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AGENCY FOR INTERNATIONAL DEVELOPMENT

PROJECT PAPER FACESHEET

TO BE COMPLETED BY ORIGINATING OFFICE

1. TRANSACTION CODE (X APPROPRIATE BOX)
[X] ORIGINAL [ ] CHANGE [ ] ADD [ ] DELETE

PP

DOCUMENT CODE 3

2. COUNTRY/REGIONAL ENTITY/GRANTEE
TAB

3. DOCUMENT REVISION NUMBER

4. PROJECT NUMBER
931-11-690-076

5. BUREAU
A. SYMBOL: TAB
B. CODE: 6

6. ESTIMATED FY OF PROJECT COMPLETION
FY 78

7. PROJECT TITLE - SHORT (STAY WITHIN BRACKETS)
Evaluation of Two-Way Audio in Health

8. ESTIMATED FY OF AUTHORIZATION/OBLIGATION
A. INITIAL MO. 6 YR. 76 B. FINAL FY 76

9. SECONDARY TECHNICAL CODES (MAXIMUM SIX CODES OF THREE POSITIONS EACH)

10. ESTIMATED TOTAL COST ($000 OR EQUIVALENT, $1 = ____)

A. PROGRAM FINANCING	FIRST YEAR B. FX	C. L/C	D. TOTAL	ALL YEARS E. FX	F. L/C	G. TOTAL
AID APPROPRIATED TOTAL						
(GRANT)	(100)	( )	(100)	(100)	( )	(100)
(LOAN)	( )	( )	( )	( )	( )	( )
OTHER U.S.						
HOST COUNTRY						
OTHER DONOR(S)						
TOTALS	100		100	100		100

11. ESTIMATED COSTS/AID APPROPRIATED FUNDS ($000)

PROJECT PURPOSE CODE	PRIMARY TECH. CODE	FY 76 A. GRANT	B. LOAN	FY 77 C. GRANT	D. LOAN	FY 78 E. GRANT	F. LOAN	ALL YEARS G. GRANT	H. LOAN
		100						100	
TOTALS									
ESTIMATED EXPENDITURES				95					

PROJECT PURPOSE(S) (STAY WITHIN BRACKETS) [X] CHECK IF DIFFERENT FROM PID/PRP

The project will assist in the evaluation design and implementation for the two-way radio health projects planned in Nicaragua and Guatemala.

15. HAVE CHANGES MADE IN THE PID/PRP FACESHEET DATA NOT INCLUDED ABOVE? IF YES, ATTACH CHANGED PID OR PRP FACESHEET.
[ ] YES [ ] NO

14. ORIGINATING OFFICE CLEARANCE
SIGNATURE: Robert W. Schneider
TITLE: Acting Director, TA/EHR
DATE SIGNED: MO. 6 DAY 9 YR. 76

16. DATE RECEIVED IN AID/W, OR FOR AID/W DOCUMENTS, DATE OF DISTRIBUTION
MO. DAY YR.

AID 1330-8 (5-73)

BEST AVAILABLE

Project: Evaluation of Two-Way Audio in Health

Manager: Dr. David Sprague Date 8/9/76

PPU Clearance: TA/PPU, Carl Fritz Date 6/11/76

R & DC Clearances: The proposal was reviewed by the R & DC on March 30, 1976. Two Bureau representatives indicated that USAID funding might be available to implement the project (Guatemala and Egypt were suggested as possibilities). It was suggested that the TAB pick up the costs of monitoring and evaluating the country projects.

TA/EHR, Regional Bureaus, and Mission would agree on the sites for this evaluation. No one objected to this procedure for implementing the TAB project.

Mission Clearance: USAID/Guatemala 3768 dated 5/20/76
USAID/Managua 2116 dated 5/6/76

(b) Recommendations

Approval is requested for $250,000 of grant funding.

(c) Description of Project

1. What Will Take Place

The purpose of this project is to demonstrate the effectiveness of telecommunications for assisting the delivery of health services in developing countries. Two-way audio communications will link regional medical centers with health assistants in remote rural clinics. The radio will be used by the health assistants for consultation with physicians and continuing health education and training. The project funds will provide for establishment of health management protocols, the purchase and installation of radio equipment, training in the use of radio for health, and evaluation. This communications system will be integrated with the existing health system and upon completion of this project can be incorporated into the host country health system at minimal cost.

2. Who Will Organize and Carry Out Project Activities

This project consists of three Phases: (a) Planning, (b) Implementation, and (c) Operation (for a period of one year).

All phases will require cooperation of the AID contractor and host country health and education people. This can best be appreciated by reference to Table A.

3. [illegible] Project Site

A [illegible] committee [illegible] of regional bureau representatives from [illegible] and [illegible] divisions will be formed after the [illegible]. This committee will assist TA/PHR and TA/H in [illegible] the development of criteria for site selection and the actual [illegible] itself. This process will culminate in the signing of a [illegible] with the selected country. The contract will then be put out for bid.

Table A

RESPONSIBILITIES FOR PROJECT ACTIVITIES

Project Activity (Input Activities)	Responsible	Carry Out
PHASE I		
1. Survey host country manpower & facilities for health exp.	C	C
2. Survey for appropriate courseware		
Survey	C	C
Courseware	C/HC	HC
3. Workshops		
Preparation	C	C
Workshop	C	C/HC
4. Develop health protocols	C	C/HC
5. Evaluation Design	C	C/HC
PHASE II		
6. Train in interactive radio procedures		
Preparation	C	C
Training	C	C/HC
7. Facilities Modification*		
Survey	C	C
Modification	C	C
8. Procure, install, checkout (c/o) equipment		
Specifications	C	C
Equipment purchase	C	C
Sparing	C	C
Shipment	C	C
Installation*	C	C
Checkout (c/o)*	C	C
PHASE III		
9. Maintenance*	C	C
10. Evaluation: collect, analyze, report	C	C/HC
11. Experiment operation		
Guidance	C	C
Operation	HC	HC

Legend: C - AID Contractor
HC - Host Country

3. How Successful Accomplishment Will Achieve Forecast Outcomes

Experience in rural Australia and Alaska with a similar health/education system have been successful in spite of the fact that the populations served, geography of the regions and equipment used were radically different. Therefore, based on the accumulated experience of over 45 years, it is reasonably certain that the inputs provided by AID will result in the satisfaction of outcomes noted in the Logical Framework of section 2(b). Specifically, steps are taken to ensure cooperation between participants and AID, an essential ingredient to success. This cooperation begins almost immediately with the arrival of the contractor in the host country. The coordination/decision/evaluation process begins in the planning phase and is continuous through the operational phase. Specifically how the inputs relate to outputs (outcomes) is summarized in Table B.

A major output of this contract is expected to be a viable health/education network. The desired purpose is that the host government takeover from the AID contractor and continue the system after AID support is withdrawn. By accepting the project, the host country must establish the infrastructure requisite for a truly operational system. That is, all the health and education personnel required to work in the project are the same people who would be involved in the operational configuration. Further, their functions would be the same as in the experimental operation (Phase III). The additional investment required of the host government would be in continued maintenance and supplying spare parts for the radio equipment provided by AID for the project. Total investment on the part of the host country for the 8-10 communities involved would be under $10,000/year.

4. End of Project Status

At the end of the experimental operation year (Phase III) it is expected that a significant improvement in health services as listed in

Table E: RELATIONSHIP OF PROJECT INPUTS TO OUTPUTS (OUTCOMES)

Project Inputs	#1	#2	#3	#4	#5
PHASE I					
1.Survey host country manpower & facilities for health exp.	✓				
2.Survey for appropriate courseware Survey Courseware		✓			
3.Workshops Preparation Workshop	✓	✓			
4.Develop health protocols	✓				
5.Evaluation design	✓	✓			
PHASE II					
6.Train in interactive radio procedures Preparation Training	✓				
7.Facilities Modification* Survey Modification	✓				
8.Procure, install, checkout (c/o) equipment Specifications Equipment purchase Sparing Shipment Installation* Checkout (c/o)*	✓				
PHASE III					
9.Maintenance*			✓	✓	✓
10.Experiment operation Guidance Operation	✓	✓			

(Goals)
#1.Establish a functioning health network.
#2.Establish a viable continuing education mechanism.
#3.Benefit/cost of telecommunications-mediated system vs existing system.
#4.Determine effectiveness of continuing education courses.
#5.Recommendations to policy makers.

the Logical Framework (section B[2]) will have been validated. To maintain the improved health system in operation in the trial communities the following conditions must be achieved (EOPS) [1-5 under EOPS of LogFrame].

D. SUMMARY FINDINGS

The analyses set forth in detail in Parts 3 and 4 of this paper confirm the readiness of this project for implementation in the developing world. Not only is there a need as detailed in Parts 3 and 4 but there are examples of the successful application of this technology to health services and which have been an integral part of these systems for decades. Specifically, the analyses presented in this Project Paper have shown the appropriateness and cost-effectiveness of this approach and is summarized in the following paragraphs.

1. Appropriateness

Syncrisis studies and evaluations by private and government organizations of the health needs of developing countries continually pinpoint rural areas as being the most underserved. Telecommunications offers a practical and cost-effective means for providing quality health services and guarantees that the rural populations are the direct beneficiaries. Experience has shown that telecommunications supported systems provide:

a. A direct means for reaching the rural poor;

b. A means for alleviating the problems created by the scarcity of highly skilled professionals to serve rural areas;

c. A tool to extend effective management control of scarce physician resources to rural communities (up to 25-30 per physician);

d. A means to alleviate problems of cultural and language differences between cosmopolitan health experts and rural populations;

e. No threat of any kind to the environment.

2. Budget Analyses

Two aspects of the financial picture were investigated before concluding that the project is feasible and desirable: (a) A cost-effectiveness analysis; and (b), an analysis of the ability of the host country to afford to sustain the health system after AID funds stop.

The health system is predicated on the fact that isolated paraprofessionals can perform more effectively if (a) they have support in patient management from a physician-consultant whenever necessary and (b) can assume further duties by continuing their education while performing their job for the communities they serve. Therefore, cost-effectiveness analyses were performed on the delivery and education aspect.

The delivery analysis compared the telecommunications-mediated service which provides consulting services two hours per day to every community plus the ability to reach a physician at any time for emergencies and the services of a mobile physician visiting each village 2 days each month. Although not really comparable, it represents a sufficiently conservative approach, biased against telecommunications, that the results are believable and dramatic. The measure of merit is:

$$CE_h = \frac{\text{Cost per capita/year (telecommunications)}}{\text{Cost per capita/year (mobile)}}$$

$$CE_h = \frac{\$0.99}{\$6.07} = 0.16$$

Thus the proposed approach costs 1/6 of the competitor system.

Continuing education via radio was predicated on training 15-25 paraprofessionals, all in different communities against an intensive 2-week

course given at an institution. Again these are not identical situations because in the latter situation the paraprofessionals are lost to their communities for this period. However, it does serve to demonstrate the point. The measure of merit used is:

$$CE_e = \frac{\text{Cost/per paraprofessional/course (telecommunications)}}{\text{Cost/per paraprofessional/course (classroom)}}$$

$$CE_e{}^{*} = \frac{\$171}{\$485} \text{ to } \frac{\$154}{\$485} = 0.35 \text{ to } 0.32$$

The radio education approach is about three times as cost-effective. It should be pointed out that this is not purely theoretical. Pre- and post-testing of isolated nurses showed an equivalent knowledge gain to that of their peers in a college classroom in a test conducted by the University of Alaska.

The cost of sustaining operations after AID funding ceases was analyzed in section 3(b)2. Situations involving 15 and 25 sites (communities) with 750 persons assumed per village and bordering population clusters were discussed. Also, the cost of radio equipment was varied over a range of 2.5:1 to allow for variation from country to country. The results ranged from 70¢/person/year to a worst case of 94¢/person/year.

3. AID Investment

The AID investment is committed to people and proven equipment. The funds requested appear adequate to fund the job to be done. This is spelled out in detail in section 3(b)2 where inputs were matched with funds in section 3(b)1 where inputs were shown to support the outputs of the Logical Framework.

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* The difference arises from serving 15 or 25 villages.

Coordination between AID contractor(s) and host country personnel is built in from the very beginning to ensure all are aware of objectives of the project and desired results. Decisions involving the use of host country personnel are made in conjunction with appropriate officials (Table VII). Feedback for decision making as to the effectiveness of system performance is built into the experiment protocol. Adequate evaluation data is also assured by the protocol to be developed. This is spelled out in detail in Table VIII.

2. PROJECT BACKGROUND AND DETAILED DESCRIPTION

2 (A) BACKGROUND

For the past 40 years various countries have been successfully applying telecommunications to aspects of health, education, and rural development. A recent study sponsored by the Agency for International Development* has shown health delivery and continuing education to be most cost-effective when applied in regions where the population is rural and/or dispersed. It is precisely these areas where AID's interest lies--reaching the rural underserved populations. Telecommunications provides a practical means for delivering social services at substantially reduced cost and guarantees that the rural populations are the direct beneficiaries. Telecommunications-mediated health and continuing education have

- Greatly increased the ability of scarce professional resources to manage a widely dispersed network of paraprofessionals;
- Made professional services available to rural areas without taking the professionals away from their local practices;
- Raised the proficiency level of remote paraprofessionals by providing constant contact with professionals and specialists;
- Cost-effectively provided continuing education for rural personnel without removing them from their service areas;
- Reduced the degree of severity of disabilities thus returning people to productive work more quickly;
- Eased problems of cultural differences;
- Trained local leaders for community self-improvement projects.

In the specific instance of the application of telecommunications to Alaska rural villages the following results were achieved:

- Serving rural populations cost a tenth that of conventional methods for equal service;
- Single physician managed up to 25 health sites;

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* Evaluation of Two-Way Telecommunication Systems for Interaction Between Professionals for Delivery of Social Services to Rural Populations, PCI, Aid contract #AID/otr-c-1377, October, 1975.

- Paraprofessionals with 10 weeks formal training functioned at a level of registered nurse;
- Patient disability decreased in almost 60% of cases presented to radio-physician;
- Average hospital stay was decreased by 10%;
- Remote nurses exhibited the equivalent knowledge gain from radio courses as peers in a college setting.

Further factors which make telecommunications attractive are: (1) The PCI Study* showed that the same country or region-specific variables determine the appropriate communications medium for all social services--thus adding services requires little additional equipment funds; (2) Whereas the cost of personal and supporting services has been steadily rising, the cost of communications and associated equipment has been decreasing and is expected to continue to do so; (3) Aids decentralization by providing the means for keeping all management levels informed in a timely manner.

Based on factors noted above, it is appropriate to consider projects which use telecommunications to integrate those aspects of health and education which contribute to the goal of improved health status for rural populations. The recommended approach will enhance the effectiveness of preventive and curative health delivery by providing rural practitioners access to physicians for consultation on a routine and emergency basis. Further, continuing education of health providers will be conducted via radio to enhance their ability to care for a wider range of diseases and chronic illnesses. Every effort will be made to integrate this project with the existing system and projects in allied areas.

Prior successes have been due to a large extent to strong and effective management, and timely feedback upon which to base decisions. These objectives have been most consistently achieved where scarce expert resources are made to interact with on-site paraprofessionals in the rural areas.

Effective management and feedback is achieved by:

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* Ibid.

- Establishing a protocol for interaction between physicians and health paraprofessionals;

- Establishing a set time of day, every day, when medical consultation takes place and by insisting that all paraprofessionals be present during consultation;*

- Providing means for reaching consulting physicians during emergencies other than may occur during scheduled times;

- Setting periodic administrative conferences to assess community inventories, consolidate requests for supplies, explain directives affecting procedures, etc;

- Setting procedures for followup on patients released from hospital care and/or with chronic problems.

A summary of results obtained in various countries and cost-effectiveness analyses of programs, operational and experimental, is contained in the attached Executive Summary.

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* A good deal of on-the-job training occurs during these sessions.

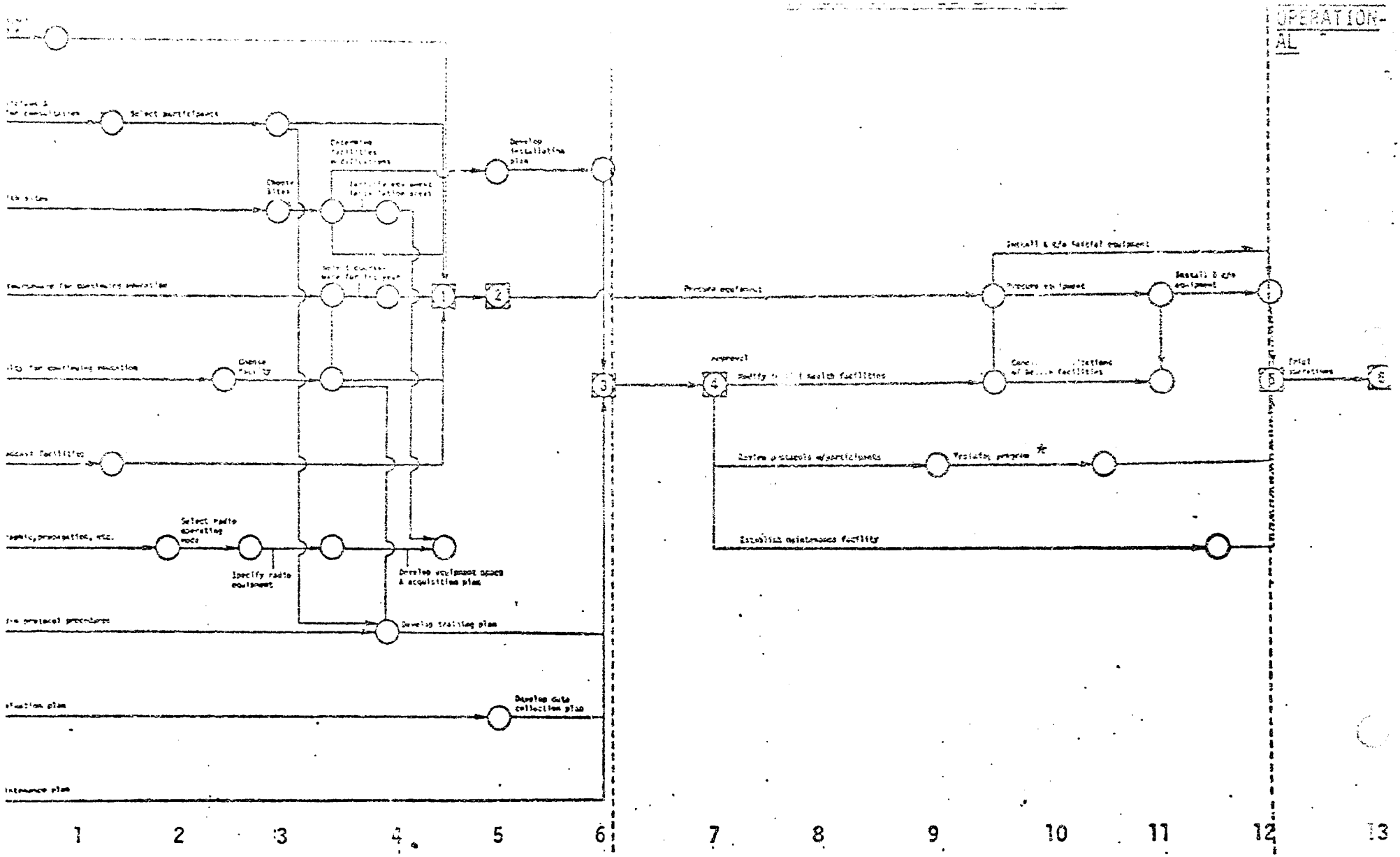
2 (B) DETAILED DESCRIPTION

The design LogFrame plus network of activities included here completely define the project. The exact details await selection of the specific country to which this project is to be applied. Therefore, the cost of equipment may be somewhat high but is in the range of reality based on studies of systems presently in operation. Basic network operations are explained in Appendix 1 attached to this paper.

The project is conceived in three phases. The first phase (see network) lasts about 6 months and is required to do the survey work necessary to particularize the project for the host country selected. Once this is accomplished, specific LogFrames and networks can be developed for project management and control. The first phase ends with presentation of all planning documents to the host country and AID for approval. There is one exception, however. Since the procurement of equipment will probably be the pacing item, approval to begin procurement action is sought after the fifth month, two months earlier than for the other plans. In addition, the network is constructed in such a way as to insure that major decisions are made with key host country personnel. This is critical to overcome a certain amount of fear on the part of people about the use of technology in what has been traditionally a hands-on service.

The Implementation Phase also lasts about 6 months. It basically consists of simple modification of health facilities to accommodate the radio equipment; procurement, installation and checkout of the equipment; training of personnel in the interaction protocol via radio and to make them comfortable with the system; and establishing the maintenance procedures to routinely check the equipment and insure emergencies are promptly cared for. At the end of this phase a trial operation to work out final operating details can begin.

The Operational Phase consists of a one month trial operation during which fine tuning of the network is performed. Network operation should



weeks: protocol, simple equipment procedures, data collection, reporting.

DEVELOPMENT HYPOTHESES	NARRATIVE SUMMARY	MEASURE OF VERIFICATION	ASSUMPTIONS
Program Goal: The purpose of the program is to establish an institutionalized health services system expected to serve the people in rural, isolated and the country areas.	Measure of Goal Achievement: Improved health care system expected __% in __ years.	1. Health Ministry records; 2. [illegible] records; 3. Survey; 4. Record of Telecommunications Agency.	Important assumptions of program goal: 1. Big Brother efforts do not outweight positive efforts; 2. Host government & educational institutions will cooperate & support this approach which will raise the health standards of the nation's rural population; 3. Reduced dependence on outside consultants will permit innovation peculiar to local needs.
Project Purpose: Host country Ministry of Health manages and operates the delivery system for improved health services to rural areas.	Conditions that will indicate purpose has been achieved: End of project status: 1. Host country managers oversee health system w/ AID consultants acting strictly in advisory role after 2-3 years; 2. Continuing education managed by University & government managers; 3. Host country picks up at least 20% of system costs after 2 years; 4. National/regional plan includes intent to expand system; 5. Bureaucratic organization modified to accommodate [illegible]	1. Consultant reports, organization charts; 2. University records, Funding documents; 3. Budget items approved; 4. National planning documents, Regional planning documents; 5. Organization charts at national & regional levels, survey.	Attaining purpose to goal link: 1. This remains a priority area to LDC government; 2. Technical assistance made available if needed; 3. Greater regional acceptance of system merits reflected in high priority in regional development plans; 4. Willingness of more regions to reorganize & accommodate the system; 5. Regions willing to support systems in their jurisdictions.
Outputs: 1. Establish a functioning health network; 2. Establish viable continuing education mechanism; 3. Benefit/Cost (B/C) of telecommunications mediated system vs. existing system; 4. Determine effectiveness of continuing education courses; 5. Recommendations to policy makers.	Magnitude of Outputs necessary and sufficient to achieve purpose: 1. Establish a functioning health network: a. All sites meet w/ physician >2/3 of the scheduled times; b. Established protocols used on all encounters; c. Patient followup expected on > 80% of those recommended by physician; d. Consultations missed due to operator errors in handling radio reduced to less than 5%; 2. Establish viable continuing education mechanism: a. Dropouts from courses below 25%; b. Scheduled course time followed >80% of radio meetings; c. Instructor available & prepared for >80% of interactions; d. Materials for course received at site at least 1 week prior to radio interaction; e. Questions asked are relevant to material for current session; 3. B/C of telecommunications-mediated system vs. existing system: a. Cost for comparable service by conventional systems (2 or 3) at least twice as high; b. __% of persons treated like & accept the system; c. >25% of disabilities lessened by radio-consultation; d. Significant changes in treatment instituted by attending physician in >25% of cases received; e. Loss of productive working days lessened by at least 5%; f. Supplies on-hand on-site more available than prior to institution of radio system (central agent aware of supplies situation on-site at all times); g. Health paraprofessionals more confident about their ability to handle their jobs; 4. Determine effectiveness of continuing education courses: a. Knowledge gained via radio equivalent to knowledge gained by peers on campus; b. Some information learned applied to patients; 5. Recommendations to policy makers; a. Recommendations made about feasibility of host country managing pilot system; b. Recommendations made about expanding system for greater coverage; c. Recommendations made about continuing education needs; d. Recommendations made about institutionalizing the health system; e. Training recommendations (if needed); f. Recommendations about expanding social services [illegible]	1a. Physician/site logs, random spot checks; b. Survey of physicians/paraprofessionals, random samples of recorded encounters; c. Physician's logs, paraprofessional's logs; d. Maintenance logs, interviews; 2a. Attendance logs; b. Radio schedule log; c. School records; d. Survey of students; e. Spot check of audio recordings interviews of instructors. 3a. Contractor study; b. Survey of sample populations for selected villages, comments made to paraprofessionals, consulting physicians; c. Interview w/attending physician(s), physician's logs; d. Interview w/physicians, audio recording of encounters; e. Records of paraprofessionals comparison w/non-radio control communities; f. Supplies logs, check frequency of urgent requests for items from prior record, w/ current ones, comparison w/ non-radio communities; g. Interviews w/paraprofessional interviews w/physicians. 4a. Pre & post tests from radio group & control group, instructor interviews; b. Survey of paraprofessionals, interviews w/physicians, medical logs. 5. Final report to host country.	Attaining output to purpose link: 1. Benefit/cost ratio is sufficiently large to convince LDC to proceed; 2. LDC and/or regional government priorities remain the same & permit expansion or necessary policy changes are made; 3. LDC is willing to expand new or reallocate resources; 4. Technical assistance is made available in this crucial period.

LOGICAL FRAMEWORK FOR SUMMARIZING PROJECT DESIGN

Est. Project Completion Date _____

Date of this Summary _____

Project Title _____

NARRATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
Inputs, Activities and Types of Resources AID SUPPORTED PROJECTS: 1. Perform a survey of host country manpower resources & facilities to ascertain system implementation; 2. Identify available resources for course material in country & outside for continuing education of rural paraprofessionals; 3. Arrange participants to introduce them to the concepts & purpose of the health network; 4. Establish health care protocol; 5. Train participants in the use of interactive radio for health delivery; 6. Modify facilities for telecommunication equipment (slight); 7. Procure, install, & checkout telecommunications equipment; 8. Provide maintenance; 9. Establish evaluation design; 10. Expert out operation guidance. HOST COUNTRY PROJECTS: 1. Participating health personnel (should be directly in line w/present duties & responsibilities); 2. Facilities (area where radio-consultation will take place); 3. Courses & teaching personnel (should be part of existing curriculum); 4. Courses supporting materials distributed to rural health paraprofessionals.	Level of Effort/Expenditure for each activity USAID: FY-76 FY-77 TOTAL Personnel 115 67 182 Equipment/Spares 30 7 37 Facilities modification 10 3 13 Training 4 2 6 Educational support materials 5 7 12 Expenditures 164 86 250 HOST COUNTRY: Physician consultants; Health paraprofessionals; Facilities (for telecommunications areas); Instructors; Courseware.		Affecting input to output link 1. Pilot programs can use existing broad cast facilities for education; 2. Cooperation of LDC, medical & educational institutions will result in dedication of professional & paraprofessional resources to this project; 3. Mission, LDC do not feel the technology is "too advanced;" 4. Mission, LDC do not feel that this system implies greater centralization of decision process.

begin immediately thereafter and last for a year. During this entire period data collection and continuing evaluation should be conducted to adapt the system to the peculiarities of the host population. Evaluation will be in accordance with the Logical Framework "Magnitude of Outputs Necessary and Sufficient to Achieve Purpose."

3. PROJECT ANALYSES

3 (A) TECHNICAL ANALYSIS INCLUDING ENVIRONMENTAL ASSESSMENT

1. APPROPRIATNESS

"Entirely aside from the personal misery and discomfort suffered by the individual and his family, the loss of time from work is a very important factor in the cost of ill health. Not only does the worker's illness cut down the family income, but a sizable part of productive capacity is lost to society."

"A Study of Health Services in Quena, Damietta, and Shubra Al Kema," Government of the Arab Republic of Egypt Ministry of Health.

a. Reaching the Rural Poor

Both the LDC Governments' and USAID's goal is to improve the quality of life for all citizens. The Foreign Assistance Act requires development assistance and projects that benefit the poorest segments of society. Traditional economic activity was premised on the assumption that large-scale projects (such as road building, construction and similar projects) would most effectively raise the standard of living of all people by enlarging the economic pie. However, those projects which support most rapid economic development are usually linked with already productive areas and thus emphasize value-added to already prosperous enterprises. The distribution of benefits to rural populations is at best a "trickle-down" effect and in many developing nations, the poor are now worse off relatively and absolutely than a decade or two ago.* Because telecommunications provides point-to-point linkage, it provides a practical and cost-effective alternative which can substantially reduce the cost of providing services to rural and isolated areas and guarantee that the rural populations are the direct beneficiaries.

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* I. Adelman and C.T. Morris, "Economic Growth & Social Equity in Developing Countries," Stanford Press, page 183, 1973.

b. Alleviating Problems of the Scarcity of Highly Skilled Professionals

A major stumbling block to the provision of adequate health services in all developing countries is the lack of highly skilled health professionals on-site in the rural communities. In the majority of developing nations this situation is aggrevated by a true shortage and maldistribution of these scarce resources. Therefore, a substitute must be provided which fulfills three criteria:

- Substitutes for the physical presence of the physician or other highly skilled professional in a timely and consistent manner;
- Extends the health management capabilities of these relatively scarce resources into the rural areas;
- Provides a means for upgrading the capabilities of the paraprofessionals who are providing preventive and primary care in rural communities.*

There is adequate evidence that telecommunications can meet these criteria and in a more cost-effective manner than conventional means.

c. Adequate Management and Feedback

Many well-conceived projects have failed because of poor management or failed to reach full potential because management skills of the host country were not up to the job after technical assistance ended. All telecommunications-mediated social services include a management protocol because of the distance between providers and users. This protocol has resulted in better record keeping, improved inventory control, better followup on patients and improved working habits on the part of the

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* The ability to upgrade paraprofessionals through adequate radio training implies their ability to accept more responsibilities. This could be exploited to expand their role and effectiveness in the fight to control communicable diseases, for example, thus eliminating to some extent the expense of mobile teams and ensures that someone is on-site and continually available.

paraprofessionals. This occurs basically because all these aspects come up in the normal course of patient care and the fact that the remote practitioners are in daily contact with the supervising physician. This ability to manager from afar is one of the most attractive features of the proposed health system.

d. Alleviating Problems of Cultural and Language Differences

Many countries in the developing world are inhabited by numerous cultures each with their own set of superstitions and taboos. Invariably the highly skilled professional represents a more "urban" culture and usually does not speak the language adequately. This combination, in many instances, has made it difficult, if not impossible, to reach a large portion of the local citizenry. Rural development forums (radio forums) and the Alaska Radio Medical Network have shown how the use of local natives, or people who have lived and were accepted by the local populations, could effectively work with their communities while acting as the interface between the distant expert and the village. This arrangement does away with language problems and potentially tricky cultural problems. One effect noted was the ego-enhancement of the village population engendered by the fact that one of their people was performing in a role traditionally reserved for outsiders.

e. Considerations of Technology and Maintenance

It is interesting to note that most countries in the world provide at least radio coverage for their populations. It is also interesting to note that transistorized radios can be found almost anywhere and that TV sets and audio recorders are not unknown in some of the most rural and isolated places of the world. The two regions which pioneered in the uses of radio for health services (Alaska and Australia) have experienced little difficulty in this regard. The equipment used is commercial, solid-state, and has had years of field trial. The experience in Alaska using

Motorola taxi radios showed that on the average one visit per village per year was required for maintenance purposes. There is less trouble than experienced with TV sets. The sporadic use which the radios are given makes an assumed 10 year life conservative. Maintenance can be performed routinely by a technician who travels from site to site, covering each one 2-3 times per year, and of course when an emergency arises. Maintenance should not be performed or required of the health personnel. Radio procedures have been little more than that required to turn on and tune in on a broadcast station. Microphones are of a push-to-talk variety, usually, which means that when the paraprofessional wishes to speak he presses a lever on the microphone and holds it until he is finished. Releasing the switch automatically opens up the receiver for return messages.

2. ENVIRONMENTAL IMPLICATIONS

(none)

3(b) FINANCIAL ANALYSIS AND PLAN

1. Financial Rate of Return/Viability

(not applicable)

2. Recurrent Budget Analysis of Implementing Agency(ies)

A number of analyses must be performed to gain a picture of costs and benefits gained. This project is being submitted by TAB/EHR and there is no identified host country at this time--the project is applicable to many LDCs. The method of analysis, therefore, is to calculate

budgetary cost on the basis of a range of costs covering the best and worst situations which could be encountered. These costs are then compared with the traditional method of providing an equivalent or almost equivalent service. The initial or capital cost and sustaining costs for the host country are also calculated to show the reasonableness of building upon and maintaining the system. The system is such that communities may be added individually or in groups depending on the investment pattern of the host country.

For purposes of this paper, two situations are analyzed; the first involving some 15 communities including their bordering population clusters and the second involving 25 communities. In each instance, the average community or village size is assumed to be 750 people and is serviced by a health center or post manned by 1 or several health paraprofessionals. The range of 15-25 communities was chosen as a reasonable size that experience has shown could be handled by a physician using the radio network approximately 2 hours per day. Emergency call-up at any other time is also included. Table I presents the situation where equipment and associated maintenance spares vary over a range of 2 1/2 - 1. As noted, this is done to cover the range of anticipated costs in any number of potential host countries. The site costs are calculated per community whereas the consultant institution (hospital or medical center) must be allocated across the number of villagers served. All other important assumptions effecting the cost calculations are covered in the footnotes attached to the table.

Annualized costs represent the cost of the host country of sustaining the service once installed as will be the situation with the villages AID sponsors with this project. The costs are very nominal, ranging from 70¢ per person per year (minimum cost) where 25 villages and low equipment costs are involved to 99¢ per person per year (maximum cost) with 15 villages and high equipment costs. Initial capitalization for new villages will cost the host country between $625 and $1325 (total site costs for high and low cases) per village depending on equipment

TABLE I

HEALTH SERVICES	CASE I			CASE II		
	Current	Capital	Annualized[1]	Current	Capital	Annualized[1]
SITE[2]						
Transceiver						
US Cost		400	75		900	180
Transportation		100			300	
Installation		25	4		25	4
Local Transportation		50	7		50	7
		575	86		1275	191
Maintenance						
Materials	50		50	130		120
Personnel[3]	208		208	208		208
Transportation	00		100	100		100
			358			428
Energy						
Battery	20		20	20		20
Charger		50	8		50	8
		50	28		50	28
HOSPITAL/CENTER						
Transceiver		500	75		1200	180
Installation		300	45		300	45
Audio Recorder		300	45		300	45
Cassettes	750		750	750		750
Local Transportation		100	15		100	15
		1200	930		1900	1035
Maintenance						
Materials	50		50	120		120
Personnel	200		200	200		200
Transportation	100		100	100		100
			350			420
Energy	0	0	0	0	0	0
			0			0
TOTAL COMMUNICATION COST						
Per Site/Year (15 sites)			557			744
Per Capita/Year (15 sites)			0.74			0.99
Per Site/Year (25 sites)			523			705
Per Capita/Year (25 sites)			0.70			0.94

TABLE I: FOOTNOTES

[1] Capital costs are annualized on a ten-year replacement basis assuming a discount rate of 8% yearly.

[2] Assumed the network initially serves 15 communities including bordering population clusters. Therefore, total population served is assumed to be 11,250 people (average of 750 people/community).

[3] A $5,000/year technician is assumed. With overhead his yearly cost is $12,500. Being overly conservative assume 3 routine visits/village/year plus an additional trip for emergency purposes. This is equivalent to 1/4 technician year or $3,125. The cost per village is therefore $208.

costs. There are no new Hospital/Center costs until another region is established. At such time, even serving a single village will require the additional capital expenditure for the Hospital/Center of between $1200 and $1900.

Upgrading of community-based paraprofessionals to remain current or persuant of their accepting additional responsibilities in the villages they serve, requires initiation of a radio correspondence school. The hospital or Medical Center can act as the focus again, using courses developed in its own continuing, nurses, or medical education training programs. The same telecommunications equipment is used after the normal working hours. Course material mailed to participating paraprofessionals at least a week ahead of the radio class is studied. The 1-2 hour radio session each week consists of a review of the highlights by a faculty member and the remaining time is spent in discussions between the instructor and student--health personnel in the communities as well as between health personnel in the villages. The add-on costs of this service are found in Table II. In this instance it is assumed that 1 paraprofessional per village "attends" each of the 3 courses presented in a year (tri-semester). Since effective classes have been held with more than 45 participating sites, the only costs which increase with participation are those concerning instructional materials distributed. For the same cases of 15 and 25 communities, the costs range from $154 to $171 per paraprofessional, a very nominal amount. Equivalent learning might take place if each of the paraprofessionals were brought to the medical center for a 2-week intensive course. However, their services would be lost to the communities for that period. This could be intolerable in situations where the staff only consists of 1 or 2 paraprofessionals. This is not a factor where radio is used. A correspondence course involving mailed materials to and from the remote paraprofessionals would incur costs equal to the radio courses but suffer from the inability of the paraprofessionals to interact with the instructor and with their peers. It is anticipated that TAB/EHR funds will cover all costs of implementation and planning and evaluation as noted in Section 2(B).

TABLE II:

RADIO-MEDIATED CONTINUING EDUCATION

CONTINUING EDUCATION	Current	Capital	(15 Sites) Annualized	(25 Sites) Annualized
Instructor[1]	125		125	75
Instructional Materials[2]	180		180	180
Supervision/Clerical[3]	208		208	208
			513	463
CONTINUING EDUCATION COST				
Per Site/Year (15 sites)			513	
Per Paraprofessional/ Course (15 sites)			171	
Per Site/Year (25 sites)				463
Per Paraprofessional/ Course (25 sites)				154

[1] Assuming an instructor nurse earns $6000/year, her burdened worth is $15,000/year. Assuming 3 courses/year or 1 per semester, this involves the nurse's time approximately 2 hours/week for radio time. To cover some preparation, paper correction time, etc, it is assumed that 1/8 her time is devoted to radio school--$125/village (15) or $75/village (25).

[2] Assuming 1 paraprofessional/site/course and $60/course in materials.

[3] Administrative and clerical support assumed to require 1/4 time of an equivalent individual earning $5000/year. Cost per community is $208.

3. Financial Plan/Budget Tables

The project is a total TAB/EHR supported one (Table III). It is not anticipated that additional funds will be needed. However, the host country must provide the health personnel required to function within the system. These will be personnel already on the job. There is no need for special or additional personnel. It is anticipated that 8-10 health centers/posts and a University Hospital or Medical Center will constitute the facilities involved. Therefore, during the Phase III Operational, the equivalent of 8-10 paraprofessionals (one per health center/post) will interact for approximately 2 hours/day, preferably 6 days/week. These hours will occur during the normal working schedule and will be in line with their regular duties. If the continuing education program is undertaken, the paraprofessionals will be enrolled in classes (1 course per semester for 3 semesters). This will entail 1-2 hours of radio interaction per week with a member of the faculty of the institution presenting the courses. It is anticipated that the coursework will be from the already existing curriculum at the participating institution. It will require that an instructor be assigned to this course. Since this is additional training, radio interaction will normally be conducted after the normal paraprofessional's working hours. This discussion pertains to item 10 or Table III (as required).

During the course of conducting the survey of item 1, Table III, the contractor should have access and cooperation from health officials, physicians of the hospitals/medical center plus sometime with paraprofessionals. This should not exceed the equivalent of 2 manweeks of their time over a period of about 3 months. Similarly, in the survey to determine what subjects can most profitably be taught to paraprofessionals to upgrade their capabilities (item 2), cooperation from faculty will be desirable to choose subjects and specific courseware.

Item 3, workshop, is the initial introduction of participating health professionals to the radio-mediated health system. It is a period of

TABLE III

SUMMARY COST ESTIMATE & FINANCIAL PLAN

SOURCE	AID	Host Country*	Other(s)	Total
1. Survey host country manpower & facilities for health system	19	2 manweeks		19
2. Survey for appropriate courseware		2 manweeks		
Survey	20			20
Courseware	10			10
3. Workshops				
Preparation	1.8	12 manweeks, transp., per diem		1.8
Workshop	6			6
4. Develop health protocols	10.5	2 manweeks		10.5
5. Train in interactive radio procedures				
Preparation	3.7	10-12 manwks, transp., per diem		3.7
Training	1.8			1.8
6. Facilities modification				
Survey	3.9			3.9
Modification	8			8
7. Procure, install, c/o equipment				
Specifications	7.7			7.7
Equipment purchase	12			12
Sparing	4.4			4.4
Shipment	3			3
Installation	2			2
Checkout (c/o)	2			2
8. Maintenance	7			7
9. Evaluation				
Design	15			15
Collect, Analyze, Report	18	10manweeks		18
10. Experiment Operation				
Guidance	30			30
Operation		as required		
OTHER COST ITEMS				
Reports	11			11
Travel & Per Diem	31.5			31.5
Car/Driver	2.7			2.7
Clerical	2			2
Contract Fees	17			17
TOTAL	250			250

familiarization, determination of specific goals and outcomes desired. It is a period when all questions are resolved and the people meet those with whom they will be working for at least a year. The 12 manweeks noted constitute paraprofessionals, physicians and administrators meeting for a maximum of 1 week.

One of the virtues of a radio-mediated health system is the management control which can be exercised by the physician-manager over his remote paraprofessionals. This is reinforced in the daily interaction. Establishing the health and management protocols (item 4) will require the cooperation of the physician(s) who will be managing the interaction.

Item 5 will actually involve simulation of radio interaction between the paraprofessionals and the consulting physician(s). Procedures will be worked out and modifications in reporting finalized.

Upon selection of the health centers/posts, a survey will be made to determine what modifications will be necessary to house the radio equipment (item 6). It is anticipated that this will be minor in all instances except the hospital/medical center where the radio-room may be located in the building away from direct access to the outside. A local contractor should be employed to do the actual modifications.

Under item 7, installation of the radio equipment will probably be performed by a local contractor. Maintenance will also be performed by a local full-time technician (item 8). Although in an operational configuration, a full-time technician would not be necessary. for this project it is best to be overly conservative.

Evaluation (item 9) is one of the most important tasks of this project. Evaluation will be performed continuously from the start of the trial operation. The feedback thus obtained will be used to modify procedures in order to tailor the system for the specific host country. During Phase III, information should be gathered by paraprofessionals and

physicians as well as contractor personnel. It is estimated that the equivalent of 1 manweek over the course of the operational year will be spent by each participant in collecting data, answering surveys and questionnaires, etc.

Table IV relates inputs of AID and the host country to the five outputs stated in the Logical Framework. The majority of funds support implementation of the health network, the backbone of the project. Host country manpower is only detailed for Phases I and II and the evaluation item of Phase III because this time will be over and above normal duties performed by the health and teaching personnel. Although the total is listed as 40 manweeks, no one individual will contribute more than 3 weeks including the 2 weeks consumed in workshops and training.

4. Summary Option

Based on the analysis of section 3, TAB/EHR is confident that the estimates presented are realistic. In the light of the benefits to be achieved compared with conventional methods of providing the same services, it is appropriate to proceed with this project. The cost of sustaining operation after the completion of AID support as well as the cost of initial capitalization for expansion should make the system very attractive to interested host countries (Table I and section 3(B)2).

(c) SOCIAL ANALYSIS

(not appropriate)

Table IV

COSTING OF PROJECT OUTPUTS/INPUTS

($000 or Other)

PROJECT INPUTS	#1	#2	#3	#4	#5	Total
AID APPROPRIATED						
1. Survey host country manpower & facilities for health system	19					19
2. Survey for appropriate course-ware		30				30
3. Workshop	5.8	2				7.8
4. Develop health protocols	10.5					10.5
5. Train in interactive radio procedures	3	2.5				5.5
6. Facilities modification	11.9					11.9
Procure, install & c/o equipment	31.1					31.1
Maintenance	7					7
Evaluation			8.5	8.5	16	33
Experiment Operation	22	8				30
TOTAL	145.5	57.5	13.5	11.5	22	250
HOST COUNTRY*						
1. Health personnel	32 mwks	4 mwks				36 mwks
2. Facilities	✓	✓				
3. Teaching personnel		4 mwks				4 mwks
4. Distribution of support materials from continuing education		✓				

* This covers manpower prior to Phase III operation. Phase III manpower use explained in text.

(d) ECONOMIC ANALYSIS

The outputs of this project are not marketable items. It is not possible to value the benefits in monetary terms since the specific country of application has not yet been specified. Therefore, this section addresses the cost-effectiveness of the proposed telecommunications approach.

In section 3(b)2 an analysis of the cost of a telecommunications-mediated health system was presented. The result for the example assumed showed that the per capita cost/year varied from 70¢ to 99¢ depending on the number of communities involved in the system. To provide equivalent services by non-telecommunications means would entail frequent visits by physicians to each of the health centers and/or posts. This comes about because in the radio network the physician is available for consultation two hours per day, everyday; i.e., 12 hours per week or 48-50 hours/month, plus he is available for emergencies any time day or night. Exactly comparable service is impossible except to have a physician on-site at all times. This is not practical and would be exorbitant even if possible. It is necessary to consider some form of mobile physician who periodically visits each community for several days. To be conservative, and bias the results against telecommunications, it is assumed that the radio service can be duplicated by a physician visit of 2 days/month to each village served. The economies of such a system results in the tabulation shown in Table V.

It will be noted that physician salary is included here where it was not in calculating Table I. The reason is that in the radio case consultation could be handled by a team of physicians, each handling a total of 2 hours/day. These physicians are available to their normal constituency at all times. The mobile physician must be a new individual(s) whose only job is that of working in the villages. No such position(s) exists at this time and so must be considered a cost of the

Table V

HEALTH SERVICES PROVIDED BY MOBILE DOCTOR(S)

	(15 sites)			(25 sites)		
	Current	Capital	Annualized	Current	Capital	Annualized
Physician(s)[1]	50,000		50,000	100,000		100,000
Vehicle(s)[2]		6,000	900		12,000	1,800
Fuel	400		400	800		800
Maintenance	600		600	1,200		1,200
Driver(s)[3]	5,000		5,000	10,000		10,000
TOTAL COSTS			56,900			113,800
Per Site/Year			37.67			45.52
Per Capita/Year			5.02			6.07

[1] Assume a physician salary of $20,000/year and burdened equals $50,000/year. Two physicians are required to cover 25 villages.

[2] Assume vehicles cost $6,000 and are annualized under the same rules as the telecommunications equipment of Table I.

[3] Assume a driver makes $2,000/year and burdened costs $5,000/year. Two drivers are required with the 25 village case.

mobile system. It should also be noted that emergency services are not a feature of this more conventional approach.

The effectivity ratio of the telecommunications-mediated health system can now be calculated:

$$\frac{\text{Cost of Telecommunications System}}{\text{Cost of Mobile System}} = \frac{0.99}{6.07} = 0.16$$

Thus the telecommunications approach is approximately 1/6 the cost of its competitor system.

Providing continuing education for the paraprofessionals other than via radio would entail bringing them to a central location for about 6 weeks/year (3 courses). Assuming they would be integrated in with others taking these courses, we can dispense with the instructor and supervision/clerical costs noted in Table II. Instructional materials costs would still be valid. The economies of this situation would appear as presented in Table VI below:

TABLE VI

CONTINUING EDUCATION COSTS (IN CLASSROOM)

	Current	Capital	Annualized
Paraprofessional[1]	400		400
Travel	25		25
Per Diem[2]	0		0
Instructional Materials[3]	60		60
			485
COST PER PROFESSIONAL/COURSE			485

[1] Assume the paraprofessional's basic salary is $4000/year & he or she only takes 1 course as opposed to the 3 assumed for Table I.

[2] Assume no charge for per diem.

[3] Same as in Table I.

The salary of the paraprofessional must be a consideration in this instance because he or she is no longer available to serve the community. There is a cost associated either with replacement or loss of these services.

Under these very simplistic assumptions, the effectivity ratio of the telecommunications-mediated continuing education system is:

$$\frac{\text{Cost of Telecommunications System}}{\text{Cost of Classroom Teaching}} = \frac{171}{485} = 0.35$$

The cost/paraprofessional is independent of the number of communities covered in the classroom system. Note, however, that the telecommunications-mediated system is insensitive to number of villages served. Therefore, 0.35 is a minimum effectivity ratio--it can only get better with increased service.

The analysis makes it obvious that when dealing with dispersed population groups, telecommunications provides more cost-effective service than any other means.

4. IMPLEMENTATION ARRANGEMENTS

(a) ANALYSIS OF THE RECIPIENT'S & AID'S ADMINISTRATIVE ARRANGEMENTS

1. Recipient

This section cannot be completed at this time since the host country is not determined.

2. AID

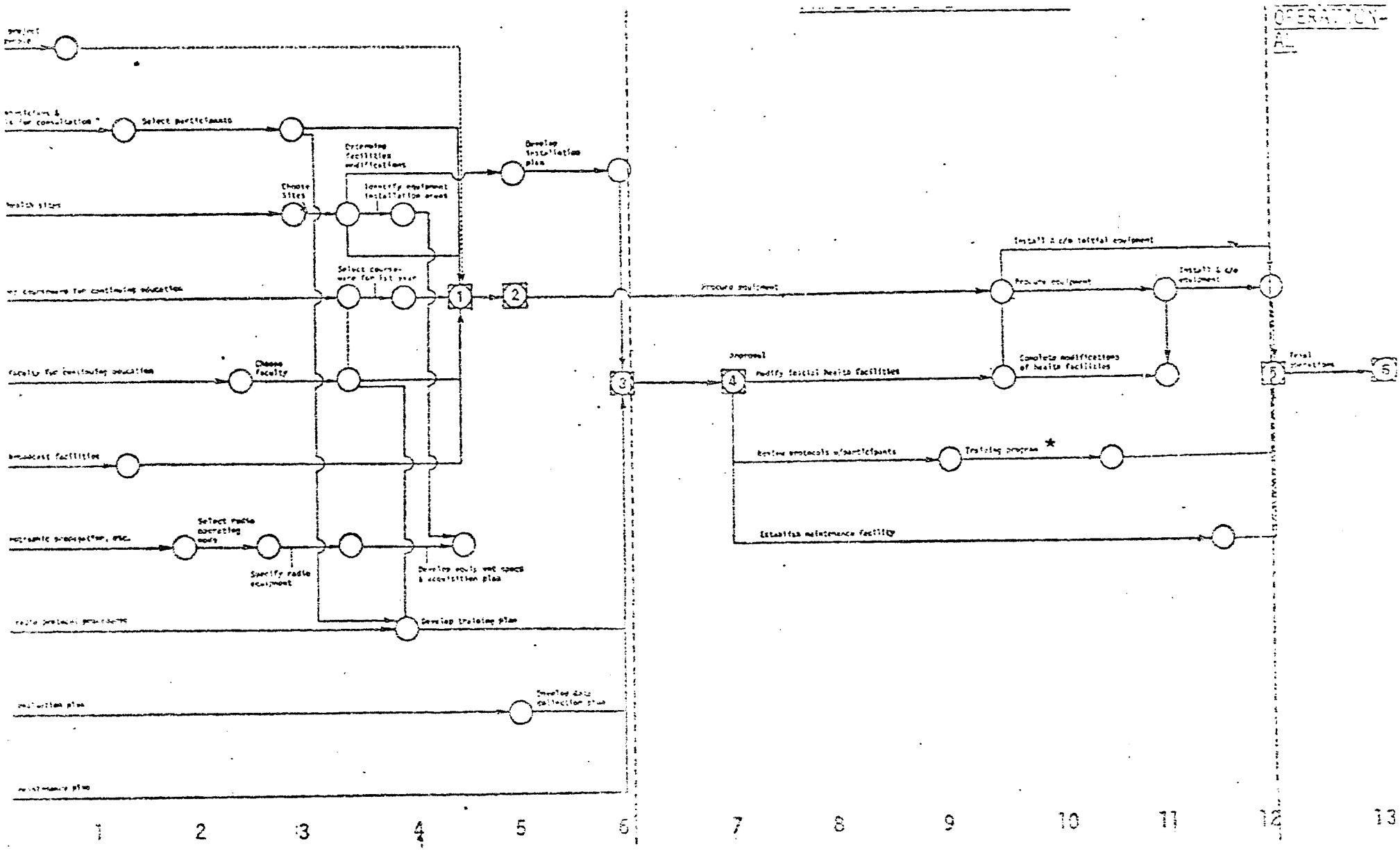
(not appropriate)

(b) IMPLEMENTATION PLAN

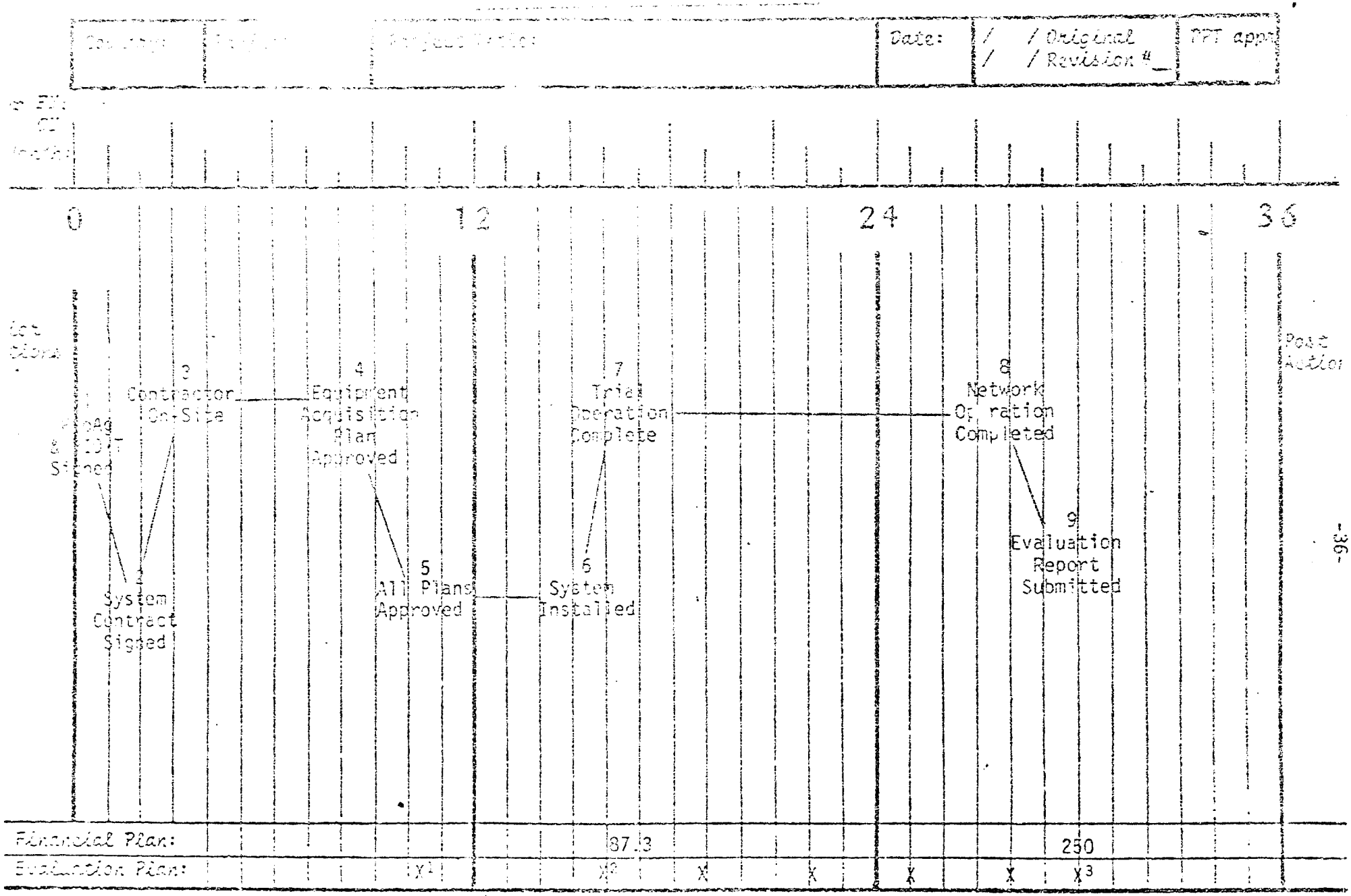
1. A detailed network of events was prepared and presented in section 2(b) "Detailed Description" and is reproduced and included here. This network contains many milestones of interest to on-site management and not necessarily to AID managers. Therefore a Project Performance Network is presented. It contains milestone events representing the summation of site milestones and which can be used by AID management to measure progress and expenditure. Along with the simplified network are a listing of the Critical Performance Indicators (CPIs). For a more in-depth understanding of the relationship of the CPIs to the overall project, compare dates on the Project Performance Network against those on the detailed network. Dollar amounts may be better understood by referring to Table IV "Costing of Project Outputs/ Inputs" in conjunction with the detailed network.

2. Logistic support entails the delivery of medical supplies to health centers/health posts, transportation of patients from rural communities to the hospital and the delivery of educational materials to the paraprofessionals participating in the continuing education program. Except for the last item, all others will use the existing structure. The benefits expected from the superposition of the telecommunication system on the existing one is better control of inventory and more timely arrival of medical supplies so that inventories are maintained at adequate predetermined levels. Continuing education material will be delivered by mail sufficiently in advance to allow for the local mail situation.

Maintenance spares for the year of operational experimentation (Phase III) will be purchased and are included in the funds requested. A technician will be hired by the system contractor and his travel to the villages paid for from contractual funds.



-2 weeks: protocol, simple equipment procedures, data collection, reporting.



[1]Eval Design Complete
[2]Other Eval Begins
[3]Eval Complete

PROJECT PERFORMANCE NETWORK

FORM

Country:	Project No:	Project Title:	Date:	/ / Original / / Revision #	Approvd:

CPI DESCRIPTION

CPI	TIME FROM PROJ'S (mos)	DESCRIPTION
1	0	ProAg & PIO/T signed
2	2	Health system contract signed
3	3.5	Contractor on-site
4	8.5	Equipment specs & acquisition plan approved by host country
5	10.5	All plans approved: Training Evaluation design Facilities modification Maintenance Health protocol Continuing education
6	15.5	System installed & checked out
7	16.5	Trial operation complete
8	28	Initial operation completed & evaluation data collected
9	30	Evaluation report submitted to host country

3. It is planned to let one or possible two prime contracts. These are: (a) a system contractor responsible for implementation and management of the health system, and (b) an evaluation contractor. It is possible that a single contract will be let should the contractor have experience in design, development, and management of radio-mediated systems as well as proven experience in evaluation methodology. Under the system contract it is anticipated that several subcontracts will be let: (a) equipment, (b) survey and modification of health facilities (where necessary) to accept the radio equipment, (c) maintenance. It is expected that the last two contracts will be let with local contractors. In summary:

FUNDING AGENT	BID TYPE	CONTRACTOR
AID	Competitive	Health system contractor (HSC)
AID	Competitive	Evaluation
HSC	Competitive	Equipment
HSC	Non-competitive	Facilities modification (local)
HSC	Non-competitive	Maintenance (local)

4. Particular care is taken to ensure that the participants from the host country are fully aware and take part in major decisions. The following table (Table VII) lists the points at which health professionals and host country officials are informed and/or consulted to help in the decision process. In addition, written reports will be submitted quarterly.

A big plus for the telecommunications system is that the management and feedback mechanisms are incorporated into the operating protocols. In other words, the managing physician being in daily contact with the remote paraprofessionals routinely receives feedback

Table VII

EVENTS NOTING COORDINATION FOR DECISION MAKING & INFORMATION SHARING WITH HOST COUNTRY PARTICIPANTS

EVENT	Time After Arrival On-Site
1. Project presentation to key host country officials	1week-1month
2. Selection of physician(s) and hospital for health system management coordinated	2-3month
3. Health centers/posts chosen to participate coordinated with managing physician(s)	3.5month
4. Selection of continuing education faculty members and participating institutions coordinated	3.5month
5. Introductory workshop for all participants	4month
6. Continuing education software selected with faculty member and managing physician(s)	4.5month
7. Radio health protocol developed with managing physician(s)	6month
8. All plans for health/education system submitted to host country for review and approval Training plan Evaluation plan Equipment acquisition plan Maintenance plan	5-7month
9. First month trial operation of network reviewed and revisions made	12-13month
10. Quarterly review of experimental operation of health/education system	15, 18, 21, 24 month
11. Evaluation report submitted and reviewed	26-27 month

on paraprofessional performance, patients, inventory levels, etc. He is continually evaluating performance and taking corrective action. This, of course, points up the second virtue of such a system--the host country personnel are the management. All participants are learning and correcting on a daily basis. The contractor is overseeing and recommending (more of a staff function) rather than being a line manager. At the end of the operational period, the entire staff of participants is trained and can manage without the help of consultants.

(c) EVALUATION ARRANGEMENTS

This section cannot be explicitly defined at this time because the host country is not identified. However, one point is worth mentioning once again--the feedback required for evaluation is to a large extent built into the network protocol. The present concept is to evaluate system performance, in health delivery for example, by using control villages as well as participating communities. Thus, if baseline data is available about the participating communities prior to installation of the radio system, it will be compared with the situation succeeding installation. Experience has shown, however, that the prior information is usually lacking or at least lacking in certain specific evaluation areas. Therefore, maximum reliance for evaluation purposes will be on data gathered from the control and participating villages.

To illustrate how the management protocol includes much of the data necessary for evaluation, Table VIII has been constructed showing the types of information which would be necessary to evaluate effectiveness and efficiency. Note the number of times radio logs and/or transcripts of encounters enter into the column on where data is obtained. The same pertains to continuing education.

Table VIII

TYPICAL EVALUATION ELEMENTS

& SOURCES OF DATA

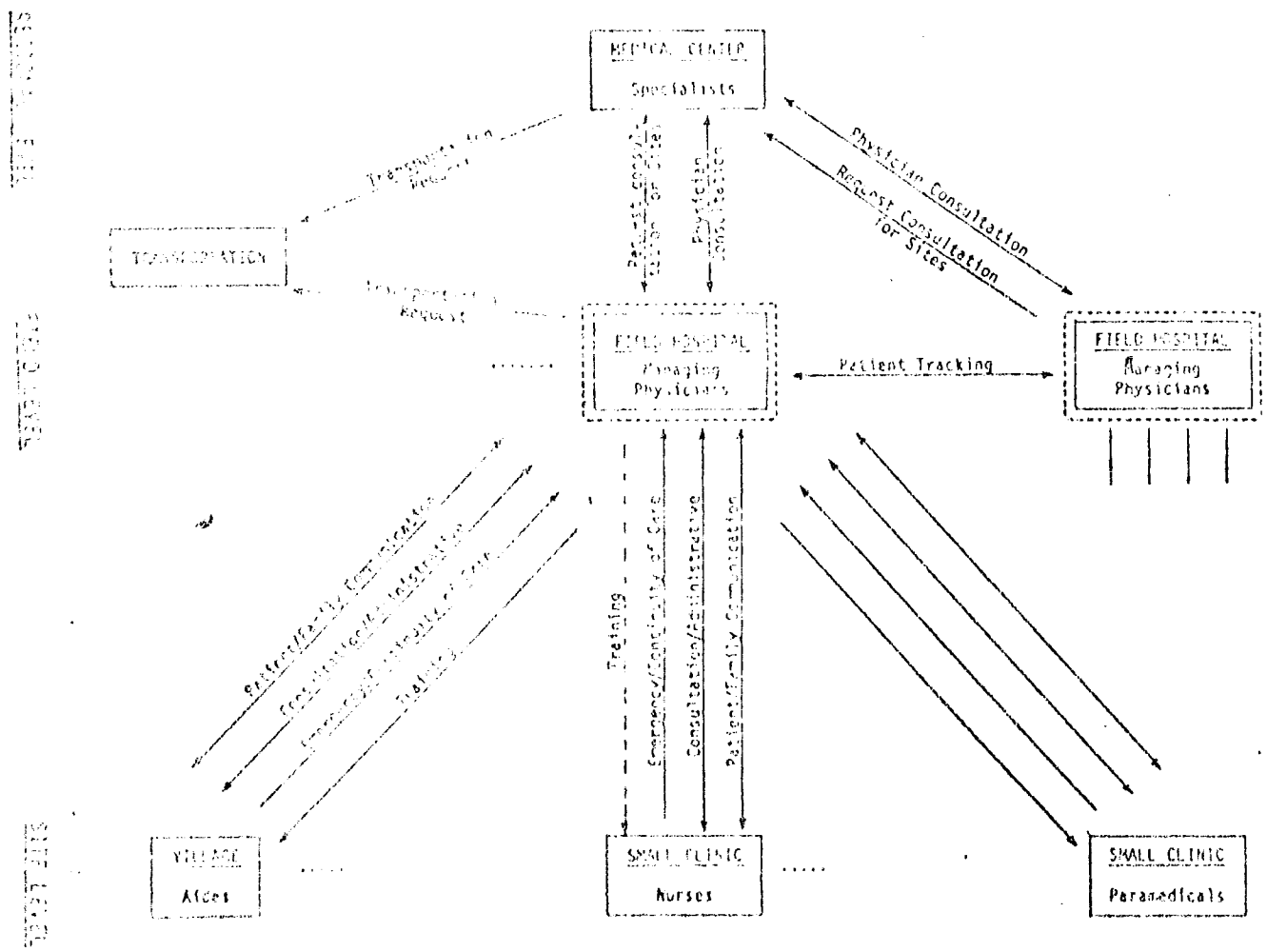
Evaluation Element	Source of Data
1. Number of medical cases treated via radio	Radio logs
2. % of patients seen by paraprofessional and presented to physician	Radio logs, paraprofessional records
3. Administrative matters exchanged (ordering supplies, drugs, etc.)	Radio logs, spot recording checks
4. Emergencies (number. # handled in villages, # moved to hospital)	Radio logs, paraprofessional records, hospital records
5. Analysis of paraprofessional-physician consultations (useful for determining types of drugs and medicines most useful, onset of epidemic, choosing continuing education courses, etc.)	Radio logs, questionaires
6. Patients seen during consultation (% of cases by age, % of age group in community)	Radio logs, baseline data
7. Diagnoses (diagnosis categories and % of occurence)	Radio logs, paraprofessional records
8. Severity (severity-complexity rating versus % of cases treated)	Radio logs, physician records
9. Change or confirmation of paraprofessional management plan	Radio logs, interviews, questionnaires
10. Effects of consultation on outcome	Questionnaires, interviews
11. Effects on hospitalization rates: • Admissions (radio versus non-radio villages) • Average length of hospital stay (radio versus non-radio villages)	Radio logs, hospital records

APPENDIX I

BASIC HEALTH NETWORK OPERATIONS

The model, Figure A-2, represents a single building block. Depending on the size of the region, population and distribution involved, this structure can be replicated and with proper coordination can be efficiently managed. The model is based on the premise that groups/communities in rural areas are serviced directly by people who are recognized to be the primary care providers. Level of training could vary from almost nothing to the substantial training of a nurse. All can be accommodated by the model simultaneously.

The important information functions are identified in the figure and the arrows indicate which elements originate and which receive. The nature and content of the interaction is, of course, a function of the



level of training of the on-site health provider. Although a field hospital* is shown on this diagram, the existence of this intermediary is not essential (dotted line around the block) to the functioning of the radio network. The function of the physician at the field hospital can be performed at the Medical Center. The center of excellence having the required specialty knowledge is key to implementation. Field hospitals may be important to other aspects of care, especially where large areas are involved.

The primary service provided is consultation. Most effective results are obtained if the on-site providers are required to be present for a specified period each day during which they can listen to the cases being discussed in all communities. It also permits high quality supervision, where the consulting physician explains the reasons for the treatment. These are effective ways of providing on-the-job training. Some interaction between on-site providers may take place, e.g., should someone from another village have an accident and it is desired to get some medical history, or if a family is moving.

Consultation regarding site cases with specialists at the Medical Center should be left to the discretion of the managing field physician. This is accepted practice by all health professionals. Requiring specialists to be present during all consultations would take them away from their regular work and tend to make physicians feel uncomfortable because someone is "looking over their shoulder."

The ability of on-site providers to reach the physician in the event of an emergency is important. In some instances the provider may be sufficiently competent to handle the situation until the scheduled consultation period. However, the less trained the individual, the more urgent the need to talk right away. The emergency alarm may be placed at the nurses' station at the hospital because someone is usually present.

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* The use of the term "field hospital" is meant to imply only that it is located in an area where its staff represents the greatest competence in the area and is responsible for management of a number of sites.

Formal lectures on important topics can be instituted over the same network. This can be presented by the field physician, by any of the consulting specialists or by other persons and could be part of a planned program to upgrade the competence of site personnel. The link representing this function is shown dotted in the case of the nurse. Since nurses are usually the most highly trained of the village providers, most lectures will be for the others.

Continuity of care of patients released from the hospital is another recommended function. This consists of notifying the appropriate site provider about patients to be returned to the community. By looking in on the patient, the site provider can keep the doctor informed of his progress. At the first signs of trouble, consultation is held and this is followed by a return to the hospital if necessary. The ATS-1 Alaska experience has shown that patients in radio villages are returned to the village and productive work earlier than patients from non-radio villages.

Administrative matters should be discussed periodically. Formalizing the inventorying of site supplies, discussing problems of procedures, etc., make for a smoother operation. This is especially important in regions where transportation is difficult or expensive. The ability to schedule supply trips, for example, to cover many sites on a single outing, is much more cost effective than having to respond to individual requests from sites.

Using the radio for patient-family communication during prolonged absence from the community is an excellent morale builder. This is especially important to elderly persons who have spent little time away from their villages. The reduction of tension could help speed recovery.

Transportation for patient care or supplies can be provided from a central facility or from facilities located throughout the region. Requests for transportation should be under the control of the managing physicians (the field hospitals or Medical Center if there are <u>no</u> field hospitals).

In order to ensure that full service is provided to all people, periodic contact between field hospitals to track migrating persons or groups is recommended. Records can be transferred and the field physician can notify the sites where these people are going. The on-site provider is then aware of the new people and they are included in the system. No one is "lost" to the system.

In addition to providing services for the on-site providers, it is recommended that field physicians be encouraged to consult with specialists at the Medical Center. Such consultation has been shown to be beneficial to patients resulting in reduction of disability in some instances. This is especially important where hospitals cannot be staffed by a full complement of specialists. Field physicians backed up by specialists over the radio can provide a greater span of care thus reducing the impact on the communities of the physician shortage.

APPENDIX II

Country Interest

A draft of this paper was circulated to several USAID's. USAID/Kinshasa saw the possibility that this activity might support PVO's or the GOZ in carrying out a program of health delivery services in recently identified "health zones". USAID/Monrovia thought the study timely considering the new emphasis being placed on rural activities. USAID/Jakarta and USAID/Yaounde have both expressed considerable interest in implementing this project. Further discussions with them awaits the outcome of the S & RC review.