
Where will they be taught?
When will they be taught?

Each of these variables is discussed below.

WHAT WILL BE TAUGHT?

Frequently recurring health problems and typical adolescent tasks had been identified in the analysis of the household data. In brainstorming sessions, the staff identified other tasks and related activities that adolescents could perform in prevention of other health problems. In reviewing the literature on control and management of communicable and

tropical diseases, content analysis was used to identify related health tasks. An interaction matrix was used to match cultural tasks with related health tasks. The resulting match was entitled "Important Health Learning Tasks."

A group of community leaders was asked to serve as members of the Project Advisory Committee (See Appendix E). The Advisory Committee ranked the health tasks, using the Nominal Group Technique to elicit opinions and an aggregated judgement in identifying the health tasks to be included in the curriculum. The high priority and low priority tasks are shown in Appendix G.

Based on the analysis of the survey data, review of the primary health care literature and the opinions and suggestions of the Advisory Committee, the following modules were selected and developed:

ORAL HYGIENE
NUTRITION/ORAL REHYDRATION
SKIN DISEASES
ACCIDENTS AND POISONS
INTESTINAL DISEASES
MALARIA/GERMS

Oral hygiene, accidents and poisons were not perceived by the communities as major health problems. However, the health education specialist from the MOE who served on the Advisory Committee stressed the importance of oral hygiene and its inclusion in the proposed national health curriculum. Health professionals on the Advisory Committee as well as project staff perceived accidents and poisons as serious and frequently occurring health problems. By consensus, the Advisory Committee and the project staff agreed to include these health problems in the curriculum.

PHASE III: SOLUTION IMPLEMENTATION

WHO WILL TEACH?

Initially, health workers were thought of as trainers for the health education curriculum. However, because of their limited number and the

demands on their time for providing services and supervision, it was decided by the project staff through discussion and by consensus to use school teachers. Teachers are already in the schools, are in daily contact with adolescents, and have a knowledge of local customs. Principals and teachers from the lower grade levels were considered since they frequently have to substitute for absent teachers. Based on these rationales, the sixth grade teacher, the principal, and one other lower grade teacher were selected from each of the four schools. In the case of the largest school, G. W. Gibson, one additional lower grade teacher was selected. It was agreed that one way to keep the MOH involved in the project would be to select two primary health care workers attached to Phebe Hospital to participate in the training.

WHO WILL LEARN?

By staff discussion and consensus, the following rationale was used to select the trainees:

> Adolescents of grade six level are at the highest level of village schools.
>
> After the completion of the sixth level, most students do not continue their education.
>
> Adolescents at the sixth level can comprehend the health content and are knowledgeable about local problems and customs.

HOW WILL THE MODULES BE TAUGHT TO THE TRAINERS?

Thirteen school personnel and two primary health care workers were trained in two workshops which covered the content of the modules and teaching methods. Additionally, the workshop included non-health modules on (1) "Understanding the Adolescent"; (2) "Classroom Organization and Management for Effective Learning"; and (3) "Monitoring Progress of the Adolescent." Project staff agreed that the latter modules were necessary since the majority of the trainers did not meet teaching qualifications stipulated by the Ministry of

Education (See Appendix H).

The content of the health curriculum training workshop was presented in two phases. The first workshop covered five days of training and the second covered two days.

During the workshops, guided instructions were given to increase participation and to reasonably assure uniformity in reading pace. The lecture-discussion approach was used in order for the trainers to give feedback in relation to the appropriateness of the modules for the adolescents' level of comprehension. Complex terminologies/concepts were explained and simplified. Complex sentences were paraphrased, sporadic comments and questions were encouraged and solicited. Most of the instruction presented was related to cultural traditions by using common terminologies and appropriate moral stories.

After the introduction of a module and the presentation of its objectives, a pre-test was administered to determine the trainers' knowledge-base of the content. Following the pre-test, instructions were given/read, content discussed, questions asked, rationales given, and exercises performed. A post-test was administered to determine trainers' gain in knowledge. Based on the gains reflected in the difference between the pre-test and post-test scores, it was evident that the trainers comprehended the curriculum content.

Throughout the workshops, trainers provided feedback to project staff in terms of suggestions or recommendations for modifying the content of the modules to ensure greater comprehension by the adolescents.

The same format was used in implementing the modules for the adolescents in the classrooms as was used in the training of the trainers. Project staff determined that a health module would require two 45 minute class periods.

Each day before a module was implemented, the adolescents were given a module booklet. Because the trainees were reading below their grade level and had problems of comprehension, simple guided instructions were given them in locating the pages and how to read along with the teacher. If a module could not be completed within the two class periods, teachers and project staff agreed to use additional class periods until the module was completed.

Trainees themselves were not involved in classroom demonstrations; their involvement would have required adding an hour to the daily schedule. The teachers, however, demonstrated the recommended techniques and procedures to the classes throughout the course of instruction.

The criterion pre-test for a module was given following the introduction of the module and before the instruction and exercises began to determine each student's baseline for the module. After the module had been completed, a post-test was given. All modules were evaluated by the teachers to determine their usefulness. Pre-tests and post-tests were graded, analyzed and percent gain (loss) calculated.

Two project staff were responsible for supervising the implementation of the modules. Weekly visits were planned to observe, to lend assistance when necessary, and to note any modifications of the teaching plan that had occurred or that were being recommended. Weekly supervisory visits were occassionally cancelled because of other demands on staff time.

WHERE WILL THE CURRICULUM BE TAUGHT?

The staff developed the criteria by which the target schools would be selected. Given budgetary and time constraints, it was decided that the sites should be located in Bong County within a twenty-five mile radius of the CUC campus where the Project office was located. The schools should reflect both public and private auspices. While some schools should be representative of

communities located near the Country's main paved highway, others should be remote from it. With these criteria, four schools were selected.

WHEN WILL THE MODULES BE TAUGHT?

By consensus, the project staff and MOE personnel recommended that the modules be taught during the 1985 national academic school calendar. Four modules were implemented between mid April and June, 1985; two modules were implemented between mid September and November, 1985.

BRIEF DESCRIPTION OF SCHOOLS AND COMMUNITIES

G. W. Gibson Elementary and Junior High School, with an enrollment of 374, is located in Sinyea, a village somewhat removed from the main highway. Taylor Ta Elementary and Junior High School is located about seven miles off the main highway and has an enrollment of 123. David Fejue Elementary and Junior High School is located in Gbatala and has an enrollment of 285. Suacoco Elementary and Junior High School, located in the town of Suacoco, has an enrollment of 200. Taylor Ta school is sponsored by the Methodist Church. The other schools are public.

There are many inadequacies in the national school system, primarily due to the depressed national economy. These problems include: (1) dilapidated school buildings; (2) overcrowded classrooms; and (3) lack of instructional materials, laboratories and libraries. The schools are understaffed. Most teachers are high school graduates with minimal professional educational training; however, in-service teacher training programs have been instituted to upgrade the quality of instruction. Students often leave school before completing the elementary curriculum. High rates of student absenteeism are reported, especially when it is necessary for them to assist in cultural ceremonies and in the performance of domestic tasks, such as farming. Low salaries, delayed monthly payment of salaries and few incentives often resulted in high rates of teacher absenteeism.

A research assistant was assigned to each community. Before administering the questionnaires, each research assistant lived in the assigned community seven days for the purpose of direct observation of health and environmental sanitation practices.

All four communities have similar general physical and socioeconomic characteristics and cultural practices. Kpelle is the dominant ethnic group residing in all four communities. The next largest group is the Mandingo who reside mainly in Gbatala (Fejue Elementary School).

A typical family unit consists of a head (man/husband), several spouses, their children, relatives and dependents who are closely linked by kinship and cultural norms. The head makes most decisions while spouses are mainly responsible for maintaining the family and rearing the children. The head of a home is the principal decision-maker in the search for health care.

Families live communally by sharing goods and providing charitable services through social organizations. Most meals are eaten communally by the entire family. However, after the food has been prepared, the head's meal is separated from the rest of the family's food. The head is also served the best food.

The people are subsistence farmers who grow crops such as rice, pepper, bitterballs, okra and other vegetables for consumption and cash crops. Income is used to pay for health services, maintain the family, and pay hut taxes to the internal revenue.

The income level of the people is low. Daily income typically amounts to about one dollar, which is often obtained from working on nearby rubber plantation or from managing a small peddler business.

Huts or houses are constructed in the traditional way of mud from the termite hills. Roofs are made of thatch or aluminum zinc. There are seldom electric or running water facilities in the homes. A hut is constructed with four or fewer rooms and can accommodate approximately eight persons at bed time. This overcrowding condition aids in the transfer of communicable diseases.

Environmental sanitation is poor. Latrines and wells are constructed away from the homes and are sometimes poorly maintained. Water sources, such as wells and streams, are poorly maintained. Furthermore, they are often contaminated by unclean utensils used to collect water. Streams which are used for drinking water are also used for washing clothes and are often contaminated with human and animal feces that flow into them from surrounding bushes during floods. Feces of animals, chickens, goats and sheep rummaging in search of food are scattered in the environment.

Communication and transportation between villages are inadequate. Within a village, information is effectively transmitted from the chiefs to the people by a town "crier." Community issues of concern are settled by the chiefs, elders and other significant individuals. Legal issues are referred to courts within the larger districts.

Beliefs in taboos, witchcraft, and superstition prevail.

RESULTS

The Plan of Work called for the analysis of all data at the project site making use of the microcomputer and Microstat. Because of several personnel changes in the Electronic Data Processing Specialist position, occurring midway the project, and because an affordable alternate plan for computerized data analyses was not feasible, the final analyses of the trainees' performance data were hand calculated. As part of the technical assistance given by TU staff, further analyses were performed at the TU site in preparing the final report. Because the variable labels for the communities in which the schools were located were not available at the time of these analyses, the communities are refered to by numbers in the discussion below.

To better interpret the effects of the health training program, it would be useful to discuss some of the similarities and differences in health practices in the target communities from which the adolescents were selected. The information for Table 8 discussed below was derived from a household survey of eighty families from each of the four communities.

From Table 8, it can be seen that none of the families get their water from a stream. Families from all of the communities get some of their water from a well. Families from Communities 2 and 4 get some of their water from a pond while families in Communities 1 and 3 almost never get their water from a pond. All of the families store their water in a covered container but almost none of them filter or boil it before consumption. Of sanitary ways of disposing of garbage, only families in Community 1 use a garbage pit. None of the communities tend to bury, burn or compost their garbage.

Families in all communities seldom use streams for toileting. Only families in Community 4 use the bush.

Families from all four communities saw malaria and diarrhea as major health problems. Bites, accidents and accidental poisoning were not seen as major health problems. Only in Community 2 were insect bites not seen as a health problem.

Families from all four communities go to Phebe Hospital and health clinics. They rarely go to herbalists, bonesetters and midwives; families in Community 4 tend to go to a traditional midwife but not to one who is trained.

With respect to diarrhea, all families considered polluted water, bad breast milk and other contaminations as causes.

All families agreed that clean water prevents illnesses, that additional health workers were needed in the community, and that everyone should wash their hands after toileting.

With respect to health practices, families in all communities use tablets in the treatment of diarrhea. Families in Communities 1, 3 and 4 are more likely than families from Community 2 to go to a health center. Families in Community 3 are more likely to go to a village health worker than families from the other communities.

In the treatment of fevers, all families give sponge baths, liquids, pills, cough mixtures, and recommend rest. Families in Community 2 do not go to health workers, and families in Community 4 neither isolate the patient nor seek the help of health workers to treat fevers.

None of the communities indicate frequent experiences with snake, dog, spider or scorpion bites; nor have any of the communities had major injuries from auto accidents, bone fractures, severe cuts, severe burns or head injuries. However, insect bites are a major health problem in Communities 1 and 3.

While there are similarities among the communities with respect to health attitudes, practices and experiences, there are also distinct and significant differences.

The analyses turn now to the performance data of the 116 adolescents enrolled in the training program.

The means and standard deviations of the pre-test for boys and girls and for each of the four schools is presented in Table 9. While not major, some differences between boys and girls were noted. Girls more than boys appeared to be more knowledgeable about oral hygiene and nutrition; however, boys seemed to be more familiar with skin diseases and, to a lesser degree, accidents and poisons. Boys' and girls' knowledge of intestinal diseases, malaria and germs is about equal.

Among the different schools, students at Gibson clearly excelled in knowledge about oral hygiene but were far behind in knowledge of skin diseases. Students at Taylor Ta were much more knowledgeable about accidents and poisons. Students at all schools were at about the same initial level in the areas of nutrition, intestinal diseases, and malaria and germs.

There were some clear differences between boys and girls as well as differences between schools on the pre-test and the post-test scores. The average scores on all modules increased between the pre-test and the post-test; however, the boys scored higher than the girls on every module. In a similar manner, the students at Taylor Ta scored highest on the post-test for all modules. However, it should be noted that there were only four students in the Taylor Ta group. The means and standard deviations of the post-test are given in Table 10.

Since the case level linkages between individual modules were not coded, only the results of the analysis of variance for each individual module are

presented in Tables 11-16 for the main effects of school, age and sex.

From Table 11, Oral Hygiene, it can be seen that students at Gibson scored a very high 61.48% on the pre-test but scored an almost identical 64.16% on the post-test resulting in no significant change. Suacoco and Fejue gained about 9 percentage points, but the students at Taylor Ta improved 42 percentage points. Again, it should be pointed out that only 4 students were in the Taylor Ta group. Even though the differences were significant at the .01 level, the presence of one uniquely small sample group advises a conservative interpretation of the results. The older children, ages 19 and older, who are beyond what one usually considers adolescent, seemed to have improved more although this difference was not significant. Boys seemed to have learned more than girls (11.11 percentage points versus 1.57); however, this difference was also not significant. Age, sex and school account for 19.5% of the variance in the pre-test/post-test differences on the Oral Hygiene Module.

On the Nutrition Module, Table 12, Taylor Ta students improved by 44.5 and Suacoco by 24.02 percentage points. Fejue and Gibson had almost no change. This difference was significant at the .01 level. Both age groups improved, but again, the older group did more so (+28.46 versus +15.74 percentage points). Boys also improved more than girls (+20.54 versus +5.81 percentage points). Both the age and sex differences were significant at the .05 level. School, age and sex combined account for 23.8% of the variance in the pre-test/post-test differences.

The older age group (19-22 years versus 12-18 years) learned more on the Skin Disease Module (sig. = .05); however, there were no significant school or sex differences (See Table 13). Combined, age, sex and school account for only 11.03% of the variance. There were no significant differences between

age, sex or school groupings on the Accidents/Poisons Module (See Table 14).

Again, in Table 15, we see that Taylor Ta students improved by 32.5 percentage points on the Intestinal Diseases Module while Gibson, Suacoco and Fejue only improved +3.52, +9.00 and +8.12 points respectively. Probably because of the small group at Taylor Ta, this difference is not statistically significant. There were no significant sex differences even though the boys again out-performed the girls +10.00 to +6.15 points. The older group again showed a statistically significant improvement over the younger age group. This difference of +18.33 versus +7.07 was significant at the .05 level. Age, sex and school combined accounted for 14.7% of the variance.

Table 16, the Malaria/Germs Module, presents interesting results. While Taylor Ta students again gained an average of +20.00 percentage points, and students at Fejue gained +14.29 points, students at Gibson actually performed lower, -11.73. This difference was significant at the .001 level. Girls indicated a slight drop of -2.59 points. Neither sex nor age presented significant differences. School, age and sex account for 19.4% of the variance.

While no clear pattern emerges, there would appear to be a tendency across the six modules that the Taylor Ta group, the older student group, and the male group, appear to have improved most between the pre-test and the post-test examinations.

Two possible confounding factors needed to be investigated. First, because there were noticeable age, sex and school differences on the pre-test scores seen in Tables 9 and 10, it was necessary to determine whether or not the post-test scores were significantly correlated with the pre-test scores. Table 17 presents the correlations between pre-test and post-test scores. The correlations are significant on five of the six modules, indicating a need to

include pre-test scores as a covariate in the analysis of the main effects of age, sex and school on pre-test/post-test differences. Again, since intermodule score correlations could not be calculated, a more comprehensive analysis could not be obtained.

Table 18 presents the results of the analysis of covariance. For this analysis, the actual age of the student was used as a **covariate** instead of using age group, an arbitrary cutoff between adolescence and young adult, as a main effect variable.

Pre-test scores represent a highly significant factor on each of the modules. When pre-test scores are included as a covariate, age is not a significant factor on any of the modules. This would indicate that any age differences were due to the adolescents' beginning level of knowledge rather than to any learning differences between age groups. Again, controlling for pre-test scores in this manner shows that sex differences only remain significant for the Skin Diseases Module (sig. < .000); differences between schools remain significant only for the Malaria/Germs Module. Interaction between the catagorical variables of sex and school was significant only for the Oral Hygiene Module where the males at Taylor Ta clearly excelled. Since there were only males in the training program at Taylor Ta, the significance may be merely an artifact of the sample.

Second, this finding underscored the need to consider another possible confounding factor. Does the inclusion of the four male students' performance at Taylor Ta significantly distort the results of the main effects relative to the combined performances of the students at the other three schools; or, does this small group of four students at the most remote school represent consistent and "real" differences? To help answer this question, the analysis of covariance discussed above was repeated excluding the four students from

Taylor Ta. The resulting significance levels of the F statistic for each covariate, main effect and interaction effect are presented in Table 19. The significance for the reduced sample (excluding Taylor Ta) is in parenthesis immediately below the significance level for the combined sample.

From Table 19, it is clear that in all cases except the two coefficients relating school to the Oral Hygiene and the Intestinal Diseases Modules, the significance levels are comparable with or without the Taylor data. Since the exclusion of the Taylor Ta students represents collapsing the school variable from four to three categories, differences in the school factor coefficients should not be surprising. However, since there were essentially no differences in the significance of the coefficients, it would seem that the Taylor Ta group did not affect the relationship of the main effect variables on the pre-test/post-test differences. The Taylor Ta sample appears to be unique only in its size.

FOLLOW-UP SURVEY

After the training program had been completed, a small scale survey was conducted in the four target communities by the co-principal investigator (J. Moore), a PRICOR Research Assistant (K. Johnson), and an interpretor to determine any actual changes in health practices. It was found that eight of the nine teachers interviewed had observed students applying lessons learned from the modules. Nine of the eleven parents interviewed reported they had been given health advice by their children. More specifically, seven of the parents reported having received ORT advice from their children. Eleven of the twelve students interviewed during the survey stated they were carrying out new health activities. The activities related to ORT, personal hygiene, home sanitation, malaria prevention, and referrals to the nearest hospital.

CONCLUSIONS AND RECOMMENDATIONS

The objectives of the PRICOR study were: (1) to identify ways in which the existing roles of adolescents in the community can be extended to include health promotion; and (2) to develop and test a health education curriculum for adolescents based on existing community health concerns and on adolescents' traditional tasks.

An advisory committee identified prevailing health problems and domestic tasks that adolescents performed. The researchers reviewed literature on the health problems identified and their management. Six health modules were selected for the curriculum: Oral Hygiene, Nutrition/ORT, Skin Diseases, Accidents and Poisons, Intestinal Diseases and Malaria/Germs.

In order to determine the appropriateness of the selected health education modules, a survey of 320 households was conducted in the four school communities. Survey results identified recurring health problems, sanitary conditions, the level of health knowledge, attitudes and practices, and tasks routinely performed by adolescents.

Following a seven day workshop during which thirteen school personnel and two primary health care workers were trained in the curriculum, the six modules were taught to sixth grade students in four village schools.

The means and standard deviations of the pre-test for boys and girls and for each of the four schools revealed some differences between boys and girls. Girls more than boys appeared to be more knowledgable about oral hygiene and nutrition; however, boys seemed to be more familiar with skin diseases and, to a lesser degree, accidents and poisons. Boys' and girls' knowledge of intestinal diseases, malaria and germs is about equal.

Among the different schools, students at Gibson clearly excelled in knowledge about oral hygiene but were far behind in knowledge of skin diseases. Students at Taylor Ta were much more knowledgable about accidents and poisons. Students at all schools were at about the same initial level in the areas of nutrition, intestinal diseases, and malaria and germs.

There were some clear differences between boys and girls as well as differences between schools on the pre-test and the post-test scores. The average scores on all modules increased between the pre-test and the post-test; however, the boys scored higher than the girls on every module. In a similar manner, the students at Taylor Ta scored highest on the post-test for all modules.

Since the case level linkages between individual modules were not coded, only the results of the analysis of variance for each individual module were obtained. While no clear pattern emerged, there appeared to be a tendency across the six modules that the Taylor Ta group, the older student group, and the male group, appear to have improved most between the pre-test and post-test examinations.

Two possible compounding factors were investigated. First, because there were noticeable age, sex and school differences on the pre-test scores, it was necessary to determine whether or not the post-test scores were significantly correlated with the pre-test scores. The correlations were found to be significant on five of the six modules, indicating a need to include pre-test scores as a covariate in the analysis of the main effects of age, sex and school on pre-test/post-test differences.

In the results of the analysis of covariance, pre-test scores represented a highly significant factor on each of the modules, indicating that any age differences were due to the adolescents' beginning level of knowledge rather

than to any learning differences between age groups. Again, controlling for pre-test scores in this manner shows that sex differences only remain significant for the Skin Diseases Module. Differences between schools remain significant only for the Malaria/Germs Module. Interaction between the catagorical variables of sex and school was significant only for the Oral Hygiene Module where the males at Taylor Ta clearly excelled. Since there were only males in the training program at Taylor ta, the significance may merely an artifact of the sample.

This finding underscored the need to determine if the inclusion of the four male students at Taylor Ta significantly distorted the results of the main effects relative to the combined performances of the students at the other three schools. The analysis of covariance was repeated excluding the four students at Taylor Ta. In all cases except the two coefficients relating school to the Oral Hygiene and the Intestinal Diseases Modules, the significance levels were comparable with or without the Taylor Ta data. It would seem that the Taylor Ta group did not affect the relationship of the main effect variables on the pre-test/post-test differences.

Although health knowledge gains differed on the six modules, the overall results indicate that the training program had a positive impact on the adolescent. All children had gained to about the same level of knowledge on all modules.

Based on the experiences of this study, the following recommendations are proposed:

(1) the design of a health curriculum for adolescents must take into account their level of comprehension;

(2) provisions should be insured for the inclusion for practical demonstrations in any health curriculum for adolescents;

(3) males demonstrated a great potential for performing

health tasks within the home and should be encouraged to do so, especially in light of the primacy of their decision-making role in the family;

(4) the health curriculum developed in this project should be incorporated into the national curriculum;

(5) the potential of adolescents as health promoters should be furthered utilized by the Ministries of Health and Education towards the aim of actively involving them in the promotion of good health.

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CUTTINGTON UNIVERSITY COLLEGE PERSONNEL

Ms. Janet Moore
Co-Principal Investigator

Overall project management, including coordination and implementation of research and project monitoring; coordination of technical and financial matters; and coordination of liaison contacts with GOL Ministries of Health and Education and other relevant agencies and organizations

Mrs. Elizabeth Sele-Mulbah
Health Curriculum Specialist

Assisted with project planning and administration; planning health curriculum design, analyzing survey data, training of adolescents' trainers, and supervision of curriculum implementation.

Miss Ayele Gaba
Health Curriculum Specialist

Assisted with planning of Health Curriculum Training Workshop, training of trainers and development of curriculum.

Mr. Wilton Kezala
WHO Consultant

Assisted in identifying health learning tasks; developing health curriculum; and supervision of curriculum implementation.

Mr. Clement Ampadu
Consultant and Statistician

Designed statistical guideline; performed statistical analysis and interpretation of the curriculum data after implementation of curriculum.

Mr. David Sua
EDP Consultant

Performed data processing of the coded survey data from 80 Strategic Informants and 320 Household Informants.

Dr. Paul Gulati
Data Processing Specialist

Assisted in formulating the plan of work during the mobilization phase of the project.

Dr. John Fay
Data Processing Specialist

Installed the printer for the microcomputer and analyzed survey data (80 Strategic Informants and 320 Household Informants).

Mr. Lewis A. Smith
Secretary/Data Entry

Performed clerical duties, compiled research and training curriculum data for computer processing and statistical analysis.

Mr. John Yarkpawolo
Driver of the Project

Ms. Sarah Quanah, Ms. Esther Poden
Ms. Yamsah Johnson, Mr. Saa Quigee
Research Assistants

Pre-tested the baseline survey questionnaires; conducted the baseline health survey and coded all survey data.

VOLUNTEERS

Mrs. David Franklin
Assistant Lecturer of the Nursing Division

Mr. Stephen W. Wilson
Political Science Student

Produced the pictorial designs for the Health Curriculum Modules.

TUSKEGEE UNIVERSITY PERSONNEL

Paul L. Wall
Co-Principal Investigator

Overall project management, including coordination and implementation of technical assistance activities.

A. M. S. Rao
Project Evaluation Specialist

Designed and implemented staff training program in module construction and monitoring procedures; participated in all planning activities; assisted in data analysis and interpretation.

Larry W. Noyes
Electronic Data Processing Specialist

Advised on design of data collection procedures, data processing methods, selection and installation of computer equipment and software packages; designed and implemented a staff training program; participated in the analysis and interpretation of data analyses.

Ms. Constance S. Hendricks
Health Curriculum Specialist

Assisted with planning of Health Curriculum Training Workshop, training of trainers and development of curriculum.

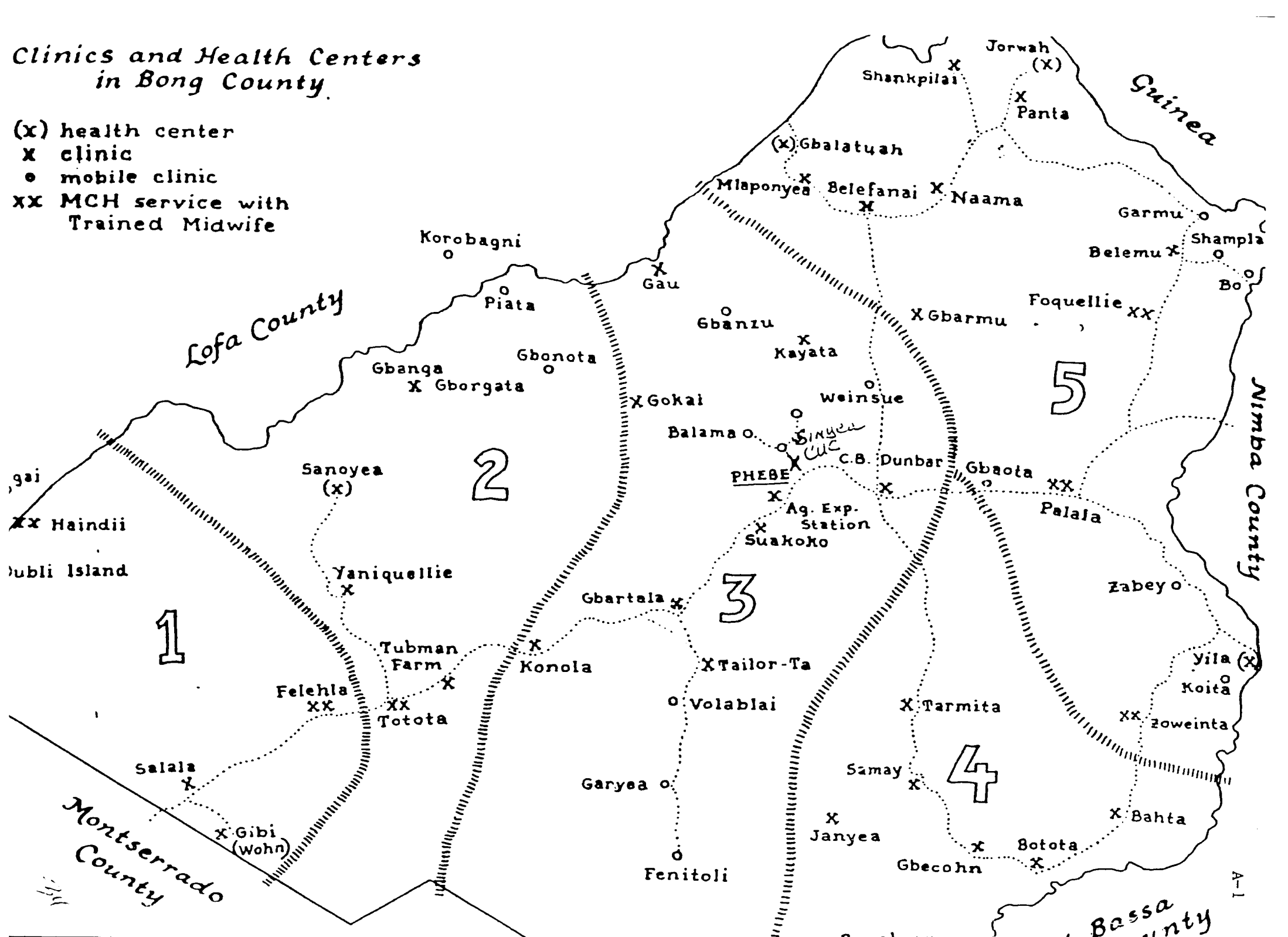
Hortense T. Calhoun
Research Assistant

Designed training materials including: coding manuals, coding procedures and interviewing techniques; developed field instrument; assisted in organizing pre-test survey data; assisted in training of project personnel in the above areas (TU site).

Victor G. Cotten
Database Manager

Responsible for the organization, entry, storage and retrieval of all project data in the TU computer system; responsible for development of analytical statements for processing data via SPSSx software; executed all word processing project needs (TU site).

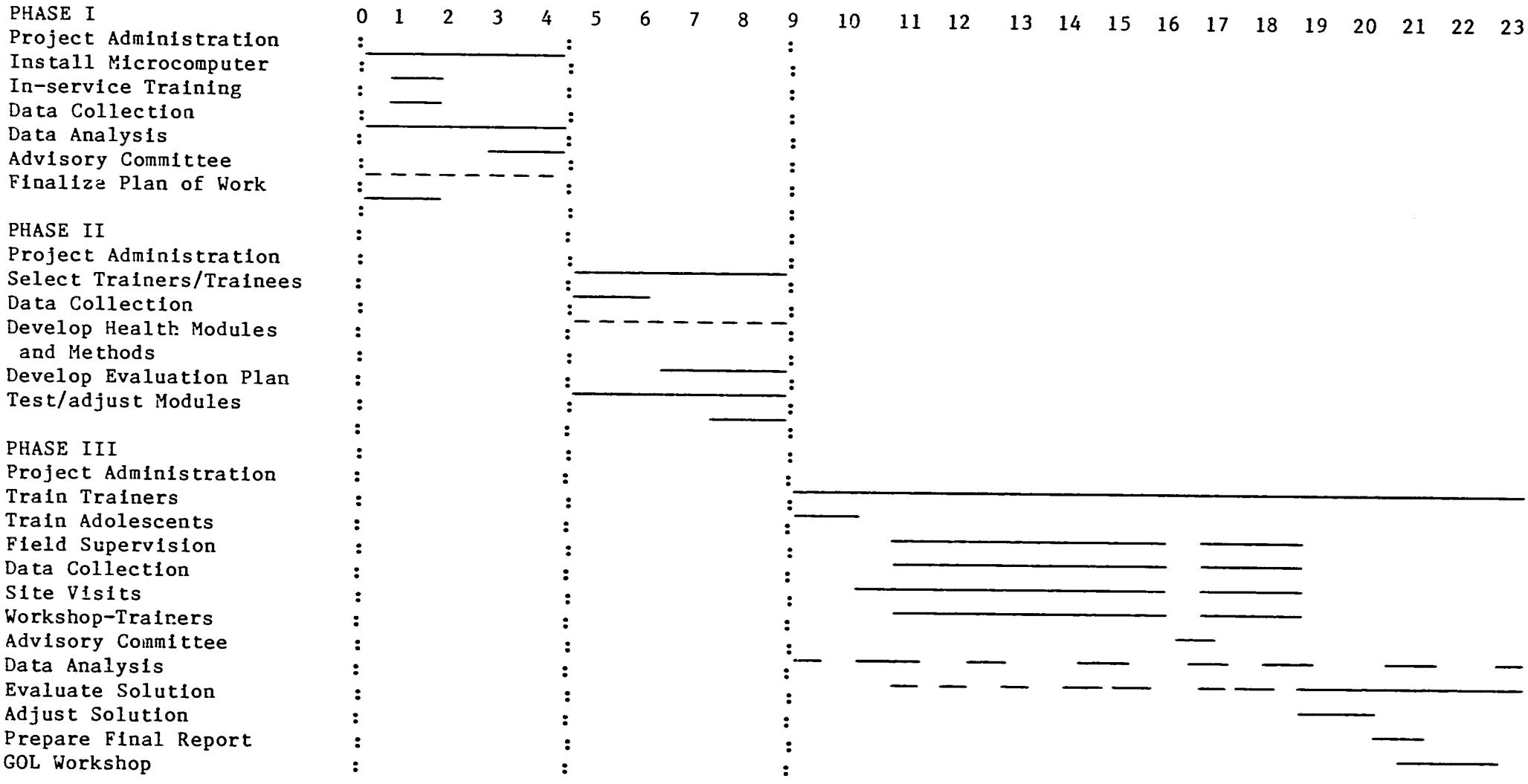
APPENDIX A


Clinics and Health Centers in Bong County
(x) health center
x clinic
• mobile clinic
xx MCH service with Trained Midwife
Jorwah (X)
Shankpilai
Panta
Guinea
(x) Gbalatuah
Mlaponyea
Belefanai
Naama
Garmu
Shampla
Belemu
Bo
Korobagni
Gau
Piata
Lofa County
Gbanzu
Gbarmu
Foquellie
Kayata
Gbonota
Gbanga
Gborgata
Gokai
Weinsue
5
Balama
SINYEA CLC
C.B. Dunbar
Gbaota
Nimba County
PHEBE
Palala
Sanoyea (x)
2
Ag. Exp. Station
Suakoko
Haindii
Yaniquellie
Zabey
Gbartala
3
Tubman Farm
Konola
Tailor-Ta
Yila (x)
Koita
Volablai
Tarmita
Felehla
Totota
Zoweinta
Salala
4
Samay
Garyea
Bahta
Janyea
Botota
Gbecohn
Gibi (Wohn)
Montserrado County
Fenitoli
Bassa
A-1

APPENDIX B

PLAN OF WORK

TIME LINE: April 15, 1984 - March 14, 1986



PHASE I: 4.5 Months **PHASE II: 4.0 Months** **PHASE III: 14.5 Months** **TOTAL TIME: 23 Months**

APPENDIX C

TUSKEGEE UNIVERSITY - CUTTINGTON UNIVERSITY COLLEGE PRICOR PROJECT

"Testing the Effectiveness of Adolescents as Health Promoters in Liberia"

BUDGET

Period: 4/15/84 thru 3/14/86

	Year I	Year II	TOTAL
Personnel (TU)			
P. Wall 15% yr 1 10% yr 2	4,500	3,150	7,650
A. M. S. Rao 10%	2,667	2,800	5,467
L. Noyes 10%	2,700	2,835	5,535
H. Calhoun 10% yr 1	1,400	-	1,400
C. Hendricks 10% year 2	-	2,394	2,394
SUBTOTAL PERSONNEL	11,267	11,179	22,446
Fringe Benefits	1,588	1,580	3,168
Consultant Costs	498	523	1,021
EDP Equipment Leasing	3,240	2,700	5,940
Communications	2,000	2,017	4,017
Supplies	3,000	3,025	6,025
Travel: International	4,816	5,298	10,114
Per Diem	2,856	3,136	5,992
Travel: Domestic	1,476	1,624	3,100
Per Diem	184	202	386
SUBAGREEMENT: CUTTINGTON UNIVERSITY COLLEGE	33,115	36,308	69,423
Indirect Cost	10,346	7,057	17,403
TOTAL	74,386	74,649	149,035

TUSKEGEE UNIVERSITY - CUTTINGTON UNIVERSITY PRICOR PROJECT

"Testing the Effectiveness of Adolescents as Health Promoters in Liberia"

BUDGET REVISIONS

Period: 4/15/84 thru 3/14/86

	Year 1	Revised Year 1	Year 2	Revised Year 2	Total	Revised Total
Personnel	11,267	14,943	11,179	16,614	22,446	31,557
Fringe	1,588	2,017	1,580	2,243	3,168	4,260
Overhead	-	-	-	-	-	-
Consultants	498	498	523	1,021		1,021
Other Direct Costs	8,240	5,000	7,742	5,042	15,982	10,042
Travel	9,332	9,332	10,260	10,260	19,592	19,592
Subagreement	33,115	39,081	36,308	30,479	69,423	69,560
Total Direct Costs	64,040	70,871	67,592	65,161	131,632	136,032
Indirect Costs	10,346	10,384	7,057	7,614	17,403	17,998
TOTAL BUDGET	74,386	81,255	74,649	72,775	149,035	154,030

APPENDIX D

CUTTINGTON UNIVERSITY COLLEGE
Bong County, Liberia

BIMONTHLY FINANCIAL REPORT

Period: _____

CATEGORIES	BUDGET YEAR	EXPENDITURES PRIOR PERIODS	EXPENDITURES THIS PERIOD	CUMULATIVE	BALANCE
Personnel (Direct Labor)					
Overhead on Labor*					
Other Direct Costs: Communications/Postage					
Vehicle Maintenance and Petrol					
Travel & Per Diem: Domestic					
International					
TOTAL BUDGET					

*Includes Fringe Benefits (33% of Personnel Costs)

APPROVED: _____

Form #1

CUTTINGTON UNIVERSITY COLLEGE

Time and Effort Report

Work Assignment Basis of Payroll Distribution

NAME _____ Payroll # _____ SS# _____

SCHOOL/DEPT _____ MONTHLY SALARY _____

MONTH REPORT COVERS _____ PAID ON ACCOUNT # _____

ACTIVITY	% EFFORT
GRANTS AND PROJECTS	
TEACHING	
OTHER	
TOTAL	100%

I certify that the information listed above is correct.

_____ Signature of Faculty Member

_____ Signature of Department Head,Dean or Project Director

Form #2

CUTTINGTON UNIVERSITY COLLEGE
Bong County, Liberia

PERSONNEL ACTION

NAME: LAST-FIRST-MIDDLE	TITLE Mr/Mrs/Ms/Dr	BIRTH DATE (Mo.,Day, Year)	SS#
HOME ADDRESS AND TELEPHONE NUMBER		FRINGE BENEFITS	
NATURE OF ACTION		PERIOD OF EMPLOYMENT	
POSITION TITLE		SALARY	
REMARKS			

For Separation Only (State Reasons)

Signature of Project Direct

Date

Signature of Executive Officer

Date

Form #3

CUTTINGTON UNIVERSITY COLLEGE
Bong County, Liberia

AUTOMOBILE TRIP LOG

DATE	LV FROM	DESTINATION	OBJECTIVE	BEGIN SPEEDOMETER READING	END SPEEDOMETER READING	MILES	AMOUNT
					TOTALS		

Signature: _____

Form #4

CUTTINGTON UNIVERSITY COLLEGE
Bong County, Liberia

EXPENSE ACCOUNT

This form to be used for reporting:
1. Travel expenses
2. Local purchases from advances

Report of expenditures by _____

_____ 19 ____

In connection with _____

Budget Account No. _____

Activity—Give Details on Other Side

DATE		EXPLANATION	Fare		Hotel or Lodging		Meals		Taxi		Telephone Telegram		Other Expenses (Itemize)	

Signature _____ Head of Department _____
(Of person making report)

BUSINESS OFFICE DATA—DO NOT FILL IN

Audited _____ Approved: _____

Grand Total Expenditures	
Amount Advanced	
Cash Returned	

I. A REPORT (ONE COPY) IS DUE AT THE BUSINESS OFFICE NOT LATER THAN ONE WEEK AFTER THE COMPLETION OF ANY ACTIVITY FOR WHICH FUNDS ARE ADVANCED BY TUSKEGEE UNIVERSITY.
II. EXPENDITURES FOR PERSONAL ITEMS WILL NOT BE APPROVED. III. SEE INSTRUCTIONS ON REVERSE.

INSTRUCTIONS

1. A report (one copy) is due at the Business Office not later than one week after the completion of any activity for which funds are advanced by Tuskegee University.

2. Give below a detailed statement of the purpose for which the funds here reported were spent.

3. In case of report of travel expenditures give the necessary information in the proper columns, showing the total of each column. In the space for "Grand Total Expenditures" give the total of expenditures.

4. In case of report of expenditures other than travel use the last column, "Other Expenses," giving explanation under the "Explanation" column, and amounts in the "Other Expenses" column.

5. Give necessary information as to amount advanced, amount spent and difference in the space provided therefor.

6. The report should be signed by the person making the report and head of the department.

7. Be sure to indicate the account to be charged for the expenditures.

DETAILED EXPLANATION OF PURPOSE OF EXPENDITURE

CUTTINGTON UNIVERSITY COLLEGE
Time Record Sheet for Staff Employees

Name _____

Period _____

Date	In	Out	In	Out	Total hrs

Signature of Employee _____

Project Director _____

Form #

APPENDIX E

MEMBERS OF THE PROJECT ADVISORY COMMITTEE

Dr. William S. Salifu, Chairperson (Replacing Dr. Kandakai)*
Academic Dean, Cuttington University College
Coordinator, CUC/TU Linkage Project

Dr. A. F. David*
Bong County Public Health Officer
Phebe Hospital
Suacoco, Bong County

Mr. Julian Kerkula**
Supervisor, Bong County Community Health Department (MOH)
Phebe Hospital
Suacoco, Bong County

Mrs. Rachael Marshall*
Coordinator of Health
Ministry of Health
Monrovia, Liberia

Mrs. Marie Mason**
Regional Supervisor of School (Lofa, Nimba, Bong Counties) (MOE)
Gbarnga, Bong County

Mrs. Janice Vani**
Director, Improved Efficiency for Learning Project (MOE)
Gbarnga, Bong County

Mr. James Suah**
Former Assistant Superintendent
Administrative Building
Gbarnga, Bong County

Mrs. Lucia Cummings**
Member, Primary Health Care Coordinating Committee of Liberia
Lecturer

Dr. D. E. S. Kandakai, Chairperson (Resigned)**
Former Academic Dean

Ms. Janet Moore***
Co-principal Investigator CUC/TU PRICOR Project
Lecturer

* Did not Participate in Nominal Group Technique
** Participated in Nominal Group Technique
*** Convener and Advisor

APPENDIX F

TI-CUC PRICOR PROJECT
Plan of Work
April 15, 1985 - March 14, 1986

Personnel Time Allocations

Phase I, Year 1	Apr	May	Jun	Jul	Aug	Tot
Personnel	1	2	3	4	5	
Moore	7	6	6	6	6	31
Mulbah	4	4	4	4	4	20
Gulati	3	3	3	3	3	15
Kezala	4	6	5	4	4	23
Smith	11	23	21	22	23	100
RA 1	0	0	15	15	15	45
RA 2	0	0	15	15	15	45
Driver	5	12	10	11	12	50
TOT PERS-DAYS	34	54	79	80	82	329

Phase II, Year 1	Sep	Oct	Nov	Dec	Tot
Personnel	6	7	8	9	
Moore	5	5	5	7	22
Mulbah	9	9	9	9	36
Gulati	1	1	2	2	6
Kezala	6	7	8	8	29
Smith	20	23	22	21	86
RA 1	8	8	8	9	33
RA 2	8	8	8	9	33
Driver	10	11	11	11	43
TOT PERS-DAYS	67	72	73	76	288

Phase III, Year 1	Jan	Feb	Mar	Apr	Tot
Personnel	10	11	12	13	
Moore	11	5	5	4	25
Mulbah	15	1	3	3	22
Gulati	7	2	5	4	18
Kezala	15	10	8	6	39
Smith	23	20	21	10	74
RA 1	0	0	0	0	0
RA 2	0	0	0	0	0
Driver	11	10	10	6	37
TOT PERS-DAYS	82	48	52	33	215

*NOTE: Apr = April 1 - April 14

Phase III, Year 2	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Tot
Personnel	13	14	15	16	17	18	19	20	21	22	22	23	
Moore	5	7	7	5	3	7	5	6	6	8	7	6	72
Mulbah	4	10	10	10	5	8	8	4	3	3	5	2	72
Gulati	2	3	3	3	1	3	3	3	3	4	4	4	36
Kezala	5	10	10	11	6	11	11	11	11	11	11	11	119
Smith	11	23	20	23	22	21	23	21	22	23	20	10	239
RA 1	0	0	0	0	0	0	0	0	0	0	0	0	0
RA 2	0	0	0	0	0	0	0	0	0	0	0	0	0
Driver	5	12	10	11	11	10	12	11	11	11	10	5	119
TOT PERS-DAYS	32	65	60	63	48	60	62	56	56	60	57	38	657

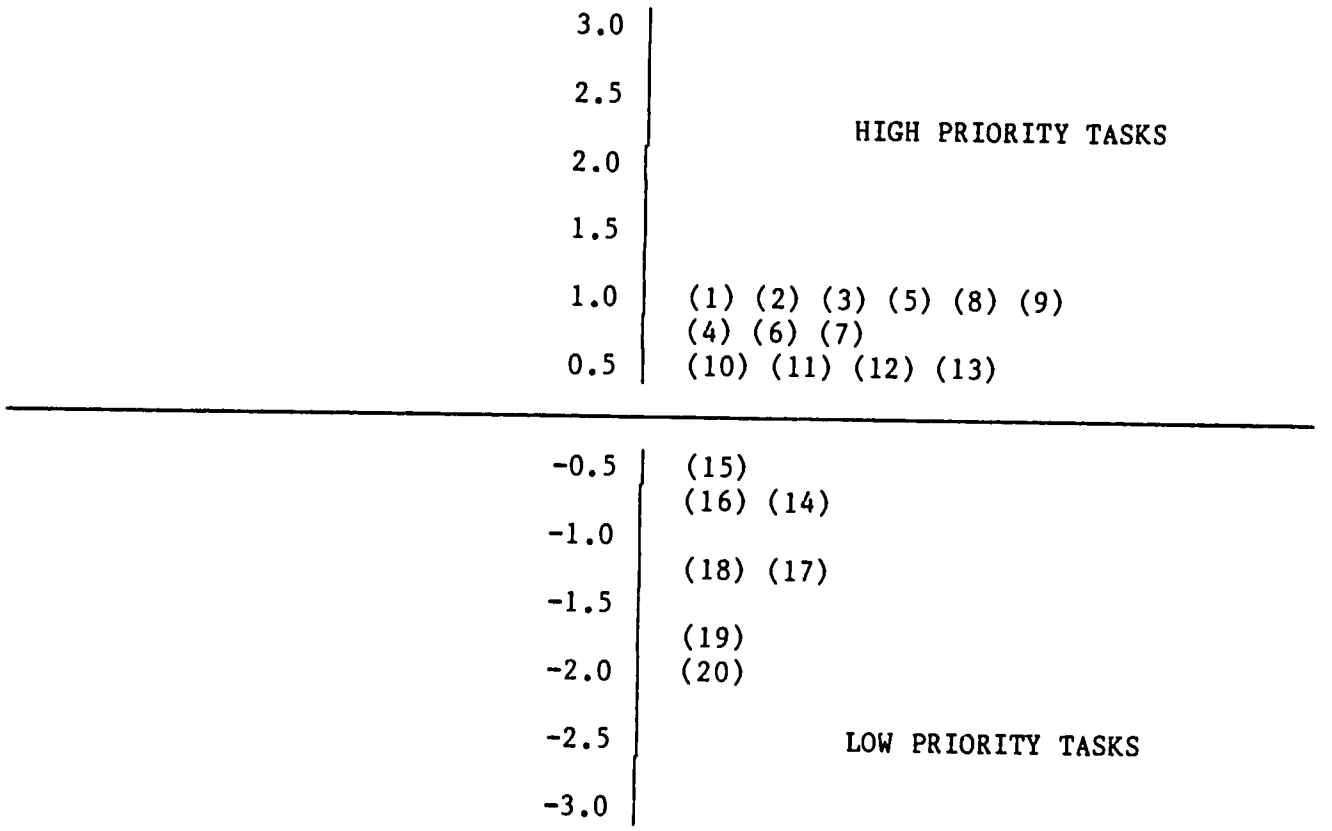
*NOTE: Apr = April 15 - April 30
*NOTE: Mar = March 1 - March 14

APPENDIX G

ANALYSIS OF HEALTH LEARNING TASKS AS RANKED BY PROJECT ADVISORY COMMITTEE

(NOMINAL GROUP TECHNIQUE)

Normalized Standard Score Scale



NUMBER IN PARENTHESIS ( ) REFERS TO HEALTH LEARNING TASKS

HEALTH LEARNING TASKS

TASKS	RANK DISTRIBUTION 1=Lo; 5=Hi; n=6					WGT SCORE	NORM SCORE
	1	2	3	4	5		
1. Seeking/performing immediate first aid in cases of poisoning			1		5	28	.99
2. Proper breast feeding				2	4	28	.99
3. Seeking medical attention in severe cases of poisoning				2	4	28	.99
4. Seeking immediate medical attention in cases of illnesses or disorders		1		1	4	26	.59
5. Digging and properly using latrines			1	1	4	27	.81
6. Seeking/performing first aid, medical attention in cases of accidents			2		4	26	.59
7. Providing balanced diet				4	2	26	.59
8. Practicing good personal hygiene				3	3	27	.81
9. Learning about procuring/storing/ preparing foods; learning about collecting/storing/useing safe water				3	3	27	.81
10. Digging and properly using waste disposal pit		1		2	3	25	.37
11. Learning ways of keeping household articles clean		1		2	3	25	.37
12. Learning about physical contacts with humans and animals that may cause infections			2	2	2	24	.14
13. Preparing and administering oral rehydration solution			1	3	2	25	.37
14. Identifying dangerous areas or items items in the home and surroundings	1	1	1	1	2	20	-.74
15. Keeping household pets and other animals healthy		1	2	1	2	22	-.30
16. Managing skin infections	1	1	1	2	1	19	-.96
17. Using Insecticides	1	1	2	2		17	-1.40
18. Taking precautions in dealing with animals, plants, insects and pets	1	2	1	1	1	17	-1.40
19. Identifying poisonous items found in the home and surroundings	1	2	2		1	16	-1.63
20. Preparing and administering antidotes for poisoning	2	1	2	1		14	-2.07

APPENDIX H

PROFILE OF TRAINERS (TEACHERS)

Level of Education	Number
High school graduate	10
Teacher training graduate	3
Some college training	1
College graduate	1
	15

Teaching Experience	Number
1 - 5 years	6
6 - 10 years	5
11 - 20 years	3
no data	1
	15

Teacher Certification Status	Number
Certified	6
Not certified	9
	15

APPENDIX I

TABLE 1

ENVIRONMENTAL HEALTH PRACTICES

VARIABLES	RESPONSES		
	PERCENT YES	PERCENT NO	N
Do you agree that using clean water can prevent illnesses?	97%	3%	318
Do you store water in covered container?	93%	7%	320
Does drinking water come from a well?	86%	14%	320
Does family have a household pit latrine?	60%	40%	320
Does family use bush for toilet?	59%	41%	320
Does drinking water come from a pond?	38%	62%	320
Do you use a pit for garbage disposal?	29%	71%	320
Does family use a communal pit latrine?	21%	79%	320
Do you burn your garbage?	16%	84%	320
Do you use compost for garbage disposal?	11%	89%	320
Does family use stream for toilet?	11%	89%	320
Do you bury your garbage?	5%	95%	320
Does drinking water come from river/stream?	4%	96%	320
Do you boil water before drinking?	3%	97%	320
Do you filter water before drinking?	2%	98%	320

TABLE 2

FAMILY HISTORY OF EXPERIENCES WITH HEALTH PROBLEMS

VARIABLES	RESPONSES		
	PERCENT YES	PERCENT NO	N
Malaria	97%	3%	320
Worms	83%	17%	320
Diarrhea/vomiting	80%	20%	320
Insect bites	72%	28%	320
Measles	71%	29%	320
Lice	68%	32%	320
Pneumonia	58%	42%	320
Eye/Ear infection	58%	42%	320
Dental problems	48%	52%	320
Scabies	40%	60%	320
Asthma	39%	61%	320
Malnutrition	33%	67%	314
Cholera	31%	69%	318
Snake bites	28%	72%	320
Dog bites	26%	74%	320
Tetanus	22%	78%	320
Accidents	20%	80%	320
Other health proble	15%	85%	320
Food poisoning	8%	92%	320

TABLE 3

FAMILY HEALTH PRACTICES

VARIABLES	RESPONSES		
	PERCENT YES	PERCENT NO	N
Do you give pills for fevers?	98%	2%	320
Do you use rest for fevers?	97%	3%	320
Do you give liquids for fevers?	93%	7%	320
Do you give child tablets for diarrhea?	93%	7%	319
Do you give cough mixture for fevers?	88%	12%	320
Do you give sponge baths for fevers?	85%	15%	320
Do you take children to health center for diarrhea?	78%	22%	320
Do you give child herbs for diarrhea?	66%	34%	319
Do you use isolation for fevers?	60%	40%	320
Do you go to health workers for fevers?	53%	47%	320
Do you take child to village health worker?	36%	64%	320
Do you give child salt/sugar solution for diarrhea?	28%	72%	319
Do you take child to traditional healer?	19%	81%	318

TABLE 4

FAMILY HISTORY OF EXPERIENCES WITH ACCIDENTS AND BITES

VARIABLES	RESPONSES		
	PERCENT YES	PERCENT NO	N
Has any family member had insect bites?	50%	50%	320
Has any family member had snake bites?	30%	70%	320
Has any family member had dog bites?	25%	75%	320
Has any family member had severe cuts?	23%	77%	318
Has any family member had scorpion bites?	22%	78%	320
Has any family member had bone fracture?	20%	30%	320
Has any family member had auto accident in last two (2) years?	17%	83%	320
Has any family member had severe burns?	16%	84%	320
Has any family member had major head injuries?	9%	91%	320
Has any family member been a victim of accidental poisoning?	9%	91%	320
Has any family member had spider bites?	6%	94%	320

TABLE 5

FAMILY KNOWLEDGE OF HEALTH CARE SOURCES

VARIABLES	RESPONSES		
	PERCENT YES	PERCENT NO	N
In treating health problems, would you			
go to zoe/herbalists?	34%	66%	319
go to bonesetters?	14%	86%	319
go to traditional midwives?	40%	60%	319
go to trained midwives?	31%	69%	320
go to other health workers?	44%	56%	320
go to Phebe Hospital?	98%	2%	320

TABLE 6

FAMILY ATTITUDES TOWARD HEALTH CARE

VARIABLES	RESPONSES			
	PERCENT AGREE	PERCENT UNCERTAIN	PERCENT DISAGREE	N
Do you agree that everyone should wash their hands after toileting?	99%	0%	1%	320
Would you agree that more health workers in this village would be useful?	100%	0%	0%	320
Do you agree that clean, sanitary latrines promote good health in the village?	98%	0%	2%	320

TABLE 7

ADOLESCENT CULTURAL TASKS

VARIABLES	RESPONSES		
	PERCENT YES	PERCENT NO	N
Do your children brush their teeth?	77%	23%	320
Do your children bath/wash hands?	76%	24%	320
Do your children run errands?	74%	26%	320
Do your children comb their hair?	74%	26%	320
Do your children wash dishes?	72%	28%	320
Do your children dispose of waste?	71%	29%	320
Do your children care for younger children?	70%	30%	320
Do your children sweep the floors?	69%	31%	320
Do your children wash clothes?	68%	32%	320
Do your children fetch water?	65%	35%	320
Do your children sweep the yard/environment?	61%	39%	320
Do your children makeup the beds?	57%	43%	320
Do your children cook?	51%	49%	320
Do your children cut/gather wood?	48%	52%	314
Do your children sell foods at market?	36%	64%	320
Do your children scrub floors?	24%	76%	320
Do your children farm?	22%	78%	320
Do your children clear the bush?	16%	84%	320
Do your children help make roads?	12%	88%	320
Do your children hunt?	11%	89%	320
Do children dig wells?	9%	91%	320
Do children dig latrines?	8%	92%	320
Do children build house	8%	92%	320

TABLE 8

DIFFERENCES BETWEEN HOUSEHOLD HEALTH BELIEFS, PRACTICES, PERCEPTIONS AND ATTITUDES IN FOUR COMMUNITIES

	COMMUNITIES				SIGNIFICANCE LEVEL OF F
	1	2	3	4	
	MEAN	MEAN	MEAN	MEAN	
SOURCE OF DRINKING WATER					
Pond	2.00	1.53	1.96	1.00	.001
Stream	2.00	1.86	1.99	1.99	.001
Well	1.01	1.56	1.00	1.00	.001
SAFE WATER PRACTICES					
Store in covered container	1.10	1.00	1.09	1.11	.01
Boil water	1.96	2.00	1.96	1.95	ns
Filter water	1.94	1.96	2.00	2.00	.05
GARBAGE DISPOSAL PRACTICES					
Bury garbage	1.85	1.97	2.00	1.97	.001
Compost garbage	1.67	1.96	1.96	1.95	.001
Use garbage pit	1.09	1.91	1.90	1.92	.001
Burn garbage	1.79	1.79	1.86	1.91	ns
HUMAN WASTE DISPOSAL PRACTICES					
Communal pit latrine	1.46	2.00	1.70	2.00	.001
Household pit latrine	1.45	1.39	1.49	1.27	.05
Bush	1.44	1.61	1.52	1.05	.001
Stream	1.94	2.00	1.71	1.91	.001

TABLE 8 (Continued)

	COMMUNITIES 1	2	3	4	SIGNIFICANCE LEVEL OF F
	MEAN	MEAN	MEAN	MEAN	
FAMILY PERCEPTIONS OF HEALTH PROBLEMS					
pneumonia a problem	1.55	1.31	1.47	1.34	.01
malaria a problem	1.01	1.01	1.01	1.08	.01
measles a problem	1.69	1.10	1.27	1.11	.001
scabies a problem	1.86	1.80	1.49	1.25	.001
lice a problem	1.81	1.12	1.30	1.06	.001
worms a problem	1.49	1.04	1.10	1.05	.001
asthma a problem	1.57	1.54	1.55	1.76	.01
food poisoning a problem	1.96	1.95	1.91	1.84	.05
ear and eye problems	1.64	1.36	1.32	1.36	.001
tetanus a problem	1.94	1.91	1.76	1.52	.001
dental problem a problem	1.74	1.40	1.39	1.56	.001
dog bites a problem	1.77	1.87	1.77	1.52	.001
snake bites a problem	1.84	1.92	1.76	1.34	.001
insect bites a problem	1.05	1.97	1.09	1.00	.001
accidents a problem	1.77	1.90	1.77	1.73	ns
other problems	1.47	1.99	1.96	1.99	.001
diarrhea a problem	1.30	1.14	1.14	1.22	.05
malnutrition a problem	1.89	1.56	1.80	1.45	.001
cholera a problem	1.84	1.82	1.62	1.49	.001
skin diseases	1.79	1.85	1.75	1.39	.001
accidental poisoning	1.91	1.92	1.97	1.82	.01

TABLE 8 (Continued)

	COMMUNITIES 1	2	3	4	SIGNIFICANCE LEVEL OF F
	MEAN	MEAN	MEAN	MEAN	
FAMILY EXPERIENCE IN TREATING HEALTH PROBLEMS					
go to zoe herbalist	1.67	1.96	1.80	1.26	.001
go to bone setter	1.84	1.96	1.86	1.86	ns
go to traditional midwife	1.65	1.99	1.81	1.01	.001
go to trained midwife	1.34	1.97	1.47	1.97	.001
go to other health workers	1.12	1.82	1.31	1.99	.001
go to health clinic	1.01	1.11	1.04	1.27	.001
go to Phebe Hospital	1.00	1.03	1.00	1.02	ns
FAMILY BELIEFS ABOUT CAUSES OF DIARRHEA					
polluted water	1.00	1.00	1.05	1.00	.01
bad breast milk	1.14	1.01	1.01	1.05	.001
witchcraft	1.82	2.00	2.48	2.10	ns
teething	1.39	1.42	1.75	1.05	.001
poor waste disposal	1.09	1.80	1.41	1.02	.001
contamination	1.01	1.01	1.05	1.00	ns
FAMILY ATTITUDES TOWARD SELECTED HEALTH PRACTICES					
wash hands after toileting	1.00	1.00	1.00	1.05	ns
additional health worker needed in community	1.00	1.00	1.00	1.03	ns
clean water prevents illnesses	1.01	1.00	1.20	1.06	ns

TABLE 8 (Continued)

	COMMUNITIES 1	2	3	4	SIGNIFICANCE LEVEL OF F
	MEAN	MEAN	MEAN	MEAN	
FAMILY PRACTICES IN TREATMENT OF DIARRHEA					
go to health center	1.00	1.75	1.06	1.05	.001
use native herbs	1.22	1.42	1.61	1.16	.001
use salt/sugar solution	1.26	1.91	1.95	1.85	.001
use tablets	1.02	1.14	1.16	1.05	ns
go to traditional healer	1.70	2.00	1.76	1.76	.001
go to VHW	1.66	1.74	1.19	1.99	.001
FAMILY PRACTICES IN TREATMENT OF FEVERS					
give sponge baths	1.00	1.14	1.21	1.24	.001
give cough mixture	1.02	1.07	1.36	1.01	.001
give pills	1.00	1.01	1.05	1.00	.05
rest	1.00	1.02	1.04	1.07	ns
give liquids	1.00	1.11	1.09	1.07	.05
isolate	1.08	1.05	1.45	2.00	.001
go to health worker	1.06	1.77	1.14	1.90	.001
FAMILY EXPERIENCES WITH BITES AND INJURIES					
snake bites	1.77	1.82	1.79	1.42	.001
dog bites	1.82	1.81	1.80	1.55	.001
spider bites	2.00	1.92	1.99	1.84	.001
scorpion bites	1.86	1.85	1.91	1.50	.001
other insects	1.00	1.95	1.15	1.91	.001
auto accidents	1.86	1.89	1.92	1.66	.001
bone fractures	1.80	1.75	1.89	1.76	ns
severe cuts	1.82	1.82	1.76	1.63	.05
severe burns	1.90	1.82	1.91	1.71	.01
severe head injuries	1.77	1.92	1.96	1.96	.001

TABLE 9

MEANS AND STANDARD DEVIATIONS OF PRETEST SCORES BY SEX AND SCHOOL FOR EACH OF SIX MODULES

MODULES

	ORAL HYGIENE		NUTRITION		SKIN DISEASES		ACCIDENTS & POISONS		INTESTINAL DISEASES		MALARIA & GERMS	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SEX:												
Male	44.77	20.13	39.53	14.89	69.98	12.66	32.76	15.15	59.25	12.71	67.20	15.64
Female	52.21	24.44	44.87	17.14	61.66	18.33	29.25	12.68	56.53	13.54	68.14	17.98
TOTAL	46.68	21.32	40.75	15.48	67.71	14.74	31.61	14.46	58.49	12.93	67.45	16.20
SCHOOLS:												
Gibson	61.48	18.65	46.66	15.28	58.33	14.34	29.54	14.30	58.82	12.69	63.91	15.59
Suacoco	39.60	15.09	35.94	13.96	68.06	10.11	31.02	13.26	58.80	10.99	67.66	15.98
Taylor Ta	41.50	17.00	36.00	23.12	85.00	30.00	57.50	12.58	60.00	18.25	72.50	25.00
Fejue	42.85	30.60	51.38	13.55	78.46	12.81	32.14	14.76	61.25	10.87	72.85	14.37
TOTAL	46.68	21.32	40.75	15.48	67.71	14.74	31.61	14.46	58.49	12.93	67.45	16.20

TABLE 10

MEANS AND STANDARD DEVIATIONS OF POST TEST SCORE BY SEX AND SCHOOL FOR EACH OF SIX MODULES

MODULES

	ORAL HYGIENE		NUTRITION		SKIN DISEASES		ACCIDENTS & POISONS		INTESTINAL DISEASES		MALARIA & GERMS	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SEX:												
Male	56.06	22.20	59.89	19.04	77.37	12.30	39.24	21.21	69.68	18.59	73.10	19.64
Female	52.90	26.56	51.12	14.75	65.08	12.91	37.83	18.50	60.34	15.46	65.55	30.80
TOTAL	55.64	23.51	57.60	18.37	73.75	13.55	38.67	20.44	66.77	18.12	71.08	23.23
SCHOOLS:												
Gibson	64.16	27.14	52.75	14.99	64.45	10.97	42.27	24.08	62.35	14.37	52.17	29.38
Suacoco	49.13	18.10	59.96	18.96	75.31	12.65	34.42	14.00	67.80	17.87	73.16	18.08
Taylor Ta	83.50	19.05	80.50	24.88	91.75	16.50	65.00	31.09	92.50	15.00	92.50	5.00
Fejue	52.57	25.38	50.92	14.77	80.00	10.00	37.14	27.01	69.37	16.52	87.14	11.38
TOTAL	55.64	23.51	57.60	18.37	73.75	13.55	38.67	20.44	66.77	18.12	71.08	23.23

TABLE 11

MODULE: ORAL HYGIENE

F ANALYSIS OF ABSOLUTE GAINS IN HEALTH KNOWLEDGE BY SCHOOL, AGE, AND SEX

INDEPENDENT VARIABLE	N	PRETEST MEAN	POSTTEST MEAN	DIFFERENCE MEAN	DIFFERENCE SD
SCHOOLS					
G. W. Gibson	25	61.48	64.16	2.68	21.38
Suacoco	45	39.60	49.13	9.53	15.12
Taylor Ta	4	41.50	83.50	42.00	16.67
Fejue	14	42.85	52.57	9.71	24.37
				F = 4.29	
				DF = 3	
				SIG = .01	
AGE					
12 - 18	70	46.47	53.61	7.14	19.57
19 - 22	14	45.14	61.78	16.64	21.70
				F = 3.04	
				DF = 1	
				SIG = ns	
SEX					
Male	63	44.77	56.06	11.11	18.93
Female	22	52.21	52.90	1.57	21.76
				F = 3.03	
				DF = 1	
				SIG = ns	

TOTAL PERCENT VARIANCE EXPLAINED: 19.5

TABLE 12

MODULE: NUTRITION

F ANALYSIS OF ABSOLUTE GAINS IN HEALTH KNOWLEDGE BY SCHOOL, AGE, AND SEX

INDEPENDENT VARIABLE	N	PRETEST MEAN	POSTTEST MEAN	DIFFERENCE MEAN	DIFFERENCE SD
SCHOOLS					
G. W. Gibson	24	46.66	52.75	6.08	23.48
Suacoco	55	35.94	59.96	24.02	20.55
Taylor Ta	4	36.00	80.50	44.50	45.88
Fejue	13	51.38	50.92	-0.46	15.48
				F = 5.59	
				DF = 3	
				SIG = .01	
AGE					
12 - 18	77	40.54	56.28	15.74	23.92
19 - 22	15	39.13	67.60	28.46	27.06
				F = 4.11	
				DF = 1	
				SIG = .05	
SEX					
Male	73	39.56	60.10	20.54	24.15
Female	22	44.90	50.72	5.81	23.43
				F = 5.95	
				DF = 1	
				SIG = .05	

TOTAL PERCENT VARIANCE EXPLAINED: 23.8

TABLE 13

MODULE: SKIN DISEASES

F ANALYSIS OF ABSOLUTE GAINS IN HEALTH KNOWLEDGE BY SCHOOL, AGE, AND SEX

INDEPENDENT VARIABLE	N	PRETEST MEAN	POSTTEST MEAN	DIFFERENCE MEAN	DIFFERENCE SD
SCHOOLS					
G. W. Gibson	24	58.33	64.45	6.12	12.96
Suacoco	47	68.06	75.31	7.25	11.15
Taylor Ta	4	85.00	91.75	6.75	13.50
Fejue	13	78.46	80.00	1.53	14.05
				F = 1.06	
				DF = 3	
				SIG = ns	
AGE					
12 - 18	70	68.12	73.28	5.15	11.88
19 - 22	13	65.38	79.00	13.61	12.31
				F = 5.50	
				DF = 1	
				SIG = .05	
SEX					
Male	62	69.98	77.37	7.38	11.19
Female	24	61.66	64.87	3.20	14.47
				F = .87	
				DF = 1	
				SIG = ns	

TOTAL PERCENT VARIANCE EXPLAINED: 11.03

TABLE 14

MODULE: ACCIDENTS AND POISONS

F ANALYSIS OF ABSOLUTE GAINS IN HEALTH KNOWLEDGE BY SCHOOL, AGE, AND SEX

INDEPENDENT VARIABLE	N	PRETEST MEAN	POSTTEST MEAN	DIFFERENCE MEAN	DIFFERENCE SD
SCHOOLS					
G. W. Gibson	22	29.54	42.27	12.72	22.29
Suacoco	49	31.02	34.42	3.40	14.27
Taylor Ta	4	57.50	65.00	7.50	39.57
Fejue	14	32.14	37.14	5.00	34.58
				F = 1.29	
				DF = 3	
				SIG = ns	
AGE					
12 - 18	71	31.83	38.40	6.57	21.60
19 - 22	14	35.71	40.71	5.00	23.12
				F = .61	
				DF = 1	
				SIG = ns	
SEX					
Male	64	32.96	38.90	5.93	23.00
Female	24	30.00	37.37	7.37	18.81
				F = .40	
				DF = 1	
				SIG = ns	

TOTAL PERCENT VARIANCE EXPLAINED: 5.2

TABLE 15

MODULE: INTESTINAL DISEASES

F ANALYSIS OF ABSOLUTE GAINS IN HEALTH KNOWLEDGE BY SCHOOL, AGE, AND SEX

INDEPENDENT VARIABLE	N	PRETEST MEAN	POSTTEST MEAN	DIFFERENCE MEAN	DIFFERENCE SD
SCHOOLS					
G. W. Gibson	17	58.82	62.35	3.52	18.00
Suacoco	50	58.80	67.80	9.00	19.08
Taylor Ta	4	60.00	92.50	32.50	12.58
Fejue	16	61.25	69.37	8.12	17.59
				F = 2.69	
				DF = 3	
				SIG = ns	
AGE					
12 - 18	65	60.15	67.23	7.07	18.85
19 - 22	12	58.33	76.66	18.33	15.27
				F = 4.02	
				DF = 1	
				SIG = .05	
SEX					
Male	61	60.49	70.49	10.00	20.16
Female	26	56.53	62.69	6.15	15.76
				F = .16	
				DF = 1	
				SIG = ns	

TOTAL PERCENT VARIANCE EXPLAINED: 14.7

TABLE 16

MODULE: MALARIA AND GERMS

F ANALYSIS OF ABSOLUTE GAINS IN HEALTH KNOWLEDGE BY SCHOOL, AGE, AND SEX

INDEPENDENT VARIABLE	N	PRETEST MEAN	POSTTEST MEAN	DIFFERENCE MEAN	DIFFERENCE SD
SCHOOLS					
G. W. Gibson	23	63.91	52.17	-11.73	30.39
Suacoco	60	67.66	73.16	5.50	13.95
Taylor Ta	4	72.50	92.50	20.00	21.60
Fejue	14	72.85	87.14	14.29	12.83
				F = 5.97	
				DF = 3	
				SIG = .001	
AGE					
12 - 18	79	67.21	71.01	3.79	21.01
19 - 22	16	70.00	74.37	4.37	23.37
				F = .11	
				DF = 1	
				SIG = ns	
SEX					
Male	74	67.56	73.10	5.54	18.29
Female	27	68.14	65.55	-2.59	26.25
				F = 3.56	
				DF = 1	
				SIG = ns	

TOTAL PERCENT VARIANCE EXPLAINED: 19.4

TABLE 17

PRETEST POSTTEST CORRELATIONS FOR EACH MODULE

MODULES	N	PRETEST MEANS	POSTTEST MEANS	r	p
ORAL HYGIENE	89	55.64	46.68	.60	.001
NUTRITION	99	57.60	40.75	-.02	ns
SKIN DISEASES	89	73.75	67.71	.63	.001
ACCIDENTS/POISONS	93	38.67	31.36	.28	.01
INTESTINAL DISEASES	95	66.77	58.49	.20	.05
MALARIA/GERMS	101	71.08	67.45	.48	.001
ALL MODULES		60.64	52.12	.56	.001

TABLE 18

SIGNIFICANCE LEVELS OF F-TESTS FOR
MAIN EFFECTS, COVARIATES AND INTERACTION EFFECTS
COMPARING ALL MODULES ON PRETEST AND POSTTEST DIFFERENCES

SOURCE OF VARIATION	MODULES: ORAL HYGIENE	NUTRITION	SKIN DISEASES	ACCIDENTS & POISONS	INTESTINAL DISEASES	MALARIA & GERMS
COVARIATES:	0.002	0.000	0.000	0.000	0.003	0.028
Age (in Years)	0.857	0.746	0.237	0.969	0.893	0.449
Pretest	0.000	0.000	0.000	0.000	0.001	0.010
MAIN EFFECTS:	0.603	0.047	0.009	0.153	0.333	0.010
Sex	0.216	0.104	0.011	0.663	0.431	0.399
School	0.951	0.127	0.173	0.089	0.274	0.000
2-WAY INTERACTIONS:						
Sex School	0.013	0.755	0.061	0.271	0.709	0.119
VARIANCE EXPLAINED (all sources combined)	0.003	0.000	0.000	0.001	0.028	0.000
Average Gain	+8.73	+17.82	+6.48	+6.32	+8.83	+3.89
% Explained Variance	27.4%	50.1%	37.9%	25.5%	27.1%	29.3%

TABLE 19

COMPARISON BETWEEN INCLUSION AND EXCLUSION OF TAYLOR TA SCHOOL DATA USING A TABLE OF SIGNIFICANCE LEVELS FOR F-TESTS FOR MAIN EFFECTS, COVARIATES AND INTERACTION EFFECTS ACROSS ALL MODULES

SOURCE OF VARIATION	ORAL HYGIENE	NUTRITION	SKIN DISEASES	ACCIDENTS & POISONS	INTESTINAL DISEASES	MALARIA & GERMS
COVARIATES:	0.001 (0.002)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.001 (0.003)	0.014 (0.028)
Years	0.257 (0.857)	0.372 (0.746)	0.092 (0.237)	0.475 (0.969)	0.346 (0.893)	0.946 (0.449)
Pretest	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.001)	0.004 (0.010)
MAIN EFFECTS:	0.007 (0.603)	0.021 (0.047)	0.014 (0.009)	0.103 (0.153)	0.034 (0.333)	0.000 (0.010)
Sex	0.218 (0.216)	0.116 (0.104)	0.011 (0.011)	0.679 (0.663)	0.440 (0.431)	0.412 (0.399)
School	0.009 (0.951)	0.054 (0.127)	0.240 (0.173)	0.059 (0.089)	0.027 (0.274)	0.000 (0.000)
2-WAY INTERACTIONS:	0.013 (0.013)	0.696 (0.755)	0.054 (0.061)	0.310 (0.271)	0.706 (0.709)	0.103 (0.119)
Sex School	0.013 (0.013)	0.696 (0.755)	0.54 (0.061)	0.310 (0.271)	0.706 (0.709)	0.013 (0.119)
EXPLAINED:	0.000 (0.003)	0.000 (0.000)	0.000 (0.000)	0.001 (0.001)	0.003 (0.028)	0.000 (0.000)