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A.I.D.  
Reference Center  
Room 1656 NS

PD-ANC-946-C100

NONCAPITAL PROJECT PAPER (PROP)

INTERREGIONAL PROJECT

A.I.D./Washington, Technical Assistance Bureau - Office of Health

PROJECT TITLE : Development and Evaluation of Measures to Reduce Food  
Waste Caused by Intestinal Diseases

PROJECT NUMBER : 931-11-510-867 Revision

SUBMISSION DATE : October 20, 1970

OBLIGATION SPAN : FY 1969 - FY 1971 IMPLEMENTATION SPAN : FY 1970 - FY 1973

FY 1969 \$ 56,388

FY 1971 \$206,000

## NON-CAPITAL PROJECT PAPER (PROP)

### DEVELOPMENT AND EVALUATION OF MEASURES TO REDUCE FOOD WASTE CAUSED BY INTESTINAL DISEASES

(UNIVERSITY OF NORTH CAROLINA)

#### 1. Summary Description

##### A. Objectives

This project endeavors to develop and field test methodology which may be utilized in determining economic relationships between environmental sanitation, and waste resulting from both (1) intestinal diseases transmitted under insanitary conditions and (2) inefficient utilization of nutrient materials resulting from intestinal malabsorption.

##### B. Project Components

The project requires the participation of specialists in a number of Public Health and medical disciplines. Sanitary engineers will have responsibility for grading the sanitation conditions of community facilities and individual households. Medical personnel will be involved in the development of protocols for measurement of nutrient waste utilizing tests which include fecal fat, nitrogen balance studies, and bomb calorimetry. Diagnosis of intestinal diseases of particular interest will require services of bacteriologists and parasitologists. The close cooperation of statisticians will be required for the development of a suitable multivariate experimental design and in the analysis and interpretation of data.

Preliminary work has already begun during FY 1969 under Contract AID/csi 2489 with the University of North Carolina. Direction of the project is vested with the Department of Environmental Sciences of the School of Public Health. Participation of personnel of other schools within the University, particularly the Medical School, has been obtained.

The four phases of work planned are as follows:

##### Phase 1.

The contractor, during FY 1969, undertook an extensive review of the literature and, based upon the results of this review, developed a proposed methodology for application in a field trial. Particular attention has been given to study plans which will assist in defining interactions between environmental sanitation, disease of the gastrointestinal tract, and tropical malabsorption. Recognizing the complexities of multivariate studies which must be undertaken, the original plan to originate field work in three paired communities has been modified to provide for an additional phase to examine the suitability of the methodology in a single pair of villages.

Phase 2.

The pilot study will test the study plan in one test village which is to be supplied with an optimum, but operationally reasonable, level of environmental sanitation, and a control village, comparable insofar as possible to the test village, except that it will have a minimum of environmental sanitation. Within the test village it is contemplated that different levels of environmental sanitation will be provided. Some families will have potable water from taps within their homes, ideal methods for safe storage of food and water, and private sewage disposal facilities. Other families will have access to potable water from outdoor taps, less satisfactory facilities for storage of food, and community or group sewage disposal facilities. The control village will be at the opposite pole having virtually no comparable environmental sanitation resources at any level.

Food supplements, compatible with national plans or possible plans, will be given in each village to control the effect of improved nutrition alone.

Definition of environmental sanitation status of families, individual members of families and communities will be determined by the assignment of weights to each component having sanitation significance. These weighted components, when averaged, will provide an overall index for individuals, families, or communities, which will then provide the basis for grouping in the analysis of variance. Interrelationships then can be established between different environmental factors and the incidence or prevalence of intestinal disease and the severity of intestinal inefficiency in the absorption of ingested food.

Phase 3

*Self Evaluation*

This phase consists of a workshop to review the results of the pilot study which would have two purposes. The first objective would be a thorough critique of the methodology and the institution of changes in plan of action which may be desirable. The second objective would be to inform other interested personnel on the methodology and the results of the pilot study with the ultimate objective of obtaining cooperation of appropriate representative countries for comparable studies.

*shouldn't the ultimate objective be something more than undertaking studies?*

Phase 4.

This would consist of the application of the methodology in at least two additional areas, representing different types of environmental sanitation situations of less developed countries in which intestinal disease may be contributing to preventable economic losses and to a poor quality of life. Decisions concerning funding and organizations which might undertake phase four in lieu of the University of North Carolina are deferred until the results of phases two and three become available.

*1/15/57*

## II. Setting and Environment

This project is related to Key Problem Area No. 3, "Waste of Nutrient Energy." Work conducted in many different underdeveloped countries of the world has revealed a very high prevalence of tropical malabsorption, a condition in which food which is eaten is not well absorbed in the intestinal tract. One of the common factors in all of these studies is that the individuals identified as having this condition live in insanitary environments. The incidence of malabsorption has been observed by Mathan and Baker to increase sharply among indigenous people during epidemics of diarrheal disease in the Indian subcontinent. Sheehy, working with U.S. military personnel in Viet-Nam, has demonstrated this condition among Special Forces troops assigned to rural areas where environmental sanitation was less than ideal. Similar observations have been made by Lindenbaum upon Peace Corp personnel working in East Pakistan. Sheehy continued his studies among the Special Forces and observed that they tended to become normal rapidly following return to the United States and resumption of their normal way of life. Others have noted that individuals taken out of an insanitary environment for even short periods of time tend to return to normal.

The exact cause of tropical malabsorption and other similar diseases of the intestinal tract remains unknown. Nevertheless, there is considerable evidence suggesting that repeated exposure of the intestine to, as yet undetermined, microorganisms, and poor living conditions, plays an important role in the development of this malfunction. Furthermore, the pathological changes which occur have been demonstrated to be reversible. It is therefore assumed in the development of this project that, even though the precise cause of tropical malabsorption remains undefined, it is possible to reduce the prevalence of this condition by improving environmental sanitation and thereby waste of ingested food.

A second benefit which can be expected is a reduction in both the incidence and the prevalence of acute and chronic intestinal diseases which are known to be caused by pathogenic bacteria and a wide variety of parasites. Regardless of the area of the world in which these diseases exist, the mode of transmission generally is the same. It is from person to person, through one or more intermediate vehicles, particularly water and food. Some exceptions do exist, such as hookworm, which makes its initial entry into the human body through the skin of the unshod foot. This being the case, it is assumed that results obtained from a study in one area would be indicative of the results which might be expected in another area even though quantitative differences may exist because of variations in climate, rainfall, density of insects, and behavioral patterns of communities.

III. Strategy

Work directed toward clarification of relationship between environmental sanitation, quality of life, economic development, and the cost-benefits of improved sanitation has worldwide implications. The large number of component factors necessitates a large institutional base which has the capacity of providing diversity of technical skills and professional analytical competence to detect and evaluate multiple interactions. The University of North Carolina has been selected as the contractor because it possesses these departments of the School of Public Health and the Medical School which provide highly qualified personnel in essential disciplines. The School of Public Health, in addition, has had wide experience in international programs and projects with developing countries. Former students at the school are widely dispersed throughout less developed countries of the world and represent a valuable resource which can assist survey teams in selecting appropriate sites for study and in implementing field work.

Economy is to be employed to the maximum possible extent. Two factors which clearly can assist in minimizing costs are already apparent. Communities selected for study should be located in countries where major programs for improvement of environmental sanitation actively are being undertaken. Test villages should already have a potable water supply in place, and some sewage disposal facilities (privies) should be available. The greater the existing improvements in environmental sanitation, the less the expenditure required to make additional changes which would include improving availability of potable water by piping into individual houses and the provision of private household latrines. Insofar as possible, inexpensive locally available materials are to be utilized for other improvements such as storage containers, food safes, etc.

Data collection will be organized not only to identify interactions between intestinal disease, nutrient waste, and environmental sanitation, but also to provide a basis for estimating cost-benefit relationships.

Assuming that the installation of a definable level of environmental sanitation proves to be valuable, efforts are to be made to transmit the results of this work to A.I.D. Missions and international agencies for the purpose of expanding the work, both to improve the quality of life and to reduce waste of human and economic resources.

IV. Planned Targets, Results and Outputs

The University of North Carolina will provide a United States base comprising excellent resources of facilities and highly skilled personnel in a wide variety of essential fields for the planning and direction of the proposed work. Included among these resources are the faculties of the Departments of Environmental Science and Engineering, Epidemiology, Biostatistics, Parasitology and Laboratory Practice, and, in the School of Medicine, the Departments of Health, Physical Education, and Psychology. The resources of the University can be called upon as needs dictate. The A.I.D. monitor will assure maintenance of a proper

perspective of the relationship between this work and the key problem area, "Waste of Nutrient Energy," and will assure dissemination of results to other sources concerned, especially the Office of Nutrition (TA/N), and the Office of Agriculture (TA/AGR). Close communications have already been established and will be continued between the managers of this project and the investigators engaged in the research project, "Measurement of Nutrient Loss from the Intestinal Tract Due to Malabsorption."

The Project Director of the University of North Carolina will be assisted by TA/N in obtaining necessary approval for the balance of work in an appropriate field study area. It is currently contemplated that the ideal setting would be Guatemala which, in addition to providing considerable valuable background data from earlier studies, possesses excellent resources at the Institute of Nutrition of Central America and Panama, and at the San Carlos University with which the University of North Carolina has a long standing professional relationship. The high incidence of severe diarrheal disease in Guatemala recently has attracted the attention of the American Press which has carried reports on the current epidemic of dysentery. This reflects the type of environmental sanitation which is appropriate for this type of study. Data collected and analyzed during the course of the pilot study of two environmentally differentiated villages will demonstrate whether or not this methodology can be employed for establishing interrelationships between poor sanitation, intestinal disease, and malabsorption. } *Object*

Output and results will occur at two levels. The first level is the testing of methodologies for determination of malabsorption and field environmental surveys. The second level would be the establishment of quantitative relationships between costs and effectiveness of environmental sanitation measures as reflected in the prevalence of gastro-intestinal disease and the quantitative assessment of food loss due to malabsorption.

The University of North Carolina and participating field personnel shall have the right to publish results in appropriate scientific journals, giving due credit to A.I.D. contributions in each instance.

The A.I.D. project monitor, in addition to frequent contacts with the investigators, will also receive periodic progress reports.

#### V. Course of Action

##### A. Project implementation

Contract AID/csd 2489 is to be extended on a year to year basis and will provide 1971 funding for the following:

a. Confirmation of suitability of proposed subcontractors, selection of specific villages for the pilot study and implementation of the completed protocol



PROJECT FOR THE DEVELOPMENT AND EVALUATION OF MEASURES TO REDUCE FOOD WASTE CAUSED BY INTESTINAL DISEASES  
 School of Public Health, University of North Carolina, Chapel Hill, North Carolina

	<u>MAN MONTHS</u> <u>FY 1971</u>	<u>FUNDING</u> <u>FY 1971</u>
<b>Personnel:</b>		
Project Director	6	11,474
Resident Coordinator	6	7,000
Secretary	2	
Consultant Staff (UNC)	8	<u>13,900</u>
		36,874
Social Security, Retirement, etc. @ 13.95		5,144
<b>University Overhead</b>		
On Campus - 34.7% (UNC)		0,378
Overseas - 16.94% (Resident Coordinator)		1,185
Travel and Transportation (Domestic and International)		3,200
Overseas Allowance (Resident Coordinator)		3,500
<b>Subcontractual Services:</b>		
San Carlos University		8,500
INCAP		67,344
Supplies and Other Direct Costs		<u>39,570</u>
<del>Subtotal (Phase 2)</del>		<del>175,695</del>
<del>Seminar (Phase 3)</del>		<del>30,205</del>
<b>TOTAL</b>		<del>206,000</del>

<sup>1</sup> Proposal submitted through the Department of Environmental Sciences and Engineering.

**PROJECT AUTHORIZATION**

<b>1. PROJECT NUMBER</b> 931-11510-87	<b>2. COUNTRY</b> Worldwide	<b>3. AUTHORIZATION NUMBER</b> TA 0022 Recd. No. 1
<b>4. PROJECT TITLE</b> Development and Evaluation of Measure to Reduce Food Waste Caused by Intestinal Diseases		<b>5. AUTHORIZATION DATE</b> 12/10/70 (Amendment)
		<b>6. PROP DATED</b> October 30, 1970

**7. LIFE OF PROJECT**

a. Number of Years of Funding: 3  
Starting FY 19 69; Terminal FY 19 72

b. Estimated Duration of Physical Work After Last Year of Funding (in Months): None

8. FUNDING BY FISCAL YEAR (in U.S. \$ or \$ equivalent)	DOLLARS (in thousands)		P.L. 480	LOCAL CURRENCY			
				Exchange Rate: \$1 =		HOST COUNTRY	
	GRANT	LOAN	CCC + FREIGHT	GRANT	LOAN	JOINTLY PROGRAMMED	OTHER
Prior through Actual FY <u>70</u>	56						
Operational FY <u>71</u>	206						
Budget FY							
B + 1 FY							
B + 2 FY							
B + 3 FY							
All Subsequent FY's							
<b>TOTAL</b>							

**9. DESCRIBE SPECIAL FUNDING CONDITIONS OR RECOMMENDATIONS FOR IMPLEMENTATION, AND LIST KINDS AND QUANTITIES OF ANY P.L. 480 COMMODITIES**

Phase I of project was funded in FY 1969.  
 FY 1971 funding will finance Phases 2 and 3.  
 Phase 4 has not been budgeted, so will require a revised PROP when submitted for approval.

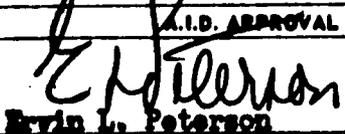
**10. CONDITIONS OF APPROVAL OF PROJECT**

(Use continuation sheet if necessary)

11. Approved in substance for the life of the project as described in the PROP, subject to the conditions cited in Block 10 above, and the availability of funds. Detailed planning with cooperating country and drafting of implementation documents is authorized.

This authorization is contingent upon timely completion of the self-help and other conditions listed in the PROP or attached thereto.

This authorization will be reviewed at such time as the objectives, scope and nature of the project and/or the magnitudes and scheduling of any inputs or outputs deviate so significantly from the project as originally authorized as to warrant submission of a new or revised PROP.

A.I.D. APPROVAL	CLEARANCES	DATE
 Ervin L. Peterson SIGNATURE	J. KEAN, TA/PM/RL	12/8/70
	J. Stockard, TA/H (phone 795)	12/8/70
	J. Haber, USA/ID (phone 795)	11/19/70
	M. Phelps, W/DO (phone 795)	11/18/70
	A. Hornstein, TA/DO (phone 795)	12/8/70
AA/TA, Deputy Assistant Admin.		
	12/10/70	
TITLE	DATE	

931-867

A.I.D.  
Reference Center  
Room 1656 NS

MEMORANDUM

DATE: December 7, 1970

TO: AA/TA, Mr. Ervin Peterson

FROM: TA/PM, John H. Kean 

SUBJECT: Development and Evaluation of Measures to Reduce Food Waste Caused by Intestinal Diseases  
Approval of PROP and Project Authorization

This project proposes to develop and field test methodology which may be used to determine economic relationships between environmental sanitation and food waste resulting from (1) intestinal diseases transmitted under unsanitary conditions, and (2) inefficient use of nutrient materials resulting from malabsorption. The first phase of the project was carried out by the University of North Carolina. It consisted of an intensive review of the literature on this subject, and led to a proposed methodology for application in a field trial. FY 1971 funding in the amount of \$206,000 will take the project through two subsequent development phases which will first field test the methodology operationally, and then establish a workshop to review the results of the pilot study.

TA/PM review of the PROP raised a question whether a scientifically significant relationship can be established between the environmental sanitation elements built into the project, and the determination of waste resulting from intestinal diseases and inefficient intestinal absorption of nutrients. Our fear was that there might be other factors contributing more significantly to malabsorption of nutrients than those considered by the project. Dr. Stockard however, took the position that the environmental sanitation universe proposed by the project can lead to scientifically valid test results. We have accepted his recommendation to proceed with the project.

It is recommended that you signify your approval of this project by signing the attached Project Authorization.

Attachment  
a/s