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PH-HEK-918

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Dr Fletcher Riggs  
Food and Agricultural Officer  
USAID/New Delhi  
Agency for International Development  
Washington, D C 20523

Dear Dr Riggs

This fall I hope to be able to come to India while on sabbatic leave While in India I would like to gatner data for a study of the policy implications of the relationship between social and economic variables and malnutrition in the Indian countryside

With the assistance of C S Ramakrishnan of the U S Educational Foundation in India I have received clearance from the Indian Government to come to India for my research Also through Ramakrishnan I have found an Indian colaborator for the project, Mr Harikesh N Misra of the University of Allahabad What I need now is financial support Thus the enclosed informal unsolicited proposal

Let me briefly spell out the highlights of what I want to do I shouId like to explore the impact of variables such as education, household size, household income and village income distribution on malnutrition Several hypotheses will be tested, each of which have important policy implications The main hypotheses to be tested are presented and discussed in the accompanying research proposal To the extent that the proposed hypotheses are supported, arguments will be strengthened for improving rural nutrition through

- 1 Increasing the productivity of the rural poor through agricultural development programs in which they themselves participate
- 2 Trying to reduce the price of foodgrains through increased foodgrain productivity
- 3 Giving considerable preference in development programs to those which would tend to lessen the income gap between the rich and the poor
- 4 Nutrition education programs which stress the importance of not allowing excessive amounts of fat, salt, and sugar in your diet as your income increases

- 5 Reducing fertility rates among the rural poor
- 6 Improving the education of rural women, as well as men

The attached proposal has not been through the University Contracts and Grants Office and this letter is only exploratory. Nevertheless I should like your opinion as to what the possibility is that AID/India might finance the project.

Because the project is basically concerned with rural people and their welfare and because the calculation of farm income will be a major component of the field work in this project, it seems appropriate to me to submit the project to agriculture for funding. However, there are important nutrition aspects to the project and it might be that the nutrition office would be interested in the project. I have discussed the project with Mary Ann Anderson and the project statement has benefited from her advice. Perhaps joint funding could be worked out between agriculture and nutrition.

Since most of the funds to be spent on this project are to be spent in India, counterpart funds could be a source of funding. If counterpart funding must be administered in India, perhaps the USEFI (through Ramakrishnan) could handle the administration of the grant for their usual fee.

Thanking you in advance for your interest in this project, I hope to hear from you soon.

Sincerely yours,



Phillips W. Foster  
Professor

cc. Virgil Norton, Chairman, Agricultural & Resource Economics  
John Mooie, Assistant Provost for International Programs  
Mary Ann Anderson, USAID/New Delhi  
Gerrit Argento, USAID/Washington  
David Lundberg, USAID/Washington  
Hal Rice, USAID/Washington  
✓ Marty Forman, USAID/Washington  
Dick Suttor, USAID/Washington

Enclosures    Proposal  
                  Curriculum Vita  
                  Hindu Village Study

February 1, 1981

Policy Implications of the Relationship between Socio-economic  
Variables and Malnutrition in Rural India

University of Maryland  
Department of Agricultural and Resource Economics  
Project Leader Phillips Foster

Collaboration in India H. K. Misra  
University of Allahabad

### Situation

Nutrition surveys have tended towards large numbers of individuals surveyed. They have told us of those regions of the country where malnutrition is most prevalent. They have shown which groups by age and sex are subject to which types of malnutrition.

But nutrition surveys have tended to ignore the relationship between nutrition and variables such as number of children in the household, education of the father and mother, and the income of the household.

Yet a substantial body of evidence suggests that malnutrition is closely related to variables such as size of family, education of parents, and most importantly, income.

Governments which are truly interested in improving human nutrition should have a pretty good fix on the relationship between the above variables, since the nature of the relationship between these variables yields important policy perspectives.

### The project proposed

It is proposed that a study be made of a north Indian village population which will yield data on the relationship between malnutrition and such variables as education, household size, and household income

Bagbana village is proposed because of the fact that it has been studied by the principal investigator intermittently ever since 1954. Good entree to the village already exists. Detailed maps of the village, by household, exist for 1973 and could be updated with relative ease to make a population survey easier in 1981. Furthermore, income and other data already exist for this village which would make possible longitudinal comparisons which would be impossible in a village for which less complete historical data exists.

### The problem and the hypotheses

The problem is to explore the impact of variables such as education, household size, and household income on malnutrition in a north Indian village population. Several hypotheses will be tested, each of which have important policy implications. The hypotheses, the justification for the hypotheses and the policy implications, should the hypotheses be supported by the field investigation and resulting statistical analysis, are presented below.

## Hypothesis 1

Individuals in households at the low end of the income scale have a higher than average incidence of malnutrition (Low income individuals are most likely to suffer from undernutrition, dietary deficiency, and secondary malnutrition )

## Justification for hypothesis

A number of studies, most notably Reutlinger and Selowsky,<sup>1</sup> have shown a striking correlation between malnutrition and poverty This is likely to be the case, even in an agricultural village, if a significant proportion of the population is poor and landless

## Policy implications if hypothesis is supported

An important technique for reducing malnutrition is to raise income of the poor This can be done through

1. Increasing the productivity of the poor
- 2 Reducing the prices of the foodgrains, etc purchased by the poor through increased production, especially of foodgrains (Inelasticity of demand for foodgrains makes it fairly easy to reduce their prices through increased production )

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<sup>1</sup>Reutlinger, Shlomo and Selowsky, Marcelo, Malnutrition and Poverty, Magnitude and Policy Options, (World Bank staff occasional papers, No 23) Baltimore The Johns Hopkins University Press, 1976

## Hypothesis 2

Individuals in households at the high end of the income scale have a higher than average incidence of malnutrition (High income individuals are most likely to suffer from overnutrition or excess consumption of fat, salt, or sugar )

## Justification for hypothesis

The most common nutritional problems in high income countries are those associated with overnutrition <sup>1</sup> Perhaps overnutrition problems are already showing up among high income people in rural India

## Policy implications if hypothesis is supported

High income groups should be offered a nutritional education program stressing the importance of maintaining a wholesome diet even though their increasing income allows them to eat more fat, salt or sugar.

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<sup>1</sup>Mayer, Jean, "The Dimensions of Human Hunger," Food and Agriculture, San Francisco Freeman, 1976, p 14

### Hypothesis 3

Per capita income, both on the average and in the lowest income group, is increasing through time and thus the incidence of malnutrition can be expected to be shifting from the lowest income group (under-nutrition, deficiency, and secondary malnutrition) toward the highest income group (overnutrition)

### Justification for hypothesis

During the 1970's India's per capita income has been rising, continuing a trend which has existed since the 1950's, although the rate of increase of the 70's is somewhat slower than it was during the previous 20 years. From 1950 to 1961 the average annual rate of growth of per capita income at constant prices was 1.91 percent. The same figure for 1960 to 1971 was 1.45 percent and for 1970 to 1976 was .72 percent.<sup>1</sup>

A recent study from the Philippines<sup>2</sup> suggests that success in the green revolution leads to increased demand for labor among the landless laborers (more labor for weeding and harvesting rice). If this labor requirement is increasing faster than population, income among the rural landless could be increasing.

### Policy implications if hypothesis is supported

Policy implications of hypothesis 2 should be emphasized

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<sup>1</sup>Roy Choudhry, Uma Datta, "Income Distribution and Economic Development in India since 1950-51," Indian Economic Journal, October-December, 1977, Vol 25, No 2, p 148

<sup>2</sup>Hayami, Yujiro, Anatomy of a Peasant Economy-A Rice Village In the Philippines, Los Banos, International Rice Research Institute, 1978

#### Hypothesis 4

Undernutrition, dietary deficiency and secondary malnutrition are positively related to the number of children in the family

#### Justification for the hypothesis

An unpublished study by Engle, et al recently showed a positive relationship in the Philippines between number of people in the household and the incidence of a second or third degree malnourished child

A regression we recently ran on data from Bagbana village in India showed a negative relationship between family size and per capita income. Since income is so closely related to malnutrition, family size may well correlate closely with malnutrition in India also

#### Policy implications if hypothesis is supported

Reducing fertility rates will improve nutrition

If hypothesis 1 is supported as well as this hypothesis, the policy implication would be that reducing fertility rates among the poor is especially important to improving nutrition

### Hypothesis 5

Malnutrition is negatively correlated with the number of years of education of the mother

### Justification for the hypothesis

The previously mentioned study by Engle shows a negative relationship between the incidence of a second or third degree malnourished child and the number of years of education of the mother in the Philippines

### Policy implications if hypothesis is supported

Increasing resources spent on the education of rural women will improve rural nutrition

## Methodology in Brief

For socio-economic variables in 1981 Use survey from attached, (Appendix A)

For socio-economic variables in 1968 Use data on file gathered from same village using same survey form in 1968

For income comparisons between 1968 and 1981 construct a village cost of living index appropriate to this village

For nutrition measurement use Jelliffe's weight for age<sup>1</sup> for infants less than one year of age For individuals one year over use Jelliffe's weight for height,<sup>1</sup> which appears to be the best single anthropometric indicator of nutritional status for individuals over one year of age<sup>2</sup>

For impact of socio-economic variables on nutrition use regression analysis

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<sup>1</sup>Jelliffe, D B , The Assessment of Nutritional Status of the Community, Geneva WHO Monograph Series No 53, 1966

<sup>2</sup>Anderson, M A , "Comparison of Anthropometric Measures of Nutritional Status in Preschool Children in Five Developing Countries", The American Journal of Clinical Nutrition, 32 November, 1979, pp 2339-2345

Budget

Air fare Washington DC/ Delhi/ Washington DC @ \$2100	
2 individuals	\$ 4,200
Salary for Project leader, three months (assume 15% fringe benefits)	
\$9 980 X 1 15 = \$11,477	11,477
Graduate assistant salary and fringe benefits	
@ \$7,000 per year, for one and one half years	10,500
Field expenses	
Interpreters/clerks 200 days X \$25 =	5,000
Rental car--120 days X \$50 per day, includes driver	6,000
Per diem for Foster,	
\$35 X 2 X 30 =	2,100
Graduate student per diem	
\$35 X 3 X 30 =	3,150
Consulting honorarium for H K Misra	
\$50 X 40 =	2,000
Computer and miscellaneous expenses in College Park	2,000
University of Maryland contract overhead charge	
50% of wages and salaries	
\$11,477 + 10,500 + 5,000 = \$26,977 X 5 =	<u>13,488</u>
	\$59,915

Appendix A

Household Survey

VILLAGE \_\_\_\_\_

Household heads \_\_\_\_\_ yrs Household No \_\_\_\_\_

caste \_\_\_\_\_ father's name \_\_\_\_\_ household head in village \_\_\_\_\_

HOUSEHOLD MEMBERS LIVING IN VILLAGE

name	sex	age	relation*	highest stand of education	Literate (Bagbana quest)		Gona age for females	had child		farm work (males)			
					Y	N		Y	N	Y	N	P primary	S secondary
1	m f				Y	N	Y	N	Y	N			
2.	m f				Y	N	Y	N	Y	N			
3	m f				Y	N	Y	N	Y	N			
4	m f				Y	N	Y	N	Y	N			
5	m f				Y	N	Y	N	Y	N			
6.	m f				Y	N	Y	N	Y	N			
7	m f				Y	N	Y	N	Y	N			
8	m f				Y	N	Y	N	Y	N			
9	m f				Y	N	Y	N	Y	N			
10	m f				Y	N	Y	N	Y	N			
11	m f				Y	N	Y	N	Y	N			
12	m f				Y	N	Y	N	Y	N			
13	m f				Y	N	Y	N	Y	N			
14	m f				Y	N	Y	N	Y	N			
15	m f				Y	N	Y	N	Y	N			

\*For wives list no of husband; for all others, list no. of mother and father, otherwise write out

EMPLOYMENT OUTSIDE FARM BY HOUSEHOLD MEMBERS LIVING IN VILLAGE

VILLAGE \_\_\_\_\_  
 HOUSEHOLD NO \_\_\_\_\_

no	occupation	type of equipment owned	time worked	remarks
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

FAMILY MEMBERS LIVING OUTSIDE VILLAGE

	name	sex	age	relation**	yrs out of vill	highest stands of education	occupation	contact with family visits	
								per yr to vill	other
51	_____	m f	_____	_____	_____	_____	_____	_____	_____
52	_____	m f	_____	_____	_____	_____	_____	_____	_____
53	_____	m f	_____	_____	_____	_____	_____	_____	_____
54	_____	m f	_____	_____	_____	_____	_____	_____	_____
55	_____	m f	_____	_____	_____	_____	_____	_____	_____
56	_____	m f	_____	_____	_____	_____	_____	_____	_____
57	_____	m f	_____	_____	_____	_____	_____	_____	_____
58	_____	m f	_____	_____	_____	_____	_____	_____	_____
59	_____	m f	_____	_____	_____	_____	_____	_____	_____

\*Brother, sister, son or daughter of any male in the household

\*\*For wives list no of husband, for all other list no of mother and father, otherwise write ou

LAND

<u>Land Farmed</u>	<u>Big</u>	<u>Bis</u>	<u>Land rented to others</u>	<u>Big</u>	<u>Bis</u>
Area cropped	_____	_____	Area in this village	_____	_____
Area in orchards	_____	_____			
Area not in crops or orchards .	_____	_____	Area in other villages	_____	_____
Area owned . .	_____	_____			
Area rented	_____	_____	What other villages?		
Area in this village	_____	_____	_____	_____	_____
Area in other villages .	_____	_____	_____	_____	_____
What other villages?			_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____			
_____	_____	_____			
<u>Total land area farmed</u>	_____	_____	<u>Total land rented to others</u>	_____	_____

FRUIT CROPS

<u>Type</u>	<u>Number of trees</u>	<u>Type</u>	<u>Number of trees</u>
Mango	_____	Other	
Guava	_____	a	_____
Banana . . .	_____	b	_____
Lime .	_____	c	_____
Papaya	_____	d	_____
Orange	_____	e	_____

CROPS THIS RABI

VILLAGE \_\_\_\_\_

HOUSEHOLD \_\_\_\_\_

Crop	Variety	Crops mixed in	Area		Irrigation available			Inorg		Remarks
			Big	Bis	Type: P-pond, Tu-tube well, W-well, 1k-tank C-canal	Big	Bis	fert		
Wheat								Y	N	
								Y	N	
								Y	N	
								Y	N	
								Y	N	
Barley	Imp Desi							Y	N	
	Imp Desi							Y	N	
	Imp Desi							Y	N	
Pea								Y	N	
								Y	N	
Gram								Y	N	
								Y	N	
Mustard								Y	N	
Potatoes								Y	N	
Vegetables (type)								Y	N	
Other								Y	N	
a.								Y	N	
b.								Y	N	
c.								Y	N	
d.								Y	N	
e.								Y	N	
Fallow										
TOTAL										

CROPS LAST KHARIF

VILLAGE. \_\_\_\_\_  
HOUSEHOLD NO \_\_\_\_\_

Crop	Variety	Crops mixed in	Area		Irrigation available		Inorg		Remarks
			Big	Bis.	Type P-pond, Tu-tube well, W-well, Tk-tank C-canal	Big.	Bis	fert	
Paddy	_____	_____	_____	_____	_____	_____	_____	_____	Y N
	_____	_____	_____	_____	_____	_____	_____	_____	Y N
	_____	_____	_____	_____	_____	_____	_____	_____	Y N
	_____	_____	_____	_____	_____	_____	_____	_____	Y N
Jowar	Imp Des1	_____	_____	_____	_____	_____	_____	_____	Y N
	Imp Des1	_____	_____	_____	_____	_____	_____	_____	Y N
Bajra	Imp Des1	_____	_____	_____	_____	_____	_____	_____	Y N
	Imp Des1	_____	_____	_____	_____	_____	_____	_____	Y N
Maize	Imp Des1	_____	_____	_____	_____	_____	_____	_____	Y N
	Imp Des1.	_____	_____	_____	_____	_____	_____	_____	Y N
Arhar		_____	_____	_____	_____	_____	_____	_____	Y N
Urd		_____	_____	_____	_____	_____	_____	_____	Y N
Moong		_____	_____	_____	_____	_____	_____	_____	Y N
Masoor		_____	_____	_____	_____	_____	_____	_____	Y N
Til		_____	_____	_____	_____	_____	_____	_____	Y N
Ground-nut		_____	_____	_____	_____	_____	_____	_____	Y N
Cotton		_____	_____	_____	_____	_____	_____	_____	Y N
Sugarcane		_____	_____	_____	_____	_____	_____	_____	Y N
Vegetables (type)	_____	_____	_____	_____	_____	_____	_____	_____	Y N
Other		_____	_____	_____	_____	_____	_____	_____	Y N
a		_____	_____	_____	_____	_____	_____	_____	Y N
b		_____	_____	_____	_____	_____	_____	_____	Y N
c		_____	_____	_____	_____	_____	_____	_____	Y N
d		_____	_____	_____	_____	_____	_____	_____	Y N
e		_____	_____	_____	_____	_____	_____	_____	Y N
Fallow		_____	_____	_____	_____	_____	_____	_____	
TOTAL		_____	_____	_____	_____	_____	_____	_____	

18

CROPS LAST ZAID

VILLAGE \_\_\_\_\_  
HOUSEHOLD NO \_\_\_\_\_

Crop	Variety	Crops mixed in	Area		Irrigation available		Inorg fert	Remarks
			Big	Bis.	Type P-pond, Tu-Tube well, W-well, Tk-tank C-canal	Big		
Paddy	_____	_____	_____	_____	_____	_____	_____	Y N
	_____	_____	_____	_____	_____	_____	_____	Y N
Vegetables (Type)	_____	_____	_____	_____	_____	_____	_____	Y N
Other								
a		_____	_____	_____	_____	_____	_____	Y N
b		_____	_____	_____	_____	_____	_____	Y N
c		_____	_____	_____	_____	_____	_____	Y N
d		_____	_____	_____	_____	_____	_____	Y N
e		_____	_____	_____	_____	_____	_____	Y N
Fallow			_____	_____				
TOTAL			_____	_____				

VILLAGE \_\_\_\_\_

HIRED LABOR

HOUSEHOLD NO \_\_\_\_\_

	Type	Number of persons	Days per person	Remarks with bullocks?
1	_____	_____	_____	_____
2	_____	_____	_____	_____
3	_____	_____	_____	_____
4	_____	_____	_____	_____
5	_____	_____	_____	_____
6	_____	_____	_____	_____

## LIVESTOCK

Number		Number	
_____	Cows	_____	Chickens
_____	Bulls	_____	Pigs
_____	Bullocks	_____	Horses
_____	Buffaloes	_____	Horses
_____	Sheep	_____	Camels
_____	Goats	_____	Other _____

## FARM EQUIPMENT

Number	Remarks	Number	Remarks
_____	Kurpi	_____	Improved leveling
_____	Parwa	_____	implements
_____	Sickle	_____	Persian wheel
_____	Desi plow	_____	Tractor
_____	Moldboard plow	_____	Tubewell
_____	Other improved plow	_____	Chain pump
_____	Harrow	_____	Dhenkuli
_____	Cultivator	_____	Mote
_____	Flour Mill	_____	Charas or Pur
_____	Improved thresher	_____	Swing baskets
_____	Seed drill	_____	Ekka
_____	Hand driven forage cutter	_____	Tonga
_____	Improved winnower	_____	Bullock cart
		_____	Other _____

## LIVING EQUIPMENT

Number		Number	
_____	Petromax	_____	Scooter
_____	Cycle	_____	Sewing machine
_____	Radio	_____	Other _____

VILLAGE \_\_\_\_\_  
HOUSEHOLD NO \_\_\_\_\_

Interviewee's number \_\_\_\_\_

Interviewer's name \_\_\_\_\_

Date of interview \_\_\_\_\_