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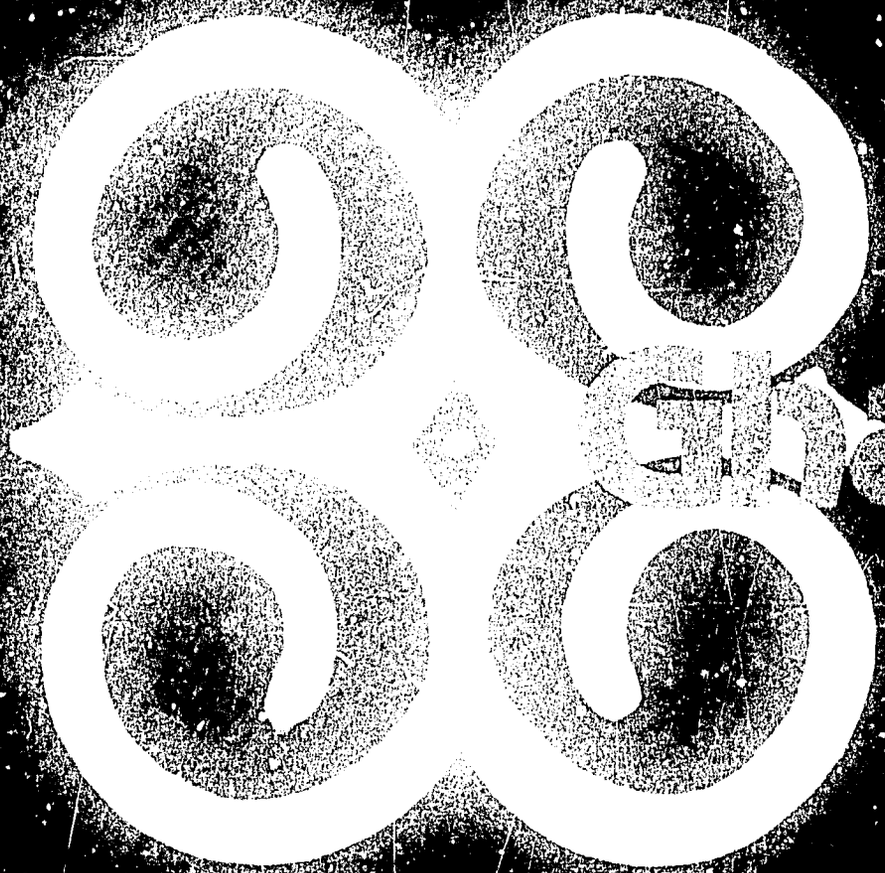
summary conclusions and recommendations



Danfa Project

summary conclusions and recommendations

Ghana

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School of Public Health
Los Angeles, California 90024

DANFA PROJECT - FINAL REPORT

CORRIGENDUM

The following corrections/additions refer to Appendix 10: Personnel

I. GHANAIAN STAFF

F. University of Ghana Campus at Legon

4. Demographer - Dr. G.M.K. Kpedekpo
   Full time: 1970-1971
   Short-term consultant: 1971-1979

II. UCLA STAFF

B. At Los Angeles Campus

2. Faculty - Ms. Cheryl E. Servais: 1972
5. Editors -
   Ms. Melinda Alpaugh Ojermark:
   1977-1978
8. Demographer - Dr. J.C. Bhatia
   Consultant: 1975-1977
   Full time: 1977-1979
9. Computer Programming Consultants -
   Dr. Pat Britt: 1970-1979
   Ms. Lili Sohrab: 1975
10. Mass Media Specialist -
    Mrs. Mona Yazdi Grieser
    Consultant: 1975-1978

THE DANFA COMPREHENSIVE RURAL HEALTH

AND

FAMILY PLANNING PROJECT, GHANA

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

FROM

THE FINAL REPORT

September 30, 1979

The University of Ghana Medical School
Department of Community Health
P.O. Box 4236
Accra, Ghana

UCLA School of Public Health
Division of Population, Family
and International Health
University of California
Los Angeles, California 90024

THIS DOCUMENT IS NOT THE FINAL REPORT

This document contains only three of the twenty-two major sections and appendices of the Danfa Project Final Report. Herein will be found:

THE PREFACE
TABLE OF CONTENTS (of complete Final Report)
MAP OF PROJECT DISTRICT
SUMMARY
CONCLUSIONS AND RECOMMENDATIONS
APPENDIX-10: PERSONNEL
APPENDIX 8: PUBLICATIONS AND REPORTS
(Excluding A8.4 Summary of Publications)

If interested in obtaining a copy of complete report, the reader should write to either:

Dr. S. Ofosu-Amaah
The University of Ghana Medical School
Department of Community Health
P.O. Box 4236
Accra, Ghana

Dr. Alfred K. Neumann
UCLA School of Public Health
Division of Population, Family
and International Health
University of California
Los Angeles, California 90024

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PREFACE

The Danfa Comprehensive Rural Health and Family Planning Project, with its focus on service, teaching and research in rural health care represents the fruition of plans set into motion during the nineteen sixties. At that time, Ghanaian planners saw the need to systematically improve methods of providing rural primary health care which included family planning. The Danfa Project was initiated by the University of Ghana Medical School and the Project has become the cornerstone of the Medical School's program of teaching and research in rural health care.

External assistance was sought by Ghana to accelerate the normal process of institution building required to meet all Danfa Project objectives. In 1969, the United States Agency for International Development provided funds for a feasibility study. This funding continued with the major Danfa contract in 1970. Under terms of this agreement with Ghana, AID negotiated a contract with the University of California at Los Angeles School of Public Health (UCLA). This marked the beginning of a remarkably harmonious and productive relationship. The main role of UCLA was to provide an extra pair of hands to help primarily with research and secondarily with training. The AID contract ended in September 1979 and facilitated work in a variety of areas which is reported in these pages.

Well before the end of the AID Danfa contract, the decision had been made by the University of Ghana Medical School to continue the basic program of service, teaching and research developed during the life of the Project. New staff positions were created which were filled by Danfa trainees and appropriate fiscal allocations to facilitate their work were made by the Government of Ghana. The value of the Project has been recognized and the Government of Ghana has made the decision to continue the Project with its own resources at the expiry of the AID contract. The continuing collaboration between the University of California and the University of Ghana is linked in an institutional arrangement of long standing.

Those associated with the Danfa Project, or simply "Danfa" as it has come to be called, feel a great sense of pride and gratitude in being associated with a project that has so much practical significance for health care in Ghana and which continues to have excellent support there.

Dr. S. Ofosu-Amaah,
Danfa Project Codirector
University of Ghana Medical School

Dr. Alfred K. Neumann,
Danfa Project Codirector
University of California, Los Angeles

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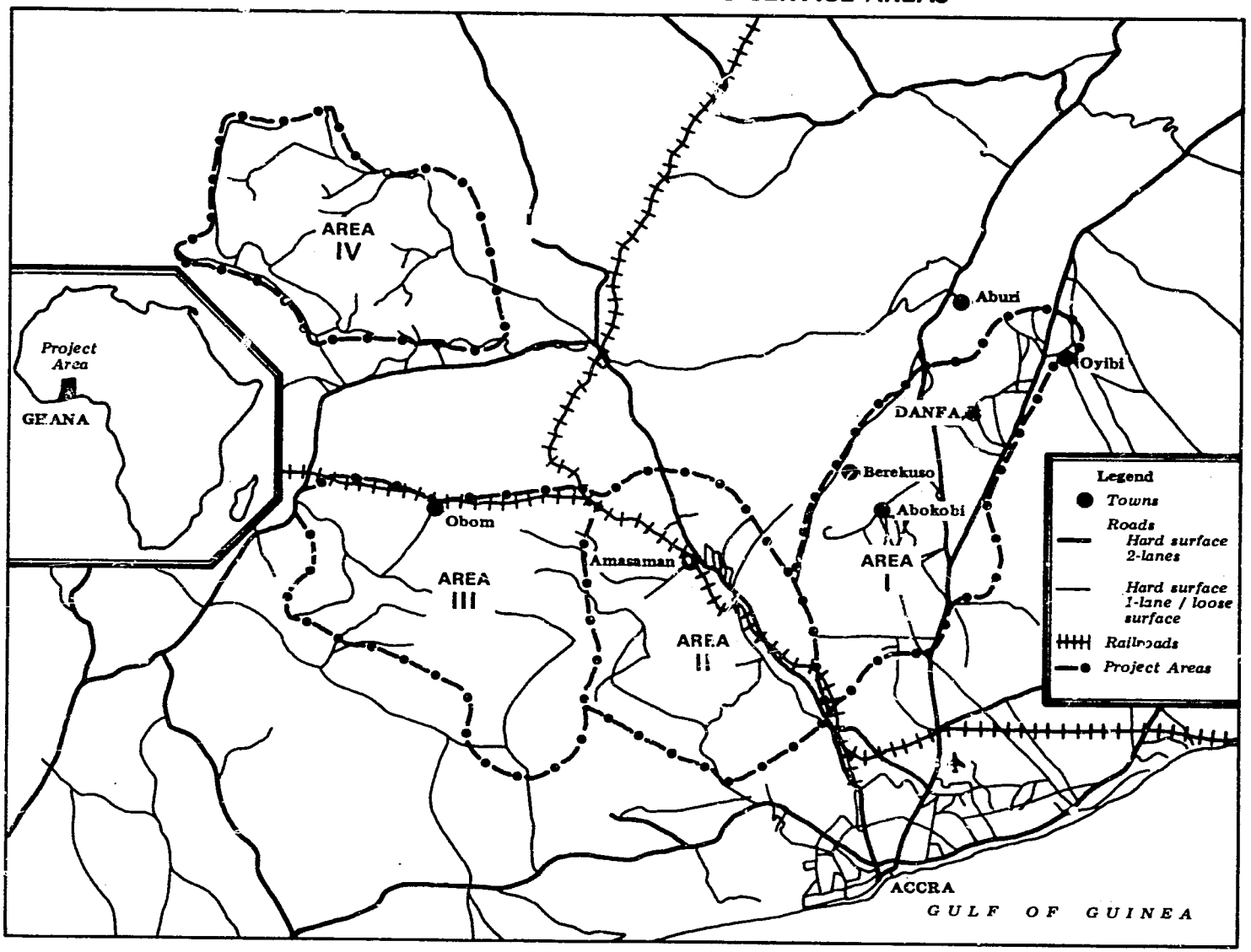

ABBREVIATIONS

AID	United States Agency for International Development (or USAID)
DCH	Department of Community Health, University of Ghana Medical School
GNFPP	Ghana National Family Planning Programme
HC	Health Center
HCS	Health Center Superintendent
HEA	Health Education Assistant
IDS	Institute of Development Studies, University of Sussex, U.K.
ISSER	Institute for Statistical, Social and Economic Research, University of Ghana
IUD	Intrauterine Device
MCH	Maternal and Child Health
MFU	Medical Field Unit
MO	Medical Officer
MOH	Ministry of Health, Ghana
PAC	Policy Advisory Committee
PHN	Public Health Nurse
PPAG	Planned Parenthood Association of Ghana
PROP	Project Paper (USAID)
RMO	Regional Medical Officer
SPH	School of Public Health, University of California at Los Angeles
TBA	Traditional Birth Attendant
UCLA	University of California at Los Angeles
UGMS	University of Ghana Medical School
USAID	United States Agency for International Development (or AID)
VDC	Village Development Committee
VHW	Village Health Worker

Danfa Project
Final Report
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SUMMARY (S-1)

SUMMARY

The Danfa Comprehensive Rural Health and Family Planning Project is a service, research and training project designed to help find solutions to health problems and to demonstrate feasible methods of delivering effective health and family planning services in rural Ghana.

S1. NATIONAL BACKGROUND

The pattern of health problems in Ghana is similar to that of most other West African countries and has an especially important impact on maternal and child health. Maternal health problems include mortality and morbidity from hemorrhage, infection and toxemia associated with pregnancy. Child health is especially diminished by the interaction of malnutrition and infectious diseases, many of which are partially or wholly preventable.

In comparison to most other countries in the region, Ghana has experienced a relatively favored economic position during this century due to substantial export earnings from cocoa, timber, gold and diamonds. Yet, the Government of Ghana has recognized that the delivery of effective health care to the majority of rural Ghanaians has been inadequate. There have been plans to expand rural health services. However, the acquisition of needed budgetary resources has been impeded, to some extent by the deceleration of growth of real national income per capita that has accompanied the political and economic instability of the past 15 years, and in part by the historically high concentration of resources in urban hospital facilities.

In 1969, the Government of Ghana recognized the importance and consequences of the rapid growth of population in Ghana and issued an official population policy. A year later it established the Ghana National Family Planning Programme, with the objective of making family planning services accessible to all Ghanaians.

S2. HISTORY OF THE DANFA PROJECT

In 1964, the University of Ghana Medical School (UGMS) decided that one of its responsibilities would be to train general medical officers to supervise rural health teams. To do this, a demonstration rural

district was needed, not too far from the capital (Accra), where the Department of Community Health could conduct research, training and service activities. Eventually the Danfa District was selected and in 1970 the Danfa Health Center was opened.

In order to rationally allocate scarce resources to the entire country, the Department of Community Health concluded that there was a need for more systematic collection and analysis of rural health information. Furthermore, the Department thought that research was required to help determine how the family planning services that were mandated by the national population policy could be best implemented in rural Ghana. As a result the Danfa Project was conceived.

External assistance for the development of the research component of the Danfa Project was obtained from the United States Agency for International Development (USAID). The University of California at Los Angeles, School of Public Health (UCLA) was identified to collaborate in the Project. The Project agreement between the University of Ghana Medical School and the USAID Mission to Ghana was signed in April 1970 and the first Project Paper (PROP) signed in May of that same year. The PROP indicated that four UCLA staff members were to be assigned to Ghana: a Chief of Party who would be responsible for management, an epidemiologist, a family planning/MCH specialist and a health educator. A health systems analyst was added to the staff in 1973. It was agreed that the Ghana Medical School would be fully responsible for the service components of the Project. UCLA was to be principally responsible for providing any assistance necessary for the research components and would also participate in some of the planning and teaching activities of the Project.

S3. GOALS AND OBJECTIVES

The goal (or purpose) of the Danfa Project was to assist in initiating a demonstration rural family health program which would help improve the health and welfare of the people, especially in rural areas. The objectives of the first phase of the project (1970-1975) as outlined in the 1970 Project Paper were:

(a) "To investigate the state of the rural community and the factors associated with effective participation in health programs."
(b) "To undertake research into the most efficient means of utilizing available manpower and other resources in the operation of health post-centered comprehensive rural health services."
(c) "To train doctors, sanitarians, midwives, community health nurses and other health personnel, both separately and in teams, for their role in rural health work."
(d) "To provide manpower oriented and equipped to handle the problems of the community."

At the time the Project was designed, controversy existed, both within Ghana and in international circles, concerning the most cost-effective way to deliver family planning services. Many thought that the most effective program would combine comprehensive health care and family planning services to produce a synergistic effect on fertility reduction, partly as a result of increased child survival, and partly as a result of increasing contacts with women in need of family planning. Another group thought that to insist on comprehensive health services would delay implementation of family planning services. They believed that the provision of family planning education and services alone would result in acceptable rates. A third group thought that sufficient motivation already existed and that couples would readily accept family planning if only effective contraceptive methods were made available. Finally, a fourth group believed that fertility reduction was primarily dependent on socioeconomic improvements and that, as these occurred, Ghanaian couples would seek out ways to reduce their fertility without the need for special programs.

One of the major research efforts, then, of the Danfa family planning program was to implement a quasi-experimental research design to help resolve this controversy and to carefully evaluate these four alternate arguments regarding the implementation of national family planning policy. Four research areas in the Danfa Project district were identified, each one to receive services corresponding to the four alternate arguments presented above. (See Table S-1).

Table S-1: Health Services Provided in Four Project Areas, Danfa Project, Ghana, 1972-75

	SERVICES PROVIDED			
Area	Comprehensive Health Care Program	Health Education Program	Family Planning Program	Standard Ministry of Health Services
I	YES	YES	YES	YES[a]
II	NO	YES	YES	YES
III	NO	NO	YES	YES
IV	NO	NO	NO	YES

[a]Equivalent.

In carrying out the original research design the family planning program was bound by two constraints. First, its operations had to be replicable within anticipated Ghanaian resources. Secondly, the family planning service inputs had to be comparable in quantity and quality in the three service areas. To assure this comparability, the same personnel were initially used to provide family planning services in all three areas.

An external evaluation by USAID was carried out in 1975 to assess progress already made and the need for redirection of effort or emphasis. The evaluation team recommended that the Project be continued to its proposed termination date with increased availability and participation of senior Ghanaian staff and increased participant training of Ghanaians overseas. Because of a Government of Ghana decision (based partially on the Danfa experience) to integrate family planning with basic health services (Area I approach), and because of the high degree of population mobility and the socioeconomic differences between the four research areas, the team recommended the de-emphasis of the four cell research design.

As a result, a new Project Paper was prepared in 1976 which adopted new objectives suggested in part by the evaluation team:

(a) Institutional Development and Training: Strengthening of institutional capability at the Ghana Medical School to conduct research and training of doctors and other health workers in the delivery of rural health and family planning services.

(b) Information Transfer: Transfer of information derived from Project activities to relevant Government of Ghana agencies on an ongoing basis.

(c) Operational Research in Health and Family Planning: Demonstration of several different health care models to include family planning as an integrated component suitable to the Ghanaian context.

(d) Epidemiological Investigation: Investigation of the state of a rural Ghanaian community, concentrating on factors associated with health and family planning behavior.

S4. PROJECT ORGANIZATION AND MANAGEMENT

To foster harmonious working relationships and in recognition of the directive role of Ghanaian principals, a number of conditions were agreed to by the several cooperating parties:

(a) Project goals and objectives would be developed jointly by UGMS and UCLA.

(b) The Project would have two Codirectors, one Ghanaian, the other from UCLA. In case of disagreement, the Ghanaian view would prevail.

(c) Prospective staff for the UCLA team would have to be approved by both Codirectors.

(d) Every effort would be made to promote genuine collaboration through joint UGMS-UCLA staffing of Project committees.

(e) There would be a UGMS Project budget provided by USAID, separate from UCLA, giving the medical school the authority to hire requisite Ghanaian staff under local personnel practices.

(f) Nearly all service costs and most training costs would be borne by UGMS.

(g) All data generated by the Project would be available both in Ghana and at UCLA.

(h) Published materials would generally be co-authored by at least one Ghanaian and one UCLA staff member.

(i) A formal Project review conference would be held at least once a year.

Project evaluation in Ghana resulted in the development of a "central services organization" which consisted of a pool of vehicles, personnel, and other support services which could be used in a variety of activities. This resulted in significant economies of scale. As a result a number of studies and programs could be carried out, many of which would have constituted major projects in their own right.

Research manpower was particularly important. Mappers, field interviewers and research assistants were usually middle-school leavers recruited and trained by the Project. Their supervisors were usually University of Ghana graduates who were trained and directed by senior Project staff. Initially, the Vital Events Registration Assistants were part-time volunteers. Because they were not recording an adequate proportion of events, the Project recruited full-time, paid, Vital Events Registration Assistants in 1974 with a marked improvement in reporting.

The Project developed an effective data processing section consisting of two programmers and several assistants. The University of Ghana's IBM 1130 computer was used, and the Project added a tape drive unit and adapted several software packages to it. Most initial survey data were processed in Ghana. However, some of the processing in the last two years was done at UCLA because the University of Ghana lacked the more advanced computer and software necessary for the final analyses.

After the second PROP, some of the UCLA responsibilities were transferred to UGMS, such as vehicle supervision, data processing supervision, and the administration of overseas participant training. Moreover, the Department of Community Health assigned two of its senior medical officers who had recently returned with MPH degrees to supervise Project activities in Areas I, II and III and participate in research design and analysis. Field priorities were shifted to reflect the revised objectives and the de-emphasis of the original hypothesis testing.

Over the years, the Danfa staff at Los Angeles were involved in UCLA staff recruitment, bibliographic, editing and writing services, electronic data processing, short-term consultation, the ordering and dispatch of supplies and equipment, fiscal accounts, and aiding in the overall planning and implementation of the Project. They were supported in these tasks by UCLA's central administrative offices: The Office of the Coordinator of Overseas Programs (OCOP), the Chancellor's Committee for International and Comparative Studies (CCICS), the UCLA Contracts Office, Accounting Office, and Central Purchasing Office.

S5. HEALTH STATUS

The investigations into the health of the rural community concentrated primarily on the status of physical health and on the sociodemographic and environmental factors related to it. Baseline demographic analysis showed that the district had a young population: 49% under 15 years. Educational levels in Area I were somewhat higher than most of rural Ghana; 44% of adults had attended school at some time and 72% of children 6-15 years were currently enrolled. The population was highly mobile, complicating the capture of vital events and the maintenance of the desired sample size of the longitudinal surveys, which suffered an attrition rate of 50% over the five-year period.

The greatest proportion of preventable morbidity and mortality occurs in mothers and children. These two groups also account for most of the utilization of ambulatory health care services. Maternal mortality is extremely difficult to estimate in a small, rural population. A special attempt midway through the Project produced an estimate of four deaths per 1000 live births, but with wide confidence intervals. An analysis of pregnancy-related complaints seen during the first year of Danfa Health Center operation suggested that only a small percentage of maternal problems were being seen.

Child mortality at the 1972 baseline was serious but not as severe as that seen in less developed African countries or in other parts of Ghana. The infant mortality rate in Area I was estimated to be 54 per 1000 and the preschool mortality rate 16 per 1000. Thus, at least 12% of children born still die before age five. Children in the Danfa district are endangered by a number of infectious diseases, especially

malaria, measles, pertussis, diarrhea, respiratory disease, worms, skin infections and poliomyelitis. These infectious diseases can interact with malnutrition to increase the risks to health.

Mean birth weight for infants born at or near term and delivered at the Danfa Health Center from 1970 to 1973 seemed to indicate that infants in Area I of the Danfa Project district begin their lives in a normal nutritional state. However, the first Village Health Survey showed that nutritional status declines in early childhood. In the age group 5-35 months, 33% of children's weights fell below 80% of standard (normally only 3% of international reference groups fall below 80% of the standard weight-for-age). There was a drop in mean weight-for-age and height-for-age compared to standards for the period 12-35 months in males and 18-35 months in females. There was then some "catch-up" between three and ten years and then a further falling off during the usual period of the adolescent growth spurt (11-17 years). Rapid catch up occurred again between 18 and 25 years, but the mean weight-for-age and height-for-age never reached 100% of the standard.

These findings are significant because diminished nutritional status seems to reduce immunologic competence and results in more severe infections, and because final growth attainment may be below genetic potential in some children. This could compromise their intellectual or motor performance. The identification of heights and weights lower than international standards during adolescence (11-17 years) is also important, and it may be that adolescent nutrition is in need of more attention than it has received in the past.

The Village Health Survey and the special malaria surveys showed that malaria was an important problem, not only in the preschool children but also in the school-age children. At any one time, 41% of children under eleven years harbor malaria parasites in their blood. Malaria was also the most frequent diagnosis made at the Danfa Health Center or its satellites in 1972, accounting for 31% of all patient visits.

The incidence of measles seen at the Health Center was only 40% of the expected number. This could have been due to the smallpox-measles eradication program that had been conducted in the area for several years. The reported incidence of whopping cough was also low for reasons that are not clear. Serological studies suggested that it was a more prevalent problem than respondents had indicated.

Diarrhea constituted 21% of the complaints recorded for children under five at the Health Center but, despite the frequency of this complaint, significant dehydration was uncommon. Respiratory complaints were second only to malaria in frequency at the Health Center. The most common helminth problems in the Danfa Project district are Ascaris (roundworm) and Necator (hookworm).

Children were examined in the Danfa district to assess the impact of endemic poliomyelitis. The observed prevalence of lameness attributable to poliomyelitis was 7 per 1000 school-aged children, and the annual incidence was estimated to be at least 28 per 100,000 population. Although no evidence for an epidemic was found, these rates were comparable with those in the USA and Europe during the years of severe epidemics. This was one of the Project's most significant findings because it suggested that the frequency of poliomyelitis in tropical endemic countries has always been as great, if not greater, than that experienced by temperate countries during epidemic periods in the twentieth century. It is also suggested that the total annual incidence of paralytic poliomyelitis in the world may be reduced by only 25% since the advent of polio vaccine. Partly as a result of this study, poliomyelitis immunization is being given increased emphasis in Ghana and many other developing countries.

Skin tests showed that tuberculosis was only a moderate problem in the Project district compared to more highly endemic areas of the world. Only 3% of children under five had positive tuberculin reactions. The greatest danger seemed to occur during adolescence when tuberculin conversion increased from 15% in 5-14 year old children to 42% in people 15 years and older.

Though an important problem in other parts of Ghana, Schistosomiasis is not significantly prevalent in Area I of the Danfa Project district; guinea worm is of more serious concern. An outbreak in 1973 led to a special epidemiological survey which showed that most of the problem was confined to Area II where attack rates as high as 80% among males 25-44 years old were found in some villages. The study was particularly important because of its economic implications. The average work loss in untreated adults was more than five weeks and usually coincided with peak agricultural activities.

The first Village Health Survey asked questions about prior immunization in children under five. In Area I, 44% reported prior smallpox vaccination (60% actually had a smallpox vaccination scar), 23% reported prior measles vaccination, 8% prior pertussis vaccination and only 7% prior BCG vaccination against tuberculosis.

The baseline longitudinal survey included a morbidity section on illnesses and related sequelae in the two weeks previous to the interview. Twenty-four percent of persons said that they had been ill at some time in the previous two weeks, and of these 39% said that they had suffered some restriction in activity. Seven percent of the school children lost at least one day from school. The average loss of productive time per member of the working population in the Project district was 0.6 days in the two-week period.

The crude death rate observed during the first registration period (1971-1972) varied from 10 per 1000 population in Area IV to 15 per 1000 in Area III. The rate in Area I was 12 per 1000. These rates are about 20-50% lower than the national estimates and are probably due in part to under-enumeration during this period.

There are a number of important factors that affect health status. Well being is enhanced in the Danfa Project district by clan ties that provide stable role models and much personal security. There is a strong tradition of community support for village self-help activities. In the first Health Practices Survey, 37% of households in Area I reported that at least one member was involved in a cooperative community activity. The longitudinal KAP surveys indicated that education, either formal or informal, and people's perception of the causation of a particular disease help to determine how they attempt to cope with the disease.

Nutrition is a very important determinant of health status. Perhaps related to several decades of health education work in the Greater Accra Region, the knowledge of proper nutrition was relatively high in the Danfa Project district. Prolonged breastfeeding is the rule; the average woman breastfeeds her infant for 16 months. This promotes strong maternal-infant bonding as well as ideal nutrition and protection from many diseases for the first six months of life. The addition of weaning foods, usually maize porridge, commonly starts between three and five months of age; a high protein food such as legumes, fish or meat is

usually added between six and 12 months of age. Unfortunately, at least 40% of the mothers waited until after 12 months of age before adding protein foods.

Environmental factors are also important. The climate and geography of the district is conducive to the support of malaria vectors that are difficult to control. The first Health Practice Survey showed that, although a large majority of the population over six did dispose of human waste under reasonably sanitary conditions, 90% of children under six defecated near the home in areas likely to be frequented by other children.

Another environmental factor is water supply. The Project district overlies hard pre-Cambrian rock that contains very few aquifers. As a result, shallow wells are impossible and there are very few locations where even deep drilled wells are feasible. There are also very few natural springs to feed gravity flow systems. As a result many villages rely on seasonal rain water or on surface waters such as streams and ponds. In Area I, 58% of the people lived in villages that were served by a branch of the capital city's water supply. While the supply could be erratic, these people were usually able to obtain a reasonable supply of sanitary water.

The system factor found to have the most impact on health (operating through delivery of health services) is distance between the patient's residence and the health service facility.

S6. HEALTH CARE DELIVERY

The original health care targets according to the first Project Paper were:

- To establish a fully functioning family health center in a rural area.
- To establish a record system that would link census files and health center records.
- To establish a health education program emphasizing maternal and child health.
- To organize ongoing operations research studies.

By 1975 most of these targets had been reached. The preparation of the new Project PROP enabled the Ghana Medical School to formulate long term, but specific objectives. Not all were to be completed by the time this final report was to be written but targets were set so that there would be substantial progress in many of the areas of endeavor. The primary health service objective, according to the revised Project Paper of 1976, is the demonstration of several cost-effective health system models that include family planning as an integrated component.

The major sub-objectives are:

- To develop systems for increased accessibility of health services by development of the satellite clinic concept and other community-based services using volunteer or traditional health workers.
- To develop methods of increased community participation in the health care system.
- To increase the effectiveness of human, physical and financial resources by analyzing costs, carrying out functional analyses, standardizing patient management regimens and developing innovative uses of personnel.
- To develop systems that improve quality of care by establishing minimum standards of preventive and curative care, functional job descriptions and operational manuals.
- To develop systems that improve environmental sanitation.

The original strategy for the provision of comprehensive health services was twofold: first, a service program based at the Health Center but with home visiting by community health nurses, and village sanitation projects supervised by the Health Center Sanitarian; secondly, a health education program based in the villages that relies on Health Education Assistants. As time progressed, it became clear that a program based primarily at a health center or relying primarily on health professionals would not reach a large percentage of the population with many of the essential services. Thus, the program was modified to bring the services closer to the villages in which the people resided, first through satellite clinics and later through village-based malaria prophylaxis, immunization

and primary health care programs. Multiplication and extension of health professional skills was achieved by training village volunteers to provide many of the services needed in their own villages.

The maternal and child health services were the most important part of the health care program. The objectives of the maternal health care program were:

- To reduce maternal mortality by 30%.
- To reduce maternal morbidity.
- To reduce fertility and increase birth intervals.

This was to be done by improving obstetrical services and making family planning information and services accessible to all the population. Obstetrical care is rendered by three groups: traditional birth attendants (TBAs), the Danfa Health Center staff, and the obstetrical staff of the Mampong Tetteh Quarshie Memorial and Korle Bu Hospitals.

The child health care program was developed using a matrix that charted disease problems according to prevalance, severity and susceptibility to attack. Based on early analyses of child health problems, the following objectives were defined:

- To reduce the infant mortality rate by 30%.
- To reduce the preschool mortality rate by 50%.
- To reduce infant and preschool morbidity rates due to:

Malnutrition	Pertussis
Malaria	Helminthiasis
Measles	Accidents
Diarrhea	Poliomyelitis
Tuberculosis	

HEALTH CENTER SERVICES AND SATELLITE SERVICES

Health Center services included maternal and child health care, inpatient care for minor medical problems, and agricultural extension. Soon after services began, the UGMS-UCLA Project team undertook a number of activities to improve the Health Center's efficiency and effectiveness.

The use of the family folder for medical records was found to be impractical. Patient retained records were recommended and "Road to Health" weight cards were introduced for child care. Job descriptions were developed. Functional analyses resulted in a number of changes including the introduction of daily (rather than weekly) MCH clinics, combining maternal with child health clinics; and the pre-packaging of drugs. An MCH procedures manual was written and a formulary developed which limited the number of drugs that could be used. The Child Welfare Clinics were reorganized into the "under-fives clinic" pattern developed by Morley in Nigeria. Finally, a study of the proportion of target population served at the Health Center revealed that 70% of the patients seen there lived within a three mile radius of the Health Center. Therefore, three satellite clinics were started in facilities supplied by the villages in order to improve accessibility.

All Health Center and village-based services did not begin simultaneously. The progressive involvement of the community in the provision of services can be divided in three phases. Phase I included four programs:

- Health education
- Nutrition
- Sanitation
- Training of traditional birth attendants

Phase II was marked by the introduction of two new community-based programs:

- Malaria prophylaxis
- Immunization

Phase III in the development of community-based programs was the Village Health Worker (VHW) program.

PHASE I: HEALTH EDUCATION

In order to determine the impact of health education alone as well as its impact when integrated with Health Center-based services, two different models of health education were implemented: an integrated

district model in Area I, and an independent regional model in Area II. Danfa Project inputs in Area II included health education and family planning, without comprehensive health services.

In order to test a new method of delivering health education services at the village level, a new community health worker was created, the Health Education Assistant (HEA). The HEAs were selected from existing uni-purpose workers; Community Health Nurses, Nutrition Technical Officers, Sanitation Assistants and Family Planning Field Workers. All HEAs (four each for Areas I and II) received training in maternal and child health, sanitation, nutrition, family planning, and in health education methods and materials. Most HEAs are women.

For purposes of better coverage, Area I was divided into five sub-areas for health education. Four of the sub-areas are covered by the same four HEAs while the fifth sub-area has been the responsibility of the other Danfa Health Center personnel. Thus, this model combines the widely accepted policy of "all health workers as health educators" with an approach that utilizes specially trained personnel with health education and motivation as their primary foci of activity.

The health education program in Area II consists of health education provided at the Amasaman Health Post (run by the Local Council), at the family planning clinics and, independently, in the communities in the area. Each of the four HEAs is assigned a cluster of villages and she plans and implements her field activities in ways similar to her counterpart in Area I. The major difference between the two models is in the nature of the relationship of the health education program to other health services. In the independent model of Area II, the HEAs operate independently but collaborate with other frontline workers in their service area.

The activities of the HEAs include:

- Comprehensive health education coverage of all villages in Areas I and II.
- Creation of lines of communication between Health Center staff (Area I) or the Amasaman Health Post (Area II) and villagers.
- Concentration on the use of preventive measures to improve health.

- Use of multi-disciplinary approaches in attacking rural health problems.
- Provision of health care through an established system of referrals and follow-ups.

PHASE I: NUTRITION

All members of the health team are involved in activities of the nutrition program, the objectives of which are:

- To prevent malnutrition, especially in mothers and children. This is done through promoting the cultivation of improved and diversified foods, by means of a demonstration garden at the health center, group talks, and private counseling of mothers. This promotion is done in cooperation with the agricultural extension agency.
- To identify persons at risk of developing malnutrition.
- To identify persons with any degree of malnutrition. This is facilitated by following the growth of children as recorded on the "Road-to-Health" weight-for-age cards.
- To rehabilitate those found to be malnourished. This is done by counseling, home visiting, the provision of supplemental foods where necessary and careful follow-up.

PHASE I: ENVIRONMENTAL SANITATION

After the Health Center Sanitarian developed close working relationships with village leaders, measures were taken to stimulate the formation of Village Development Committees (VDCs). Village needs are assessed as a cooperative effort and targets developed. Water supplies have been improved by dredging and cleaning ponds; improving storage in earthen containers in the home; and by developing cooperative self-help projects to connect villages to the region's piped water supply. Excreta disposal has been improved through the construction of 101 communal pit latrines in 61 villages in Area I from 1971 to 1978. Groups of villagers have been assigned responsibility for the maintenance of refuse disposal sites. The sanitarian has provided information on improved home construction and in three villages cooperative housing societies have been

formed with 250 members. Small homes of modern construction have been built by the Department of Rural Development using self-help labor to defray costs.

PHASE I: TRAINING OF TRADITIONAL BIRTH ATTENDANTS

One approach to solving the problem of maternal mortality has been to train traditional birth attendants (TBAs), who already perform more than 75% of all deliveries in Ghana. This solution has several advantages:

- It is less expensive.
- It is less dependent on transportation.
- It allows childbirth to take place in a more natural setting.
- After training, the TBA is a resident agent for health education in the village.

In 1972, 263 TBAs were registered by the Project staff in Area I, II and III; a ratio of 1:137 population. Most were elderly and illiterate, and half were men. The mean annual number of deliveries was seven and only 6% performed more than 20 per year.

After conducting a survey of the TBAs knowledge and practices, a program was carried out to train the TBAs to monitor women during pregnancy; to recognize and refer women at high risk or with complications; to use safer delivery techniques; to care for the cord properly; and to enlist their aid in promoting improved MCH practices and family planning.

Follow-up supervision by the Public Health Nurse and Health Center midwife has been crucial to maintaining the interest of the TBAs. Evaluation is based on their reports and special birth questionnaires administered since 1974 by the Vital Events Registration Assistants. These evaluations show that each trained TBA is performing more deliveries than previously, that they are now rendering prenatal care, that they are using the sterile cord packs to care for the umbilical cord after delivery, and, according to their own report, that they are referring women for family planning services.

PHASE II: MALARIA PROPHYLAXIS

Malaria meets the criteria of a disease that must be given attention in any MCH program in West Africa. It is prevalent, serious, and susceptible

to attack. Major eradication efforts are not considered feasible in most of Africa at this time; rather, control measures are recommended. The Danfa Project selected pyrimethamine chemoprophylaxis as the most feasible method of control and set the objective of reaching each month all pregnant women seen in the prenatal clinics and 80% of children 0-10 years.

Although Health Center staff were used during the first year to distribute tablets to children living nearby, volunteers were used exclusively in subsequent years because they proved more effective. In the first five months of the program, 87% of the households with children under five participated at least once, and half participated three or more times. During the first five years of the program from 1973 to 1977, the mean monthly coverage was 38% of children under six and 83% of school children 6-10 years. Results of malaria surveys showed lower parasite rates and parasite densities in Area I (the only area receiving prophylactic treatment) compared to Area II. Results of this program indicate that volunteers can be very effective in distributing malaria prophylaxis tablets at the village level.

PHASE II: EXPANDED IMMUNIZATION PROGRAMS

Because of a number of problems, the exclusive Health Center-based approach to immunization had historically resulted in low levels of coverage in many African countries, including Ghana. Therefore, a combined Health Center and mass village-based approach was chosen by the Project. The priorities for prevention were measles, whooping cough, tetanus, tuberculosis and poliomyelitis.

An annual cycle seemed most feasible for replication nationwide and a schedule recommended by a PAHO conference on immunization was chosen. Under the expanded immunization program, children receive BCG, DPT and oral polio vaccinations once in the first year of life, and DPT, oral polio, measles and smallpox vaccinations once in the second year of life. In addition, children under one are supposed to receive another DPT-polio vaccination at the Health Center.

There are 61 villages in Area I. Initially, 18 collection points were identified for vaccination so that no one would have to walk more than one mile to be vaccinated. Even then, intensive health education

was necessary to achieve good participation by the population. Using PED-O-JET guns which greatly speed the vaccination process, Project staff are now able to vaccinate all of Area I in three days. During the three programs carried out in Area I from 1974 to 1976, an average of 51% of the children under age two were vaccinated each year.

PHASE III: THE VILLAGE HEALTH WORKER PROGRAM

In order to consolidate a number of volunteer health activities, the Village Health Worker (VHW) program was developed. Community acceptance was an important consideration from the program's start and village representatives joined Project staff and government health officials in determining the program's objectives, designing the curriculum and screening candidates for training. Three villages participated in a pilot study after which six additional villages were chosen as program sites; 15 men and five women were selected for training from the nine villages.

A training manual was prepared based on a WHO-produced manual. Prevention of disease was particularly emphasized during training although simple diagnostic and curative measures were included. Basic recordkeeping, referral and supervision procedures were also discussed. Training lasted 11 weeks, for a total of 110 hours of instruction.

Supervision of VHWs is a joint effort of the trainers, the Village Development Committee and, where applicable, other more senior village-based health workers. Regular continuing education of the VHW is also provided. Despite problems in receiving promised remuneration from villagers, the VHWs seem satisfied with their voluntary status and enjoy the prestige of serving as "village doctor". Older, more established VHWs have proved the most satisfactory in terms of stability and commitment.

In the first 15 months of the program these 20 volunteers delivered a significant amount of primary health care and were involved in 14,015 patient encounters. This represents 3.1 service encounters per person in these villages per year--a high rate of utilization. However, the ultimate success of a demonstration project depends on its incorporation into the national health program. Based on the Danfa experience and a similar WHO-sponsored project in Kintampo, Ghana, the Ministry of Health is now examining the feasibility of launching a nationwide program to make Village Health Workers their frontline primary health worker.

EVALUATION

The first level of evaluation was directly related to the evaluation of the attainment of the specific objectives of the initial (1970) and revised (1976) Project Papers. This level consisted of a number of functional analyses of the health delivery system. After the start of the satellite clinics, the percent of the population living within four miles of health services rose from 34% to 85%, and the percentage of the residents in Area I seen at least once during the year rose from 29% in 1970-71 to a high of 56% in 1973. The utilization of child and prenatal clinics nearly doubled. There was a drop in the percent of children under five seen at the Danfa clinics from 1972 to 1976 which could be attributed to the increased availability and participation in village-based services. A number of other functional analyses were carried out to improve clinic efficiency. Many were described previously (see Health Center Services).

Table S-2 shows various unit costs for operating the Danfa Health Center/satellite system (not including drug costs for non-Area I residents served).

Table S-2: Operational Costs of the Danfa Rural Health Center and Satellites Per Unit Noted, Cedis (Dollars)

	1973	1974	1975	1976
Per Patient Visit	1.30(1.13)	2.52(2.19)	2.98(2.59)	3.84(3.34)
Per Person in Area I	2.49(2.17)	4.42(3.85)	4.75(4.13)	5.05(4.39)

In 1975-76, the five rural health centers examined by another study group had per patient visit costs ranging from ¢2.17 to ¢4.32, with an average of ¢3.05. Danfa's cost per patient visit was ¢2.98 in 1975 and ¢3.84 in 1976. Thus, operational costs at Danfa appear to be in line with those at the only other rural health centers available for comparison.

While the Health Center and satellites, health education and family planning programs constituted the major share of the costs of the comprehensive health services package in Area I, several other important components were also provided. These were the antimalaria, immunization and traditional birth attendant programs. Table S-3 shows the package component costs on a per capita basis, including drug costs for non-Area I residents.

Table S-3: Area I Comprehensive Health Services Program, Per Capita Operating Costs, Cedis (Dollars)

	1973	1974	1975	1976
Danfa Health Center and Satellites	2.66(2.31)	4.83(4.20)	5.19(4.52)	5.65(4.92)
Health Education	0.57(0.50)	0.60(0.52)	0.70(0.61)	0.73(0.64)
Family Planning	0.25(0.22)	0.43(0.38)	0.51(0.44)	0.52(0.45)
Plus F.P. Health Education[a]	*0.09(0.08)*	*0.10(0.09)*	*0.14(0.12)*	*0.15(0.13)*
Plus F.P. by Danfa H.C. Staff[a]	---	---	---	*0.14(0.12)*
Antimalaria Program	0.04(0.03)	0.10(0.09)	0.12(0.10)	0.13(0.11)
Immunization Program	---	0.22(0.19)	0.09(0.08)	0.10(0.09)
TBA Program	0.02(0.02)	0.06(0.05)	0.07(0.06)	0.07(0.06)
TOTAL	3.54(3.08)	6.24(5.43)	6.68(5.81)	7.20(6.27)

[a]To avoid double counting, not counted in family planning.

In direct comparison to per capita recurrent cost estimates of ¢10.00, ¢7.54 and 6.42 for three districts studied by the University of Sussex Institute of Development Studies group, the per capita operating cost of ¢7.37 for the Danfa Area I comprehensive package appears to be in an appropriate range. However, the cost of the Danfa comprehensive package is probably greater than the amount the government presently spends in the rural area, but nevertheless is in a feasible range if the Ministry is able to attain its avowed goals of greater equity in the distribution of fiscal resources. Admittedly, this kind of equity can be arrived at only slowly, given large sunk capital investments in hospitals which must remain functional, but the government is making a start in this direction by putting a moratorium on further capital investment in upper level facilities.

The second level of evaluation measured the Project's effects on health-related knowledge, attitudes and practices. The results of longitudinal surveys of knowledge, attitudes and practices in the same population may be influenced by the learning experience from the prior survey. Thus, the actual attitudes and practices of the population may differ from those reported. Nevertheless, various surveys late in the Project indicated that 87% of women obtained prenatal care, that 74% of deliveries were performed by trained personnel, and that the TBAs were using sterile cord packs for cord care after delivery. The longitudinal Child Practices Survey of 1977 demonstrated increased understanding of disease causation and more appropriate behavior for treatment, either at home or elsewhere. The 1976 Health Practices Survey showed improvement in health-related behavior; 72% of children two to five years had weight-for-age cards in Area I, 69% had birth certificates and 50% had a positive history of immunization.

The third level of evaluation is an assessment of the Project's impact on health status. The ultimate goal of any health program should be the maintenance or improvement in a population's health status. However, the measurement of the impact of health services on morbidity and mortality is notoriously difficult. Even if changes in health status are detected, it is usually impossible to attribute them solely to health service interventions.

There is no single index that can be used to reliably assess the morbidity of an entire community. Project studies showed a lower prevalence of positive malaria indices in Area I compared to Area II. This was not reflected in a reduced percentage of malaria cases seen at the Health Center, but this could be due to misdiagnosis by Health Center staff or to increased motivation to seek early treatment for mild attacks of malaria. Project studies also showed that measles and whooping cough were maintained at low levels of incidence. Anthropometric studies indicated an improvement in the nutritional status of children. However, data were more variable from year to year than anticipated and improvements of similar magnitude were seen in all four Project research areas, including Areas III and IV where no nutrition program was carried out. Therefore, it is difficult to say that the health care program in Area I

had a definite impact on malnutrition. No other significant changes in morbidity could be detected with methods available.

In Area I, the crude mortality rate was observed to fall from 12.4 per 1000 population in 1971-72 to 6.2 in 1976-77. This decrease was statistically significant although these observed rates are most likely underestimated for all years but perhaps especially for 1971-72 and 1976-77. Since the greatest under-reporting probably occurred in 1971-72, the down trend is probably real.

A significant reduction in child mortality rates was observed in Area I; from 24.7 per 1,000 population in 1971-72 to 18.1 in 1976-77, which is statistically significant. The rates are more variable in the other three Project areas and no statistically significant trends could be discerned. The observed reduction in Area I was 27%. This reduction was due primarily to a reduction in preschool mortality (the age group most likely to benefit from the Project's health programs) rather than in the infant mortality rate.

The analysis of program impact on health status illustrates the very difficult problems involved in the collection and interpretation of morbidity and mortality data in a small, mobile rural population in a country such as Ghana. The reductions shown in malaria morbidity and possibly malnutrition are encouraging, as is the maintenance of relatively low levels of measles and pertussis. If the reductions in death rates are real it indicates that the child health program is improving the health of preschool children especially.

Because the magnitude of the errors that may have occurred in the collection, recording, and processing of mortality events cannot be known, the degree to which the comprehensive health care program was responsible for changes of the magnitude described above is not certain. Nevertheless, the statistically significant changes observed in these rates in Area I, where the comprehensive program operated, and the absence of changes in the other three areas suggests that the trends in reduction in Area I may be real and that, despite the marked deterioration in economic conditions during the study period, the program did have a significant impact on health status.

S7. FERTILITY

The observed crude birth rate (CBR), 45 per 1000 population, was somewhat lower than expected given the 1970 national figure (48 to 52 per 1000) but when standardized to the national Ghanaian population it became 56, a very high rate. There was a high rate of natural population increase (3.2% annually) and high fertility rates (GFR=222 live births per 1000 women 15-49 years; TFR=7.6).

Ghanaians have traditionally desired large families, as reflected by one of the highest fertility rates in the world. The mean number of desired children for men was 9.8 and for women 6.6. Nevertheless, there were indications of a change in attitude towards control of fertility. Whereas studies conducted in 1965 showed that only 8% of women in the Accra rural area approved of family planning, 72% of the baseline 1972 sample expressed approval. Knowledge about family planning had also increased with 65% of respondents reporting knowledge of the pill. However, use of modern family planning methods was minimal.

In the Danfa Project district the age of menarche has been steadily diminishing over the past decades probably due to better nutritional status. The baseline KAP survey showed that the average woman reported menarche at 15 years, was married at 19 and had her first pregnancy that same year. Marriage in the survey area is a fluid relationship with stages of mutual consent and marriage by customary rites. Remarriage rates are high among women during their reproductive years and among men at all ages.

The level of education was found to be related to reproductive behavior and attitude. The more educated the respondent, the more approving was that respondent toward smaller families. Christians, who composed 51% of the sample, were more supportive of smaller families than Muslims or traditional believers. The more children a couple has, the less likely they are to want additional children, so that 39% of women with five or six children wanted no further children. Some women, unfortunately, find that they are unable to have any children. We found that 2% of women in the Project district suffer from primary infertility; another 4% suffer from secondary infertility.

Danfa demographic studies have shown that the average woman has seven or eight live births by the end of her childbearing years. One or two children die in early childhood leaving her with five or six living children. The mean birth interval is about 30 months. Breastfeeding is practiced in almost all cases and lasts for about 16 months if a pregnancy does not supervene. In one of the survey samples of non-acceptors, it was found that abstinence only lasts five months. An examination of acceptor registration forms containing information about pregnancies occurring before starting family planning showed that the risk of conception after a live delivery is at least 10% by 12 months, 33% by 18 months and 50% by 24 months. The result is a fertility rate among the highest in the world with three of every ten women aged 20-40 delivering a child each year.

In spite of a very pronatalist tradition, there were many reasons why couples tried to limit their fertility. The most common reason was to ensure an adequate spacing between births. Although women may not have been aware of its anti-fertility effect, breastfeeding has been and still is, the most important child-spacer in countries such as Ghana because of the anovulatory effect of lactation hormones. Abstinence (after childbearing) was another method but may have minimal impact in this district because it is only practiced for the first five months after delivery when the mother is usually not ovulating because of lactation hormones.

In a recent study, rhythm was used in 18% of all birth intervals. However, ideas of what constituted the "safe period" of the menstrual cycle varied widely and two-thirds of traditional midwives interviewed gave times of safe periods that fell wholly or partially into what is scientifically considered to be unsafe periods! Despite this, respondents in the Project district reported rhythm to be rather effective, with a low accidental pregnancy rate of only eight per 100 woman-years use. Although this could reflect inaccurate reporting, it may be worthwhile to investigate in greater detail the nature and impact of rhythm and other traditional methods of fertility control in rural Ghana.

S8. FAMILY PLANNING

From 1972 to 1975 the Danfa Project family planning program was organized to conform to the constraints of the original research design. Thus, during this period the program consisted principally of family planning education provided by Health Education Assistants (HEAs) in Area I and II and family planning services provided by the family planning team in Areas I, II and III. No Project family planning services were offered in Area IV, the reference area.

Following the de-emphasis of the research design in 1975, additional service components were added with the objective of examining the cost-effectiveness of other ways of providing and expanding family planning services.

FAMILY PLANNING EDUCATION

The Project has learned that simply making contraceptives available is not sufficient by itself to attract significant numbers of family planning acceptors in rural Ghana. Rather there are two essential elements. One is education which must include both motivational support and information about methods. The second is the accessibility of contraceptive services.

Several types of personnel were involved in family planning education:

- Health Education Assistants
- Family planning team members
- Health Center staff
- Volunteer Village Health Workers
- Traditional birth attendants
- Acceptors themselves

FAMILY PLANNING SERVICES

The family planning service program gradually evolved into a package made up of four family planning delivery components: the family planning team (a mobile unit), the Health Center staff, the village-based primary care program, and the commercial program. Each of these four components could stand alone if the resources needed for the other three were not available.

The family planning team is composed of a family planning nurse, a Family Planning Assistant, a clerk and a driver. In 1972, three clinic sites were selected for family planning services in each of the three areas. The family planning team was not posted to any one clinic; rather each of nine clinic sites was visited by the team once every two weeks. The first time the team visits a village, as many interested villagers as possible are assembled for a short talk on family planning and villagers select the method they desire. No consent from a spouse is required as a condition of receiving services, and no charge is made for services.

An important modification of the family planning team's work was the extended program. Nine months after the program was initiated, an analysis was made of the numbers and percentages of acceptors as a function of the distance they lived from any of the three family planning clinic locations in their area. Most acceptors came from the immediate villages where the clinics were held. Since the time of the family planning team was not being fully utilized in the nine existing clinics, their work was extended to cover a larger number of villages. They now visit an additional village on their way to one of the nine regularly scheduled clinics; nearly 70% of the population in each area are reached in their own villages at least once every four months. From the back of the vehicle they are able to provide most services. Women who want IUD's have them inserted in their own homes. In the first few months after beginning this program, the monthly acceptance rate doubled; before that it had begun to fall as numbers of women needing services in the clinic villages diminished. Furthermore, since the onset of the extended program, the geographic distribution of acceptors has closely paralleled that of the population in each area.

The second component to be introduced with the utilization of Health Center staff to integrate more completely family planning services into the MCH clinics. The family planning clinics had always been integrated with the times and locations of the MCH clinics. However, family planning services were not available on a daily basis, nor were they provided by the regular MCH staff. Although a separate family planning team, working in a less hectic atmosphere, might be able to provide a higher quality service, it is economically more realistic to

have services provided on a daily basis by the regular clinic staff. For this reason, resident clinic nurses and midwives in all three areas have been phased into the delivery of family planning services. After a short in-service training program they are able to offer all family planning services, except IUD insertion.

Although in-service training was provided for all clinic staff, the community health nurses, working in under-five's clinics, were most successful in recruiting new acceptors. These nurses see large numbers of mothers 9 to 18 months after delivery when mothers are most anxious to ensure adequate child spacing. Immediate postpartum programs can have only limited impact in rural Africa where most women deliver at home and where the IUD is not popular. Rather, it is in the widespread under-five's clinics or child welfare clinics where the most rapid increase in family planning acceptance can occur. This approach has now been adopted by the Ministry of Health, and Project staff have worked with them in developing a family planning training manual for all Ministry of Health personnel which is now used in its regional training programs.

A third component developed was the village-based primary care program. In this program volunteer Village Health Workers are trained to assist in providing primary health care, including family planning services. Our experience is still limited, but in nine months this group of Village Health Workers recruited 21 acceptors per month. This compares with six acceptors per month recruited in these villages through the other two approaches during the first five Project years. The advantages of VHWs are the ready accessibility to information and services from a person who is part of the community structure, and a greater cost-effectiveness than that of the mobile team. The mobile family planning team will eventually spend more time supervising these community distributors than providing direct services. In this way, community distributors could greatly multiply the work of trained family planning workers.

Finally, the fourth component, a modest commercial program, was introduced in 1977 in Area II. Foam and condoms were offered for sale at Ghana National Family Planning Programme (GNFPP) clinic prices at small kiosks in the more populated towns in Area II. There were few sales and when the shopkeepers (who were allowed to retain all monies

collected) were asked why, they answered that the people preferred to get the same contraceptives free at the Danfa clinics.

EVALUATION AND RESULTS

At times, there has been some pessimism that the traditional culture in rural Africa is so pro-natalist that family planning services would gain only very limited acceptance if offered. On the contrary, Project results for the five-year period show that there is reason for optimism. In order to conform with overall Project goals and the need for replicability, the Danfa family planning program was not especially intensive or aggressive. Yet, there have been siginficant changes in family planning knowledge, attitudes and practices and in some measures of fertility.

The improvement of knowledge and approval of family planning that was noted in the few years before the Project began continued during the life of the Project. During the 1977 longitudinal KAP survey about 90% of men and women in Area I said that they knew about modern methods such as the pill and approved of family planning, compared to 70% in 1972. The number of couples in Area I reporting that they ever used modern contraceptives increased from 11% in 1972 to 34% in 1977. This compares to an increase in Area II from 7% in 1972 to 21% in 1977, and in Area III from 2% in 1972 to 8% in 1977; a marked difference that may be partly related to different Project inputs in the three areas. Despite a high level of knowledge and approval of family planning in Area IV, even at the baseline, there was no significant increase in the use of contraceptives in that area, presumably because services were not readily accessible. This contradicts the argument of those who say that, with increasing socioeconomic level and knowledge of family planning, people will seek out services themselves, and that therefore, making family planning services accessible is not important.

The typical female acceptor is 28 years old, married, illiterate, and accepts the pill. Important socioeconomic factors associated with acceptance were age, literacy, religion and occupation. Ninety percent of female acceptors were married and in three-fourths of the cases the acceptor said that she had spoken to her spouse about family planning and that he approved. Of married male acceptors, 78% reported that they

had discussed family planning with their wives; literate men were more likely to do so that illiterate men.

During the five years of the program there were 3,743 family planning acceptors, 45% of whom were men. The pill has been the most popular method among women and its popularity seems to be increasing. Although the acceptance of the IUD has been negligible in Areas II and III, 17% of female acceptors have consistently chosen the IUD in Area I.

Table S-4 shows acceptor rates representing only women and couples resident in the Project district who accepted in Danfa family planning program clinics. These rates are expressed as a percentage of all women of reproductive age, married and unmarried.

Table S-4: Acceptor Rates per 100 Women of Reproductive Age (WRA) by Area, 7/72 to 6/77

	Area I	Area II	Area III	Areas I,II,III combined
Female Acceptors[a] per 100 WRA	27.2	16.7	5.8	15.4
Couple Acceptors[b] per 100 WRA	37.6	31.0	14.2	26.1

[a]WRA is the mean no. of women of reproductive age (15-44) married and unmarried in population during period July 1972 to June 1977.

[b]Assumes that each man who accepts family planning is associated, on the average, with one woman of reproductive age. Thus, acceptance rates for couples are all female and male acceptors divided by the mean number of WRA during the period July 1972 and June 1977.

Again, Area I shows a markedly higher rate of acceptance than Areas II or III, especially among women, and Area II far surpasses Area III. Although not a controlled experiment, it seems that the increased acceptance in Area I is related to lower child death rates present at the start of the Project which continued and, very importantly, to the increased contacts with women in need of family planning in the Project's maternal and child care clinics.

There were several distinct increases in the numbers of acceptors being seen each month: with the start of the extended outreach of the

family planning team in June 1973, and again with the initiation of daily services by the Danfa Health Center staff in April 1976. Although there was a decrease in early 1977, this was abruptly reversed in June 1977 with the involvement of the Village Health Workers in family planning. Each new program component appeared to increase the number of acceptors and provide services to certain couples who would not have been reached by any other component. These acceptance rates are encouraging and are probably the highest yet observed in Africa, south of the Sahara.

Two-thirds of the female acceptors said that they accepted in order to space births but one-third said they accepted either to delay their first pregnancy or to stop having children entirely. However, the health of the child was not the most common reason women gave for using contraceptives. Rather it was to protect their own health. The second most common reason was freedom to work or study and to allow time for another child to become older and able to look after the next baby. Health of the child was only the third most common reason given.

Danfa program acceptors used the contraceptive methods for significantly long periods of time. For all methods, 36% of female acceptors surveyed in the 1977 follow-up study were still practicing 12 months after acceptance. This is less than the mid-Project survey in which 46% of women reported continued use at 12 months. The lower rate in 1977 could be due partly to the decreased use of the IUD which has the highest continuation rate in the Danfa program (65% at 12 months). Men reported much higher continuation rates than women; 70% at 12 months.

The most common reasons women gave for stopping use of family planning methods were side effects (26%), accidental pregnancy (22%), planning a wanted pregnancy (22%) and supply problems (12%). The accidental pregnancy rate (for all types of contraceptives, except IUD) is too high and it is clear that the ideal contraceptive--safe, effective and practical for use in rural Africa--has yet to be found.

The system factors that were found to be important for successful family planning services in rural Ghana are:

- Information and motivation
- Accessibility of services
- Quality of services
- Choice of contraceptives

Wherever significant numbers of couples have accepted modern family planning methods and used them correctly for a reasonable length of time, fertility change has b en observed when studied by accurate methods. Still, the Project a empted to directly assess fertility change in family planning program acceptors. The extended use effectiveness rate is defined as the percent of acceptors (or if male acceptors, their female partners) who did not become pregnant for a specified period after acceptance, regardless of whether they continued to use the method or not. Follow-up studies showed that 60% of Danfa female acceptors had not become pregnant 12 months after acceptance. Men reported an even higher rate of use effectiveness. The reduction in the risk of pregnancy for the 12 months after acceptance was 55% in women and 85% in the partners of male acceptors. Birth intervals increased by about six months in acceptors after they had used family planning.

A study of components of fertility in acceptors and controls showed that the acceptors used modern contraception 18% of the time during the five-year period. During the entire five-year period acceptors had a higher general fertility rate than did non-acceptors (271 per 1000 women compared to 245 for non-acceptors). However, it must be noted that they are a much more fecund group than their age-matched controls, with a general pregnancy rate of 823 per 1000 woman-years exposure without contraception compared to 637 in controls. This rate for acceptors was reduced by 75% (to 208 per 1000 woman-years) when exposed and using any modern method of contraception. Using the IUD the risk reduction was 100%.

Based on analyses of births recorded by the dual collection system for vital events, the observed birth rate was estimated to have fallen in Area I from 43 to 33 per 1000 population and the general fertility rate from 226 to 178 per 1000 women aged 15-49. The changes in birth and fertility rates were statistically significant only in Area I. However, because of problems encountered in the collection system and probable under-enumeration in some years it is not certain that these results accurately reflect the true rates during each of the Project years. Nevertheless, since there was probably a greater under-enumeration in the first registration period (1971-72), it is likely that any reductions in rates reflect actual trend directions and that the program did contribute

to a real reduction in the birth rate in Area I during the five Project research years.

The health status of children born just prior to birth intervals during which there was use of modern family planning was examined. The mean duration of breastfeeding was prolonged by about one-half month for intervals in which any contraception was used, and by two and one-half months when the method was the pill. This is a very important finding. Up until now the concern had been whether the pill reduced the quantity or quality of milk. This question cannot be answered by these studies, but it appears that the pill often prolongs breastfeeding because it prevents the pregnancies that often occur during lactation in these fecund acceptors, and which often result in the mother's abrupt termination of lactation. Thus, there may be a trade-off: some women prolonging their lactation because of the pill; others suffering a diminished quantity or quality of milk. No significant difference was found in mortality rates or nutritional status between children born before contracepting intervals and those born before non-contracepting birth intervals.

The family planning program costs for Area I are outlined in Table S-5. Most significant is the per capita cost of $0.65 (total family planning program cost divided by total population of the three Project areas). This is a feasible cost in many African countries.

Table S-5: Danfa Family Planning Program Costs, Areas I, II and III, 1976

	Cedis (₵)	U.S. Dollars ($)
Family Planning Team	₵ 21555	$ 18743
Health Education Component	5044	4386
Health Center Components[a]	3237	2815
Contraceptives	5509	4790
Total	₵ 35345	$ 30734
Cost per capita (all 3 areas)[b]	₵ 0.75 ($ 0.65)	
Cost per new acceptor (1976)[c]	₵23.00 ($20.00)	

[a]Danfa Health Center (₵2380) Amasaman Health Center (₵857)
[b]Exchange rate $1 = ₵1.15
[c]Assume one-half of total costs for new acceptors.

S9. INSTITUTIONAL DEVELOPMENT AND INFORMATION TRANSFER

INSTITUTIONAL DEVELOPMENT

Project outputs required to strengthen the Medical School's institutional capability included:

- Training of doctors, medical students and other health care workers to better understand and manage rural health problems.
- Developing training methodologies for all levels of health workers, including traditional practitioners and volunteers.
- Training specialists with the full range of capabilities needed in the current and future teaching and research programs of the Department of Community Health, University of Ghana Medical School.

The training provided by the Project dealt with two categories: local training and that occurring outside of Ghana. Local training included the training of research interviewers and assistants, professional health workers, traditional birth attendants, Village Health Workers, and medical students. Medical students experience the Danfa Project first-hand; it is the heart of the community health program of the Ghana Medical School. The medical student interaction with the faculty and other health workers in the Department is most intense during their period in the Danfa Project district. Since 1970, nearly 500 Ghanaian medical students have participated in the community health experience at Danfa. Students from many health training institutions of the Ministry of Health spend short periods studying the programs at Danfa. These include students from the Public Health Nursing School, the Nursing Training College, and the Health Center Superintendent School.

Overseas participant training was crucial to the strengthening of the Ghana Medical School's teaching and research capability. Some personnel spent short periods attending seminars or intensive programs, while others studied for a year or more earning university degrees and conducting valuable field studies. A total of 19 Ghanaians used the participant training resources of the Danfa Project for 22 different training experiences.

Most of those who took part in the participant training program worked for some time in the Danfa Project before the specified training was undertaken and nearly all worked for the Project subsequent to their return. Of the 19 persons who were involved in the Danfa participant training program, eleven are presently with the Department, and five persons occupy positions in the Ministry of Health which facilitate their teaching or consulting with the Department. Only three participants are out of direct contact with the Danfa Project and Department of Community Health. These training programs expanded the staff of the Department of Community Health and increased its teaching and research capabilities. The Department's capacity to gather, analyze and disseminate information and to play a significant role in improving the health of the people of Ghana is now demonstrable.

In addition to staff expansion, the University, the Medical School and the Department of Community Health acquired various pieces of equipment, vehicles and appliances which had been purchased with UCLA contract funds for Danfa Project use. The University IBM 1130 Computer was greatly enhanced by the addition of a tape drive system purchased, by agreement with USAID, from funds made available through the UCLA contract to expedite Danfa data processing.

INFORMATION TRANSFER

The transfer of information has occurred at two levels: informally, through experience within the Project; and formally, through seminars, workshops, published materials and special training manuals, and by formal meetings with various divisions and units of the Ministry of Health, the Ghana National Family Planning Programme, the Planned Parenthood Association of Ghana, and through the Policy Advisory Committee of the Danfa Project.

There have been a number of important informal mechanisms of communication. The Ministry of Health divisions which have been closely associated throughout the Project include MCH and Family Planning, Health Education, Nutrition, Communicable Disease Control and the Health Planning Unit. From its inception, the Health Planning Unit of the Ministry of Health has been intimately associated with the Department of Community Health and has also directly requested Danfa Project findings such as morbidity patterns, costs of services, and strategies for primary health care.

Experience gained in the Project became part of the basic information which went into the formulation of the Primary Health Care Strategy for Ghana. Members of the Department and Project also served on various committees of the Planning Unit and have taken part in seminars organized by the Ministry of Health covering topics of family planning, traditional midwifery, child health and health education.

Innumerable visitors came to Danfa to view Project activities and met with Project senior staff. While time consuming for staff, these visitors provided an opportunity for exploring problems and solutions related to primary health care and they were important in disseminating information outside Ghana.

One of the important formal mechanisms instituted for facilitating information transfer from the Project to other agencies of the Government was the Policy Advisory Committee (PAC). Membership of the Committee included a number of high level officials from the Ghana Medical School, the Ministry of Health, the Ghana National Family Planning Programme, the Ministries of Economic Planning, Education, Social Welfare, Rural Development, the Central Bureau of Statistics, and the Institute for Social, Statistical and Economic Research (ISSER). The purpose of the PAC was to foster collaboration, optimal attainment of the Project objectives, and flow of information from the Danfa Project to the agencies represented. The PAC antedated the 1976 Project Paper and generated some of the ideas found therein.

An equally important formal mechanism has been the publication of articles and manuals. Over 50 journal articles and monographs describing Project activities or findings have been published or are now in press. There are approximately 30 additional publications in progress. At least 25 conference presentations also have been given throughout the world since the Project began.

Several manuals have been produced including:

- A Program Manual for Traditional Birth Attendants--Organization, Training and Evaluation (1977). The TBA training manual was accepted for use by the Ministry of Health in 1978.
- Manual A and B for Training Serving Personnel of the Ministry of Health in Family Planning (1977). This manual was produced in collaboration with the Ministry of Health.

- Preliminary Manual for Trainers of Village Health Workers (1977). The MOH has been provided with this manual for potential use in MOH training efforts of VHWs or similar village-level personnel.
- Manual of Maternal and Child Health Procedures (1972). This is used by Danfa Health Center personnel.

Two additional manuals are planned dealing with malaria prophylaxis and expanded immunization programs.

Futhermore, Monographs 9, 10 and 11 constitute working manuals of field activities developed by the Project and applicable to other rural health service/research programs:

- Conducting a Rural Health Survey: Experience from the Village Health Survey, Danfa Project, Ghana. Monograph No. 9. (1975).
- Mapping and House Numbering Methods in a Rural Health Project. Monograph No. 10. (1976).
- Experience in Selecting, Training and Supervising Interviewers in a Rural Health Project. Monograph No. 11. (1976).

S10. ATTAINMENT OF GOALS AND OBJECTIVES

The phase of formal research and development that was supported by the USAID contract has come to a close. Much has been learned about the health status of rural Ghanaians and the factors that affect it. Innovative approaches have been implemented to expand the work of health centers in a cost-effective manner and to involve the people in solving their own health problems. It has been demonstrated that rural Ghanaians approve of family planning and will use effective contraceptive methods if provided with the necessary information and services. The Danfa research experience and the participant training program have greatly enhanced the capability of the Department of Community Health of the Ghana Medical School to teach, to plan and evaluate health programs, and to conduct field research. A number of important conclusions and recommendations have resulted from this phase of the Danfa Project which are described in the following section.

The Danfa Project will continue indefinitely as the most important training experience of the Department of Community Health in both its undergraduate and postgraduate programs. Through a variety of formal and informal mechanisms, the Department will continue to make the results of its work known to relevant ministries and agencies in Ghana and elsewhere in the world, and to offer recommendations for improving the health of rural Africans.

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CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS AND RECOMMENDATIONS

Conclusions and recommendations in this section are presented as follows:

1. Health Care Delivery
2. Family Planning
3. Ongoing Supervision and Evaluation of Family Health Programs
4. Institutional Development
5. Information Transfer
6. Project Planning and Administration

CR1. HEALTH CARE DELIVERY (See also Section 6.16)

Baseline analyses of morbidity and mortality rates suggest that the health status of the population of the Danfa district was somewhat better than expected given the health statistics from other parts of rural Ghana or most other countries in Africa. General socioeconomic development, prior health services and proximity to Accra undoubtedly played a role in significantly improving health status in the Danfa Project district over the past several decades. Nevertheless, the Danfa health programs implemented over the past five years appear to have accelerated this process and to have significantly improved health status.

Despite certain social, economic and health improvements that also have reduced death rates during this century elsewhere in Ghana, significant health problems still remain. Because of economic difficulties over the past 15 years, it has become impossible to maintain existing health care facilities and programs at their former level of funding in constant dollars and it is difficult, therefore, to plan expansions of health care services.

In considering the expansion of primary health care to rural areas such as the Danfa health district, it is important to be realistic and to consider only those service programs that can be implemented under existing national resources. The essential criteria of a feasible rural health care program for Ghana are:

- It must deal with the major causes of morbidity and mortality to the extent feasible with existing technology.

- It must be accessible to the entire population and result in high participation rates.
- It must be feasible for implementation with existing national resources.
- Its most important objectives must be capable of being evaluated.

It is likely that sufficient funds will not be available in Ghana in the next ten years to build, supply and staff all the health centers and health posts that the Ministry of Health had previously planned. Even if they were able to do so, the Danfa experience has shown that strictly health center-based care does not necessarily deal with the major causes of morbidity and mortality and that it is often not accessible or utilized by a large percent of the population who live more than three miles away.

In fact, primarily for reasons of accessibility, the Danfa program evolved into a more village-based primary health care program. Based on this experience, there are several recommendations:

Health Care Recommendation 1:
VILLAGE-BASED PRIMARY CARE USING VILLAGE HEALTH WORKERS SHOULD BE TESTED IN VARIOUS REGIONS OF GHANA.

This is perhaps the only feasible method at this time of bringing health care to rural areas in Ghana that will have a significant impact on health status. In some circles, such village-based care is being referred to as first level care. In concurrence with the Institute of Development Studies (IDS), University of Sussex report, it is suggested that funds to implement such a program must be found in existing national resources. This will require the reduction of certain existing health care costs, and the utilization of the saved funds for implementing rural health care. Two important ways of realizing these savings are through the reduction and control of drug supplies and more efficient use of staff.

A village-based primary health care program is not easy to implement. It requires careful planning, training and supervision, but above all, a high level of national morale and a will to succeed in this venture. Any such village-based primary health care program in Ghana must include the following components:

- First aid for common injuries and illnesses.
- Health education, especially in nutrition, sanitation and family planning.
- Community cooperative efforts in water supply, refuse disposal and nutritional supplements for malnourished children.
- Malaria treatment and chemoprophylaxis.
- Expanded village-based immunization against measles, pertussis, tetanus and tuberculosis.
- Training of traditional birth attendants.
- The community distribution of contraceptives.
- Surveillance of child growth and development.
- Surveillance of disease incidence especially reportable and important communicable disease, maternal mortality and, if possible, vital events.

Health Care Recommendation 2:
RURAL HEALTH CENTERS, WHICH WILL BE NEEDED TO PROVIDE SECOND LEVEL CARE AND TO SUPPORT THE VILLAGE-BASED PROGRAM, MUST BE MADE MORE EFFICIENT.

This could be accomplished by the following:

- Reduce the size and cost of health center construction. The Danfa Project has demonstrated that services can be adequately provided in modest facilities often provided by the communities themselves.
- Reduce the size of the staff. Health center staff rosters are much larger in Ghana than those found in East Africa, for example.
- Simplify patient records. The use of patient-retained records such as those now used for children (Morley type) should be used for all age groups. Not only is this more efficient, but it is more desirable from the patient's and the health worker's point of view. Family folders are not of practical use in the typical busy African outpatient clinic.
- Organize satellite clinics to help expand secondary level coverage.
- Offer daily maternal and child health services, including family planning.

- Pre-package commonly used drugs and, if possible, have them dispensed by the health worker seeing the patient.
- Reduce the drug formulary to include only those drugs that are commonly needed, effective, and least expensive. Other special or less frequently needed drugs should be available only to the Health Center Superintendent.

Staff from these second-level centers would spend a significant proportion of their time supervising the village-based primary health care program. This would include resupply of drugs, in-service training, and advice and consultation on medical and health matters.

Health Care Recommendation 3:
HEALTH PROGRAMS MUST ADDRESS THE MAJOR CAUSES OF MORTALITY AND MORBIDITY.

Specifically, health programs must include:

- A maternal health program. Women must be provided with safe and accessible prenatal and delivery services, either at health facilities or by training traditional birth attendants.
- A malaria prophylaxis program. One that utilizes village volunteers can be very effective in distributing malaria prophylaxis tablets, as demonstrated in the Danfa Project. There is about a 78% reduction in the risk of parasitemia in the month after taking the tablet.
- An expanded immunization program. Immunization is one of the most cost-effective methods available for reducing mortality and morbidity. Aggressive and innovative methods are needed to bring immunization services to children in villages.

Health Care Recommendation 4:
HEALTH EDUCATION MUST BE AN INTEGRAL COMPONENT OF EVERY PROGRAM BECAUSE IT IS ESSENTIAL TO ACHIEVING SIGNIFICANT PARTICIPATION OF THE POPULATION IN HEALTH PROGRAMS.

The Danfa Project found that health education did not significantly affect health status measures when it was separate from comprehensive health services. The health education was most effective when it was part of routine

program schedules and when immediate action on the part of the population was possible. The Project also found that the health education component was able to bring about a significant increase in the level of family planning acceptance in Area II and, in conjunction with comprehensive health services, led to an even greater level of acceptance in Area I.

Mechanisms for the integration of health education are:

- Train level two health staff associated with health centers or health posts in community development and health education techniques.
- These health workers identify, train and coordinate the activities of village volunteers.
- Organize comprehensive coverage of rural health districts by assigning responsibility for supervising health programs in specific communities to individual health workers.
- Integrate health education into routine annual and monthly program schedules in primary and preventive health care.
- In order to make health education most effective:
  (a) It must be integrated into comprehensive health care.
  (b) Where this is not possible, educational efforts must be focused on existing community health and development programs.
  (c) Opportunities must be provided for immediate behavior change.

Health Care Recommendation 5:
TRAINING MUST BE MADE MORE EFFECTIVE AND MORE RELEVANT TO PROGRAM OBJECTIVES.

In designing any training program, whether prior-to-service or in-service, the tasks that each health worker must perform must be identified. Then each task must be analyzed to determine the knowledge and skills required to perform the task. Important objectives in improving training are:

- Training must be competency-based. Each worker must be trained to become competent to perform each required skill and must be tested to be certain that the worker has the required knowledge and skill before proceeding to learn the next task.

- Job description of Ministry of Health personnel must be reassessed and revised to bring them in line with current health service needs and objectives. The revised job descriptions must then be made available to all Ministry of Health personnel.
- Appropriate in-service training exercises must be developed to help MOH personnel on the job adapt to the new job roles. In-service training must also become a routine part of the professional life of all MOH personnel.

CR2. FAMILY PLANNING (See also Section 8.16)

Based on the experience of the Danfa family planning program, the three most important conclusions are:

- Interest in fertility reduction is significant in this rural population.
- People need information and services if they are to act on this interest.
- If information and services are provided, results will be acceptable.

Recommendations for expanding family planning services in rural Ghana and elsewhere in Africa based on these conclusions and the Danfa experience follow.

Family Planning Recommendation 1:
FAMILY PLANNING SERVICE COMPONENTS MUST IMMEDIATELY BE INTEGRATED WITH OTHER HEALTH SERVICES.

The integration of family planning with other health services is often regarded as being much more complicated than it really is. There are many countries in Africa where health services are reasonably accessible to 50% of the population. The easiest and most cost-effective way to immediately integrate family planning with other health services and also to rapidly expand the numbers of current acceptors is to train all serving health personnel to deliver family planning services as a regular part of their other duties. This can be done rapidly if training in IUD insertion is excluded initially. Such training is especially important for nurses who conduct the

maternal and child health clinics. Thus, we recommend integrating family planning and maternal and child health clinics as to time, place and personnel. In other words, a nurse who conducts an under-fives clinic would offer, as one of a number of clinic services, family planning advice and methods to mothers of children attending the clinic.

Family Planning Recommendation 2:
MOBILE FAMILY PLANNING TEAMS SHOULD BE USED TO EXPAND AND SUPPORT OUTREACH PROGRAMS AND HEALTH CENTER PROGRAMS.

These teams would be involved in three main activities:

- Outreach Programs. The Danfa experience has shown that women will not walk far for family planning services. This problem can be partially overcome by contacting women when they are visiting the MCH clinics for other reasons. In areas that are poorly served by MCH clinics, outreach programs are justified. The extended program of the Danfa family planning team demonstrated that acceptor rates can be doubled by having a mobile family planning team visit outlying villages as infrequently as once every four months. Employing such a schedule a team can cover a district of 200 sq. miles (500 sq. km) and 60,000 population.
- Supervision of Village-based Family Planning Programs. During outreach village visits the family planning team can recruit and supervise village volunteers who can act as village agents for family planning and be able to motivate other villagers and supply them with contraceptives. These volunteers may be teachers, TBAs, members of women's groups, or Village Health Workers. Although such a village-based family planning program could stand alone, it would be more efficient to integrate it with other village-based primary health care programs. Even in an integrated program, the family planning team could still play a useful support role.
- In-Service Training and Support of Health Service Staff. As part of their district responsibilities, the family planning team can train serving health personnel in family planning. This responsibility could be ongoing and include refresher courses, supervision where appropriate, collection and feedback of monthly returns,

consultation for problem cases, monthly IUD insertion, or weekly clinics during very busy days in certain urban locations.

Family Planning Recommendation 3:
VILLAGE-BASED FAMILY PLANNING SERVICES MUST BE DEVELOPED.

In rural areas a village-based family planning program using volunteer family planning workers such as Village Health Workers can be very effective. Once organized it is relatively inexpensive to maintain. However, the start up costs in time and money should not be underestimated. Moreover, continued support and supervision must be vigorously maintained. Because this support often requires expensive vehicles and personnel, it can be more easily justified if it is combined with the support of other village-based programs such as TBA training, malaria prophylaxis, village-based primary care, or other outreach family planning services. The mobile family planning team can be used to help support this activity.

Family Planning Recommendation 4:
COMMERCIAL DISTRIBUTION PROGRAMS MUST BE EXPANDED.

These supplement those family planning services provided by health personnel. Commercial contraceptive distribution sources may be especially important for unmarried men and women anxious to avoid unwanted pregnancy and who prefer the anonymity of a commercial source.

Each of the four components recommended above (integration of family planning with other services, utilizing mobile family planning teams, developing village-based family planning services and commercial distribution programs) could stand alone if the resources needed for the other three were not available. However, the benefits of family planning are such as to warrant the integration and implementation of all four program components in rural Ghana.

Family Planning Recommendation 5:
FAMILY PLANNING SERVICES SHOULD BE PROVIDED FREE OF CHARGE.

Although the Danfa Project did not conduct a controlled study of the impact of charges for service on acceptance rates, it was the impression that free services facilitated acceptance by many poor rural men and women. At the

very least, a controlled study should be undertaken to determine if there is a disincentive in charging for family planning services.

CR3. ONGOING SUPERVISION AND EVALUATION OF FAMILY HEALTH PROGRAMS.

Supervision and evaluation is one of the major components of project management. It is brought to attention here because it is the component that often receives the least emphasis. Ongoing or internal evaluation is stressed because too often evaluation is taken to mean a periodic external review of results at long intervals. This usually results in the detection of problems or deficiencies at a stage so late in program implementation that remedies cannot be effected in time to assure program objectives. The success of many of the Danfa health and family planning programs was achieved by the constant supervision of Project workers and evaluation of short-term implementation targets. To assure attainment of objectives in similar projects, several recommendations are offered.

Evaluation Recommendation 1:
EVALUATION AND SUPERVISORY PROCEDURES MUST BE AS SIMPLE AS POSSIBLE WITH RAPID FEEDBACK OF CONCLUSIONS AND SUGGESTIONS.

Evaluation Recommendation 2:
EVALUATION AND SUPERVISION MUST OCCUR ON ALL LEVELS.

- Community Level Evaluation. Village-based primary health care programs require careful monitoring and supervision. These should be a collaborative effort of the Village Development Committees (VDCs), the Village Health Workers, TBAs and other village workers. Objectives and methods of assessment must be jointly agreed upon.

  For example, using record books of the type prepared for the Danfa TBA training manual, even illiterate Village Health Workers would be able to tally visits, diagnoses and nutritional status. The VDC or council of elders might agree to record vital events in the villages. Supervisors could easily consolidate such village level reports to develop service utilization rates, morbidity rates, and vital rates for their district.

- Health Center and Health Post Level Evaluation. Again, objectives and methods of assessment must be jointly developed by staff and supervisors. Job descriptions and standards of performance must be prepared. Controls on access to drugs and equipment are important to avoid pilferage or overutilization. Regular weekly or monthly staff meetings aid in the review and evaluation process.
- District and Regional Level Evaluation. District and regional objectives must be clearly and quantitatively stated. Attainment of short-term implementation objectives must be constantly monitored by supervisory personnel through frequent visits and meetings with peripheral staff. Data collection must be carefully and simply organized. Analyses of data and feedback of results to peripheral staff must be rapidly carried out. This can be aided by using computer processed forms or cards where facilities permit. But if electronic data processing is used it must be kept simple and the amount of data regularly generated kept to the absolute minimum so that district staff have the time and capability to analyze it.

CR4. INSTITUTIONAL DEVELOPMENT

The Danfa Project has demonstrated that a medical school can act as a research and development unit of the Ministry of Health. This kind of collaborative relationship can utilize those skills often found in a medical school setting to help solve national health problems.

To foster such relationships, the following recommendations are made:

Institutional Development Recommendation 1:
DEMONSTRATION PROJECTS OF SERVICE, TEACHING, AND RESEARCH, SUCH AS THE DANFA PROJECT, SHOULD BE DEVELOPED IN OTHER COUNTRIES, AND IDEALLY, IN EACH MAJOR REGION OF THOSE COUNTRIES.

These should be joint collaborative efforts of medical schools (and possibly other professional schools) and Ministries of Health. Experience in these project districts should form an important part of the training of medical students, nurses and other health professionals.

Institutional Development Recommendation 2:
TEACHING STAFF WITH THE NECESSARY SKILLS TO PARTICIPATE EFFECTIVELY IN THESE PROJECTS MUST BE DEVELOPED.

The skills of particular importance are:

- Teaching methods, especially competency-based training
- Epidemiology
- Biostatistics
- Maternal and child health
- Family planning
- Control of infectious diseases
- Research methods and survey design
- Health economics
- Management
- Demography
- Electronic data processing

Institutional Development Recommendation 3:
MEDICAL SCHOOLS OR OTHER TRAINING INSTITUTIONS SHOULD AID IN PREPARING TRAINING MANUALS.

The development of these training and operational manuals should be based on the experience of a demonstration project. If produced in collaboration with the appropriate divisions of the Ministry of Health and its training institutions, they can help assure a high standard of preventive and curative care.

Institutional Development Recommendation 4:
MEDICAL SCHOOLS SHOULD RECEIVE ADEQUATE SUPPORT TO PARTICIPATE IN THESE ACTIVITIES.

Important here is the creation of new staff positions in the medical school for trained faculty, the strengthening of electronic data processing capability, the development of editing, illustration and publishing capabilities, and the provision of necessary operating funds through either regular budgets or donor assistance.

CR5. INFORMATION TRANSFER

Demonstration projects can only reach their objectives if there is active collaboration between the project staff, the medical school, other training institutions, the Ministry of Health, and other relevant government ministries or agencies. To foster this collaboration, there are several recommendations.

Information Transfer Recommendation 1:
A POLICY ADVISORY COMMITTEE OF THE PROJECT, COMPOSED OF REPRESENTATIVES FROM ALL RELEVANT AGENCIES, MUST BE ORGANIZED.

This committee would set project objectives and review findings for incorporation into national health policy.

Information Transfer Recommendation 2:
PROJECT EXPERIENCE MUST BE INCORPORATED INTO THE CURRICULUM OF MEDICAL SCHOOLS AND OTHER TRAINING INSTITUTIONS.

Information Transfer Recommendation 3:
PROJECT STAFF MUST DEVELOP FORMAL AND INFORMAL RELATIONSHIPS WITH RELEVANT GOVERNMENT MINISTRIES AND AGENCIES.

These should include memberships on advisory committees, formal and informal consultations, and participation in workshops, seminars, and conferences.

Information Transfer Recommendation 4:
PROJECT STAFF MUST BE ENCOURAGED AND AIDED TO TRANSMIT PROJECT EXPERIENCE BY MEANS OF PUBLISHED ARTICLES, MANUALS AND CONFERENCE PRESENTATIONS.

CR6. PROJECT ORGANIZATION AND MANAGEMENT

A number of lessons have been learned during the collaboration of UCLA and the Ghana Medical School in the Danfa Project which should be considered by others who might be involved in similar projects.

- The development of a demonstration project and the strengthening of the host country institution is of necessity a long-term project requiring five to ten years to come to full fruition. The time required is often greater than that initially anticipated.

- The possibility for any domination by donor country institutions which are involved as major participants must be avoided. True collaboration and protection of the prerogatives and involvement of the host country institution and staff can be assured by the kind of arrangements developed in the Danfa Project: co-directorships, joint staff meetings, and joint authorship of papers.
- The independence of the host country institution must be assured. In areas of disagreement the host country institution must have the final decision making authority.
- The host country institution must be provided with a separate local personnel budget. If there is external assistance and participating donor country institutions, the host country institution must be provided with a separate budget to hire and control local staff under local personnel practices and salary scales.
- Economic and political difficulties may arise during the course of the collaboration and, therefore, contingency plans may be necessary.
- Host country colleagues should be available in all key categories of activity. If they are not, consideration should be given to dropping these categories of activities from the project work plan.
- The time available for host country participants to be involved in the project must be realistically assessed. Their other national and international advisory and teaching responsibilities must be considered.
- Long-term longitudinal research studies engender many problems because of changing priorities, staff turnover and population mobility. The most successful research studies are usually those that can be planned and completed in a short period of time by the same staff.
- Extensive demographic studies should be avoided because of their complexity and cost. Retrospective sample surveys will often suffice to obtain estimates of vital rates. If other demographic information is required it may be preferable to coordinate these activities with the national census.
- Data processing capability must be realistically assessed and, if possible, work tailored so that it can be analyzed using equipment existing within the host country.

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APPENDIX 8: PUBLICATIONS AND REPORTS

APPENDIX 8: PUBLICATIONS AND REPORTS

This appendix includes Danfa Publications Policy; a sample "Manuscript Checklist"; a list of publications, presentations, monographs, training manuals, etc.; and finally, a summary of each publication and selected monographs.

A8.1 DANFA PROJECT PUBLICATIONS POLICY

The following is the Publications Policy (revised in January 1976) verbatim:

1. The Danfa Project is a collaborative research project between the University of Ghana (principally the Medical School) and the University of California, Los Angeles, U.S.A., and is funded jointly by the U.S. Government (through AID) contract, and the Government of Ghana. There are two codirectors in charge of the Project - a Ghanaian and the other from UCLA, with the Ghanaian Codirector as senior.
2. These guidelines for publication are deemed necessary by the Codirectors to protect the interests of research workers in the Project in both collaborating institutions.
3. Permission for authorship using Danfa Project data may be allowed research workers by the Codirectors for any of the following reasons:

    (i) Planning the project or special study that is the subject of the paper.
    (ii) Taking part in the execution of the project to a significant degree.
    (iii) Taking a significant part in the reduction, analysis and interpretation of data.
    (iv) Taking part in the planning, review of the literature, and the writing of the paper.

4. The senior author will be the one principally responsible for the planning and the execution of the work in question and/or the one who played the principal role in the analysis and interpretation of

the data and the actual writing as determined by both Codirectors. All co-authors of a paper must have taken an active part in the preparation of material and the writing of the paper to the satisfaction of the Codirectors.

5. Unless both Codirectors decide otherwise, articles will include at least one author from the Ghanaian side and one from the UCLA side.
6. No article using original Danfa Project data may be submitted for publication without the prior written approval of both Codirectors.
7. All articles for publication should bear the following footnote "supported in part by US/AID Contract OCOP/AID/afr-I.D.A. - 73 - 14."
8. Before deciding to write a paper, for the purposes of coordination, it is suggested that the author(s) should informally discuss matters with the Ghanaian field Coordinator, the UCLA Chief of Party, or the Codirectors, and then submit tentative titles and arguments, and the prospective co-authors in order of listing on the special Project manuscript checklist to the Codirectors for review.

   The authors thereby become committed to completing the writing of the proposed manuscript within four to six months. They will then submit the manuscript for final approval using another set of the Project manuscript checklist.
9. In an effort to help authors, the Project whenever possible will arrange for bibliographic searches, provide copies of articles and books, provide limited editorial services and special manuscript typists who will prepare articles for submission in the specified manner prescribed by the journal selected for the publication.

   Students may be given permission to work with Danfa data for their University thesis by the two Codirectors.

A8.2 MANUSCRIPT CHECKLIST

The following is a facsimile of the form used when a manuscript was planned, and again when it was completed.

Figure A8-1: Danfa Comprehensive Rural Health and Family Planning Project Manuscript Checklist

In accordance with publications guidelines established by the Danfa Project Codirectors it is kindly requested that four (4) copies of this form be completed both when a paper is in the planning stage and when completed.

Check one:

Initial Planning Stage _____ (date) _____

**Manuscript Completed _____ (date) _____

TITLE

BRIEF OUTLINE OF PAPER (use only at planning stage)

AUTHORS (in order of appearance) (List affiliations and degrees if not noted on manuscript).

ACKNOWLEDGEMENTS

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Other (in narrative form)

S. Ofosu-Amaah, Codirector

A.K. Neumann, Codirector

F.K. Wurapa, Field Coordinator

I.M. Lourie, Chief of Party

Senior Author

**NOTE: The checklist copies are to be attached to a copy of the manuscript when the latter is completed and being forwarded for final signatures.

A8.3 LIST OF DANFA PROJECT PUBLICATIONS AND REPORTS

This subsection consists of a chronological list organized as follows:

A8.3.1 Published papers

A8.3.2 Papers in press

A8.3.3 Papers submitted

A8.3.4 Conference presentations

A8.3.5 Monographs

A8.3.6 Training manuals

A8.3.7 Annual or semi-annual progress reports

A8.3.8 Proceedings of the Annual Review Meetings

Subsection 8.4 summarizes papers and monographs.

A8.3.1 Published Papers

1. Sai, F.T., F.K. Wurapa, E. Quartey-Papafio. "The Danfa/Ghana Comprehensive Rural Health and Family Planning Project - A Community Approach." Ghana Medical Journal, Vol. 11, No. 1, pp. 9-17, 1972.

2. Neumann, A.K., J. Prince, E.F. Gilbert, I.M. Lourie. "The Danfa/Ghana Comprehensive Rural Health and Family Planning Project - Preliminary Report." Ghana Medical Journal, Vol. 11, No. 1, pp. 18-24, 1972.

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A8.3.2 Papers in Press

1. Wurapa, F.K., D.D. Nicholas, D.W. Belcher, S. Ofosu-Amaah. "Epidemiology of Malaria in the Accra Plains of Ghana--Implications for Control Programmes." Ghana Medical Journal.

2. Lamptey, P., D.D. Nicholas, E. Quartey-Papafio. "A Village Based Primary Health Care Program in Rural Ghana--Selection, Training and Supervision of Village Health Workers" (1978, unpublished). WHO Forum.

3. Lamptey, P., F.K. Wurapa, D.D. Nicholas. "The Evolution of a Primary Health Care Program--The Danfa Experience, 1970-1977." Journal of Tropical Pediatrics and Environmental Child Health.

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A8.3.3 Papers Submitted

1. Lamptey, P., F.K. Wurapa, D.D. Nicholas. "The Evolution of a Primary Health Care Program--The Danfa Experience, 1970-1977." Submitted to the Ghana Medical Journal.

A8.3.4 Conference Presentations

1. Wurapa, F.K. "Rapid Population Growth and Rural Development." Published in The Teaching and Practice of Family Health - Proceedings of the Conference sponsored by the Association of Medical Schools in Africa; Kampala, Uganda, November 29 - December 3, 1971.

2. Wurapa, F.K., I.M. Lourie. "The Danfa Rural Health and Family Planning Project." Published in the Proceedings of the African Regional Population Conference, sponsored by the IUSSP and ECA; held in Accra, Ghana, December 13-17, 1971.

3. Sai, F.T. "A Rural Health Model: Danfa, Ghana." In Health Care for Remote Areas, An International Conference, sponsored by Kaiser Foundation International, Bellagio, Italy, May 1972. (James Hughes, Editor.)

4. Wurapa, F.K., I.M. Lourie. "Population Growth and Rural Health." Presented at the West African Regional Seminar on Population Studies, December 1-4, 1972. Published in the Proceedings of the Seminar.

5. Wurapa, F.K., I.M. Lourie. "Focusing on Family Health in the Rural Communities." Published in The Teaching and Practice of Family Health - The Proceedings of a Regional Seminar, sponsored by the Association of Medical Schools in Africa; Accra, Ghana, January 8-12, 1973.

6. Wurapa, F.K. "Community Approach to the Organization of a Comprehensive Rural Health Care System - The Danfa Experience." Paper presented at the Conference on Health of the Family Unit, University of Sierra Leone, September 1973. Published in the Proceedings.

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9. Britt, P.M., S.N. Blumenfeld, F.K. Wurapa, G.M.K. Kpedekpo, A.K. Neumann. "A Case Study in Computer Applications for Developing Countries - The Danfa Comprehensive Rural Health and Family Planning Project, Ghana." Paper presented at the Second Jerusalem Conference on Information Technology, July-August, 1974, Published in the Proceedings.

10. Sohrab, L. "Computer Applications in the Danfa Project - A Tool for Social and Economic Development of Ghana." Presented at the Student Paper Sessions of the Jerusalem Conference on Information Technology, August 1, 1974.

11. Belcher, D.W., F.K. Wurapa, D.D. Nicholas. "Health Care and Family Planning." Presented at the International Health/Family Health Conference. Washington, D.C., October 1974.

12. Ward, W.B., L. Enberg, D.W. Belcher. "Preliminary Report of Efforts to Develop Social Indicators to Guide and Assess Rural Development." University of Ghana, May 1974.

13. Neumann, A.K., C.G. Neumann, W.B. Ward. "The Design and Implementation of an Integrated Nutrition Health and Family Planning Program in Rural African Villages." Presented to the 19th Annual Meeting of the African Studies Association, Boston, Massachusetts, November 3-6, 1976.

14. Nicholas, D.D., J.H. Kratzer, S. Ofosu-Amaah. "Paralytic Poliomyelitis in Ghana--Survey of Lameness." Poster presentation at 1976 Joint Meeting of the American Society of Tropical Medicine and Hygiene and the Royal Society of Tropical Medicine and Hygiene, November 4, 1976.

15. Neumann, A.K., F.K. Wurapa. "Strategies for Strengthening Health Services Infrastructure." Presented at the Latin American Studies Association - African Studies Association Annual Meeting, Houston, Texas, November 4, 1977 (See #3 of Section D).

16. Neumann, A.K. "Integration of Rural MCH/Nutrition/Family Planning Services - The Danfa/Ghana Project as a Model." Prepared for IUNS Working Conference in Hyderabad, India, October 7-21, 1977 on the theme: Community Action - Family Health Programme Delivery - An Integrated Package.

17. Neumann, A.K., C. Neumann, S. Ofosu-Amaah. "Integration of MCH, Family Planning and Nutrition Programs from a Managerial Perspective." Presented to the XVth International Congress of Pediatrics, New Delhi, India, October 1977.

18. Wurapa, F.K. "Institutional Organization: Assessment of Alternatives." Presented at the Conference on the Future of Academic Community Medicine in Developing Countries, April 10-14, 1978.

19. Lourie, I.M. "Background and Introduction to The Danfa Project." Presented at the 106th APHA Annual Meeting in Los Angeles, California, October 15-19, 1978.

20. Lamptey, P. "The Danfa Project Primary Health Care Program." Presented at the 106th APHA Annual Meeting in Los Angeles, California, October 15-19, 1978.

21. Neumann, A.K. "Impact Institutionalization and Policy Implications of The Danfa Project." Presented at the 106th APHA Annual Meeting in Los Angeles, California, October 15-19, 1978.

22. Blumenfeld, S.N. "Systems and Costs Aspects of the Danfa Project." Presented at the 106th APHA Annual Meeting in Los Angeles, California, October 15-19, 1978.

23. Nicholas, D.D. "The Danfa Family Planning Program." Presented at the 106th APHA Annual Meeting in Los Angeles, California, October 15-19, 1978.

24. Ward, W.B. "The Impact of Community Health Education on Health and Family Planning Practices in Rural Southern Ghana." Presented at the 106th APHA Annual Meeting in Los Angeles, California, October 15-19, 1978.

25. Belcher, D.W., F.K. Wurapa, D.D. Nicholas, S. Ofosu-Amaah. "Health status measurement in a Rural Health Project." Presented at the 106th APHA Annual Meeting in Los Angeles, California, October 15-19, 1978.

26. Neumann, A.K. "Introduction to Practical Evaluation." Prepared for the AID African Health/Nutrition/Population Officers Conference held at Taita Hills, Kenya, November 26 - December 1, 1978.

27. Ward, W.B., M.E. Pappoe. "Health Education in Rural Ghana." Presented at the International Union of Health Educators Conference, London, England, September 3-6, 1979.

A8.3.5 Monographs

1. Kpedekpo, G.M.K., D.W. Belcher, F.K. Wurapa, A.K. Neumann, I.M. Lourie. "Results of the Analysis and Evaluation of Vital Registration Data from the Four Project Areas." (Vital Events 1 - Monograph Series, Number 1) 1975.

2. Kpedekpo, G.M.K., F.K. Wurapa, I.M. Lourie, D.W. Belcher, A.K. Neumann. "Estimates of Indices of Mortality from Registration Data." (Vital Events 2 - Monograph Series, Number 2) 1975.

3. Kpedekpo, G.M.K., D.D. Nicholas, S. Ofosu-Amaah, F.K. Wurapa, D.W. Belcher. "Estimates of Indices of Fertility from Registration Data." (Vital Events 3 - Monograph Series, Number 3) 1975.

4. Kpedekpo, G.M.K., F.K. Wurapa, I.M. Lourie, A.K. Neumann, D.W. Belcher. "Some Results and Problems on the Estimation of Vital Rates in a Rural African Setting via Multiple Methods." (Vital Events 4 - Monograph Series, Number 4) 1975.

5. Kpedekpo, G.M.K., F.K. Wurapa, I.M. Lourie, A.K. Neumann, D.W. Belcher. "Migration Patterns, Population Growth and Change in the Project Areas of Danfa." (Vital Events 5 - Monograph Series, Number 5) 1975.

6. Kpedekpo, G.M.K., I.M. Lourie, F.K. Wurapa, D.W. Belcher, A.K. Neumann. "The Basic Demographic Characteristics of the Danfa Project Areas - An Analysis of the Population Size, Age/Sex Distribution." (Demography 1 - Monograph Series, Number 6) 1975.

7. Kpedekpo, G.M.K., F.K. Wurapa, D.W. Belcher, A.K. Neumann, I.M. Lourie. "The Basic Demographic Characteristics of the Danfa Project Areas - An Analysis of Marital Status, Education, Ethnic, Religious and Occupational Composition." (Demography 2 - Monograph Series, Number 7) 1975.

8. Kpedekpo, G.M.K., K. Asuming, S.N. Blumenfeld, F.K. Wurapa, D.W. Belcher. "An Analysis of the Characteristics of Households, Household Size, Household Heads and the Relationship within the Households." (Demography 3 - Monograph Series, Number 8) 1975.

9. Belcher, D.W., F.K. Wurapa, D.D. Nicholas, G.M.K. Kpedekpo, S. Ofosu-Amaah, L.K. Derban, R.O. Asante. "Conducting a Rural Health Survey: Experience from the Village Health Survey, Danfa Project, Ghana." (Monograph Series, Number 9) 1975.

10. Belcher, D.W., G.M.K. Kpedekpo, F.K. Wurapa, I.M. Lourie. "Mapping and House Numbering Methods in a Rural Health Project." (Monograph Series, Number 10) 1976.

11. Belcher, D.W., F.K. Wurapa, I.M. Lourie, K. Kwabia, S. Avle. "Experience in Selecting Training and Supervising Interviewers in a Rural Health Project." (Monograph Series, Number 11) 1976.

A8.3.6 Training Manuals

1. A Programme Manual for Traditional Birth Attendants - Organization, Training and Evaluation, December 1977.

2. Manual A and B for Health Workers and Serving Personnel, March 1977.

3. Danfa Comprehensive Rural Health and Family Planning Project: Ghana - Preliminary Manual for Trainers of Village Health Workers, Phase I and Phase II, 1978.

4. Village Health Survey Manual. In progress.

A8.3.7 Annual or Semi-annual Progress Reports

1. Semi-Annual Progress Report - January-June 1971.

2. Semi-Annual Progress Report - July-December 1971.

3. Semi-Annual Progress Report - January-June 1972.

4. Semi-Annual Progress Report - July-December 1972.

5. Annual Progress Report - January-December 1973.

6. Annual Progress Report - January-December 1974.

7. Annual Progress Report - January-December 1975.

8. Annual Progress Report - January-December 1976.

9. Annual Progress Report - January-December 1977.

A8.3.8 Proceedings of the Annual Review Meetings

1. Proceedings of the Fifth Annual Review Meeting. February 26-28, March 1, 1974. Accra, Ghana.

2. Proceedings of the Sixth Annual Review Meeting. March 17-18, 1975. Accra, Ghana.

3. Proceedings of the Seventh Annual Review Meeting. February 12, 1976. Accra, Ghana.

4. Proceedings of the Eighth Annual Review Meeting. February 24, 1977. Accra, Ghana.

Danfa Project
Final Report
summary conclusions
and recommendations

APPENDIX 10: PERSONNEL

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I. GHANAIAN STAFF

A. Codirectors

Three codirectors served in the following order:

Dr. F. T. Sai (1970-1972)

Dr. Silas R. A. Dodu (who continued in "acting" capacity (1972-1975)

Dr. S. Ofosu-Amaah (1975-1979)

B. Department of Community Health, Ghana Medical School

Dr. F. K. Wurapa, Field Coordinator/Epidemiologist (1970-1979)

Dr. P. R. Lamptey, MCH/FP and Medical Officer Area I

Dr. L. Osei, Medical Officer Areas II and III

Dr. E. K. M. Agbenu, Sociologist/Anthropologist

Mrs. E. M. Pappoe, Health Educator

Mr. E. K. Quartey-Papafio, Community Development/Sociology

Mrs. E. M. Asante, Public Health Nurse

Mrs. D. Richardson, Public Health Nurse

Mrs. M. Peasah, Public Health Nurse

Mrs. M. B. Amonoo-Acquah, Family Planning Nurse/Midwife

Mrs. S. Botchway, Family Planning Nurse/Midwife (FP Team)

Mrs. Stella Ansah, Public Relations, Writer/Editor

C. Department of Obstetrics and Gynecology, Ghana Medical School

Dr. D. Ampofo, assisted in MCH and Family Planning

D. Ministry of Health

Dr. R. Amonoo-Lartson, Deputy Director of Medical Services

Dr. R. O. Asante, Medical Officer

Dr. E. Osei-Tutu, Epidemiologist

E. Danfa Health Center

Approximately 16 staff, including Health Center Superintendent, midwives, nurses, sanitarian, laboratory technician, dispensary (pharmacy) assistant, engine attendants (for electric generator), laborers.

F. University of Ghana Campus at Legon

1. Supervisors -- There were two to four supervisors at different times.
   (a) Chief and Principal Research Assistants were K. Assuming, K. Kwabia, S. Asher, O. Abedi, S. Avle
   (b) Senior Research Assistants were T. Nsiah and S. Afo-Kantanka

2. Research Assistants -- There were four to eight research assistants (editing/coding) at different times, with approximately 16 total.

3. Computer programmers -- D. Dovlo and K. Tipong-Annor

G. Field Staff

1. Interviewers -- range of 30-45 at different times. Total of 100-120 different interviewers over the years.

2. Vital Events Registration Assistants
   (a) Volunteers (first phase) -- 57
   (b) Full-time (second phase) -- 18
   Total of approximately 85-90 for the duration of the Project.

3. Family Planning Team
   (a) Nurse midwife -- one (over the years three different ones used)
   (b) Family planning (nurse's) assistant -- one
   (c) Clerk -- one (over the years two different ones used)

4. Health Education Assistant Teams -- Two teams of four persons each: community health nurse, nutrition technical officer, rural sanitarian, family planning field worker; total of eight persons. Total of approximately 16 different staff over the years.

II. UCLA STAFF

A. In Ghana

In Ghana, the Project began with four and later six staff in residence.

	Full Time Resident in Ghana	Full Time Resident at UCLA	Other
Dr. Irvin M. Lourie Chief of Party	8/70 - 4/78	4/78 - 8/79	TDY; feasibility study
Dr. Donald W. Belcher Epidemiologist	8/70 - 6/76		7/76 - 8/79 Part time
Dr. Jerry Niswonger Family Planning Specialist	8/70 - 11/71		
Replaced by: Dr. David D. Nicholas Family Planning/MCH Advisor	3/72 - 7/77	7/77 - 8/79	
Dr. JoAnn Cannon Health Educator	8/70 - 7/72		
Replaced by: Dr. William B. Ward Health Educator/ Anthropologist	1/73 - 7/75		7/75 - 8/79 Part time
Dr. Stewart N. Blumenfeld Health Systems Analyst	3/73 - 7/77	7/77 - 8/79	
Mrs. Harriet S. Lourie Administrative Assistant	7/71 - 4/78		

B. At Los Angeles Campus

1. Codirector and UCLA Campus Principal Investigator -- Dr. Alfred K. Neumann, Danfa Feasibility Study, September 1969 - April 1970 and Danfa Project, May 1970 - August 1979

2. Faculty -- Dr. H. M. Lieberman, Dr. Charlotte G. Neumann, Ms. Olive Johnson, Dr. C. Hopkins; all were part-time or without salary consultants throughout the Project.

Dr. Jagdish Bhatia, Senior Researcher/Demographer

3. Administrative Assistants -- Ms. Alva Pryor, Ms. Lily Knutson

4. Training Officer -- Ms. Margaret Ross-Price, Ms. Larrie Lance

5. Editors -- Ms. Debra Boyd, Mr. Gregory Apparcel, Ms. Beth Wassenberg

6. OCOP -- Ms. Janet Bardin and OCOP staff, including fiscal affairs specialists, secretarial and shipping support staff.

7. Additional UCLA Support Resources -- Personnel and fiscal staff in the School of Public Health, contract specialists, accounting experts, purchasing and travel agents, the staff of African Studies Center, and the staff of the Chancellor's Committee for International and Comparative Studies.

III. UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT

A. Mission Directors

Mr. R. Cashin
Mr. H. North
Mr. I. Coker

B. Health and Population Officers

Dr. J. Prince
Dr. F. Zerzavy

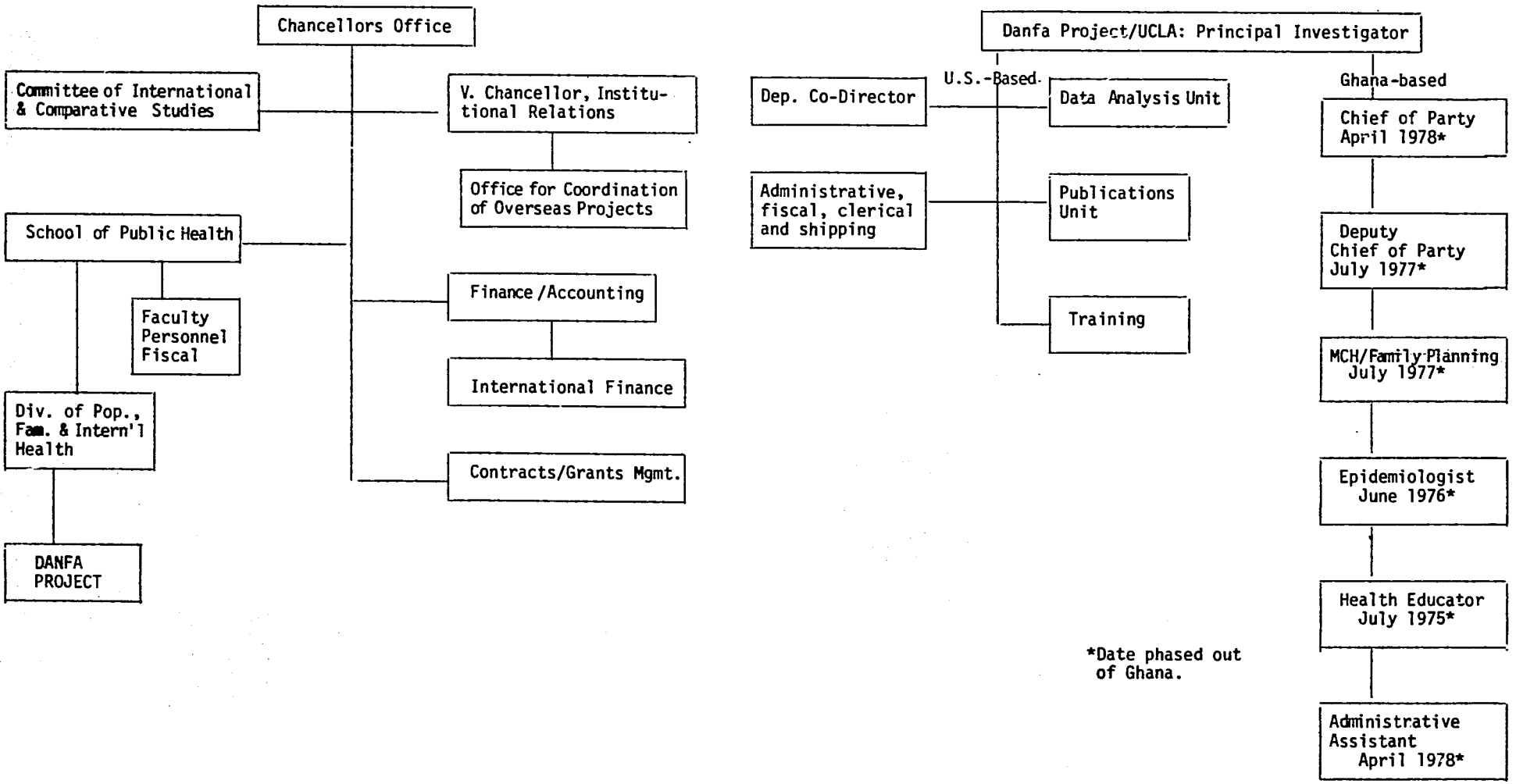
C. Project Officers

Mr. F. Gilbert
Mr. M. Feldstein
Ms. J. Bryson
Mr. G. Flores
Mr. J. Wiles

IV. U.S. PEACE CORPS VOLUNTEERS

There were two computer programmers, David Johnson (September 1974 to July 1976) and Richard Winegardner (September 1976 to July 1977).

Figure A10-1: UCLA Organization/Danfa Comprehensive Rural Health and Family Planning Project: Ghana



Data Project

Data Project