

5/5/75

Paris No. 49/001  
REPORT U-44  
9310067-01  
PD-AAA-947-01

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PROJECT APPRAISAL REPORT (PAR)

1. PROJECT NO. 31-11-510-867	2. PAR FOR PERIOD: Jan. 1974 TO Jan. 1975	3. COUNTRY Worldwide	4. PAR SERIAL NO. 3
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Food Waste/Sanitation Cost-Benefit Methodology

6. PROJECT DURATION: Began FY 1971 Ends FY 1977	7. DATE LATEST PROP May 23, 1972	8. DATE LATEST PIP	9. DATE PRIOR PAR
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10. U.S. FUNDING	a. Cumulative Obligation Thru Prior FY: \$	b. Current FY Estimated Budget: \$ 397,000	c. Estimated Budget to completion After Current FY: \$ 797,499
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11. KEY ACTION AGENTS (Contractor, Participating Agency or Voluntary Agency)

a. NAME	b. CONTRACT, PASA OR VOL. AG. NO.
TA/H	AID/ed-2959
University of North Carolina	
Institute of Nutrition for Central America & Panama	

I. NEW ACTIONS PROPOSED AND REQUESTED AS A RESULT OF THIS EVALUATION

A. ACTION (X)			B. LIST OF ACTIONS	C. PROPOSED ACTION COMPLETION DATE
USAID	AID/W	HOST		
	X		1. Revise PROP and extend termination to Dec. 1978.	June 30, 1975
	X		2. Prepare PIO/T for supplemental FY 1975 funding.	May 15, 1975
	X		3. Prepare PIO/T and contract amendments for FY 1976 funding.	Aug. 31, 1975
UNC	X		4. Recruit agricultural economist advisors from TA/AGR.	April 30, 1975
UNC	X	INCAP	5. Delete nutrient supplementation from future planning.	March 31, 1975
			6. Revise budget estimates for a termination date of December 31, 1978.	June 30, 1975
UNC			7. Develop data and programming for thorough, rapid data analysis.	Sept. 30, 1975
UNC			8. Redesign annual report to present a clearer picture of the value of food waste.	Dec. 31, 1975
UNC			9. Study methods for possibly establishing estimates of beans/corn digestibility using available data.	June 30, 1975
UNC			10. Continue latrinization ongoing surveys and health education.	N.A.
		INCAP	11. Complete digestibility study in soldiers.	May 31, 1975
UNC		INCAP	12. Increase frequency of anthropomorphic measurements.	May 31, 1975
UNC		INCAP	13. Improve laboratory quality control.	June 30, 1975
		INCAP	14. Perfect methodology for assessing the economic value of food waste.	June 30, 1975

D. REPLANNING REQUIRES  
 REVISED OR NEW:  PROP  PIP  PRO AG  PIO/T  PIO/C  PIO/P

E. DATE OF MISSION REVIEW

PROJECT MANAGER: TYPED NAME, SIGNED INITIALS AND DATE: 5/5/75 James E. Banta  
 DIRECTOR: TYPED NAME, SIGNED INITIALS AND DATE: James E. Banta, M.D., Assoc. Dir., TA/H

III. Standard Questions:

A. Project Inputs:

1. Are key inputs being supplied according to plan?

For the period under review, all of the originally planned inputs have been made as expected except latrines which though in storage have not been accepted by the community. Two new elements were introduced last year, one with, and one without, additional funding. These have not progressed as well as had been hoped. First, was the study to determine digestibility of the traditional beans and corn diet among military personnel who were presumed to be living under sanitary conditions superior to those in the rural communities where the methodology is being tested. INCAP personnel encountered numerous delays with the result that at the time of the evaluation, studies had been completed upon only 10 soldiers. Second, was the incorporation of an assessment of non-work activities with the economic analysis component. This could not be accomplished without additional funds.

no AD funds

It is becoming evident that inputs originally planned for future work will need to be modified though at this time the quantitative amounts of such required modifications cannot be stated precisely.

Some additional staff may be needed for the health education component.

Originally, it was expected that nutrient supplements could be obtained under the Food for Peace Program but the sharp reduction of U.S. surpluses and the disappearance of such commodities from Guatemala necessitates discontinuation both of this input and of this phase of the study.

No Pills II  
PLVSD

Data analysis will require more time and funds than originally allowed for this activity.

Funding requirements are increasing. Predominately, these are attributable to two annual salary increases for INCAP personnel which have occurred since January 1974 under PAHO, increased overhead and travel costs.

2. Are assumptions regarding supply of inputs still valid?

The validity of the three input assumptions listed in the PROP has been tested and of these two have proven valid. The field metabolic ward was functioning on schedule and it has been possible to fill all of the key technical positions. One essential technician who died suddenly has been replaced during the last year.

Installation of the completed treated water supply in the test community was delayed about six months. The new supply was originally scheduled to become operational in June 1973 but installation of the distribution system was not completed until September of that year. Failure of the U.S. supplier to provide proper connectors delayed chlorination of the system until January 1974.

The delay in the introduction of health education which resulted from a shortage of funds and which was referred to in the 1974 PAR has proven somewhat advantageous in that time has been allowed to observe the effects of water supply improvement alone.

Assumptions which have not been enunciated previously have significantly altered the situation. Inflation has exceeded expectations. Devaluations of the U.S. dollar have contributed to unexpected salary increases for subcontractor personnel whose salaries come under the

*Money cost  
& time for data  
analysis*

United Nations system. The assumption that final data analysis could be completed in about three months using only the equipment available at INCAP is clearly no longer valid. The computers at INCAP are old and suffer frequent mechanical failures; the volume of relevant data is exceeding our original expectations.

3. Rating of Action Agent's performance against the plan:

Both the contractor's and the subcontractor's performances are judged to be satisfactory. Recruitment, training and assignments of good quality personnel to the field and to base institutions has proceeded in a timely fashion. The screening of about 100 communities was carefully conducted and two villages which were closely comparable in most essential respects was accomplished on schedule. Collection of baseline nutritional, physiological, morbidity and environmental health data has proceeded as planned except for a short period when, because of funding limitations, some surveys were conducted every other month rather than following the planned monthly schedule. The contractor in view of increased inflationary pressure has absorbed some personnel costs in order to provide additional funds needed by the subcontractor to cover increased expenses.

One major problem has concerned the inability of the subcontractor to estimate funding requirements more accurately. However, it is doubtful that at the beginning of this project anyone would have anticipated either the 50% inflationary increases which have occurred in Guatemala since 1972, increased travel costs or the dollar devaluations and two United Nations salary increases, all of which contribute to the large increase in funding requirements.

*Poor  
cost  
projection*

Other problems have been an over-estimation of the sub-contractor's data analysis capabilities and the as yet unresolved question of the adequacy of laboratory quality control.

B. Transformation of Inputs into Outputs:

1. Are the resources sufficient to produce the predetermined outputs by specified target dates?

One additional person may be required to assist with the education of villagers in sanitary practices and personal hygiene but with this exception the number of personnel now on board both at UNC and at INCAP are judged to be adequate. Fecal nitrogen analyses are proceeding more slowly than we would like but it is doubtful that anything can be done to improve this situation in the near future. The technician who was performing nitrogen analyses died suddenly several months ago and the replacement technician is proceeding cautiously. No additional personnel or supplies will be required for the nutrient supplementation phase of the project, since this element of the originally planned project cannot be undertaken. The unwritten assumption that nutrient supplements would be available under the Food for Peace Program has proven not to be valid.

It has become obvious not only that the data analysis capabilities of INCAP are inadequate to cope with the volume of material being generated by this project but also that a satisfactory analysis of the data using both UNC and INCAP resources will require more time than was expected originally.

One major problem exists in the transformation of inputs into outputs. Present inputs of personnel, supplies and equipment though

*What to do about the*

adequate generally to achieve the predetermined outputs cannot be maintained without a substantial increase in funding necessitated almost exclusively by inflation and salary increases at INCAP, which comes under the U.N. system.

Target dates until now have been met except for completion of the water supply and installation of the latrines, which have yet to be accepted, in the improved community. The water supply has delayed all subsequent target dates approximately six months. Preparation of Section I of the Methodology originally was planned for February, 1975. The first draft has been completed but needs revision which cannot be accomplished until after the next cycle of metabolic ward studies scheduled for June-November, 1975. This will provide a little over the minimum of 18 months that has been assumed necessary for detecting improvement in intestinal function. The 18 months interval is a major assumption and in the event that such improvement has not become evident it is desirable that at least one additional year be allowed for the detection of physiological improvement. However, it also is clearly evident that health education is needed and this intervention is now being introduced into the improved community.

Necessary increases in the funding inputs currently are estimated as follows:

Funding:

FY 1975	\$141,290
FY 1976	218,670
FY 1977	432,150
FY 1978	343,105
	<u>\$1,135,215</u>



based upon the longer observation period will have a target date of September 1978.

4. Phase III, the workshop, is rescheduled for December 1978 and, as originally planned, will require additional funding.

The technical epidemiological and health survey outputs are routine ongoing activities which do not need special comment since they are progressing satisfactorily.

Action agent's reports to date have been of good quality and have focussed well upon the major areas of interest in the project. The next report will offer the first good opportunity to assess the action agent's ability to present information on the main issue, namely food waste attributable to malabsorption. This requires a passage of time <sup>which</sup> when this review was conducted had not been adequate.

Attention is called to the finding that the time honored d-xylose test, which for many years has been so heavily relied upon by clinicians throughout the world as a measure of intestinal malabsorption, correlates only very, very weakly with absorption of real food fats, carbohydrates and proteins.

D. Project Purpose:

1. The statement of purpose will need to be revised to delete all references to nutrient supplements both in the PROP and in the contract.
2. The conditions expected at the end of the project as now described will be compatible with the revised statement of purpose,

3. The assumptions remain valid. Many individuals in the two Guatemalan Communities are exceeding the accepted levels of fecal nitrogen and fat excretion which have been established as upper limits of optimum physiological performance on a different type of diet. That the Guatemalan diet differs from those that were employed to establish "normal" parameters is immaterial in this methodological field test because the focus is upon quantifying the reduction of fecal calories, fat and protein which occurs after introduction of sanitary improvements. It, therefore, is still assumed that the observed baseline levels are higher than they could be as a consequence of environmental pollution and that reductions in malabsorption will follow the introduction of a better water supply, improved waste disposal and more attention to hygienic practices.

*Whitaker  
Linnman*

4. The rationale remains sound despite cancellation of plans to provide nutrient supplements to both communities. Food savings attributable to improved sanitation still can be measured, provided sufficient time is allowed for better physiological performance to become manifest. It will not be possible, however, to assess what benefits might arise from improved nutrition independent of, or synergistic with, improved sanitation. Nevertheless the possible beneficial role of improved sanitation in reducing food waste and thereby improving nutritional efficiency retains its position of paramount importance.

E. Project Goal:

All elements of the project goal remain unchanged since necessary revisions are compatible with the goal as now stated.

IV. Issues Narrative:

The evaluation team included James Banta, TA/H; Joe L. Stockard, TA/H; A. Dale Swisher, SER/ENGR; Jack Keeve, TA/N; Norman Holly, PPC and Frank Consolazio, U.S. Army Bioenergetics Laboratory. Ms. Evelyn McLeod, TA/PM, found it necessary to withdraw from the evaluation team.

One issue raised the previous year remained unresolved. Reference is made to digestibility of the traditional Guatemalan diet which predominately consists of beans and corn. Literature searches have failed to reveal any relevant studies by others over and above those of Darke which have long been in hand. Negotiations with the Guatemalan Army for permission to perform studies on military personnel consumed far more time than expected with the result that, at the time of the evaluation, data were available from only 10 of the planned 20 soldiers. Although only individuals having a normal d-xylose test were included in the digestibility study, fecal nitrogen, fat and calorie excretion by these subjects after ingesting the village test meal were slightly higher than has been observed in the village population. *had much higher than 10 liter results*

While this is compatible with the hypothesis that beans and corn are relatively indigestible such should not yet be concluded. Only 6 days were allowed for the soldiers to adapt to the rural diet and 4 days for the balance study. It has been recommended by Consolazio that the remaining 10 "normal" soldiers have an adaptation period of 16 to 24 days on the rural diet. If fecal nitrogen excretion still remains high it probably indicates poor digestibility of corn and/or bean protein. (None

of the subjects at Purdue who ate a diet heavy in Opaque-2 corn had fecal nitrogen values above 2 grams per day, the level which is considered to be the upper limit of normal in this project). (However, this is a most unlikely explanation for the observed high excretion on fairly low dietary intakes. The contractor should first try as diplomatically as possible to determine whether in fact these soldiers have been living under superior sanitary conditions for at least 2 years.

The assumption that 18 months following introduction of the potable water supply allows sufficient time to observe improved nutrient absorption cannot yet be accepted or rejected. This interval will end in July 1975 and so the next series of metabolic examinations will have to be completed before any impressions can be obtained concerning the assumptions validity. Considerable attention was given to the question of whether introduction of health education or any other intervention should be deferred until the effect of water supply alone could be assessed. It was the consensus of the majority that although determination of the minimum intervention necessary to reduce morbidity and malabsorption was desirable for planning future projects, the requirement for health education in order to achieve a measurable result in the shortest possible time was so overt that introduction of this component should proceed rapidly. In arriving at this decision, it was recognized that even though the originally planned nutrient supplementation phase could not now be implemented, the project termination date would need to be amended probably to December 1978. Extension of the project to this date should be reconsidered by the evaluation team after

*how is this being handled?*

December, 1978. Extension of the project to this date should be reconsidered by the evaluation team after the new digestibility data from ten additional soldiers becomes available but in no case does it appear reasonable to terminate the project earlier than about April 1977.

*has this been read*

Testing with d-xylose has contributed very little to the assessment of food waste attributable to intestinal malabsorption. It now is clear that the correlation between absorption of d-xylose and absorption of real food is terribly weak. The principal contribution of the d-xylose test has been to assist in demonstrating that malabsorption in the classical clinical sense does occur in the project area. This test could be discontinued but doing so would result in only very modest savings, less than \$1000.00 per year. Consensus of the evaluation is that this element could be dropped if necessary.

*What would then be the test*

The economic component was expanded during 1973 to include data collection on economic aspects which exceeded the original intentions of TA/H. Additional funding was not provided and a separate project concerned with the expanded economic element was disapproved during a subsequent annual program review. Last year the contractor considered it possible to undertake data collection on non-work activities with available funds, but inflationary pressures prevented accomplishment of this plan. The evaluation team concluded that either personnel for the economic component should either be increased in order to accomplish a full economic assess or the present inadequate effort to document work productivity, earnings, leisure time activities etc. should be abandoned. The Director, TA/H has concluded that the expanded economic element should be closed out and the project resume its original focus upon the value of food savings and the reduction in morbidity that can be accomplished by environment improvements.

The high fecal fat values on a modest dietary fat intake have lead to a question of laboratory quality control. Although duplicate specimens are always checked and although the contractor's biochemist has assured himself that the tests are being performed correctly, it was the consensus of the evaluation team that unknowns should be introduced into the system with a check being performed at an independent laboratory.

*where does  
this mean  
has been done?*