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REPORT ON CO-OP HEALTH PROJECT

CONSULTANCY

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TABLE OF CONTENTS

	Page
Executive Summary	v
Economic/Financial Analysis of USAID/Bolivia Co-Op Health Project	1
I. Estimation of Future Health Care Demand by Target Population	2
A. Background	2
B. The Montero Study	4
C. Projection of Income and Expenditures	g
II. Analysis of Proposed Project Services and Costs	20
A. Services and Expenditures	20
B. Financing Approaches	24
III. Cost-Effectiveness Analysis	30
Appendix A: Preliminary List of Information to be Gathered as Part of PRICOR/Co-Op Health Project Household Survey	
Appendix B: The Development of a Self Financing Health Care Delivery System Through Cooperatives in Bolivia	

EXECUTIVE SUMMARY

The scope of work for this consultancy was the following:

a. Review financial feasibility methodology used in the approved PID and modify, as necessary.

b. In association with anthropologist, design questionnaire and select sample to provide data on current expenditures by target population for health care, including drugs, as a percent of estimated average family income, as well as estimated demand for health services to be provided under the project.

c. Determine costs, both fixed and variable, to provide specifically identified health services to target populations through the self-financing primary health care system.

d. Review program membership recruitment steps outlined on page 30 of the PID and propose specific methodology for adjusting both packages of health care services to be delivered and alternative means of generating revenues to cover program costs under the life of the program.

e. Provide the guidelines for establishing an actuarial table that would allow the project to determine a fee schedule based on the pathology encountered, rates of utilization of services, and service delivery costs.

f. Based on most likely assumptions regarding demand for various services and estimated service delivery costs, carry out a financial analysis of the project's self financing aspect using the methodology employed in the PID.

g. Complete PRICOR proposal taking into account recommendations of those who reviewed the original draft proposal and the results of the analyses requested above.

h. To the extent possible, prepare an economic cost effectiveness analysis to determine whether the proposed health care delivery system is the least cost alternative for meeting the project's health care delivery alternatives.

It was determined that the analyses called for in tasks a, c, e, f, and h could be presented most coherently as part of one overall analysis of the proposed project. For this reason, these items have been incorporated in the economic/financial analysis of the project presented in this report. The other tasks included in the scopes of work are addressed below.

- Work with anthropologist to design questionnaire and select sample to provide data on current health care expenditures (Task D)

Frequent discussions were held in Santa Cruz with anthropologist Ivokraljevic concerning the types of questions to be asked of co-op members in order to assess the extent of their current health care expenditures, the relationship between these expenditures and household income, and identify those factors affecting their demand for health care.

An extensive list of questions/information items was developed for this purpose. Given the anthropologist's limited scope of work and time constraints, such a comprehensive data gathering activities was not possible. A shortened list of questions was therefore developed and incorporated into the anthropologist's survey instrument. The schedules of this consultant and the anthropologist did not overlap sufficiently to allow this consultant to review the findings of his survey.

Both the extended and shortened list of economically-oriented questions are presented in Appendix A. The extended list should form the basis of the economic portion of the household survey instrument to be developed under the PRICOR project.

- Review Program Membership Recruitments Steps in PID (Task D)

The membership recruitment steps described on pages 30-31 of the PID provides for the following steps to be carried out in sequence:

- Announcement to co-op of establishment of program and its membership fees.

- In individual communities, conducting of survey to determine health care needs and expenditures.

- Negotiation with individual communities concerning services to be provided and financing mechanisms.

Negotiation of these matters at the individual community level would likely result in a wide variety of service packages find financin schemes being offered within the same co-operative. The result would be an administrative nightmare, particularly at the higher levels of the health delivery system (II and III) where one facility would be serving individuals from several communities, each with different service coverage and payment mechanisms.

It is recommended that this methodology be revised so that only one service package and one financing mechanism be set up for each co-operative. The packages finally selected by a co-op could be drawn from a number of possible alternatives designed by provider organization/PRICOR staff. The basis for development of these alternatives should be the analysis of data collected from a sample of households representative of the entire co-op and the final analysis of the viability of various financing mechanisms. Analysis of each benefit package vis-a-vis each financing alternatives need also be carried out to ensure the costs of each service package are met be each financing alternative. A fuller description of the way in which these analyses will be undertaken can be found in the methodology section of the PRICOR proposal found in Appendix B.

- Complete PRICOR proposal

A revised proposal to receive funds from PRICOR for operations research activities associated with the co-op health project has been prepared and is included as Appendix B to this report. This revision has been developed to reflect the concerns of USAID/Bolivia and the comments made by members of PRICOR's grant review panel. This document has been discussed with and approved by Dr. Marco Antonio Tellez, General Manager of FENACRE, the recipient of the award.

ECONOMIC/FINANCIAL ANALYSIS
OF USAID/BOLIVIA COOP HEALTH PROJECT

This document provides an economic and financial analysis of the proposed USAID/Bolivia Coop health project as described in the Project Identification Document (PID). In general this analysis should be seen as an expansion of the one included in the PID. When necessary, however, modifications were made in the basic approach presented in that document.

A review of the costing approach contained in its PID reveals it to be quite sound. Given that the nature and the costs of service inputs has not changed since the PID, it was determined through discussions with Dr. Hougen of USAID/Bolivia that the principal issue on the supply/cost side, after reviewing the financial analysis and correcting any discrepencies in input prices, would be the assessment of whether the proposed financing/pricing policies will generate the utilization and expenditure levels necessary to cover project costs. Given this goal of establishing a health and delivery system which will be self-supporting, an accurate assessment of the target communities' ability and willingness to pay for health services is essential. For this reason, this report will begin with an analysis of the demand side of the health care market in the project's target area.

The outline for this analysis is as follows:

I. Estimation of Future Health Care Demand by Target Populations
   - A. Background
   - B. The 1977 Montero Study
   - C. Projection of Income and Expenditure Levels

II. Analysis of Proposed Project Services and Costs
   - A. Services, Financing and Expenditures
   - B. Comparison with Projections and Baseline Data
   - C. Financing Approaches

III. Cost-Effectiveness Analysis

I. Estimation of Future Health Care Demand by Target Population

A. Background

Historically, health care services to low-income rural or peri-urban populations in developing countries have been provided through governmental health delivery systems (for free or at a nominal charge) and/or through individual entrepreneural providers practicing either traditional or western medicine. A review of attempts to establish community-financed delivery systems indicates that most have not met with any great degree of long-term success (Stinson, 1982). This same review identified the following eight general approaches to generating community contributors:

- Personal service fees
- Drug sales
- Personal Prepayment
- Production-based prepayment
- Income generating schemes
- Community or individual labor
- Donations and ad hoc assessments
- Fund-raising through festivals, raffles, etc.

Before any one or a combination of the above general financing altenatives can be selected as the optimal approach, a thorough understanding of the factors affecting the need and demand for health services must be gained. These factors can be subsumed under five general categories:

Category	Factor
Demographic	• Age, Sex (D_1, D_2)
Biological	• Incidence of disease (B_1)
	• Severity of illness (B_2)
Cultural	• Perception of Illness (C_1)
	• Socio-cultural factors affecting acceptability of different types of services (C_2)
Service-related	• Types of services avaialbe (S_1)
	• Accessibility of services (travel time and transport costs) (S_2)
	• Quality of care provided (S_3)
Economic	• Price of individual services/Cost of contribution (E_1)
	• Total cost of care (E_2)
	• Disposable income/available resources (E_3)
	• Opportunity cost of receiving/net receiving care (E_4)

When services are provided free of charge, the first three economic factors — the price of services, total costs, and available income/resources — may not play a very significant role. However, when some form of financial contribution is required to suport the health care system, these factors become much more important.

Certain of these factors may remain fairly fixed over time; others may change from year to year or may fluctuate on a seasonal basis within a single year. These factors must be carefully considered in both projecting the potential demand for health services and designing appropriate community-financing mechanisms for such services.

The effect of these factors on the project's target population is explored below.

B. The Montero Study

The only baseline data available for assessing the potential health care demands of the target population is provided by the results of a 1977 household survey conducted in the Montero region of Santa Cruz.

This survey asked interviewees to recall the incidence of illness and the amount of health care expenditures incurred during the two week period immediately preceeding the interview. From the survey sample it was determined that the average per capita health expenditure during the two week period was US $2.13 ($b 20 = US $1). These expenditures were divided as follows:

Drugs	76.4%
Service Fees	14.6%
Transportation	5.0%
Other	4.0%
	100%

The Montero study extrapolated these expenditures to a full year period to obtain an estimate of $55.38 in health care expenditures per capita or, when multiplied by an average household size of 5.6 persons, an estimate of $309 in average annual family expenditures on health care. Taking this sum as a proportion of the 1977 net cash income for the average small farm household in Santa Cruz ($898) yields a finding that farm families may have been spending roughly 35% of their net cash income on health care.

The study findings indicated that an average individual became ill about 12.5 times per year and visited a health provider 2.6 times per year. The complete annual behavior pattern of the average individual can be expressed in the following general utilization/expenditure equation:

$$a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5 = \$55.38$$

where: a_1 = # illness episodes when no provider was contacted

a_2 = # visits made to a physician/year

a_3 = # visits made to a nurse/year

a_4 = # visits made to other types of health workers/year

a_5 = # hospital admissions/year

x_1 = average cost per illness when no health care provider is contacted

x_2 = average cost per visit to a physician

x_3 = average cost per visit to a nurse

x_4 = average cost per visit to other types of health care provider

x_5 = average cost per hospital admissions

Using the Montero data in this equation provides the following complete utilization/expenditure equation:

$$9.87\ (\$1.46) + 1.69\ (\$10) + .44\ (\$3.28) + .31\ (\$4.05) + .185\ (\$115.52) = \$55.38$$

It should be noted that the Montero household survey was conducted during the months of October, November and December, 1977. If it is assumed that the factors affecting the utilization of, and expenditures for, health services do indeed change either seasonally or from one year to the next, extrapolation of the findings of a point in time study could yield biased estimates of annual levels. For example, the incidence of diarrheal and respiratory disease — which accounted for nearly half of all reported illness espisodes in the Montero study — are believed to be positively related to, respectively, the arrival of the rainy and cold seasons in Santa Cruz. Evidence of this can be found comparing the incidence of diarrheal diseases, presented in a report prepared by staff at the Hospital de Saavedra (Bacherer, 1982) with the average rainfall recorded in that area over a 20 year period (See Figure 1). As illustrated in the same figure, the incidence of respiratory problems was found by the hospital to increase during the cold months of May, June, and July.**

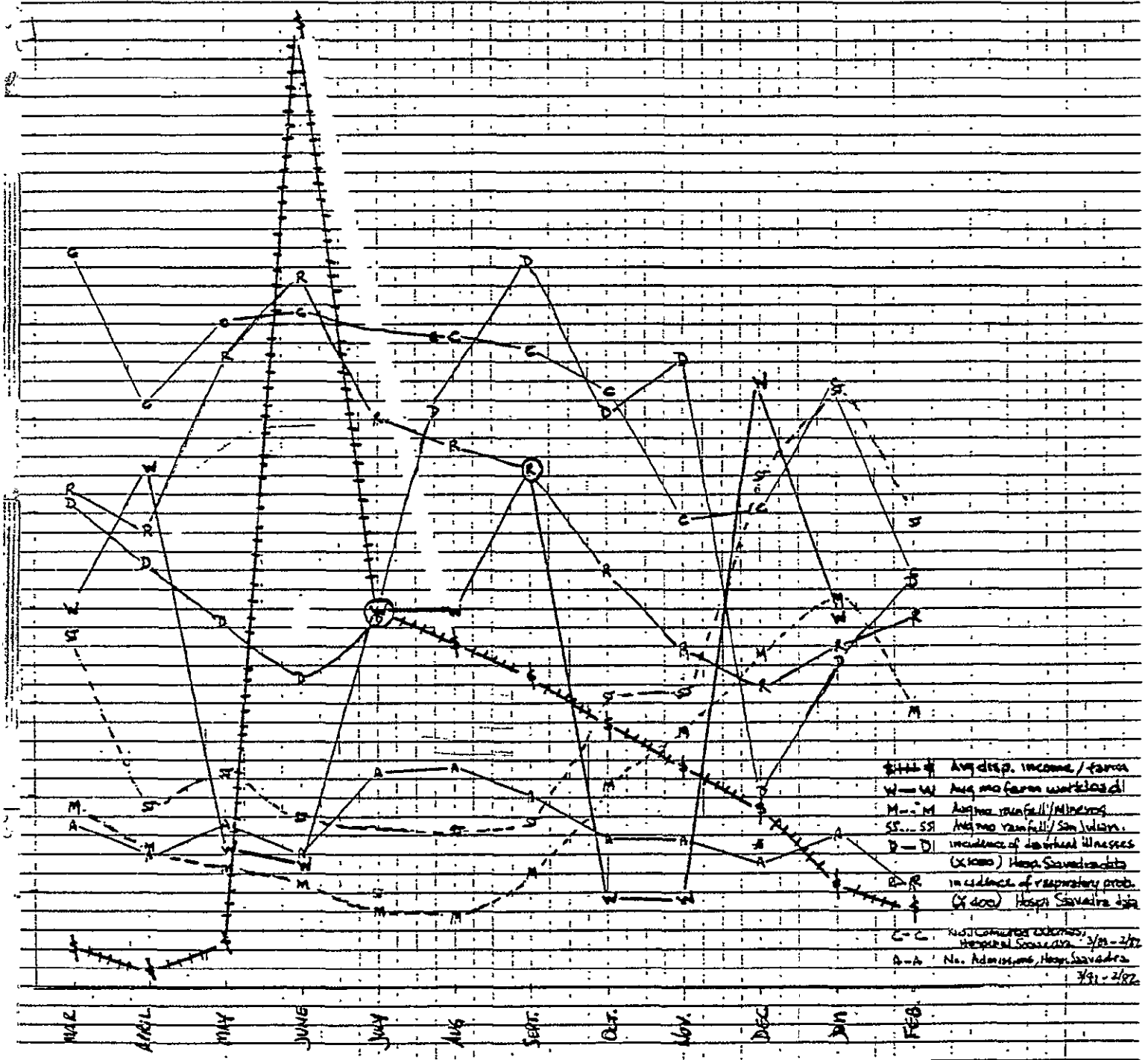
**It should be noted that while they may be indicative of the fluctuations in the incidence of different diseases, these charts should be viewed with some caution as the methodology used for determining incidence rates is not described in the report.

Similarly, given the cyclical nature of farm production, substantial seasonal variation in the economic factors affecting health service utilization/expenditures can be expected. A recent study prepared by the Menonite Economic Development Associates (MEDA) (Graber, 1982) estimated the relative level of income available to an average farm household during the course of a year. As illustrated in Figure 1, income for those farmers unable to store their harvest is estimated to arrive in one lump sum in June when the bulk of his crops (in the MEDA report, assumed to be rice and corn) are sold. Based upon a projected monthly family budget, available or disposable income is shown to be progressively reduced during subsequent months until it reaches its low point in April. Income is increased slightly in May from the projected sale of an early rice harvest, with the replenishment of the family's income coming once again after the June sale of its crops.

Just as monthly disposable income levels could be expected to vary in an agricultural society, so too might workload requirements differ from month to month. The MEDA study also estimated the amount of manpower needed by a farm family to accomplish certain tasks during the course of a crop year, including land preparation, seeding, weeding and harvesting. Indices of these requirements are also presented in Figure 1 for a small farmer cultivating two hectares each of rice and corn. As can be seen, the workload is highest during April - when the rice and corn harvest overlap, in September -- when land preparation activities predominate, and in December -- when the farmer is busy with weed and pest control.

With respect to health services utilization, farm workload or manpower requirements can be viewed to some degree as a surrogate for the cost of using/not using health services. Several possible relationships could be hypothesized. In the first, the farmer may be more concerned about the opportunity cost (a loss in productivity, cost of hiring replacement) of taking time out to

Figure 1. Comparison of Indices of Factors Affecting Health Services Utilization and Sample Utilization Levels



seek health services for problems which develop during peak work periods and therefore not seek care. Conversely, a second hypothesis might claim that the farmer would be more concerned about the potential opportunity costs of not receiving care for a health problem which develops immediately before or during peak manpower periods, i.e., the possibility of the problem becoming worse and incapacitating him even further for the remainder of the busy period. Yet a third possibility could be that the farm household's reaction to the need for health services during busy periods might be determined by which household member becomes ill (highly productive male vs young child), the perception of the severity of the illness, and other factors such as available income. For example, during the high workload month of April, the farmer may choose to continue working, and ignore most health problems because available income is near exhausted and paying for needed care or drugs might require selling off certain household possessions or taking out a loan. During the busy month of September, however, available income is greater and the relative cost of receiving care may not be so great.

It should be noted that the seasonal fluctuations in disposable income and the opportunity cost of receiving/not receiving care were modeled upon a small rural farm family which cultivated two hectares of rice and two of corn, who had no storage facilities, and whose sale income was derived from crop sales. While the general principles would also apply to small farmers producing other crops such as vegetables, or who had some small ancillary sources of income, the timing and magnitude of the seasonal fluctuations would be expected to vary. Indices of these factors as well as actual utilization data from the Hospital Saavedva are also plotted on the chart shown in Figure 1. These fluctuations would not apply, however, to low-income peri-urban families which relied on family members' salaries as their major source of income. In these

cases, disposable income (at least in nominal terms) would likely be much more stable over the course of a year, as would the opportunity cost of an income-generating member of the family being ill.

The purpose of the previous discussion has been threefold:

- to present a rough approximation of the significant fluctuations in factors likely to affect health care utilization and expenditures which occur during the course of a year.
- to highlight the fact that the variations in these factors often move in contradictory directions, i.e. the factor positively influencing utilization may be increasing at the same time another positive factor may be decreasing or a negative fator increasing.
- to identify the potential biases which may be introduced if, without giving adequate consideration to changes in these and other underlying factors, the findings of a single point in time crossectional survey is extrapolated to a full year or compared to the results of a similar survey conducted at another time in the year or on a substantially different population (e.g. far vs peri-urban).

Despite the above caveats, it appears that the timing of the Montero study (October through December) may represent a relatively "average" period for both utilization and disposable income, certainly more representative than months such as April or June. For the purposes of this analyses, the extrapolation of the Montero findings will therefore be assumed to represent a relatively valid estimate of annual expenditures.

C. Projection of Income and Expenditures

The discussion so far has focused only on examples of the seasonal variations in factors affecting health care utilization/expenditures. There are, however, important factors the relative values of which may change from one

year to the next. Certain of these, such as the individual's perception of illness, may without intervention change slowly from year to year. For others, the changes may be more precipitous. An examination of the effect of inflation in Bolivia in recent years will provide a good example of how certain factors move in one direction, rather than cyclically, during the course of a year and therefore change their absolute level from one year to another.

As described earlier, an estimate of the relative proportion of farm income in Santa Cruz which was spent on health services in 1977 (34.5%) could be obtained by projecting the average household expenditure level found in the Montero study to a full year ($309) and then taking it as a percentage of the average income at that time of a small farmer ($898). Since that time, however, the economic situation in Bolivia has been very volatile, with high rates of inflation sending prices soaring. These 1977 expenditure and income figures can be used as a baseline to estimate in very rough terms what the effect of the country's economic crisis has been in both real and nominal terms on the cost of health services and other consumer goods and on the income of the small rural farmer. An attempt can also be made to relate these findings to wage-earning peri-urban families.

For the purpose of this analysis, an index of 100 is assigned to both the 1977 average income of a small farmer and the composite price level for consumer goods during that year. It is assumed for purposes of this exposition that health care prices will move in line with overall consumer prices. Estimates of annual growth in wholesale agricultural product prices and in the consumer price index (La Paz) found in a recent International Monetary Fund (IMF) document are used respectively, as surrogates for the increases in small farmer income and consumer prices faced by the farmer (including those for health care). These rates of growth are presented in the table below.

Annual Rates of Growth in

Selected Economic Indicators

(%)

Item	1978	1979	1980	1981
Consumer Price Index	10.4	19.7	47.2	32.4
Wholesale Price Index/ Agricultural Products	20.6	27.8	54.7	24.8

To determine price and income levels from the end of 1981 to the present, different methodologies were used for each measure. To estimate price levels, the rate of increase in the CPI for 1981 (32.4%) was carried through to March, 1982 when the exchange rate of the unofficial market in which most non-central government activities take place was reported to be $b 115 = US$ 1. In March, 1983 that rate had increased to approximately $b 500 = US$ 1, a monthly increase of 13% or 334% over a 12 month period. It is assumed that 75% of consumer good inputs were affected, either directly or indirectly, by this drop in the unofficial purchasing power of the peso and therefore their prices raised accordingly, while 25% of consumer good inputs were domestic inputs whose prices (e.g. salaries) were downwardly sticky and therefore are assumed to have risen at a rate of only 100% during the same period. The composite inflation rate for March 1981 to March 1982 resulting from this methodology is 275.5%, calculated in the following manner:

$$\begin{array}{rr} .75 \times 334\% = & 250.5\% \\ .25 \times 100\% = & \underline{25.0\%} \\ & 275.5\% \end{array}$$

It should be noted that the Montero study found that 76% of all health care expenditures went toward the purchase of drugs. That the price of drugs, most of which are imported in either final form or as raw materials, has risen at a rate at least comparable with the one just estimated is evidenced by the data

which indicate that the wholesale retail prices of certain drugs and medical supplies purchased in Santa Cruz have risen during the period June to November, 1982 at an average rate of over 19% per month, or an annual rate of over 700%. Interestingly, however, a more recent review of wholesale drug prices in Santa Cruz found almost no increases in prices from November through March. This was the result of an agreement between pharmaceutical manufacturers and the government in which the manufacturers agreed to freeze prices in return for access to dollars needed for the purchase of foreign goods. How long this accord will continue is uncertain.

To estimate increases in small farm income from 1981 through the 1983 harvest period, estimates were obtained from MEDA for the following: a) the average price received by the previously described "average small farmer" per unit of rice and corn, and b) an estimate of the relative contribution of each crop to the farmer's total net income from both harvests (66% rice, 34% corn).

These estimated prices are shown in the table below. Where MEDA officials indicated a range of possible prices for the 1982 and 1983 harvest, a value in the lower range was used to reflect the decline in the size of the yields for those harvests.

Estimates of Prices for Selected Crops

1981 - 1983

Crops	PRICE 1981	PRICE 1982	1981-82 increase	PRICE 1983	1982-83 increase
Rice ($b/fanega)	1300	2100	61.5%	7500	257.1%
Corn ($b/quintale)	135	225	66.7%	750	233.3%
% increase weighted to reflect relative impact on income			63.25%		249.2%

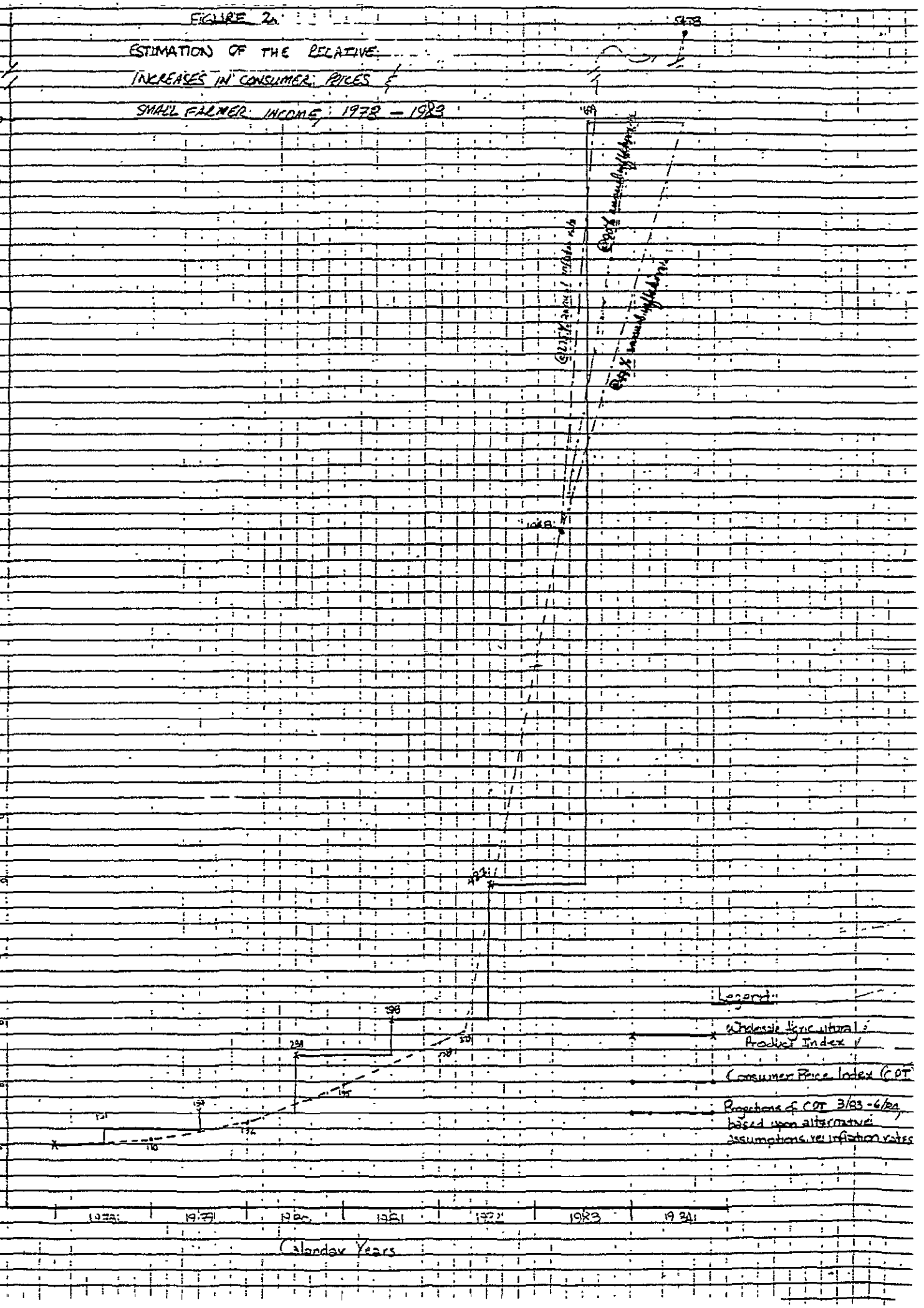
Combining these estimates for the recent growth in these surrogates for prices and small farm income with those of the IMF report for 1978-81 will allow us to assess the present economic status of the small farmer. A graph increasing the 1977 baseline indices for these two items by the estimated annual rates of growth is presented in Figure 2.

The income of the small farmer is shown as a step function to reflect the assumption that the bulk of his income is received at roughly one point during the year. This amount is presumed to be the total available until the following year's harvest is sold. The graph for the consumer price index is a smooth function, reflecting continuous movement in price levels during the course of a year. The small farmer is "better off" than he was in late 1977 (i.e. his income could buy more than it did then) whenever his income line is to the left of the CPI line. According to this analysis, the small farmer more than maintained the purchasing power of his income through the early part of 1982, about the time prices for the 1982 harvest were being negotiated. Shortly after that period, however, the rate of inflation skyrocketed and despite an increase of approximately 63% in the unit price of his rice and corn crops, the purchasing power of the small farmer's income plummetted in the later half of 1982 and the first part of 1983. The farmer's situation is likely to improve in June of this year as the result of an anticipated 249% increase in crop prices. Depending upon the rate of inflation experienced during that period, however, this improvement may be short-lived.

As illustrated by the projections for the growth of the CPI in Figure 2, for the small farmer's income to have the same or better purchasing power than it did in 1977 during the entire July 83-June 84 period, the inflation rate for that period could not exceed 47%. If the present 275% rate of inflation were to continue, farmers' purchasing power would quickly drop below 1977 levels. At a 90% inflation rate, it is estimated that famers would be better off than in 1977

FIGURE 2a

ESTIMATION OF THE RELATIVE INCREASES IN CONSUMER PRICES & SMALL FARMER INCOME, 1978 – 1983



for the first half of July 83 - June 84 period, with the purchasing power of their incomes dropping below 1977 levels for the second half of that period.

The net effect of recently high inflation rates and the uncertainty of the magnitude of further increases in price levels leaves the future purchasing power of the small farmer in doubt. If the annual inflation rate abates to an average of 90% over the next 12 months, the farmer's purchasing power will remain about what it was in 1977. That is, by allocating 35% of his income to health services he will be able to buy the same quantity of services as he was able to purchase at the time of the Montero study. If inflation is greater than 90%, the farmer will have to spend an even greater proportion of his income to purchase the same amount of services as in 1977, or he will have to settle for purchasing smaller quantities of health care with his 35% allocation.

How changes in these economic factors actually influence the small farmer's health care expenditures is not known. As the average household income changes, its health care expenditure patterns may be affected in one of three ways:

1) it may stay as a constant proportion of nominal income (i.e., the income elasticity of these expenses = 1);
2) it may increase at a higher rate than income (elasticity > 1);
   or it may drop as a proportion of the total income (elasticity < 1).

Inflation may also affect the elasticity of health care expenditures. For example, if the purchase of certain units of health care is relatively insensitive to price increases (i.e., price elasticity < 1) and prices rise more rapidly than income, expenditure might also be seen as income elastic.

If it is assumed that crop prices will reach the levels projected in Figure 2 and that the farmer will maintain health expenditures at the proportion of his household budget as in 1977 (i.e., the income elasticity of health care expenditures is 1), then the following estimate of household expenditures can be made:

1977 income	x	1983 index factor	=	1983 income	x	% of income on health care	=	Total household expenditures on health care	
$b 17,960	x	16.99	=	$b 305,140	x	.345	=	$b 105,273	= US$526.37*

This figure of $526.37 is extrapolated from 1977 Montero expenditure levels, of which approximately 39% went toward inpatient hospital costs ($21.37 of the $55.38 per capita amount). However, the benefit package proposed for the coop project includes very little inpatient services, estimated to be only 21.6% of the projects' target population's requirements (again based on Montero utilization rates). Thus the project benefit package would make up only 69.4% of total 1977 health care expenditures, or approximately 24% of household income. If this percent is applied to 1983 estimated income, this will provide a per capita budget constraint within which the revenues required to cover project services must fall, as calculated below:

est. 1983 income	x	% exp. on project health services	÷	average family size		÷	b/US exchange rate	=	per capita budget constraint
$b 305,140	x	.24	÷	5.6	=	$b.13,077	÷ 200	=	US$65.39

It should again be noted that as the result of inflation, this amount of $65.39, although equal to 24% of the average household income, may not be able to buy the same amount of services that 24% of the average 1977 household income could purchase.** If overall prices, including health care

*At the current official exchange rate of $b 200 = US $1.

**It should in fact be realized that the important figure for estimating the budget constraint is the Bolivian peso value, for this will be the currency used for paying for health care services. Different US $ estimates would result from converting this amount at either the official or unofficial exchange rate.

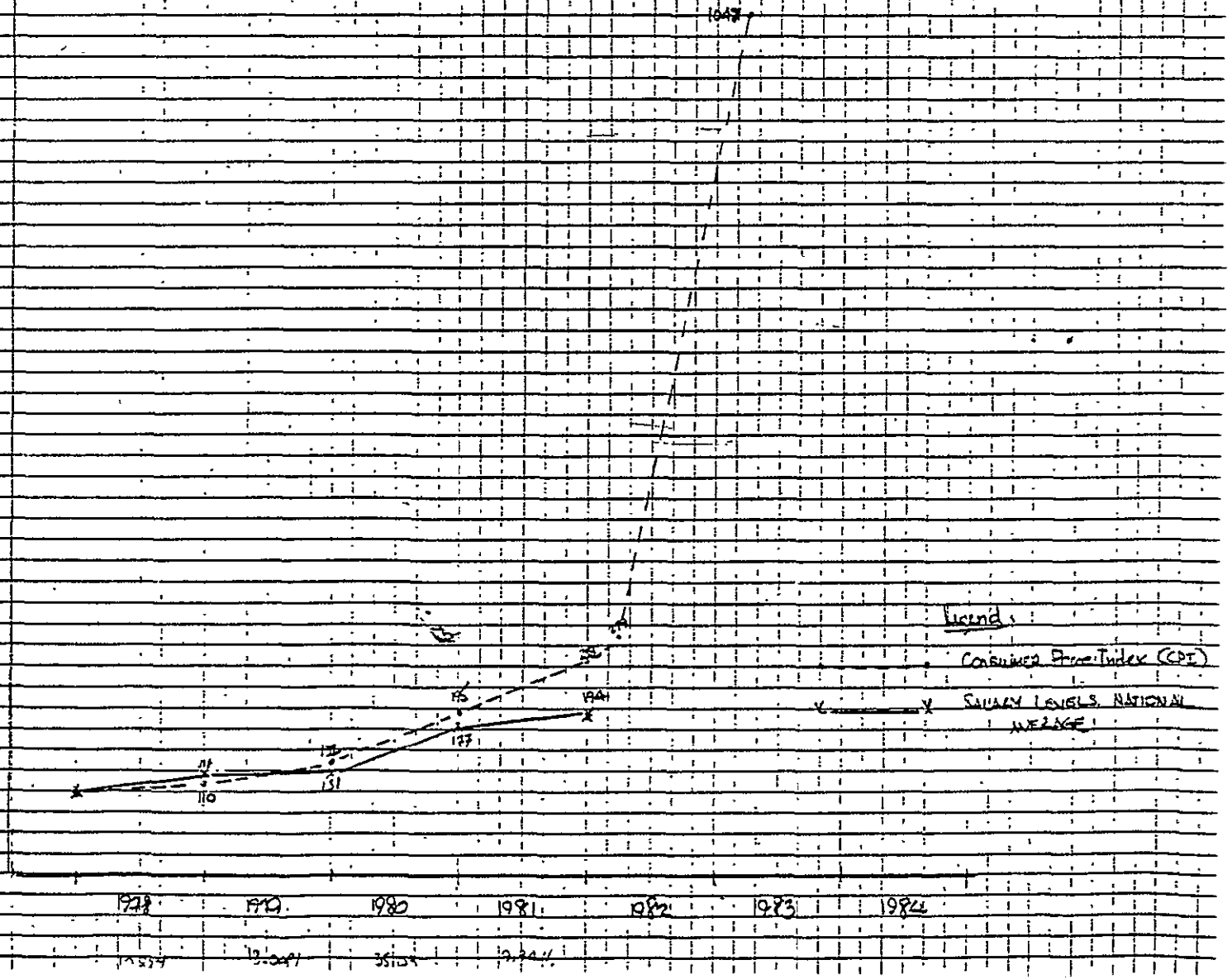
prices, rise between March 1983 and January 1984 rise at an annual rate of 90%, the purchasing power of the household's income would remain at 1977 levels. If the rate was 105%, 24% of the household budget would be able to be only about 80% of the services it could have purchased in 1977. However, because the actual prices of project services will be determined by a direct analysis of input prices, the major value of this figure of $65.39 will be to serve as a budget constraint giving a preliminary indication of the maximum amount individuals would be willing to pay for the type of health services to be offered by the project.

It must be stressed, however, that this issue of the price and income elasticity of health care expenditures is in fact a critical factor in affecting people's ability and willingness to pay for services in the current economic environment of Bolivia. While the asusmption of unity elasticity may be valid based upon the important nature of these services, an empirically-based estimate of this aspect can only be obtained through the type of household survey and analysis to be carried out in the PRICOR project. This project may also allow the determination of different elasticities. The results of these studies will provide up-to-date information for the final design of program benefit packages. For the purpose of the analyses in this document, the assumption of unit elasticities will continue to be used.

Sufficient information, including baseline expenditure and income data, is not available to fully analyze the effect of inflation on wage-earner's income and health care expenditure patterns. Figure 3 presents some information on the reported rate of increase in salary levels in Bolivia. Whereas the small farmers' income was estimated to have kept pace with inflation up until early 1982, average salary levels appear to have not kept up with inflation during the period 1978-1981. This situation is likely to have been severely exacerbated in

FIGURE 3

ESTIMATION OF THE RELATIVE INCREASES IN CONSUMER PRICES & NAT. AVG. OF SALARY LEVELS 1978 - 1981



1982, although there is some indications that employers may have in some cases provided support in the form of bonuses, subsidized food, or through other means. Nonetheless, it is thought that the peri-urban wage earner, whose income is not directly tied to the increasing prices of consumer products, has probably suffered more from inflation over the past five years than the small farmer. To address this situation to some degree, the Bolivian government recently announced an across-the-board increase of $b 3,010 per month for employees earning up to $b 50,000 per month. Additional increases will be made on a semi-annual basis, the amont to be determined by the level of inflation during that period.

Because of the dearth of information on wage-earner's health care expenditure patterns the remainder of this analysis will concentrate upon the comparison of the extrapolated Montero findings with the costs associated with the project's proposed service package. Until better data on the behavior of the peri-urban household can be obtained from the PRICOR project, the assumption must be made that the absolute income and expenditures patterns of the rural area are relatively applicable to the peri-urban population as well. Thus a per capital budget constraint of $65.39 is used for the peri-urban target population as well.

II. Analysis of Proposed Project Services and Costs

A. Services and Expenditures

An analysis of the utilization and financial data contained in the PID indicate that the per capita expenditure pattern presented in Table 1 is anticipated.

These expenditures are based upon certain assumptions concerning the types of services to provided, the charges to be assessed for each service, and utilization levels for each service. Since the time the PID was prepared, several minor changes in project inputs have been made which would increase slightly the amount of revenue to be generated by each individual to cover total costs. These are:

	Yearly Cost (US$)	Per Capita @ year avg. of 36,900 indiv. covered for the 3 years (US $)
a) Addition of two drivers, a pharmacist, a pharmacist assistant to the provider org. staff	6,980	.189
b) Addition of two vechicles to provider organization		
- Yearly amortization @ $25,000 base cost and 4 year useful life	6,250	.169
- Gas, maintenance	2,000	
c) Recent increase in minimum wage @ 2.8% of original per capita revenues)		.41
		.78

Yearly per capita revenues to support the updated cost estimates would thus be $14.47 + .78 = $15.23.

Two important comparisons can be made between the expenditure levels and patterns extrapolated from 1977 data to 1983 and those proposed in the PID. Table 2 highlights these comparisons using the updated revenue figure of $15.23.

TABLE I

Annual Projected Per Capita Expenditures (US$)

	Member Fees	Drugs	Service Fees	First Aid Fees	Inpat. Fees	Lab Fees	Delivery Fees	Coop Save	Total	% Total Exp.
Level I (225 persons)	3.84	2.218	.347	-	-	-	-	.222	6.627	(45.8%)
Level II (1,575 persons)	-	1.75	.63	-	-	-	-	.032	2.412	(16.7%)
Level III (6,300 persons)	-	2.66	1.189	.929	.223	.357	.048	.028	5.43	(37.6%)
Total All Levels	3.84	6.63	2.17	.93	.22	.36	.05	.28		
% Total	(26.5%)	(45.8%)	(15%)	(6.4%)	(15%)	(2.5%)	(3%)	(2%)	$14.47	

TABLE 2

	Anticipated per capita expenditures through Coop project (US$)	Anticipated health care expenditures projected from Montero data (US$)	% of Anticipated health care expenditures accounted for by Coop project
Drugs	6.97 (46.8%)	49.96 (76.4%)	14%
Fees, Miscellaneous Charges	8.26 (54.2%)	15.43 (23.6%)	53.5%
	15.23	65.39	23.3%

First, and perhaps most importantly, the total revenues needed to support the proposed project health delivery system fall well within the previously estimated per capita health budget constraint of $65.39, accounting for only 23.3% of that amount. Even if the assumption of the unit price elasticity of health care is relaxed, projected project expenditures may still be within the new budget constraint. For example, if an annual health services inflation rate of 150% is projected through the rest of 1983 along with a very low long-term price elasticity of .5 for health care services from 1978 through 1983 and the price of health care services prior to March 1983 rose roughly at the same rate as the consumer price index, the annual budget constraint for health care

set in early 1984 would be approximately $60.50.* Projected project revenues would still be only 25% of this figure.

A similar analysis can be conducted to assess the sensitivity of health care expenditures to changes in real income. If the assumption of 150% annual inflation through the remainder of the year is applied to all consumer goods and the estimated index of 1983 farm income from Figure 2 is used, real farm income would be about 82% of 1977 levels (1/2083/1/1699). If an estimate of 1 is used for the real income elasticity of health care is used, real 1983 expenditures would be 82% of 1977 levels or $45.19 per person. If the income elasticity of health care expenditures were increased to 1.25, 1983 expenditures would be $42.64.** In these cases, the per capita revenues required of the project would be 34% and 36% respectively of projected expenditure levels.

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*Extrapolating from data shown in Figure 2, if an annual inflation rate is assumed from March 1983 to the end of the year, the index value for the price of health care services will be 2083 in January 1984. Per capital health care expenditures were $b 1108 in 1977 ($55.38 x 20 pesos to the US$1 = $b 1108). Therefore:

$$Ep = \frac{\%\ \text{expenditures}}{\%\ \text{price}}$$

$$.5 = \frac{\frac{1108-x}{1108}}{\frac{100-2083}{100}}$$

x = $b 12,093 - 200 $b/$US = US$60.47

where EP = price/elasticity

x = 1983 health care expenditures

** $$E_I = \frac{\%\ \text{expenditures}}{\%\ \text{real income}}$$

if E = 1 $= \frac{\frac{US\$55.38-x}{55.38}}{\frac{1-.815}{1}}$

x = US$45.19

if E = 1.25 $= \frac{\frac{US\$55.38-x}{55.38}}{\frac{1-.816}{1}}$

x = US$42.64

where E_I = Income elasticity
x = 1983 health care expenditures

In summary, the PID's estimates of annual per capita expenditures required to be made on project services appear to be well within the projected budget of the average farm family. For the project's revenue requirements to be beyond the ability or willingness to pay of the target population in early 1984, inflation would have to continue at 250% per annum and the elasticity of health care expenditures with respect to real income would have to be greater than 1.95.* In essence, such a situation would indicate that health care expenditures are very sensitive to changes in real income and during inflationary times would drop at nearly double the rate at which real income declines.

In fact, however, different components of total health care expenditures may have different elasticities. For example, in times of tight money, individuals may reduce their expenses on health care provider fees through increased frequency of self-diagnosis and self-prescribing of drugs. In other words, payment of provider fees may be more strongly effected by reductions in real income, while drug-related expenses may be less elastic, or even negatively elastic (i.e., as real income drops, overall health care expenditures may drop while drug expenses are reduced at a lesser rate or remain fairly constant). For this reason, it is important that the benefit package to be offered through the coop health project take this into consideration.

B. Financing Approaches

This point then leads to several other observations which can be made of the data presented in Tables 1 and 2. First, as seen in Table 1, nearly 27% of total revenues are projected to be obtained through monthly membership fees.

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*If inflation continues at 250%, price index by early 1984 will be 2682. Real income index will be 1/2682/1/1699 = .63. Therefore,

$$E_I = \frac{\frac{55.38-15.23}{55.38}}{\frac{1-.63}{1}} = \frac{.72}{.37} = 1.95$$

The significant fluctuations in the rural family's disposable income, however, make the successful collection of equal monthly payments highly unlikely. A recommended alternative would be to collect the bulk of these fees soon after crop sales (June - July) either in a lump sum payment or through a few monthly front-loaded payments.

In addition, it should be noted from Table 2 that the project's proposed allocation of revenues by type of service – 45% for drugs, 54% non-drug services – differs substantially from the breakdown of expenditures observed through the Montero study (76% drugs, 24% other). As a result, the project's non-drug fees would account for over half the anticipated expenditures the average family might make on non-drug services had the Montero pattern been projected to 1984. These revenues are based on relatively reasonable fees and on these less flexible assumptions:

- 80% of the community will register to participate in the program;
- each facility in the system will reach full capacity by its third month of operation; and
- the number of <u>paid</u> provider contacts will be 4.86 per year per community resident (an 87% increase over the Montero rate of 2.6 per person).

Were one or more of these assumptions to be violated to any great extent, given the proposed revenue structure, the financial self-sufficiency of the project might be jeopordized. A closer look at the proposed pricing of drugs, however, provides evidence that additional revenues might be generated which could be used to subsidize non-drug related service delivery activities at Levels II and III or support the provider organization if utilization/participation rates fall short of expectations.

In the PID, drug revenues were estimated at the cost of a certain quantity of drugs (assumed to include transportation and taxes) plus a 20% markup. However, as shown in Table 3, the base prices of a sample of drugs to be used in

TABLE 3

Comparison of Costs of Selected Drugs, By Source

(US$)

Drug	Amount Req. (units) (1 year)[1] (Courses of Treatment x units/treat.)	Lowest Avail.[2] Unit Cost	Bolivian Wholesale Unit Cost[3]	Bolivian Retail Unit Cost[4,5]	Total Cost Lowest Available Wholesale	Total Cost Bolivian Wholesale	Total Cost Bolivian Retail	U.S. Wholesaler Costs
1) Antidiarrheal	13,710 x 15 = 205,650 tabs	.004 (US wholesale)	.028	.036	823	5,759	7,313	823
2) Piperazine	575 x 15 = 86,250 tabs	.003 (Act. Medeor)	.019	.024	259	1,639	2,070	895
3) Anticholinergic	7,170 x 20 = 143,400	.004 (US wholesale)	.035	.044	574	5,019	6,310	574
4) Antacid pills	5,205 x 30 = 156,150 pills	.004 (US wholesale)	.028	.035	625	4,372	5,465	625
5) DS Lactated Ringer's W Solution	600 x 2000cc	10.00 (UNICEF)	30.44	33.66	6,000	18,264	23,196	price not avail.
6) Ampicillin, Oral	800 x 20 = 16,000 plus	.031 (UNICEF)	13.4	.17	496	2,144	2,720	698
7) Ampicillin Suspension	400 x 2 = 800	.50 (UNICEF)	3.479	4.43	400	1,396	3,544	price not avail.
8) Tetracycline HCl oral 250 mg.	2,520 x 34 = 85,680	.012 (UNICEF)	.069	.087	1,028	5,912	7,554	1,259
9) Sulfa	630 x 40 = 25,200	.021 (US wholesale)	.019	.024	479	479	605	529
10) Cold Tablets	4,890 x 20 = 97,800	.006 (US wholesale)	.021	.027	587	2,054	2,633	587
11) Ophthalmic Antibiotic ointment	7,170x1(5mg)= 7,170	.10 (UNICEF)	.53	.67	717	3,800	4,804	3,589
12) Aspirin	35,150x30= 1,054,500	.002 (UNICEF)	.007	.009	2,109	7,382	9,160	3,610
					14,097	58,220	75,374	
Comparison of prices for which wholesale US prices available					7,697	38,560	48,634	18,129

1. Number of courses of treatment and dosage per treatment estimated by public health physician consultant.
2. Sources: Recent price lists of Action Medeor (W. German exporter), NY-based US wholesaler and UNICEF.
3. Sources: INTI and VITA price lists (Santa Cruz, March 1983).
4. Bolivian wholesale prices + 27% markup (maximum set by government).
5. Actual retail prices higher when purchases made in small quantities. Survey of several retail pharmacies in City of Santa Cruz and Mineros found sale price for one aspirin tablet to be US$ 0.023 to US$ 0.04 ($b 4–8).

Findings

Local wholesale prices 400% higher than lowest available wholesale prices (not including transport, handling taxes).

Local retail prices at least 532% higher than lowest available wholesale.

US wholesale prices 135% higher than lowest available wholesale prices.

Local wholesale prices 113% higher than US wholesale prices.

Local retail prices 168% higher than US wholesale prices.

the project varies subtantially from one source to another. Local retail prices were found to be, on average, over 530% higher than the lowest available wholesale prices (exclusive of taxes and transportation).

Further, Table 4 indicates that, depending upon the efficiency of the drug procurement process, a much greater markup may be applied to drugs while still pricing them substantially below current market prices. Five alternative sources of project drug supplies are considered:

a) The purchase of drugs from the cheapest available source, with one-half of drugs purchased from U.S. wholesalers with USAID funds at the official 200-1 exchange rate and drugs from other sources purchased with foreign exchange obtained at the unofficial $b500 - US$1 rates;

b) Drugs purchased entirely from US wholesalers (whose prices are sometimes higher than other sources) using USAID funds which are replaced in the project with local currency at 200 to 1;

c) Bolivian wholesale;

d) Bolivian retail; and

e) Same as (a) above but local currency used for all purchases at 500-1 exchange rate.

If a policy is adopted to see the prices of these drugs at 80% of local retail prices,* various markups are possible, ranging from 1.6% to 115% of acquisition costs. If a policy is established of placing 25% of the markup in reserve to cover systems losses and unanticipated increases in replacement costs, from 1.2% (Procurement C) to 90% (Procurement A) of acquisition costs could be available to support other project activities. These amounts range from

*It should be noted that this estimate of local prices is based on wholesale bulk prices plus the supposedly "maximum markup set by the government. It most likely underestimates considerably the actual retail price to families who purchase drugs in small quantities. For example, as indicated on a footnote in Table 3 the actual selling price for one adult aspirin tablet ranged from 2¢-4¢ as opposed to the estimated retail price of less than 1¢.

TABLE 4

Potential Markup for One-Year Project

Drug Supply, By Source

	A Wholesale drug costs, lowest available	B US Wholesale	C Bolivian Wholesale	D Bolivian Retail	E Lowest available wholesale, using local currency for all purchases
Base (US$)* price	65,842	155,387	329,210	418,096	65,842
Transport @ 25% Taxes @ 10%	23,045	54,385	-	-	23,045
	88,887	209,772	329,210	418,096	88,887
Conversion to peso	½ @ 200/1 ½ @ 500/1	x 200	x 200	x 200	x 500
Total acquisition cost	31,110,900	41,954,400	65,842,000	83,619,200	44,443,500
80% of local retail				66,985,360	
Allowable markup to set prices @ 80% of local retail (%)	35,874,460 (115%)	29,940,960 (59.4%)	1,053,360 (1.6%)	**	22,451,860 (50.5%)

*Calucalted from list of drugs prepared by Public Health Consultant Dr. R. Lebon. Other prices determined using relationhips between prices of sample drug found in Table 3.

**Losses incurred.

$b790,020 (US$3,950) (Option C) to $b26,905,845 (US$134,529) (Option A). The dollar value of these estimated "profits" represent a substantial portion of acquisition costs in alternatives (A) and (E) because of the different exchange rates used in the process: 500-1 for half of (A) purchases and all of (E), and 200-1 to convert peso profits to dollars.*

Thus, it is estimated that if the utilization, cost, and membership assumptions on which the PID's financial analysis is based are met, the project may be expected to achieve self-sufficiency somewhat earlier than projected due to the additional income to be generated through drug sales. If these assumptions are not met, these additional funds will serve as a reserve to subsidize other activities and thus maintain the project's fiscal integrity. The exact amount of these revenues will depend on the efficiency of the drug procurement procedures developed.

On the topic of pricing policies, task E of this consultant's terms of reference asks for guidelines for establishing an actuarial table that would allow the project to determine a fee schedule based on the pathology encountered, rates of utilization of services, and service delivery costs. The establishment of fee levels should be predicated on the idea of meeting or exceeding the total cost of providing such care, both fixed and variable. The idea presented in the PID of offsetting fixed costs with fixed sources of income and variable costs with variable revenues is conceptually an attractive one. It should be viewed with some caution, however, if such an approach generates fee levels which are significantly at variance with existing prices of competitors in the marketplaces. For example, such an approach might recommend setting drug prices slightly above acquisition costs, thereby leaving the service delivery side of the system potentially vulnerable to fluctuations in the demand for such

*Such profit margins are predicated on the project's ability to charge prices which, while substantially less than local retail, are, in fact, in excess of the 27% and 15% markup limits set for local retailers on national and foreign produced drugs, respectively. This legal point should be explored carefully.

services. Variations from the basic concept of the fee for a service covering all attendant costs should be based not directly on the specific pathology encountered but, to the extent possible, on:

- estimation of the relative sensitivity of the demand for service to changes in the price charged for that service (price elasticity) and
- the perceived value of the utilization of that service to the sponsors of the delivery system.

The sensitivity of demand for changes in services will be determined by:

- The individual's perceived need for a particular service;
- the existence of alternative sources of that service and the cost of that alternative (including travel costs, waiting time, etc.);
- the relationships between utilization of one service and access to another (e.g., the demand for provider diagnostic services will likely be less sensitive to price increases if it is a prerequisite to the purchase of low-cost drugs).

Consideration of the second factor (i.e., the value assigned to it by project sponsors) would be the basis for subsidizing substantially preventively-oriented services such as health education and pre-natal and well-baby care.

III. Cost-Effectiveness Analysis

The time constraints of this consultancy did not allow a detailed cost-effectiveness analysis of the proposed project. However, several brief points can be made with respect to the cost-effectiveness of the proposed coop health project.

First, the preceding analysis of drug costs has indicated that through more efficient procurement practices, the potential exists for substantial reductions in drug costs. These lower costs can be passed on to the consumer through two approaches: lower drug prices, reduced travel costs, and subsidization of provider service costs to keep these in line with alternative sources (i.e., Ministry of Health facilities). As a result, it is estimated that services can be provided to the target population at a total cost lower than the existing situation.

A second point to be made is the fact that the services to be delivered through the coop health project as well as the manner in which they will be delivered are not the same as the current situation. If the measurement of alternative approaches' cost-effectiveness is based upon each's achievement of certain goals related to the health status of the target population, these differences are very important. In the current situation,

- many needed drugs are simply not available,
- services are not coordinated, i.e., substantial amounts of drugs are being consumed without adequate diagnostic and treatment controls, and
- effective preventative services are not being provided.

The proposed coop health project would address these shortcomings of the present system by providing a coordinated delivery system. Th effect of this situation will be to improve the effectiveness of project inputs in actually achieving improvements in the health status of the populations to be served.

In addition to contrasting the proposed project to current health care delivery system, comparisons with other alternatives can also be made. The most frequently discussed possibility would be for USAID/Bolivia to establish solely a revolving fund for the purpose of purchasing low-cost drugs and providing these drugs through Ministry of Health facilities. This approach was not estimated to be as cost-effective as the proposed project design because of the serious deficiencies in Ministry administration and service delivery infrastructure that have been identified through the Montero project experience and discussed in the PID. These shortcomings would likely raise projected costs somewhat, dilute the effectiveness of services delivered, and have the end result of requiring a higher cost to effect a unit change on health status than the project approach.

APPENDIX A

Preliminary List of Information to be Gathered as Part of PRICOR/Co-op Health Project Household Survey

I. Community Specific

(Assign unique ID to each community)

A. General Characteristics

- # families
- # families who are members of participating co-op
- existence of other co-ops - # families in community who are members
- geographic size of community
- access to roads
- quality of roads
- health care providers accessible to community
- existence of health promoter (Y/N)
- rural vs. peri-urban
- other characteristics
  - source of potable water
  - age of community/fluctuations in size

II. Household Specific

A. General

Assign unique ID to each household and to each member of household.

1. Basic socio-demographic data

- size of household
- ages of household members
- ethnic background
- years at present location
- condition of house
- primary residence
  - other residences
- access to potable water
- sanitation facilities

2. Income

a. Peri-Urban

i. identify each individual bringing in income
ii. type of work - manner of payment (salary, commission, etc.)
iii. date employment began/date of recent terminations
iv. income level/worker
v. other regular sources of income/identify source, amount
vi. increases in salaries over past year
  - amount of increase/worker
  - date of increase

vii. renumeration by employers informs other than salaries
- super-sueldos
- subsidized food
- other

viii. if payment other than salary - any change in hours worked

ix. is land/home owned or rented
- amount of land
- condition of home
- if rented monthly rent

x. any crops grown for commercial purposes (Y/N)
- if yes continue with first set of rural questions concerning crops

b. Rural

i. size of land
- owned/rented

ii. condition of house

iii. types of crops grown this year and last year

iv. hectares cultivated/crop - this year and last year

v. yield/crop - this year and last year

vi. price received/unit/crop (at farm gate, if possible), this year and last year

vii. cost of harvesting - this year and last year - per crop
a. mano de obra (hired) - specify amount
b. transportation - specify amount
c. other (specify nature) - specify amount

vii any other sources of income, this year and last year - specify sources and amount

viii plans for income from cocheca
- expand cultivated land (identify percents, is possible)
- capital purchases
- savings

c. Both Groups (rural and peri-urban)

i. levels of savings - current and this time last year - interest rate in both periods

ii. any loans outstanding
o if yes - how much
- for what purpose
- from whom
- date indicated
- anticipated payment date
- interest rate

o if no, what was date of last loan
- for what purpose
- from whom
- date iniciated
- anticipated payment date
- interest rate

o if current or last loan was not to cover cost of health problem, ask date of last loan for this purpose and repeat questions

- how was health care problems resolved?

iii. have you had to sell any of your possessions over the last 12 months
- if yes, what, when, how much received

iv. do you anticipate selling any items in the next 12 months

vi. what are your average daily recurrent costs
- food, other items

vi. to what extent is family self-sufficient, i.e., grows its own food

3. Health Care Utilization and Expenditures

A. Begin with Montero-type questions if possible, determine type and quantities drugs were purchased and at what price, travel time home and distance to pharmacy and other sources of care re unless utilization during last two weeks for hospitalizations seek up to 3 month recall. After all illness incidences identified, proceed to additional specific questions.

B. i. if no illness reported, ask what would be done if someone mildly sick and if very sick.

ii. if illness reported, but no contact made with health professional, inquire where person would go if condition became a) slightly more serious or b) much more serious.

iii. Location of nearest pharmacy - distance/travel time, (rainy and dry), mode of transportation. If drugs purchased during last two weeks and were from here, ask if price is lower than other places.

If drugs not purchased from nearest pharmacy, why not?

iv. Determine location, travel time, etc. of nearest hospital, possible sources of physician and nurse consulta externa.

v. If these providers used in past two weeks, ask about reasons for selecting facility:

- location
- cost
- if usual site of service
- quality

v. If a health care provider was used in past two weeks but it was not be closest one identified in B. v. above, or response in B. ii. above was to use a different provider, ask why closest facility not selected.

- price
- personality of provider/quality
- other things - e.g., no drugs

vi. For visits to provide:

- if drugs were to be purchased as part of treatment, were they purchased:
  - from provider
  - from other source
- if from separate source, why?
- not available for provider
  - cheaper at other source
- if other source, distance/travel from
  - provider
  - home
- were drugs purchased during same visit to provider?

C. In past 12 months, have you needed services but had been refused because you had no money?

- when
- where

D. If no hospitalization reported in last 3 months,

- identify date of last hospitalization
- cause
- facility
- duration
- total cost
- service of financing
  - savings
  - loans
  - income
  - items sold
  - other
- outcome
- impression of facility

4. <u>Co-op Participation</u>

A. i. member of co-op (Y/N)
   - La Merced, Mineros, San Julian

   ii. if yes, how long

   iii. reason for decision to join/not join

   iv. if La Merced member
   - ever use its physician referral service
     - when last time
     - cause
     - cost
     - frequency - source of care
   - ever use its pharmacy,
     - if no, why
     - if yes, why
   - are prices lower than in other places, e.g., closest pharmacy identified in B. ii.

5. Other

- open ended questions about views concerning provision of health care thru co-ops, etc.
- questions about desired services, willingness to pay for such services.

APPENDIX B

THE DEVELOPMENT OF A SELF FINANCING HEALTH CARE DELIVERY SYSTEM THROUGH COOPERATIVES IN BOLIVIA

A Proposal Submitted to :

FRICOR

by

Federación Nacional de Cooperativas de Ahorro y Credito de Bolivia

and

USAID/Bolivia

INDEX

I. Research Problem

A. The Health Problem

B. The Proposed Health Care System

C. The Health Interventions

D. The Target Populations

II. The Operational Problem

III. Utilization of Research Results

IV. Methodology

A. Phase I: Baseline/Diagnosis

1. Tasks

a. Literature Review

b. Key Informant Interviews

c. Case studies

d. Longitudinal Data Collection/Analysis

e. Household Surveys

f. Analysis of Data

g. Preparation of Reports

B. Phase II: Development of Service Packages/Financing Mechanisms

1. Decision variables

2. Tasks

a. Identification of Possible Services

b. Analysis of Service Costs

c. Development of Benefit Package Options

d. Identification and Analysis of Financing Policies

e. Development of Interactive Computer Capability

f. Preparation of Reports

C. Phase III: Implementation of Co-op Health Project

1. Tasks

a. Development of Management Information System

b. Periodic Analysis of MIS Data

c. In depth Program Evaluation

7. Management Plan

A. Organization

B. Institutional Capability

C. Workplan and Reporting Requirements

D. Research Staff

VI. Budget

ABSTRACT

Ranking lowest on key health indicators in all Latin American, Bolivia urgently needs primary health care services for marginal areas. This project proposes to develop self-financing PHC services through the large and active cooperative movement in and near the city of Santa Cruz. Over a two year per baseline studies, needs assessments, health manpower training, and well-defin PHC programs will be developed for the populations served by three agricultur cooperatives in the area. In the end, all programs will be community finance and operated mainly by cooperative leaders and health promotors.

The project is unique in its nontraditional approach to providing PHC services. The major research interest will be the community financing and se diagnosis/needs assessment. Quasi experimental research designs using a combination of interviews, observations and an encounter based management information system will be utilized to record cost and health service ut iliz data. The responsible institution in Bolivia will be the Federación Nacional de Cooperativas de Ahorro y Crédito de Bolivia (FENACRE) with technical assistance from the Tulane University Department of Biostatistics and Epidemiology. The results of this research will be important to leadership of the targeted cooperatives as well as the directors of other cooperatives in Bolivia. Additionally, it will be useful for the USAID/Bolivia mission to have concrete information on self-financing models for health care.

PRICOR PROPOSAL

DESIGN OF A SELF-FINANCING HEALTH CARE DELIVERY SYSTEMS THROUGH THREE COOPERATIVES IN THE DEPARTMENT OF SANTA CRUZ, BOLIVIA

I. RESEARCH PROBLEM

Bolivia, among all the nations in Latin America ranks lowest on key indicators of the health status of its population. Efforts to address the health needs of the country's predominatly rural population through the public health care delivery system operated by the Ministry of Social Welfare and Public Health (MSW/PH) have historically been hampered by serious administrative and fiscal shortcomings within that organization. Indeed, the experience in a recent USAID-supported rural health program yielded the conclusion that without major administrative changes and dramatic increases in financial resources, there is little hope that the MSW/PH could establish the complex systems needed to support the delivery of rural health services with any degree of continuity.

The Ministry's problems have been exacerbated by the recent economic crisis in Bolivia which has forced the government to reduce its 1982 health operating budget by 70 percent in real terms from the 1981 level. As a result, government funds are barely sufficient to cover the salaries of health facility personnel and perhaps food for patients who are admitted. Adequate quantities of medical supplies are not available, and very few facilities carry even minimal supplies of essential drugs.

In view of the inherent weknesses of the MSW/FH delivery system and the pressing health care needs of the country's population, USAID/. Bolivia began exploring alternative ways of making essential health services more readily available. The Mission has proposed utilizing several existing savings and loan and agricultural cooperatives in the Department of SantaCruz as a vehicle for providing primary health care services to their rural and peri-urban cembers. This private sector delivery mechanisms is envisioned to be self-supporting. With the communities serviced generating sufficient revenues to cover all delivery system costs. A fuller description of this project can be found in the project identification paper presented in Appendix A.

The research problem to be addressed by this PRICOR project will be to design the community financing mechanisms necessary this USAID-supported cooperative health project to achieve self-sufficiency. To achieve this objective, PRICOR-supported activities will also be directed at developing those service packages which each co-op community could reasonably be expected to support and at periodically assessing and revising as necessary the finance/services packages which are initially selected by each co-op.

A. The Health Problem

The complex of diseases found in Bolivia is standard to developing countries, including infectious, often-vaccine preventable diseases, diarrheal diseases aggravated by malnutrition, and others. Although population specific data is difficult to get, hospital based mortality in Santa Cruz, the target region of this proposal, had as the first causes of death accidents and poisonings, diarrheal disease, tuberculosis, perinatal infections and acute respiratory infections (Dept. de Planificación, 1982).

More specific community based data from the rural areas of Santa Cruz us available which specifies the conditions in the target area. At the end of 1977 a baseline interview and rudimentary clinical examination of 3372 persons was conducted in the NE and NW sections of the Montero region of Santa Cruz (Frerichs, 1979). Although the data was collected 4 years ago there is no reason to suspect that conditions have improved drastically. Indeed the recent economic collapse in Bolivia may have aggravated them.

This survey covered 51 communities using three teams of two interviewers, each with Quechua language speaking capability. As well as standard morbidity and mortality information obtained through interviews, information was also obtained by taking samples and a physical examination, including a blood sample for hematocrit, weight, height and measurements of mid upperarm, chest and head. Some of the results of the survey were:

- 51% of males and 53% females are less than 15 years of age. demostrating large proportion of children dependent on the working age population.
- Child dependency ratio is 112.2 indicating that there are 1.12 children less than 15 years of age for every person aged 15 - 64 years
- Languages spoken in the household were Spanish and Quechua.
- Common occupational designation 75% self employed agriculture worker woman 94%
- Based on blood samples taken to children of both sexes from 0.5 - 10 years results show that, based on WHO definition, nearly one half of all children below six years are anemic.
- Infant mortality rate - 113.5 per 1,000 live births (4 times more infant deaths than USA population of comparable age). Overall mortality was 11.6 death per 1,000 pop.
- General fertility rate 277.6 births per 1,000 women aged 15 - 44 years.
- Of all children aged 0.5 years 41.0% had at one time received DPT vaccine, 37.4% been vaccinated for measles and 34.5% had been immunized for Polio. Only 3.5% had even received BCG vaccine for Tuberculosis and only 1.4% ever been vaccinated for yellow fever.

While the overall sample was a bit small for calculating mortality rates, this survey information is consistent with 1982 hospital mortality and is typical of a medically underserved population where known health interventions can have a rapid and major impact. It should also be noted that the rest of Bolivia follows the same general pattern as the Santa Cruz region. A summary list of vital indicators is illustrated in Table 1.

Although no recent data exists regarding the causes of infant mortality recent estimates of overall infant mortality show little change in the last decade. Accordingly, it is reasonable to use Puffer's report of over a decade ago as a benchmark to the causes of infant mortality. She reported that the principal causes of infant mortality were nutritional deficiencies (34%), respiratory disease (29%) and diarrheal disease (13%). (Puffer, R. and Serrano C., 1973)

An added source of health information for the target area in and around Santa Cruz comes from the national nutrition survey completed in 1981 by the Instituto Nacional de Alimentación y Nutrición in coordination with the Ministerio de Planeamiento y Coordinación and the United States Center for Disease Control (1981). Using the cluster sampling techniques traditional for these studies a total of 885 children were submitted to anthropometrics in the urban and semi-urban areas of Santa Cruz with another 1,007 taken from rural plains area similar in most respects to the region around Santa Cruz.

Table 2 illustrates the relative rates of malnutrition for both areas.

Table 1

GENERAL BOLIVIAN DEMOGRAPHIC AND HEALTH PROFILE

(2)	Population total (1981) in 1,000s	5,755
(1)	Density	5.94 Hab/km^2
(1)	Population in communities of less than 200	50%
(2)	Growth rate	2.64%
(1)	Average age	18.5 years
(1)	Masculinity index	97.10
(1)	Crude mortality rate	16.68/1,000
(1)	Crude fertility rate	130
(1)	Life expectancy	49.69
(1)	Economically active population 15 - 65 years	41.52%
	Literacy rate	36.79%

(1) Ministerio de Planeamiento y Coordinación e Instituto Nacional de Alimentación y Nutrición, 1981 Estado Nacional de la Población Boliviana.

(2) Laboratory for Population Statistics Summary Series # 3. The 1980 Bolivian National Demographic Survey: A Summary of Results. The University of North Carolina at Chapel Hill, 1981.

Table 2

PERCENTAGE DISTRIBUTION OF CHILDREN
ACCORDING TO WATER LOW CLASSIFICATION

Santa Cruz (urban) and Valley rural population

Bolivia 1981* [1]

Area	Weight/Height*	Height/age*	Combined Categories	Normale	Total
Santa Cruz urban	.7	26.5	.6	72.7	885
Llanos rural	1.2	35.1	0.0	63.7	1,009

* All anthropometrics classify critical individuals as those outside of a range 2 standard deviations from the reference standard.

1 Table constructed from table No. 4 page 69 (Ministario de Planeamiento y Coordinación et al, 1981).

While the Santa Cruz area, urban and rural, is one of the better areas nutritionally of Bolivia the levels of malnutrition are still unacceptably high and combine with our other indicators to justify the need for the delivery of basic health services to a relatively large portion of the population.

8 Community Based Primary Health Case System: The proposed Health Care System

To describe the current available community based health system in Bolivia and the logic that has been used to arrive at this proposed rather non-traditional approach to expanding health care some background material on the experience regarding health interventions and options in Bolivia might be useful.

The following observation from Mission documentation illustrates the rationale for this kind of thinking.

"A major observation of the Bolivian medical care-system is that many resources exist which are not being used efficiently. Rather than asking for new hospitals, new equipment, new personnel, etc., the present resources should be more effectively organized and utilized. This includes lab material, X-Ray machines, operating tables, hospital beds, and trained personnel, who are often utilized to less than ten percent of their capability. Better supervisors and administration are needed even more than more financial resources, although one cannot deny that the financial resources are meager for rural health. (Appendix I provides a more detailed summary of this rationale)."

Within the above context, USAID/Bolivia began to turn to the large and active cooperative movement as a mechanism to improve health care.

In the search for alternative mechanisms for the delivery of health care in the rural areas, the Mission conducted a brief review of the health care delivery capability of three cooperatives in the Santa Cruz area. The cooperatives had particular appeal as they are client-oriented, privately managed organizations arranged in part to deliver health care as a service to their membership. Also, coops in Bolivia are well known for assisting the economically active portion

of the population from different social and economic classes. Savings and loan or consumer coops serve from the middle class urban dweller to the small farmer in the rural areas. Some coops offer farm credit and technical assistance in improving agricultural practices. By and large, the coop movement responds to the staff interests of its members and there is considerable motive for providing quality services and continuity in the programs they offer.

C. The health intervention

Three existing cooperative organizations ting cooperative organizations receive technical assistance and financial support from USAID to develop self-financing rural health programs. These programs will build on the experience gained over the years from other rural health care projects including the USAID financed Montero project which operated in the Santa Cruz area between 1976-1980. The objective of the planned project will be to provide essential primary health care services to unserved or underserved, high-risk populations in selected rural and marginal urban areas of Santa Cruz that are served by cooperatives. Given the nature of the illnesses encountered in rural Bolivia, and in order to have an impact on infant and maternal mortality and morbidity, the health services provided by the project will emphasize prevention backstopped by simple curative services that address the most common debilitating illnesses. A proposed "package" of services would contain a mix of the following. The final package will upon in consultation with the community leadership structure.

Preventative Health Care

Prenatal and postnatal education

Referrals based on high-risk assessment

Education in breast feeding and weaning food preparation

Oral rehydration therapy and education

Growth monitoring

Immunizations

Basic home sanitation education

Dental hygiene

Curative Health Care

Asistance in routine births

First Aid

Administration of a pre-selected set of drugs to treat common maladies: colds, ear and eye infections. skin infections, poisoning, snake bites. severe dehydration.

The PHC services will be delivered through a five-level. community-based system, which is a modification of the six-level system utilized in the Montero project. The co-op project will concentrate on providing services at Levels I and II and III. At Level I, the community level, two health promoters will cover between 40-50 families (200-250 people). Health posts staffed by auxiliry nurses will comprise Level II, covering approximately 9 communities of 280 families. The Area Clinic at Level III will be staffed with a physician and auxiliary nurse, and will provide general outpatient care. It will be designed to take referrals, conduct simple X-ray and lab tests, supervise the community health workers, and make referrals as necessary to higher levels of the health care system. These higher level facilities --- the Referral Hospital (Level IV), Specialty Hospital (Level V) and Regional Hospital (Level VI) --- will continue to be operated by the MSW/PH. About 4 Level II health posts will report to each Level III facility. A Central Provider Organization will be established to give the necessary administrative and logistical support to these facilities.

The Target Populations

The service components to be studied by this project will be ~~potentially~~ directed towards the memberships of three different cooperative units. One of these, La Merced, serves the marginal urban population of Santa Cruz, the majority of whose members are engaged in agriculturally related occupations. The cooperatives Agrícola Integrada Mineros (CAIM) and Cooperativa Agrícola San Julian (CASJ) are agricultural-cooperatives in rural areas north of Santa Cruz. CAIM's membership is representative of those families who have participated in "spontaneous" colonization programs. These are primarily highland families from the Departments of Potosi and Chuquisaca settled over the past decade with little assistance from the Government of Bolivia. CASJ is an example of the Cooperatives established by the Government of Bolivia using land grants to attract families with generally the same background. Thus the three selected cooperatives represent a large urban base coop providing services to low and middle income families, a spontaneous rural coop developing along traditional lines and a government sponsored Agricultural coop. Based on preliminary reviews, the USAID Bolivia Mission feels that cooperatives attract their membership from a sufficiently wide range of community residents so as to be representative of the typical rural and marginal urban residents of the AID-selected developmental corridor. These cooperatives also attract and serve that segment of the rural population which is essentially the same target population as used by the Mission's agricultural projects.

When calculating the exact parameters of the proposed primary care projects it is important to note that all three of these cooperatives have agreed that membership in the proposed projects be open to all members of the community who meet the prerequisitias of participation. Therefore the target populations of each of these cooperatives can be realistically conceptualized at three different levels as

per figure A.

POTENTIAL LEVELS OF INVOLVEMENT IN COOP HEALTH PROGRAM

Active Members of Co-op interested in Health Components	Members of Co-op not initially interested in Health Components	Members of Community who qualify for services.

Since the success of the financing mechanism and its configuration ultimately depends upon the absolute number of individuals participating, the pool to draw from is important. Taking the membership of La Merced to Santa Cruz urban co-op as an example we can establish some rough population parameters.

The city of Santa Cruz is reported by Instituto Nacional de Estadística (1981) as having 254,682 individuals living in the Departmental capital. La Merced with a reported 28,000 members at an average of between 5 family members per co-op member would give us about 140,000 individuals potentially covered. About 4,000 of these co-op members however do not reside in the urban area but in the towns and villages around same. Establishing the precise mix of accessible urban co-op members and others would be one initial objective of this research project.

The rural cooperatives are primary recent migrants arriving within the last decade. From a recent census department survey in the same general geographic area we can

cite high fertility levels 6.37 versus 4.71 in the urban areas for 1980. Frerichs (1979) documented a mean family size of 5.6 persons. The total Bolivian population from the 1976 census shows a 0-4 proportional population of 15.9 percent, a figure which might be slightly increased for the somewhat younger population in Santa Cruz rural areas. As of this moment there are roughly 3,000 families living in the San Julian catchment area and 500 members and 14 co-ops of the Mineros groups. Using the San Julian colonization as an example case and assuming 5.6 family members per co-op member we would arrive at a total population estimate of between 16,800 of which 17% or roughly 2,900 would be in the 0-5 category. Taking overall Bolivian census figures (1976) for the proportion of females in the 15-45 year age range we would add another 21% or 3,528 individuals for and approximate figure of 38% of the population as primary targets for preventive care. In the case of San Julián some 6,384 individuals are targeted. This figure would be increased for first aid and related services administered to the active male population. While more accurate population parameters need to be calculated for the intervention areas during the first phase of the project, the primary target population could be considered between 40-45% of the population ultimately served.

II. THE OPERATIONAL PROBLEM

Given that the goal of the USAID-supported project is to establish through these three cooperatives a primary health care delivery system which will be supported entirely by community-generated funds at the end of the project's third year, the objective of this PRICOR project will be to design a financing system which will result in achievement of this target. Because the amount of revenues requires within such a closed system is directly related to the cost of the services delivered, PRICOR activities will also be directed toward identifying those packages of services which not only contain essential primary care services but are also financially supportable by the target communities.

As described earlier, the organizational structure for the delivery of care through Level I, II. and III facilities and a list of services to be provided at each level have tentatively been established during the preparation of the USAID project documents. Final decisions concerning the scope of services to be provided will be made by each cooperative, within certain limits. ONe such limit will be the community's ability to support such services, which will be estimated by the PRICOR project.

Historically, health care services to low-income rural or peri-urban populations in developing countries have been provided through governmental health delivery systems for free or at a nominal charge and/or through individual entrepreneural providers practicing either traditional or western medicine. A review of attempts to establish community-

financed delivery systems indicates that most have not met with any great degree of long-term success (Stinson, 1982. This same review identified the following eight general approaches to generating community contributors:

- Personal service fees
- Drug sales
- Personal Prepayment
- Production-based prepayment
- Income generating schemes
- Community or individual labor
- Donations and adhoc assessments
- Fund-raising through festivals, raffles, sc.

Before any one or a combination of the above general financing alternatives can be selected as the optimal approach, a thorough understanding of the factors affecting the need and demand for health services must be gained. These factors can be subsumed under five general catagories:

Category	Factor
Demographic	. Age, sex (D_1, D_2)
Biological	. Incidence of disease (B_1)
	. Severity of illness (B_2)
Cultural	. Perception of illness (C_1)
	. Socio-cultural factors affecting acceptability of different types of services (C_2)
Service-related	. Types of services available (S_1)
	. Accessibility of services (travel time/cost)(
	. Quality of care provided (S_3)

Economic

- Price of individual services/Cost of contribution (E_1)
- Total cost of care (E_2)
- Disposable income/available resources (E_3)
- Opportunity cost of receiving/net receiving care (E_4)

When services are provided free of charge, the first three economic factors — the price of services, total cost, and available income/resource—may not play a very significant role. However, when some form of financial contribution is required to support the health care system, these factors become much more important.

Certain of these factors may remain fairly fixed over time; others may change from year to year or may fluctuate on a seasonal basis within a single year. An example using data from Bolivia will illustrate this fact and will also highlight the importance of considering changes in these factors when designing a community financing scheme.

The household survey carried out in the Montero region of Santa Cruz was conducted during the months of October, November and December, 1977. This survey asked interviewees to recall the incidence of illness and the amount of health care expenditures incurred during the two week period immediately preceeding the interview. From the survey sample it was determined that the average health expenditure during the two week period was US$2.13 ($b 20=US$1). The Montero study extrapolated this figure to a full year period and multiplied it by an average household size of 5.6 persons to arrive at an estimate of $309 for average annual family ex-

penditures on health care. Taking this sum as a proportion of the 1978 net cash income for the average small farmers household in Santa Cruz ($1,086)* yields a finding that farm families may have been spending roughly 28% of their net cash income on health care.

However, if it is assumed that the factors affecting the utilization of and expenditures for health services do indeed change either seasonally or from one year to the next, extrapolation of the findings of a point in time study could yield biased estimates of annual levels. For example, the incidence of diarrheal and respiratory diseases — which accounted for nearly half of all reported illness episodes in the Montero study — are believed to be positively related to, respectively, the arrival of the rainy and cold seasons in Santa Cruz. Evidence of this can be found comparing the incidence of diarrheal diseases, presented in a report prepared by staff at the Hospital de Saavedra (Bacherer, 1 with the average rainfall recorded in that area over a 20 year period (See Figure 1). As illustrated in the same figure, the incidence of respiratory problems was found by the hospital to increase during the cold months of May, June, and July*.

Similarly, given the cyclical nature of farm production, substantial seasonal variation in the economic factors affecting health service utilization/expenditures can be expected. A recent study prepared by

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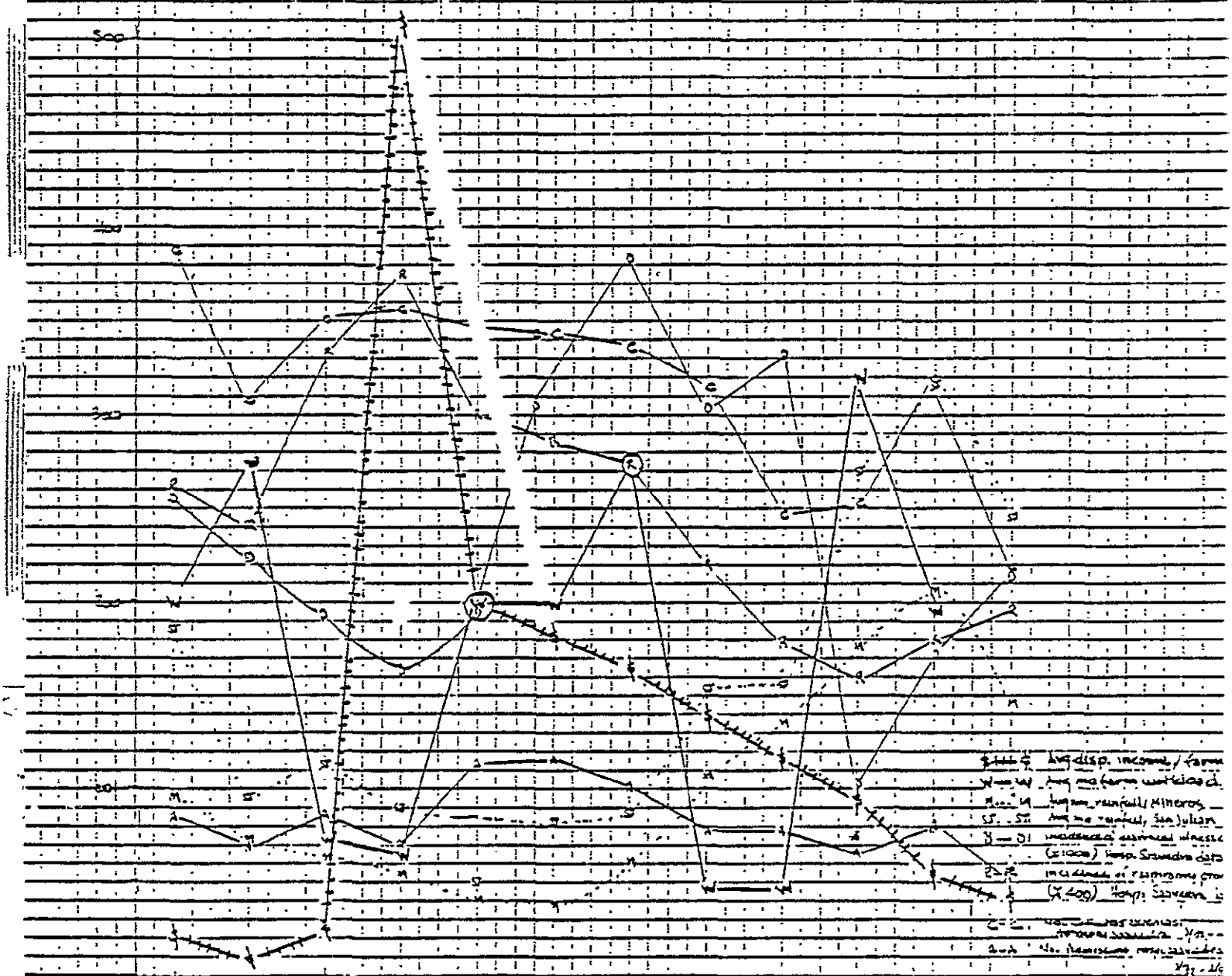
* It should be noted that while they may be indicative of the fluctuations in t incidence of different diseases, these charts should be viewed with some caution as the methodology used for determining incidence rates is not described in the report.

II-5

Chart — Comparison of Indices of Farms Making Use of Sources of Irrigation and Similar Non-Irrigation Units



the Mennonite Economic Development Associates (MEDA) (Graber, 1982) estimated the relative level of income available to an average farm household during the course of a year. As illustrated in figure 2, income for those farmers unable to store their harvest is estimated to arrive in one lump sum in June when the bulk of his crops (in the MEDA report assumed to be rice and corn) are sold. Based upon a projected monthly family budget, available or disposable income is shown to be progressively reduced during subsequent months until it reaches its low point in April. Income is increased slightly in May from the projected sale of an early rice harvest, with the replenishment of the family's income coming once again after the June sale of its crops.

Just as monthly disposable income levels could be expected to vary in an agricultural society, so too might workload requirements differ from month to month. The MEDA study also estimated the amount of manpower needed by a farm family to accomplish certain tasks during the course of a crop year, including land preparation, seeding, weeding, and harvesting. Indices of these requirements are also presented in Figure 2 for a small farmer cultivating two hectares each of rice and corn. As can be seen, the workload is highest during April— when the rice and corn harvest overlap, in September, during which land preparation activities predominate, and in December, when the farmer is busy with weed and pest control.

With respect to health services utilization, farm workload or manpower requirements can be viewed to some degree as a surrogate for the cost of using/not using health services. Several possible relationships could be hypothesized. In the first, the farmer may be more concerned about the opportunity cost (a loss in productivity, cost of hiring replacement) of taking time out to seek health services for problems which develop during peak work periods and therefore not seek care. Conversely, a second hypothesis might claim that the farmer would be more concerned about the potential opportunity costs of not receiving care for a health problem which develops immediately before or during peak manpower periods - i.e, the possibility of the problem becoming worse and incapacitating him even further for the remainder of the busy period. Yet a third possibility could be that the farm household's reaction to the need for health services during busy periods might be determined by which household member becomes ill (highly productive male vs young child), the perception of the severity of the illness, and other factors such as available income. For example, during the high workload month of April, the farmer may choose to continue working, and ignore most health problems because available income is near exhausted and paying for needed care or drugs might require selling off certain household possessions or taking out a loan. During the busy month of September, however, available income is greater and the relative cost of receiving care may not be so great.

It should be noted that the seasonal fluctuations in disposable income and the opportunity cost of receiving/not receiving care were modeled upon a small rural farm family which cultivated two hectares of rice and two of corn, who had no storage facilities, and whose sale income was derived from crop sales. While the general principles would also apply to small farmers producing other crops, such as vegetables or who had some small ancillary sources of income, the timing and magnitude of the seasonal fluctuations would be expected to vary. These fluctuations would not apply, however, to low-income peri-urban families which relied on family members' salaries as their major source of income. In these cases, disposable income (at least in nominal terms) likely be much more stable over the course of a year, as would the opportunity cost of an income-generating member of the family being ill.

Indices of these factors as well as actual utilization data from Hospital Saavedra are also plotted on the chart shown in figure I. The purpose of this exercise is threefold:

- to present a rough approximation of the significant fluctuations in factors likely to affect health care utilization and expenditures
- to present a rough approximation of the significant fluctuations which occur during the course of a year.
- to highlight the fact that these variations in these factors often move in contradictory directions

  i.e. the factor positively influencing utilization may be increasing at the same time another positive factor may be decreasing or a negative factor increasing.

- to identify the potential biases which may be introduced if, without giving adequate consideration to changes in these and other underlying factors, the findings of a single point in time crosssectional survey is extrapolated to a full year or compared to the results of a similar survey conducted at another time in the year or on a substantially different population (eg. farm vs peri-urban).

The discussion so far has focused only on examples of the seasonal variations in factors affecting health care utilization/expenditures. There are, however, important factors the relative values of which may change from one year to the next. Certain of these, such as the individual's perception of illness may without intervention change slowly from year to year. For others, the changes may be more precipitous. An examination of the effect of inflation in Bolivia in recent years will provide a good example of how certain factors move in one direction, rather than cyclically, during the course of a year and therefore change their absolute level from one year to another.

As described earlier, an estimate of the relative proportion of farm income in Santa Cruz which was spent on health services in 1977 (22%) could be obtained by projecting the average household expenditure level found in the Montero study to a full year ($309) and then taking it as a percentage of the average income at that time of a small farmer ($1,086). Since that time, however, the

economic situation in Bolivia has been very volatile with high rates of inflation sending prices soaring. Using these 1977 expenditure and income figures as a baseline (with all the aforementioned caveats about extrapolating longitudinally from cross-sectional studies), to estimate in very rough terms what the effect of the country's economic crisis has meant to in both real and nominal terms to the cost of health services and other consumer goods and to the income of the small rural farmer. An attempt can also be made to relate these finding to wage-earning peri-urban families.

For the purpose of this analysis, an index of 100 is assigned to both the average income of a small farmer and the composite price level for consumer goods. It is assumed that health care prices will move in line with overall consumer prices. Estimates of annual growth in wholesale agricultural product prices and in the consumer price index (La Paz) found in a recent International Monetary Fund (IMF) document are used as surrogates for the increases experienced in small farmer income and consumer prices faced by the farmer (including those for health care), respectively these rates of growth are presented in the table below.

Annual Rates of Growth in

Selected Economic Indicators

Item \ Year:	1978	1979	1980	1981
Consumer Price Index	10.4	19.7	47.2	32.4
Wholesale Price Index/Agricultural Products	20.6	27.8	54.7	24.8

To determine price and income levels from the end of 1981 to the present differing methodologies were used for each. To estimate price levels, the rate of increase in the CPI for 1981 (32.4%) was carried through to March,1982 when the exchange rate of the unofficial market in which most non-central government activities take place was reported to be So 115 = US$ 1. In March, 1983 that rate had increased to approximately So 500= US$1, a monthly increase of 13% or 334% over a 12 month period. It is assumed that 75% of consumer good input s were affected, either directly or indirectly, by this drop in unofficial purchasing power of the peso and therefore had their prices raised accordingly, while 25% of consumer good inputs were domestic inputs whose prices (e.g. salaries) were downwardly sticky and therefore ave have risen at a rate of only 100% during the same period. The composite inflation rate for March 1981 to March 1982 resulting from this methodology is 275.5%, calculated in the following manner:

$$.75 \times 334\% = 250.5\%$$

$$.25 \times 100\% = 25\%$$

$$275.5\%$$

It should be noted that the Montero study found the 76% of all health care expenditures net toward the purchase of drugs. That the price of drugs, most of which are imported in either final forms or as raw materials, has risen at a rate at least comparable with the one just estimated is evidenced by the data 3 which indicates that the wholesale retail prices of certain drugs and medical supplies purchased in Santa Cruz have risen during the period June to November, 1982 at an average rate of over 19% per month, or an annual rate over 700%. Increasing a more recent review of wholesale drug prices in Santa Cruz found almost no increases in prices from November through March. This was the result of an agreement between pharmaceutical manufacturer and the government in which the manufacturers agreed to freeze prices in return for access to dollars needed for the purchase of foreign goods. How long this accord will continue is uncertain.

To estimate increases in small farm income from 1981 through the 1983 harvest period, estimates were obtained from MEDA of: a) the average price received by the previously described "average small farmer" per unit of rice and corn, and b) an estimate of the relative contribution of each crop to the farmer's total net income from both harvests (66% rice, 34% corn).

These estimated prices are shown in the table below. Where the MEDA official indicated a range of possible prices for the 1982 and 1983 harvest, a value in the lower range was used to reflect the slight decline in the size of the yields for those harvests.

Estimates of Prices for Selected Crops

1981 - 1983

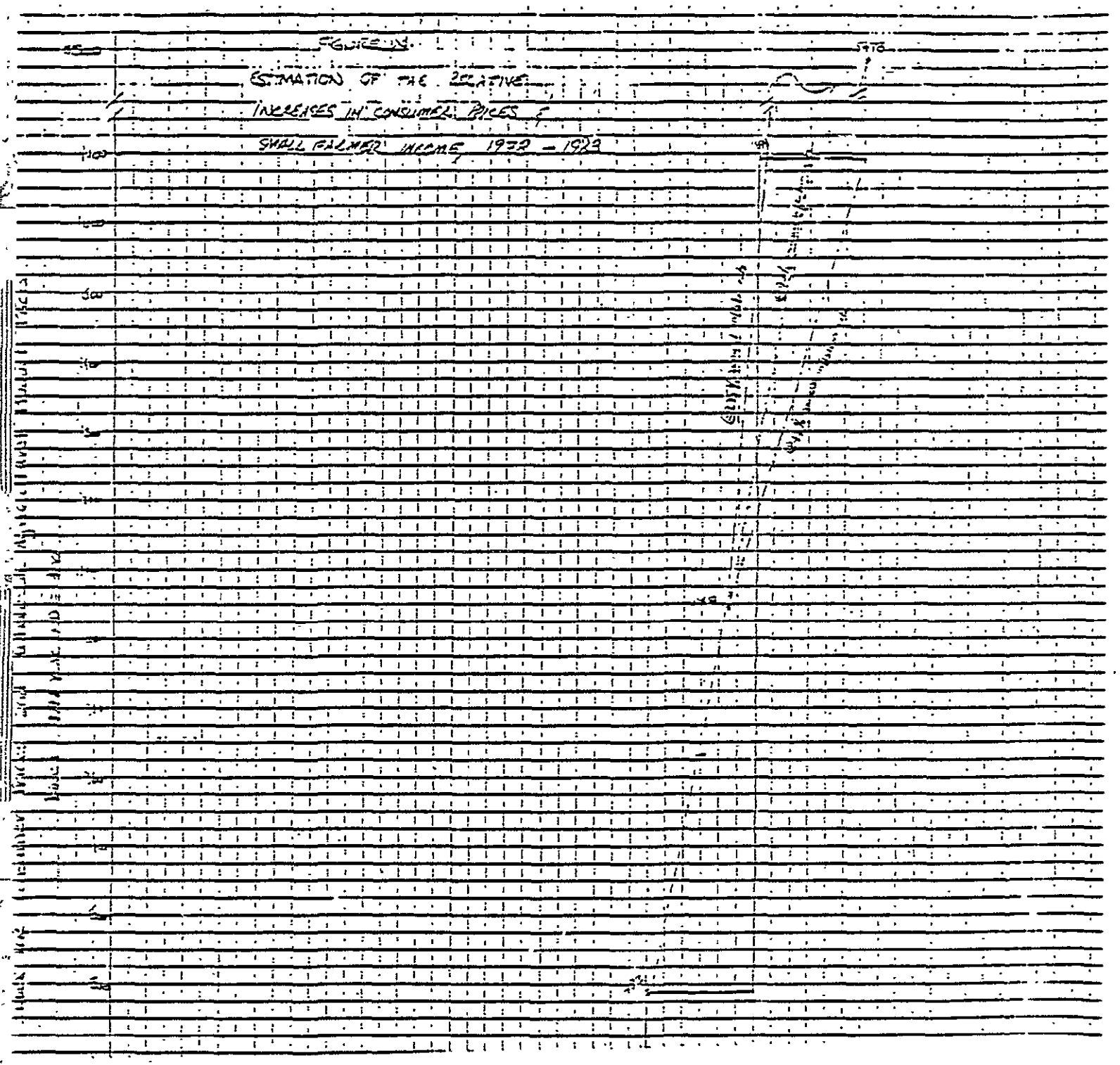
	PRICE 1981	PRICE 1982	1981-82 increase	PRICE 1983	1982-83 increase
Rice ($b/fanega)	1300	2100	61.5%	7500	257.1%
Corn ($b/quintale)	135	225	66.7%	750	233.3%
% increase weighted to reflect relative impact on income			63.25%		249.2%

Combining these estimates for the recent growth in these surrogates for prices and small farm income with those of the ~~IMF~~ IMF report for 1978-81 will allow us to assess the present economic status of the small farmer. A graph increasing the 1977 baseline indices for these two items by the estimated annual rates of growth is presented in Figure 2.

The income of the small farmer is shown as a step function to reflect the assumption that the bulk of his income is received at roughly one point during the year. This amount is presumed to be the total available until the following year's harvest is sold. The graph for the consumer price index is a smooth function, reflecting continuous movement in price levels during the course of a year. The small farmer ~~assumed to~~ is ~~be~~ "better off" than he was in late 1977 (i.e. his income could buy

FIGURE IV.

ESTIMATION OF THE RELATIVE INCREASES IN CONSUMER PRICES & SMALL FARMER INCOME, 1932 - 1939



more than it did then) whenever his income line is to the left of the CPI line. According to this analysis, the small farmer more than maintained the purchasing power of his income through the early part of 1982, about the time prices for the 1982 harvest were being negotiated. Shortly after that period, however, the rate of inflation skyrocketed and despite an increase of approximatelly 63% in the unit price of his rice and corn crops, the purchasing power of the small farmer's income plummetted in the later half of 1982 and the first part of 1983. The farmer's situation is likely to improve in June of this year as the result of an anticipated 249% increase in crop prices. Depending upon the rate of inflation experienced during that period, this improvement may be short-lived. As illustrated by the projections for the growth of the CPI in Figure III, for the small farmer's income to have the same to have the same or better purchasing power than it did in 1977, during the entire July 83-June 82 period the inflation rate for that period could not exceed 47%. If the present 275% rate of inflation continued, farmers' purchasing power would quickly drop below 1977 levels. At a 90% inflation rate, it is estimated that farmers would be better off than in 1977 for the first half of July-83-June 84 period, with the purchasing power of their incomes dropping below 1977 levels for the second half of that period.

The net effect of recently high inflation rates and the uncertainty of the magnitude of further increases in price levels leaves the future purchasing power of the small farmer in doubt. If the annual inflation rate abates to an average of 90% over the next 12 months, the farmer's

purchasing power will remain about what it was in 1977, that is, by allocating 28% of his income to health services as he was able to purchase at the time of the Montero study. If inflation is greater than 90%, the farmer will have to spend an even greater proportion of his income to purchase the same amount of services as in 1977, or he will have to settle for purchasing smaller quantities of health care with his 28% allocation. Given the likelihood of increases in the prices of other essential items such as food and transportation, the latter scenario is likely to occur with health care expenditures increasing in nominal terms but decreasing in real terms.

Sufficient information, including baseline expenditure and income data is not available to fully analyze the effect of inflation or wage-earners' income and health care expenditure patterns. Figure 7 presents some information on the reported rate of increase in salary levels in Bolivia. Whereas the small farmers' income was estimated to have kept pace with inflation up until early 1982, average salary levels appear to have not kept up with inflation during the period 1978-81. This situation is likely to have been severely exacerbated in 1982 although there is some indications that employers may have in some cases provided support in the form of bonuses, subsidized food, or through other means. Nonetheless, it is thought that the peri-urban wage earner, whose income is not directly tied to the increasing prices of consumer products, has probably suffered more from inflation over the past five years than the small farmer. To address this situation to some degree, the Bolivian government recently announced an across-the-board increase of $63,010 per month for employees earning up to $650;000 per month. Additional increases will be made in a semi-annual basis, the amount to be determined by the level of inflation during that period.

FIGURE V

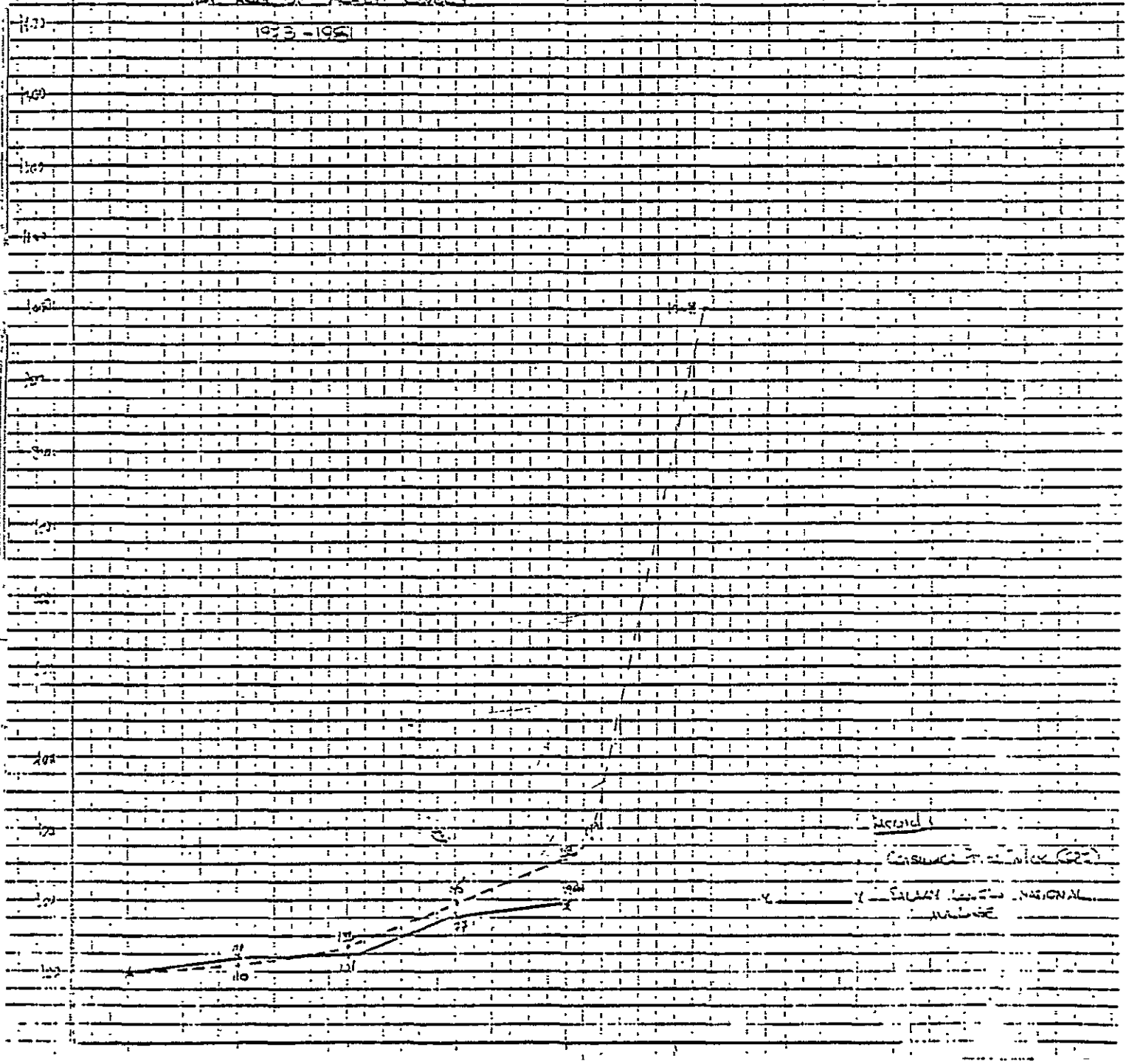
ESTIMATION OF THE

RELATIVE INCREASES IN

CONSUMER PRICES &

NAT AVG OF SALARY LEVELS

1973 - 1981



III. UTILIZATION OF RESEARCH RESULTS

The principal decision makers who will benefit from the results of this research are USAID/Bolivia, the board of Directors and staff members of the co-op health project's provider organization, and through these groups, the families in the communities served by the three co-operatives participating in the project. USAID officials will base the design, the benfit packages and financial mechanisms to be offered the co-op communities in large part upon the results of the FRICOR research.

In the longer run, the f ings of this research are expected to be of value to other co-ops i olivia which may be interested in organizing a similar health del ery system. The organization implementing this research, the Federación acional de Cooperativas de Ahorro y Crédito (FENACRE), currently provides technical assistance to over 100 co-ops in Bolivia and will be an excellent conduit for disseminating information on the project to other co-ops.

Finally, the findings of this project will be of great value to the research and provider mmunity worldwide which is seeking innovative ways to finance th delivery of primary health care services. The work to be carried out under this project, in particular the longitudinal analysis of factors affecting the demand for health care (see Methodoloty sec will greatly add to the existing knowledge base in this area.

IV. METHODOLOGY

The activities to be completed under this PRICOR project, which will be very closely integrated with the ongoing activities of the larger USAID/B supported cooperative health project, can be divided into three relatively distinct phases. There are the following:

I Baseline/Diagnostic Phase

II Service Package/Financing Mechanism Development Phase

III Systems Implementation/Refinement Phase

The activities of each of these phases which will be carried out sequentially, although with some overlap in phases I and II and will be designed in such a way as to provide the information necessary to move to the next phase of the methodology. Phase I activities will be concentrated upon the collection of data essential to projecting the anticipated demand for, and cost of, health services in the areas to be served under the USAID project. In Phase II, these data will be analysed to estimate the population's ability and willingness to pay for health care and also to design alternative service packages, the cost of which fall within the household/community/coop's budget constraints. Based upon the characteristics of the population and the nature of the services to be provided, phase II will also generate recommendations concerning the optimal way of collecting the necessary financial support from the population.

Phase III will coincide with the actual implementation of the USAID co-op health project. PRICOR-supported resources will be directed toward carrying out ongoing analysis of the co-op health project activities, including analysis of utilization and revenue data. These activities to yield the

insight needed to make those fine tuning/mid-course adjustments in the financing mechanisms, pricing structures, and even service packages which may be necessary to ensure the self-sufficiency of the delivery systems established under the USAID/B project. Phase III will also include near the end of the 3 year co-op health project a major household survey/data collection effort similar to the one carried out in phase I. This final effort should yield valuable information about the effect of the health system on participating households, both health-wise and economically, and is expected to provide recommendations concerning: 1) ways to maintain the self-financing aspect of the co-op delivery system once USAID/B inputs have ended, and 2) ways of transferring the concepts developed and experience gained under this project to other co-ops in Bolivia.

Greater detail about the specific approaches to be employed under each of these phases is provided in the following sections.

A. PHASE I: Baseline/Diagnosis

The goal of Phase I will be to develop a thorough understanding of the environment in which the USAID/B-supported co-op health project will operate. More specifically, emphasis will be on the following:

- Identification of those factors affecting the target population's general need and demand for health services.
- When possible, estimation of the levels, in either absolute or relative terms of these factors during the course of a year and from year to year.

. Estimations of the existing utilization patterns for each co-op population.

. Identification of any substantial variation across sub groups of the target population (eg, between the different co-ops, and/or across different socio-economic grouping) in the nature and/or strength of factors affecting the need and demand for health services.

. Identification of those types of services (either existant or currently unavailable) for which the target population has expressed or exhibited the greatest willingness to pay.

1. Tasks

The tasks necessary to achieve the goals of phase I are the following:

. Literature Reviews

. Key Informant Survey

. Case Studies of Innovative Health Care Financing Approaches in Bolivia

. Longitudinal Data Collection/Analysis

. Household Surveys

. Analysis of data

. Preparation of Reports

Each of these tasks is discussed below

. Literature Review

One of the first tasks to be accomplished under Phase I will be an exhaustive review of the literature relevant to this project. While a substantial amount of time has already been dedicated to this task in the preparation of the USAID/B project documentation, additional effort in this area may prove fruitful. These literature topics which should be reviewed include:

- Analysis of factors affecting the need and demand for health services
- Community financing of primary health care/community health workers
- The experience of primary health care projects in Bolivia
- General characteristics of Bolivia, with special emphasis on the Santa Cruz area --- health conditions, economic conditions, health services, cooperatives, etc.
- Methodological issues associated with household surveys, costing procedures, etc.

The result of this literature review will be development of preliminary list of those factors likely to a ffect the need and demand for health care and therefore the ultimate success of the USAID/B self financing project. An initial list of possible factors, already discussed to some degree in Section III, is presented below:

CATEGORY	FACTOR
Demographic	. Age, Sex
Biological	. Incidence of disease (seasonality issue)
Cultural	. Perception of illness . Socio cultural factors affecting acceptability of different types of services
Service related	. Types of services available . Accessibility of services . Quality of services . Price of services . Total cost of care affected by inflation . Disposable income available resou . Opportunity cost of receiving/no receiving care

For some of these, the initial literature review may also yield some information as to the relative impact of these factors on health service utilization levels as well as further ideas concerning sources of measurement of these factors (ie, additional studies, reports). The bulk of the literature review will take place during the first three months of the PRICOR project, although additional documents which are identified during the course of the project will also be carefully reviewed. The information obtained from the initial intensive review will certainly influence the direction and esign of either Phase I activities (eg, the key informant interviews, household surveys, etc.)

b) Key Informant Interviews

A second Phase I task will be to interview individuals who are particularly knowledgeable about the various issues to be addressed in this project. Semi-structured interviews of approximately one hour each will be conducted in La Paz and Santa Cruz with individuals drawn from health providers, researchers, international organizations, co-op officials, village leaders, agricultural economistas, and others. The purpose of these interviews will be to gather as much background and substantive information as possible on needs, services, cost, economic conditions, financing options. This information will be used to identify further factors likely to affect the self-financing aspect of the co-op health project and will also influence the direction of subsequent secondary data gathering efforts and the design of household survey questions.

These key informant interviews will be conducted during the first three months of the project.

c) Case Studies of Innovative Health Care Financing Approaches in Bolivia

Several cooperatives in Bolivia, including the La Merced Co-op in Santa Cruz, provide some form of health care to their members. La Merced, for example, has its own pharmacy and operates a physician referral service for its members, paying 25% of the cost of the office charges of the referral physicians. In addition, at least one physician group practice in La Paz attempted to establish a pre-payment financing system. The experiences of these entities, as well as those of other innovative financing mechanisms which may be identified through the literature review or key informant interviews, will be closely examined through a case study approach to be carried out in the first two to three months of Phase I.

d) Longitudinal Data Collection/Analysis

An important task to be carried out during Phase I will be the collection and analysis of data which directly or indirectly provides measures of those factors identified earlier as affecting individual's need for health services, as well as their ability and willingness to pay for such services. In large part, this effort should focus on these factors which are likely to change in a cyclical pattern during the course of a year or exhibit a trend to increase or decrease from one year to the next. This task will thus concentrate on a longitudinal analysis of changes in health care utilization factors.

The analysis of the cyclical trends in disease incidence, disposable income, and opportunity costs and the long run trends in income and price levels discussed earlier in Section II of this proposal are examples of the types of data collection and analysis activities which should be carried out as part of this task. One activity to be carried out under this task would be to seek other datasets which would support, update, or modify these analyses. Certainly the income and workload cycles for farmer growing sugarcane should also be analysed.

These analyses, which to the extent possible should be quantitative in nature, can be expected to yield substantial insight into the appropriateness of certain financing mechanisms. Where possible, models will be developed to depict the hypothesized relationships. An example of this type of modeling for monthly membership fees is presented as part of a later discussion of Phase II activities. In examining yearly rather than seasonal changes in certain factors, modeling exercises directed at anticipating the effects of inflation on the cost of providing future health services will be of critical importance in order to determine at what level membership or service fees would have to be set to be sufficient to cover escalation in the replacement costs of drugs and supplies. The modelling of projected charges in the relative changes in income levels and consumer price for the target populations will also play a critical role in estimating reasonable health care expenditure levels or budget constraints for households in these populations.

An up-to-date market study of wholesale and retail drug prices in the Santa Cruz, Mineros, San Julián areas will be carried out initially (and updated periodically, even through Phase III) to measure the increases in

local market prices and to ensure that drug prices established during Phase II will be competitive. Similarly, a supplement to current inventory of health care facilities in the areas of the three co-ops will be carried out if necessary to identify the specific location, range of services available, and monthly utilization and locally generated income levels at these facilities and to generally assess quality of care provided. This information, along with data to be developed in the next ask on target population distribution, will be used in determining locations for the level II and III facilities to be operated under the USAID/3 project.

Finally, an effort will also be made through the use of multivariate regression analysis and other appropriate statistical techniques to more clearly identify and quantify the relationship between the factors identified and examined as part of this task (the independent variables in this particular exercise) and the monthly utilization and local income levels at MSW/FH facilities (dependent variables). The general form of the equation will be:

$$U = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + \ldots + b_n x_n$$

Where U will be one of the following four variables:

1) No. outpatient visits/mo. in area MSW/FH facilities
2) No. admissions/mo. in area MSW/FH facilities
3) Local revenue collected/admission/mo. in area facilities
4) Local revenue covered/OPD visit/mo. in area facilities

and

x_1= monthly surrogate values for incidence of diarrheal problems (eg, rainfall, data from Saavedra hospital report)

x_2= monthly surrogate values for incidence of respiratory problems (eg. dummy variable for cold months)

x_3= monthly index value for available income for avg. farmer in area

x_4= monthly index value for farm workload

x_n= monthly measures of other variables thought to affect utilization/expenditure and for which values are obtainable.

For the peri-urban facilities, the agriculturally related variables (x_3 and x_4) will not be used. If any significant findings result from this analysis, they will provide important information to be used in projecting the utilization of co-op health project services. To carry out this analysis data will be input into computer database and a statistical software package will be used to perform the analysis. Activities under this task are anticipated to be carried out during the first five months of the PRICOR project.

e) Household Surveys

The largest task to be carried out in Phase I will involve the design, testing, and implementation of a household survey in the communities serviced by the three cooperatives participating in the USAID project and the subsequent analysis of the data connected.

The steps to be carried out as part of this task are:

i. Identification/mapping of the target population for each co-op health system

ii. Finalization of sampling methodology based upon characteristics of population and selection of samples

iii. Design, pretest, and refinement of survey instrument

iv. Training of interviewers

v. Implementation of surveys

- interviews
- field edits/verification
- re-interviews, when necessary

vi. Cleaning and entering of data

vii. Analysis of data

viii. Preparation of summary tables, reports.

The survey, which will be administered to a small sample of the co-op health project's target populations, will be a relatively comprehensive one It will gather information on the basic socio-demographic characteristics o the household and will attempt to assess health status through a two week recall of illness episodes, health care utilization and expenditures. It will also include fairly detailed questions about general health care utilization and referral patterns and about the economic status of the household, both currently and in the previous year. Lastly, questions will be included which solicit information about the types of health services people would like to have access to and for which they are willing to pay. A list of suggested data elements to be collected through this survey is presented in appendix B.

Despite the previously described limitations of cross-sectional, point-in time survey, there are several reasons for conducting such a survey as part of this project:

- It will provide up-to-date information about existing utilization and expenditure patterns. The longitudinal analysis of cyclical fluctuations in these patterns described under task (i) above should allow a relatively sensitive extrapolation of these findings to an annual basis.
- Its findings will provide a mechanism for heightening each co-op's and community's awareness of the nature and extent of their current health problems and expenditure levels. This will be an integral part of the co-op's benefit package selection and membership recruitment and enrollment processes.
- It will identify point-in-time differences in average expenditure, utilization, and income levels across co-ops, as well as assess the degree of variation in these items across communities and households within a particular co-op.
- The utilization data will peovide guidance in formulating a reasonable estimate of what utilization levels might be anticipated under the co-op health delivery system. The self sufficiency of the system will be extremely sensitive to utilization if any costs other than those which are completaly variable (eg, drug, supplies) are to be supported through utilization-based fees.
- A careful estimation of annual health care expenditure and income figures will provide the basis for establishing an upper limit on the cost of the packages of services which will be offered to a particular co-op (eg, no benefit package option should cost the average household more than x% of its annual net income).

- The instrument developed for the household survey can also be expected to serve, with perhaps some refinement or condensation, as a registration for families wishing to enroll in the co-op health program.

The baseline survey will focus on a small sample of the target population rather be administered to all households.

The reason for this is that the information obtained from the household surve combined with the longitudinal analyses, will be the basis upon which the various package options and financing approaches to be ach co-op will be developed. Given the size of target population (3.700 rural families and 6.000 urban families) and the amount of information to be obtained, a survey of this magnitude would require substantial time and costs not only could a relatively long period between the start and the finish of the survey bias the finding beacuse of monthly fluctuations in utilization and expenditures, but it would also delay the project's ability to present aggregate information to each co-op about the health needs, utilization, and expenditure patterns of its member communities. This information will be part of the basis for each co-op's selecting a service package and financing mechanism.

An estimated 720 households will be interviewed as part of this survey. This number will be roughly divided among the three participating co-ops and control groups as follows:

Mineros:	120
San Julián:	150
La Merced:	300
Control:	150
Total:	720

This number is based upon the stratification of the populations at each of the three co-op sites to reduce the anticipated variance in responses. The Mineros population will be divided into two strata: individuals living close in with reasonable access to health services and individuals living in remote, inaccessible communities. The San Julian population will be divided into two strata based upon this criterion or perhaps the length of time the nucleo has been established. The criterion for stratifying the peri-urban La Merced population will be determined once better general information on this population is obtained. Assuming: 1) the total number of households in the Mineros, San Julian and La Merced catchment areas of 2030, 1670, and 6,000 families, respectively; 2) the equal division of each of these populations into the two strata; 3) an expected variance of approximately .25 in the value of responses within each strata, and 4) a normal distribution, thus the above samples should provide measures of within 5% of the true population means, as indicated by the calculations of standard error for each strata given below:

Mineros

$$ES = \sqrt{\frac{N-n}{N-1} \times \frac{s^2}{n}}$$

$$= \sqrt{\frac{835-60}{834} \times \frac{.25}{100}}$$

$$= 4.8\%$$

San Julián

$$ES = \sqrt{\frac{1015-75}{1014} \times \frac{.25}{100}}$$

$$ES = 4.3\%$$

La Merced

$$ES = \sqrt{\frac{3000-150}{2999} \times \frac{.25}{100}}$$

$$= 4.9\%$$

It must be stressed that this sample selection methodology is only provisional. A critical step in the execution of this task will be to assess the populations to be surveyed, and revise the methodology as required. As more information concerning the characteristics of the populations and their dispersion on certain key items is obtained, this methodology may require modification and the sample size changed accordingly.

The benefits of structuring the household survey sample in this manner are the following:

- It will provide each co-op with a profile of the health needs and care seeking behavior of a cross section of its membership. Since decisions concerning benefit packages and financing mechanisms will be made at the co-op level and will in large part be driven by the findings of the survey, this is the appropriate level of aggregation for the data.

- By also including households in the community which are not co-op members, the data will allow a profile of this segment of the population to be developed and comparisons to be made between co-op member and non-member households. As non-member families are potentially an important source of demand for project-supported services, it is important that their characteristics and patterns be known.
- Comparison of the samples of both member families and all families in the Catchment Area of each co-op health project will allow the better tailoring of the service packages/financing mechanisms to each co-op.
- The survey data will provide an important baseline for a subsequent evaluation of the impact of co-op health project. The inclusion of non-member families as well as a rural control group will facilitate analysis of the effects of the program at both the community and individual level. This evaluation, which will take place 24 months after this first household survey, is discussed in a subsequent section describing Phase III activities.

The survey will be administered at each site by a team of 3 to 4 well-trained local informers under the direction of a field supervisor at each site. If the survey is not carried out during a period of high farm activity, a maximum of 4 interviewes could be expected per interviwer per day at the rural sites. A maximum of 5 interviewer per day is anticipated in the rural areas. The field supervisor will oversee the administration of the interviews, checking at the end of each day for incomplete forms, inconsistencies, and other problems. Follow-up contacts will be made as necessary.

The field edited versions will then be forwarded to the PRICOR project office in santa Cruz where the data will be entered in a computer and cleaned. It is envisioned that the minimum computer facilities required at PRICOR project headquarters will be a high quality microcomputer (such as an IBM Personal Computer) with a large capacity hard-disc drive for the necessary storage capacity a good quality printer, and multiple software programs. This system should be fully compatible with the computer system the USAID/B project's central provider organization will operate. Final selection of the type of computer should be strongly influenced by the availability of compatible statistical software systems (such as SAS or SPSS) which are available or should be available in the near future.

The survey instrument will be designed and tested in the second and third months of phase I. The survey will be administered simultaneously in the three co-op areas during months four and five.
The type of analysis which will be performed on the survey data at the end of Phase I are described in the next task.

f. Analysis of Data

The first round of analysis will be primarily descriptive in nature, with summary tables prepared for each co-op which describe health care problems, utilization, expenditure, and referral patterns cross tabulated tables will also be prepared which identify these values by member/ nonmember families by age and sex, by types of services, income etc. The first analysis will yield a cross-sectional profile of the general population serviced by each co-op. In the second analysis, this point in-time information will be combined with the analysis of longitudinal and seasonal variations in factors affecting health needs and service utilization (see Phase I, task c) to project more accurately a full year's profi

these factors than would be possible through straight extrapolation of household survey findings. The results of this analysis will generate the following:

- a model of average annual household health care utilization and expenditures, both total and for individual services. for members and non-members in each co-op catchment area.
- an estimate of the average annual income for families (member and non-member in each co-op's catchment area. current and subsequent year (projected)
- an estimate of the average percent of income currently spent on health services;

A third analysis to be undertaken in Phase I will be to attempt to define relationships at the individual or household level between various characteristics (eg. age, sex, income, etc.) (independent variables) and health care utilization and expenditure levels (dependent variables). Because the values of the dependent variables may be clustered around zero, logit or tobit model would appear to be the preferred procedures to employ in carrying out this third analysis.

g. Preparation of Reports

The following reports/documents will be prepared during Phase I:

1. Summary Report: Background Research on Community Financing of Primary Health Care

   a. Summary of Findings from Literature Review

   b. Summary of Findings from key informant interviews

   c. Analysis of longitudinal/Seasonal Factors Affecting Health Care Utilization and Expenditures

   d. Development of Model for Addressing Changes over Time in Health Utilization and Expenditures

2. Documentation for Carrying Out Household Survey

   a. Description of Target Populations

   b. Final Sampling Methodology

   c. Final Survey Instrument

   d. Protocol for Training of Interviewers

   e. Data Analysis Plan

3. Analysis of Household Survey Data

   a. Descriptive analyses

      - summary tables

      - cross tabulations

   b. Projection of cross-sectional findings to annual basis

   c. Results of multivariable analysis of relationships between individual/household characteristics and health care utilization expenditures.

The workplan presented in Figure identifies the months in which these reports are due.

3. Phase II: Development of Service Packages/Financing Mechanisms

For the USAID/3 coop health project to be self-financing, a sample relationships must ultimately be achieved, namely:

$$TE_p = TC_s$$

Where: TE = total expenditures by households within the community on health services provided through the co-op health system, and

TC_s = total cost of providing these services through the co-op health system.

Phase I activities have been concentrated on the first have of this equation, attempting to identify the factors affecting health care utilization and expenditures and to define a range of possible (or rather probable expenditure levels. Because the communities' willingness or ability to pay for health services is more of a given at this point that the packages of services to be offered to these communities, it is logical to concentrate first on defining the likely upper limits of utilization and expenditures, and, working backward, design a series of service packages which will fit with these limits, both in terms of anticipated utilization and costs.

Phase II efforst are therefore directed at defining the second half of the above tautology, the supply side. These activities will begin in the second month of the project and therefore overlap Phase I work considerably. They will, however extend past the seven months of Phase I, becoming much more intensive once the final products of Phase I are available.

1. Decision Variables

It is during Phase II that the values of the project's major decision variables will be set. These variables include the following:

- the services which are to be included in the various benefit packages to be offered to each co-op.
- the cost to be associated with each service/benefit package
- the pricing/financing structure which is to be associated with each service/benefit package.

While the ultimate decision as to what array of services and financing mechanisms will be implemented will be left to each co-op membership, the range of options from which they select will be set by the PRICOR-USAID/B project.

Five general criteria will be used to select the types and number of services to be offered in any benefit package. The service must:

- address the primary health care needs of the population,
- be of high quality,
- be acceptable to the population to be served,
- be delivered in the most cost-effective manner possible, and
- be part of a total package, which, based upon reasonable utilization levels estimated in Phase I, will not require excessive financial contributions from the community to be supported.

With respect to the mechanisms for financing such services, the criteria for evaluating them will be:

- their ability to generate funds sufficient to cover total systems costs, including supply replenishment costs.
- the burden they place on the community is equitably distributed accross the community
- they foster utilization of services at the most appropriate, least cost level in the system
- they provide incentives for the utilization of preventively-oriented primary health care services
- to the extant possible, they consider seasonal variations on the population's need for and ability to pay for health services

Data from Phase I as well as further analysis to be completed in Phase II will be used to evaluate various service packages and financing mechanisms against the above criteria. The tasks involved in carrying out this assessment are described below.

2. Tasks

The following tasks will be completed during Phase II:

- identification of services to be included in benefit packages
- analysis of service costs
- development of benefit package options
- identification and analysis of possible financing mechanisms/pricing policies
- development of interactive computer capability to assist co-ops in analyzing/selecting a benefit package/financing approach
- preparation of reports

Each of these is described briefly below

a. Identification of Possible Services

A substantial amount of effort by USAID/B in identifying services which could potentially be included in the various benefit package options offered to the co-ops. The PRICOR project staff will review this list and suggest additions/revisions based on the results of the key informant interviews and household surveys.

b. Analysis of Service Costs

PRICOR project staff will identify the inputs and related costs necessary to provide the services identified in task (a). Estimates of participating household and utilization estimates derived on Phase I will be used to estimate the volume of each service likely to be provided. These analysis will identify:

- fixed costs
- variable costs
- anticipated increase in cost of inputs over time
- anticipated replacement costs for consumables

c. Development of Benefit Package Options

Based upon the above cost analysis, several service package options will be developed for each co-ops. Special attention will be paid to ensuring that the estimated total cost of any benefit package will not exceed the co-ops communities' ability to pay, as estimated in Phase I. This limit is set to minimize the possibility that insufficient funds to support the delivery system would be generated by the community. With this overall constraint in mind, services will be added to the package in line with how well each meets the service selection criteria identified earlier.

d. Identification and Analysis of Possible Financing/Pricing Policies

Using the general categorizations found in Stinson (1982) and those uncovered through the Phase I literature review and key informant interviews, PRICCR project staff will develop a list of possible financing mechnisms/ pricing policies. These will be evaluated against the criteria set for the earlier. Where possible, quantitative models will be developed to assess the feasibility of different alternatives.

As an example, the finding illustrated in Figure 2 (page) that the disposable income of the farmer varies widely during the course of a year might well rule out the possibility of generating a given sum of money by assessing monthly membership fees, each equal to one-twelfth of the desired sum. If payment of such monthly sums is linked to the level of disposable income for the month, this situation might be modeled in the following fasion:

$$E(X) = p1\left(\frac{E(X)}{12}\right. + p2\,\frac{X}{12} + \ldots\ldots + p12\,\frac{X}{12}\;;$$

Where: $E(X)$ = the desired or expected amount to be collected in one year through membership fees

Pn = the probability that the monthly membership fee is paid for month n

However, if Pn is assumed to be positively related to the level of available income in month n, then following the fluctuations on income depicted in Fugure III, then Pn might drop by 1/12 from an initial value of 1.0 for every month after a one time receipt of income from the harvest. This could be expressed as:

p_1 = 1.0 for $month_1$, if month 1 = June

p_2 = .92 for $month_2$, if month 2 = July

p_{12} = .08 for $month_{12}$, if month 12 = May

If the desired level of membership fees were $o 1000 (i.e., X = $o 1,000), then the above situation would yield only $o 540 not $o 1,000 if the monthly fee was set at $o 83.3 ($o 1,000/12), as illustrated below.

$$X = 1.0\ (83.3) + .92\ (83.3) + .83\ (83.3) + .75\ (83.3) + .67\ (83.3) + .58\ (83.3) + .5\ (83.3) + .42\ (83.3) + .33\ (83.3) + .25\ (83.3) + .17\ (83.3) + .08\ (83.3)$$

$$X \quad 539.78$$

Where X = total membership fees collected during year

This model indicates that if the objective is to collect $o 1,000 in membership fees over a year and the probability of the sum being paid during any one month is directly related to income available in that month, at least 3 other options are preferable to the first if membership fees are to be collected.

a) Raise the monthly membership fee to an amount greater than E (X)/12. In the case modeled above, setting the monthly amount at $o 154.3 rather than $o 83.3 would yield $o 1,000;

b) Set the monthly membership fee on a sliding scale, pegged at a fixed percent of available income for month m; or

c) More away from monthly membership fees toward one lump sum payment at the time of highest income or payments during only those months in which income is high.

e. Development of Interactive Computer Capability for Analysis/ Selection of Benefit Packages/Financing Policies

Once the various benefit packages, and financing/pricing options have been developed, these will be presented to co-op/community members for discussion and selection of the option preferred for that co-op. In the course of these discussions, the co-op members may suggest certain variations to one or more proposed options. To allow project personnel to respond to these suggestions and provide the co-op with immediate feedback on the cost implications of these modifications, the project's computer facilities will be brought to this meeting and will be used to generate these estimates. This will require beforehand the adoption of existing software applications (eg Visi Calc) or the development of new programs to process changes to the variables in the formula equating total costs with total expenses. This rapid analysis of the co-op members suggestions should prove valuable in reaching agreement on these decision variables without the need for a long series of meeting in which successive options are manually casted out, then modified once again.

f) Preparation of Reports

A report shall be prepared at the end of Phase II which will document:

- the development and evaluation of the service package options, including
  - detailed cost analyses, including estimation of replacement cost of supplies
  - comparisons of total costs with community budget constraints (percent of average family income)
  - estimation of break-even participation (membership) and utilization rates
- analysis of financing mechanisms and presentations of models developed
- analysis of estimated relationships between benefit packages and financing/pricing approaches
- the development of the software to estimate impact of changes in package options
- results of meetings with co-op leaders concerning selection of services and financing approaches.

C. Phase III. Implementation of Co-op Health Project

Once a service package and a financing structure, the USAID/B co-op health project will then proceed to enroll households into the program and provide services to them. The household survey instrument developed in Phase I, or a modified version thereof, will be used as a registration form for families enrolling in the health program. The aggregate information on the health problems and expenditure of each co-op program's target population

as well as pamphlets describing the health program will be used to educate household about the potential benefits of the project.

During the implementation of the co-op health program, the PRICOR-funded component will support the large project the following ways:

- provide assistance in the development of a management information system.
- undertake periodic analyses of the data in this MIS to identify as early as possible unanticipated changes in membership, utilization rates, revenues, and/or costs and develop solutions to these problems.
- conduct an in-depth evaluation of the program 24 months after initiation of the first haousehold survey.
- preparation of reports

These tasks are described in more detail below.

1. Tasks.

a. Development of a Management Information System

PRICOR-funded staff will assist co-op health project personnel in the development of a computerized management information system (MIS) and related data collection instruments assistance will be provided in designing appropriate coding structures and software programs to allow easy data entry, retrieval analysis, and report generation. The principal purpose of the MIS will be to store and analyse information concerning service utilization, revenues, and costs. In addition to the registration forms, each level of the co-op health care system will also record on a standard form the following information for each health care encounters: the unique ID of the family

(or if possible the individual) provided at time of registration in the health program (a dummy code to be used for non-enrolled families) type and quantity of services provided, and the charges/revenues for each. These forms will be periodically forwarded to through the higher levels of the system to the central provider organization where the data will be entered into the MIS. Family data from the registration forms and/or Phase I household survey will be linked with subsequent utilization expenditure entries for that household.

The database will be utilized by the provider organization as the basis for establishing both revenue and inventory control systems. In addition, as third use of this MIS will be to generate the data needed to carry out various analyses of program performance. The nature and utility analyses is discussed as part of the next task description.

b. Periodic Analyses of MIS Data

At least semiannually, PRICOR-funded resources will be devoted toward undertaking a through analysis of the information contained in the MIS. These analyses will be used to document the performance of each component of the health delivery system, act as an early-warning system for identifying problems which may be developing solutions to these problems.

The statistics which should be generated as part of these analyses will include:

- health program enrollment rates/community
- cross tabulations of enrollment rates and
  - -co-op member/non-member
  - -economic characteristics
  - -participating co-op
- utilization rates, by service, level, community
- disenrollment data
  - -by community
  - -by co-op
  - -by family characteristics
- a comparison of revenue generated at each treatment setting (each level I, II, and III site) with anticipated utilization/revenue levels to identify sites with low productivity.
- identification of those sites where there is a discrepancy between reported utilization rates and reported revenue levels to assess whether certain providers are not charging for services, not promptly forwarding revenues to central provider organization, or overcharging for services.

The prompt and thorough review and analysis of these types of data, particularly when coupled with other sources of information concerning such important factors as changes on farm income or inflation levels, will be critical to the project's ability to develop modifications to its policies and procedures during the course of the implementation period which will both respond to identified operational problems and be acceptable to the co-ops and communities being served.

c) In-depth Program Evaluation

Approximately twenty-months into Phase III (PRICOR project month), project resources will be focused on undertaking a comprehensive review of the co-op health program. The purpose of this review will not only be to evaluate the impact of its activities, but also to develop a final set of recommendations designed to refine the project's self-financing policies and procedures.

The basic approach to this evaluation will be to repeat several of the tasks carried out in Phase I, namely:

- key informant interviews
- analyses of longitudinal and seasonal factors affecting health care utilization/expenditures
- household surveys

In addition, a report will also be prepared which documents the operational and policy issues encountered during the course of program development and implementation and how each was addressed, provides recommendations concerning future program improvements and ways the program might best be transferred to other co-ops.

It will be important that the household survey to be begun exactly 24 months after the first survey was initiated so that the findings can be compared without any seasonal biases. The key informant interviews will follow the same general structure of Phase I interviews although the individuals identified as key informants will likely change and the topics for discussion focused more directly on program activities and impacts. Similarly, collection

Similarly, collection and analysis of values for longitudinal/seasonal factors will be concentrated on data for the previous implementation period, although some projection of variables into the future may also be required.

The household survey will be administered in the same manner as the Phase I survey, utilizing the ssentially same instruments and sample selection methodology. In this case, however, the supplemental sample, if necessary, will be drawn from health program members rather than co-op members to ensure sufficient representation of households participating in the program. As in Phase I, the sampling methodology will again be reviewed in Phase III and minor adjustments necessary to insure the validity of findings will be made. In addition, several slight, although important, change to the survey instrument will be made. One will be to provide space in the section asking for a two week recall of health care utilization and expenditures, whether or not services were provided through or outside of the co-op delivery system. Another question will ask non-participants if they had even been members of the health program and, if so, why they left. Several rather open-ended questions will also be added to the end of the survey instrument asking respondents to evaluate the program and explain their reasons for using/not using services.

A sample of households from the co-op area used as a rural control group will also be interviewed in Phase III. Analysis of changes in characteristics/behavior patterns in this control will serve as a baseline for identifying those changes in health status, utilization, and expenditures in the San Julián and numerous co-op areas that could be attributed to the effect of the health project. Because it is anticipated that not all of the

peri-urban communities served by La Merced will have received project health coverage by the time of the survey, this uncovered population will serve as the control group for those peri-urban communities which have reviewed project services.

The analysis of this survey data will be more complex than that carried out in Phase I. In addition to the preparation of summary descriptive statistics and cross-tabulations describing Phase III survey findings, pre and post-intervention comparisons will be made for each group to identify any changes which may have occurred in their levels of health status and health care utilization and expenditures. Comparisons will also be made between the experimental and control groups in an attempt to set out the impact on these values of other factors not associated with the project. As described under task (a) of Phase III, the original household survey or registration form of those families participating in the program will be linked through the MIS with the information on their program utilization and expenditure levels reported on the service encounter forms. These member families included in the Phase III survey will also have their interview responses linked to their MIS records. This integration of records will provide a relatively comprehensive history of these households' health status, income, health expenditures, and other characteristics which spans their participation in the project.

The information in this rich historical database will be analysed using multivariable regression analysis in an attempt to identify more clearly the relationship between the socio-economic characteristics of households, variations in seasonal and longitudinal variables, and the dependent variables

of health status, health care utilization and expenditures. Logit or prebit regression techniques would appear the most appropriate given the level of variable measurement involved. Because the requirements of this ambitious analysis are likely to exceed the computer capacity envisioned for the PRICOR-project, once the Phase III household survey data has been entered a copy of the database along with all supporting documentation will be forward to Dr. William Bertrand of Tulane University's Department of Epidemiology. The analysis of these data will be completed by Dr. Betrand and his colleagues utilizing the university's substantial computer resources.

It is anticipated that the Phase III household survey will be carried out in PRICOR-project months 28 and 29. The data will be entered, cleaned, and forwarded to Tulane in month 30, with the analysis of this data to be completed by the end of project month 34.

V. MANAGEMENT PLAN

A. Organization

The institution which will implement this PRICOR project is the Federación Nacional de Cooperativas de Ahorro y Crédito de Bolivia (FENACRE). As described earlier, FENACRE is the national association of savings and loan cooperatives and presently provides technical assistance to over 100 co-ops in Bolivia.

The activities to be carried out under this grant will be carefully integrated into the overall operations of the larger co-op health project. FENACRE will either share office space in Santa Cruz with the project's provider organization or have its own offices located in the same building. All project staff will reside in Santa Cruz with the exception of the Principal Investigator who will be located at FENACRE headquarters in Cochabamba.

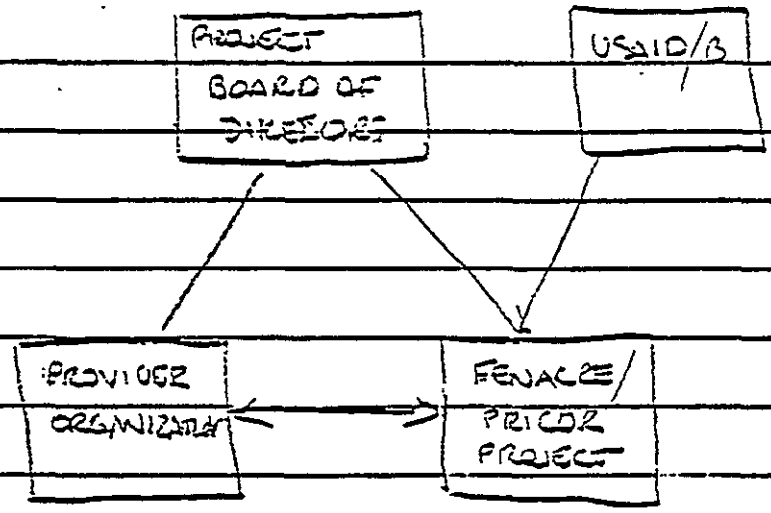
The relationships between the principal organizations involved in the co-op health project are depicted in Figure V-1. The FENACRE/PRICOR project will work in close co-operation with the provider organization and will have its activities overseen by the provider organization's board of directors as well as USAID/Bolivia.

B. Institutional Capability

FENACRE has been identified by USAID/Bolivia as the responsible group for implementing the PRICOR Bolivia project through the following mechanism:

RELATIONSHIPS BETWEEN
MAJOR ORGANIZATIONS

V-2



1) A review of prior work of a similar nature produced by the organization.

2) A site visit to Fenacre headquarters in Cochabamba and their field office in Santa Cruz.

1. The set of documents reviewed were generated as part of a prior USAID contract which produced a socio-economic study of agricultural co-ops Documents prepared and reviewed were:

   a. Manual para el Codificador (coding manual) 1981

   b. Informe de trabajo (1981) progress report

   c. Route sheet for Baseline Survey (no date)

   d. Trabajo de Tabulación de la Boleta Adicional y Codificación de cuestionarios (progress report, no date)

   e. Comentarios adicionales (baseline survey, no date)

The documentation illustrated a clear familiarity with survey research techniques and experience in the management of a field survey. The coding manual in particular was one of the better field guides that I have encountered and indicates a high level of expertise. It should be noted that technical assistance was provided for this activity through the U.D. Department of the Census.

The site visit established Fenacre as having a capable and well organized management team acustomed to modern computer based activities and dedicated to the co-operative movement. A recent series of audits by big eight affiliates indicates sound bookkeeping procedures. All members of management were enthusiastic in support of the project and past AID experience with Fenacre has been sound.

In addition, back up technical assistance to the project during Phase III will be acquired from members of the Tulane School of Public Health Department of Biostatistics and Epidemiology. The data processing and statistical consulting group have routinely assisted in AID, WHO and PAHO small scale reserach projects. Main frame computer accessibility is through a DEC-20-60 interactive system. The statistical consulting group consists of 5 biostatisticians, 4 programmers, and 3 field epidemiologists. Technical assistance in the area of health economics and financing will be provided during the course of the project by Lawrence Bartlett.

6. Workplan and Reporting Requirements

The schedule for completion of the tasks identified in the methodology section is presented in Figure V-2. Copies of the reports called for in this workplan will be provided by FENACRE to FRICOR, the board of directors and executive director of the provider organization, and USAID/Bolivia. In addition, bi-monthly financial and progress reports will be submitted to FRICOR throughout the contract period.

Since the AID intervention project is designed in such a way as to be dependant upon first phase feedback from this project; every means possible including meetings, exchange of documents and mutual participation in projects will be used to further this objective. The research products are designed to be developed in such a way that full documentation of the research process as well as the basic components of a final report will be ready for reporting of results at the end of project. Continual feedback of intermediate results at every stage will be a major responsability of the Principal Investigator and Project Director.

It is useful to restate at this point that one of the most immediate and potentially important feedback points will be in the communities themselves up through the cooperative level by involving these individuals in the actual research process we expect to make doubly sure that the results will be immediately available to them.

D. Staffing

In the first year, the PRICOR/FENACRE project will be staffed by one part-time principal investigator, five full time staff members, seventeen temporary hire field staff, and two consultants. The principal investigator will be located at FENACRE headquarters in ochabamba, while all other staff will operate from offices to be rented by FENACRE in Santa Cruz.

The five full time staff to work on the project during year one are the following personnel:

- Project Director
- Economist/Systems Analyst
- Statistician
- Programmer/Data entry clerk
- Secretary

The chart on the organizational relationship between project staff is presented in Figure V-3 in general, the principal investigator and project director will have overall responsibility for management of the project. The economist/systems analyst will be principally responsible for conducting the data analysis and costing tasks, while the statistician will have primary responsibility for the development, implementation and analysis of the household survey. The programmer and secretary will provide administrative and technical support services as needed to all tasks. A chart allocating each of these individual's

Figure V-2

[illegible]

time across year 1 tasks is presented in Table V1. In addition, four field supervisors and therteen interviewers will be brought on as temporary help to administer the household survey. The epidemiology and health economics consultants will participate for approximately two weeks each in both the questionnaire data analysis plan development stage and the actual data analysis stage.

The project will most require the services of the statistician or the seventeen temporary full staff in year two. The workload allocations of the remaining project staff is presented in Table V2. The project's epidemiological and health economist consultants will both travel to Santa Cruz for a trip of approximately two weeks to assist in the analysis of the MIS data base.

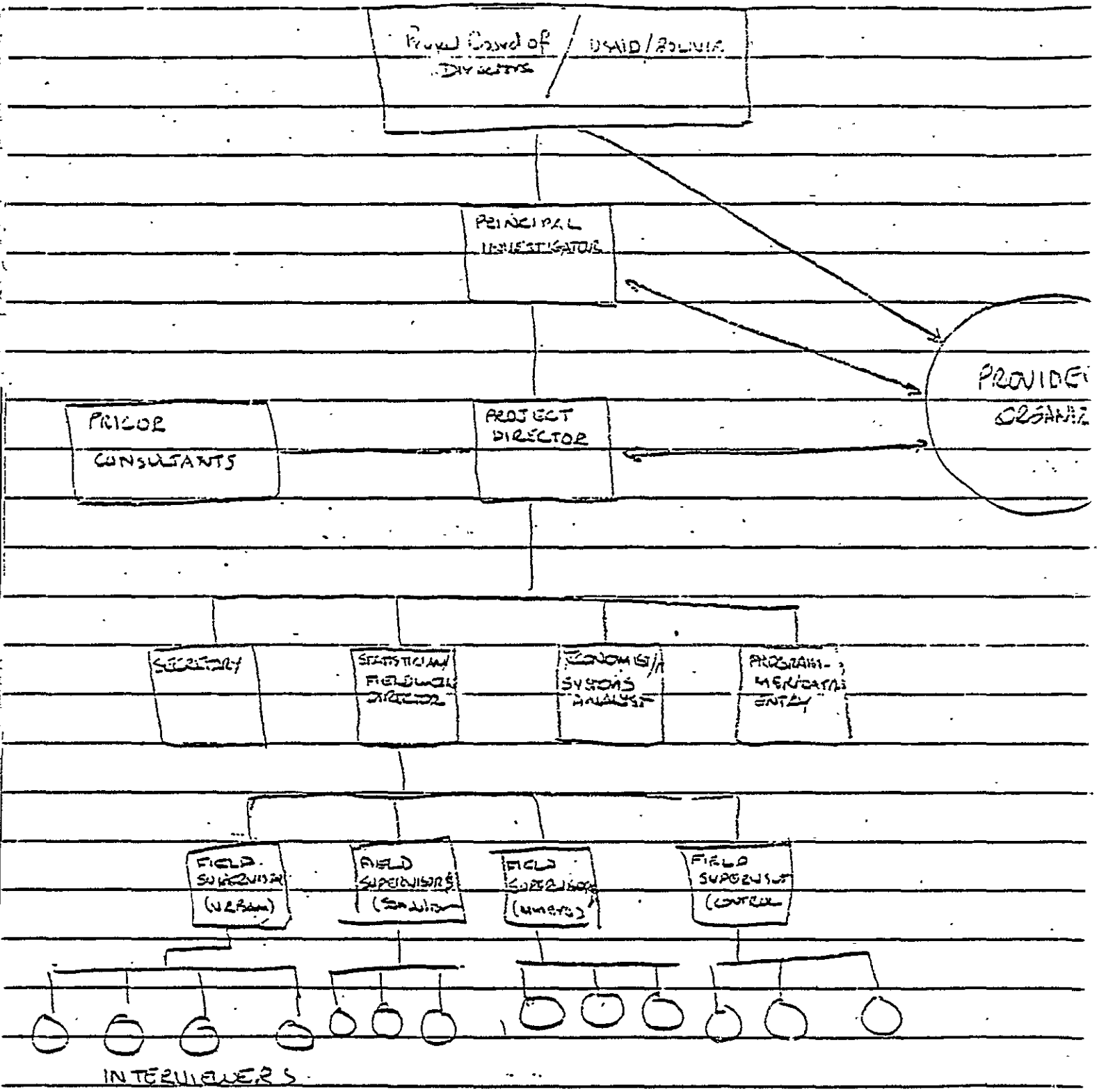
In year three, the need to carry out another household survey will require the project to contract for the services of a statistician for approximately 6 months. As in year 1 seventeen field staff will be hired for short-term interviewing and field supervision activities. The project's two consultants will both spend two weeks in Santa Cruz assisting in the end-of-project evaluation. In addition Tulane University School of Publich Health and Epidemiology will process this large quantity of end project data. Table V3 identifies the allocation of project staff's time to year 3 tasks.

Upon notice of award of this grant, FENACRE will begin recruiting to fill these project positions. Sr. Marco Antonio Tellez, General Manager of FENACRE will serve as principal investigator. The candidates for these positions will be assessed against the optimal qualifications criteria for each position presented in Table V4. Once appropriate personnel have been identified by FENACRE the curriculum vitae and USAID biodata sheets for these individuals (including Sr. Tellez) will be submitted

to USAID/Bolivia for review, then forwarded to PRICOR/Washington for final approval. Similarly, any change in project personnel during the life of the project will also require USAID/Bolivia and PRICOR prior approval.

CHART OF FINANCE/MGMT OF PROJECT

(YEAR 1)



FENACRE/PRICOR Project

Workload Allocation year 1

	Principal Investig.	Project Director	Econ.	Stat.	Programmer data inf.	Total/ tasks
Central Adm.	26	39	-	-	10	75
Phase I						
1. Warehouse Review	-	7	10	5	-	22
2. Key informant interviewers	-	8	6	3	-	17
3. Case studies	-	6	5	-	-	11
4. Longitudinal Data collection/Analysis	-	22	35	25	25	107
5. Household survey						
a. design/test	-	10	4	10	-	24
b. sampling method.	-	3	-	10	-	13
c. field superv. travel	-	3	-	15	-	18
d. interviewers	-	5	-	40	-	45
e. data entry/analysis	-	25	25	70	85	200
6. Report prepared	-	12	10	15	10	47
Phase II						
1. identification serv.	-	5	5	-	-	10
2. analysis of services costs	-	20	45	5	15	85
3. dev. of services package options	-	10	10	5	20	45
4. identification of alt. formulating policies	-	20	30	5	10	65
5. development inf. computer capacity	-	20	35	22	40	117
6. Reports	-	15	15	15	10	55
Phase III						
development of MS	0	30	25	15	40	110
	26	260	260	260	260	1.066

FENACRE/PRICOR PROJECT

Year 2 Workload allocation

	Principal Invest.	Project director	Economist syst/anal	Progr.	Total
General administrator	26	26	-	10	62
Phase III					
Dev/refinement of MIS	-	34	80	125	239
Periodic Analysis of MIS data (including special system)	-	200	180	125	505
	26	260	260	260	806

FENACRE/PRICOR PROJECT

Year 3 Workload Allocation

	Princip Inv.	Proj Dir.	Econ.	Stat.	Programmer/ data entry	Total task
General Adm.	26	35		-	-	-
Phase III						
Periodic Analysis of MIS data	-	40	75	5	70	
In depth evaluation						
Longetudinal data analysis	-	25	40	10	40	
special studies of data, other	-	50	60	5	40	
key inform interv. implementation	-	25	20	-		
	-	5	-	10		
survey instrument review/revision	-	10	5	10	10	
training of field supervision/interviewrs	-	-	-	15		
Adm. of instrument	-	10	-	20		
Analysis of data	-	40	40	40	30	
Reports	-	20	20	15	20	
	26	260	260	260	260	

Suggested qualifications for PRICOR Project Personnel

Principal Investigator

1. Holds senior level administrative position within FENACRE
2. Experience in the administration of research projects

Project Director

1. Educational background in some analytic field (e.g statistics, economics)
2. Previous senior level administrative experience, experience in project management prefered
3. Knowledge of computer systems/applications
4. Previous experience in manipulation of large data sets
5. Knowledge of health care issues
6. Previous experience in survey administration/analysis

Economist/Systems Analyst

1. Educational background in economics, finance or related field (training in computer sciences with experience in these types of applications may be substituted)
2. Previous experience in primary data analysis
3. Previous experience in the design and implementation of management information system
4. Knowledge of health care issues
5. Fluency in computer language (BASIC,FORTRAN) (optional)

Statistician

1. Educational background -statistics
2. Experience in sample selection household survey design, implementation and analysis
3. Previous experience in analysis of large data sets

Programmer/data entry clerk

1. Training in computer sciences or related field
2. Fluency in at least one computer language.

6. BUDGET SUMMARY

PRINCIPAL INVESTIGATOR: DR. MARCO ANTONIO TELLEZ

ORGANIZATION: FENACRE

ADDRESS: Casilla 829
Cochabamba, Bolivia

DURATION: From (mo/yr) 5/83 through (mo/yr) 4/86 No. months 36

BUDGET CATEGORIES		U.S. DOLLAR AMOUNT REQUESTED			
		Year 1	Year 2	YEAR 3	TOTAL
A. Personnel (Direct Labor)		16,194	10,560	17,926	44,680
B. Fringe Benefits		9,716	6,336	10,756	26,808
C. Overhead on Labor		-	-	-	-
D. Consultant Costs	PRICOR	13,365	5,100	5,360	23,825
E. Other Direct Costs		10,707	8,180	10,608	29,495
F. Travel and Per Diem		4,872	662	4,196	9,730
G. Subagreements	PRICOR	7,900	3,938	4,431	8,369
				6,000	6,000
H. Total Direct Costs		41,489	25,738	49,486	116,713
I. Indirect Costs	PRICOR	21,265	3,938	9,791	34,994
		8,298	5,148	8,697	22,143
J. Total Budget		49,787	30,886	58,183	138,856
	PRICOR	21,265	3,938	9,791	34,994

Principal Investigator

DR. MARCO ANTONIO TELLEZ
Typed Name and Title

Signature

Date

Authorized Institutional Representative

Typed Name and Title

Signature

Date

DETAILED BUDGET
PROVIDE ONE FOR EACH YEAR
YEAR: 1

A. Personnel (Direct Labor) Name Position	Time/Effort Estimated %	Days	Rate ($/Day)	Total $US
Principal Investigator	15	39	11.54	450
Project Director (TBN)	100	260	13.84	3,598
Economist/Systems analyst (TBN)	100	260	9.81	2,551
Statistician (TBN)	100	260	9.81	2,551
Programmer/data entry clerk (TBN)	100	260	7.63	1,938
Secretary/typist (TBN)	100	260	4.50	1,170
Temporary				
Field Supervisor (4) (TBN)	20	52	8.75	1,820
Interviewers (13) (TBN)	20	52	3.13	2,116
Total				16,194

B. Fringe Benefits (If Applicable) (See Schedule ____) Rate 60% x Base 16,194 = Total 9,716

C. Overhead on Labor (If Applicable) (See Schedule ____) Rate ____ x Base ____ = Total ____

D. Consultant Costs Name	Speciality	Estimated Days	Rate ($/Day)	Total $US
Dr. William Bertrand	Social Epidemiology design and field methods	30	243	7,290
Lawrence Bartlett	Health Financing and Economist	25	243	6,075
Total			PRICOR	13,365

E. Other Direct Costs (Supplies, Postage, Material) Item Description	Number of Units	Cost Per Unit	Total $US
Paper/supplies	12 mos.	100	1,200
Printing-general			510
questionnaires			1,000
Office rental/Santa Cruz	12	170	2,040
Field kits (sleeping bags, lanterns)			857
Lease of Micro computer, hard disc drive, printer	12	300	3,600
Miscellaneous supplies and software			1,500
Total			10,707

F. Travel and Per Diem (International Travel)			Per Diem		
Itinerary	Cost x No. Trips	= Total	Rate x No. Days		= Total
New Orleans/La Paz/Sta Cruz	1300 x 2	= 2,600 PRICOR	40 x 60		= 2,400 PRICOR
Washington, D.C./La Paz/ Sta Cruz (RT)	1,450 x 2	= 2,900 PRICOR			
Domestic Travel			**Per Diem**		
Itinerary	Cost x No. Trips	= Total	Rate x No. Days		= Total
1. Sta Cruz Sta Cruz/La Paz (2 mos)	$35 x 24	840	10	x 240*	400
2. Transport from Sta. Cruz to and within San Julian-vehicle Leased from fides	$110	x 12 mo = 1,320			
3. Gasoline @$.30 galon x 10gls/car wk x 52 weeks		312			
Total					4,872 PRICOR 7,900

G. Subagreements (A "Detailed Budget" must be submitted for each) List by Name	Total
1.	
2.	
3.	
4.	
Total	

H. TOTAL DIRECT COSTS:		41,489
	PRICOR	21,265

I. Indirect Costs (General and Administrative Costs) (See Schedule ____) Rate 20% x Base 41,489 = Total 8,298

J. Total Budget		49,787
	PRICOR	21,265
Year 1	$ US	

DETAILED BUDGET
PROVIDE ONE FOR EACH YEAR
YEAR: 2

A. Personnel (Direct Labor) Name Position	Time/Effort Estimated %	Days	Rate ** ($/Day)	Total $US
Principal investigator (Tellez)	10	26	12.70	330
Project Director (TBN)	100	260	15.22	3,957
Economist/Systems Analysis (TBN)	100	260	10.79	2,805
Programmer/data entry clerk (TBN)	100	260	8.39	2,181
Secretary/typist (TBN)	100	260	4.95	1,287
** Includes 10% increase over year 1				
Total				10,560

B. Fringe Benefits (If Applicable) (See Schedule ____) Rate 60% × Base 10,560 = Total 6,836

C. Overhead on Labor (If Applicable) (See Schedule ____) Rate ____ × Base ____ = Total ____

D. Consultant Costs Name	Speciality	Estimated Days	Rate* ($/Day)	Total $US
Dr. William Bertrand	Social Epidemiology design and field methods	10	255	2,550
Lawrence Bartlett	Health Financing and Economist	10	255	2,550
* Assumes 5% increase over year 1				
Total			PRICOR	5,100

E. Other Direct Costs (Supplies, Postage, Material) Item Description	Number of Units	Cost Per Unit	Total $US
Office supplies, postage	12 mos.	125	1,500
Printing			400
Office rental	12	190	2,280
Misc. supplies (computer and data)			400
Lease of computer	12	300	3,600
Total			8,180

F. Travel and Per Diem International Travel					Per Diem			
Itinerary	Cost	x No. Trips	=	Total	Rate	x No. Days	=	Total
New Orleans/La Paz/Sta Cruz (RT)	1430	x 1		1,430 PRICOR	44	x 22		968 PRICOR
Washington, D.C./La Paz Santa Cruz (RT)	1,540	x 1		1,540 PRICOR				

Domestic Travel					Per Diem			
Itinerary	Cost	x No. Trips	=	Total	Rate	x No. Days	=	Total
Sta. Cruz/La Paz or Santa Cruz/Cochabamba	38.50	x 12		462	10	x 20		200

Total		662
	PRICOR	3938

G. Subagreements (A "Detailed Budget" must be submitted for each) List by Name	Total
1.	
2.	
3.	—
4.	
Total	

H. TOTAL DIRECT COSTS: 25,738

PRICOR 3,938

I. Indirect Costs (General and Administrative Costs) (See Schedule _____) Rate 20% x Base 25,738= Total 5,148

J. Total Budget

Year 2 $ US 10,886

PRICOR 3,938

DETAILED BUDGET
PROVIDE ONE FOR EACH YEAR
YEAR: 3

A. Personnel (Direct Labor) Name Position	Time/Effort Estimated %	Days	Rate** ($/Day)	Total $US
Principal investigator (Tellez)	10	26	13.97	363
Project Director (TBN)	100	260	16.74	4,352
Economist/systems analyst (TBN)	100	260	11.87	3,086
Programmer/data entry clerk (TBN)	100	260	9.23	2,400
Secretary/typist (TBN)	100	260	5.45	1,417
Temporary				
Statistician	50	130	11.87	1,543
Field Supervisors (4)	20	52	10.59	2,203
Interviewers (13)	20	52	3,79	2,562
** Includes 10% increase over year 2				
Total				17,926

B. Fringe Benefits (If Applicable) Rate 60% × Base 17,926 = Total 10,756
(See Schedule _____)

C. Overhead on Labor (If Applicable) Rate _____ × Base _____ = Total _____
(See Schedule _____)

D. Consultant Costs Name	Speciality	Estimated Days	Rate ** ($/Day)	Total $US
Dr. William Bertrand	Social Epidemiology design and field methods	10	268	2,680
Lawrence Bartlett	Health Finance and Economics	10	268	2,680
** Assumes 5% increase over year 2				
Total			PRICOR	5,360

E. Other Direct Costs (Supplies, Postage, Material) Item Description	Number of Units	Cost Per Unit	Total $US
Office supplies, postage	12 mos	167	2,000
Printing Questionnaires and reports			2,000
Office rental	12	209	2,508
Misc. computer and data supplies			500
Lease of computer	12	300	3,600
Total			10,608

F. Travel and Per Diem - International Travel				Per Diem			
Itinerary	Cost x No. Trips	=	Total	Rate x No. Days		=	Total
New Orleans/La Paz/ Sta Cruz	1,573		1,573 PRICOR	48.5	x	24	= 1,164 PRICOR
Washington D.C./La Paz/ Sta Cruz	1,694	x 1	1,694 PRICOR				

Domestic Travel				Per Diem			
Itinerary	Cost x No. Trips	=	Total	Rate x No. Days		=	Total
Sta Cruz/La Paz or Sta Cruz/Cochabamba	42.35	x 12	= 508	12	x	150*	= 1,800
transport Nineros			1,600				
2 cars rented @ $ 200/mo.							
Gasoline $0.60 gal x 60 gal/mo/car x			298				

Total		
		4,196
	pricor	4,431

G. Subagreements (A "Detailed Budget" must be submitted for each) List by Name	Total
1. University of Tulane (data processing)	6000
2.	
3.	
4.	
Total	6000

H. TOTAL DIRECT COSTS:		49,486
	PRICOR	9,791

I. Indirect Costs (General and Administrative Costs) (See Schedule ____) Rate 20% x Base 43,486 Total 8,697

J. Total Budget

Year 3 $ US 58,183

PRICOR 9,791

PD-AAQ-486
ISN: 37706

AMERICAN PUBLIC HEALTH ASSOCIATION
International Health Programs
1015 Fifteenth Street, NW
Washington, DC 20005

REPORT ON CO-OP HEALTH PROJECT

CONSULTANCY

A Report Prepared by:

LAWRENCE BARTLETT
HEALTH ECONOMIST CONSULTANT

During the Period:

March 1-26, 1983

Supported by The:

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT
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TABLE OF CONTENTS

	Page
Executive Summary	v
Economic/Financial Analysis of USAID/Bolivia Co-Op Health Project	1
I. Estimation of Future Health Care Demand by Target Population	2
A. Background	2
B. The Montero Study	4
C. Projection of Income and Expenditures	g
II. Analysis of Proposed Project Services and Costs	20
A. Services and Expenditures	20
B. Financing Approaches	24
III. Cost-Effectiveness Analysis	30
Appendix A: Preliminary List of Information to be Gathered as Part of PRICOR/Co-Op Health Project Household Survey	
Appendix B: The Development of a Self Financing Health Care Delivery System Through Cooperatives in Bolivia	

EXECUTIVE SUMMARY

The scope of work for this consultancy was the following:

a. Review financial feasibility methodology used in the approved PID and modify, as necessary.

b. In association with anthropologist, design questionnaire and select sample to provide data on current expenditures by target population for health care, including drugs, as a percent of estimated average family income, as well as estimated demand for health services to be provided under the project.

c. Determine costs, both fixed and variable, to provide specifically identified health services to target populations through the self-financing primary health care system.

d. Review program membership recruitment steps outlined on page 30 of the PID and propose specific methodology for adjusting both packages of health care services to be delivered and alternative means of generating revenues to cover program costs under the life of the program.

e. Provide the guidelines for establishing an actuarial table that would allow the project to determine a fee schedule based on the pathology encountered, rates of utilization of services, and service delivery costs.

f. Based on most likely assumptions regarding demand for various services and estimated service delivery costs, carry out a financial analysis of the project's self financing aspect using the methodology employed in the PID.

g. Complete PRICOR proposal taking into account recommendations of those who reviewed the original draft proposal and the results of the analyses requested above.

h. To the extent possible, prepare an economic cost effectiveness analysis to determine whether the proposed health care delivery system is the least cost alternative for meeting the project's health care delivery alternatives.

It was determined that the analyses called for in tasks a, c, e, f, and h could be presented most coherently as part of one overall analysis of the proposed project. For this reason, these items have been incorporated in the economic/financial analysis of the project presented in this report. The other tasks included in the scopes of work are addressed below.

- o Work with anthropologist to design questionnaire and select sample to provide data on current health care expenditures (Task D)

Frequent discussions were held in Santa Cruz with anthropologist Ivokraljevic concerning the types of questions to be asked of co-op members in order to assess the extent of their current health care expenditures, the relationship between these expenditures and household income, and identify those factors affecting their demand for health care.

An extensive list of questions/information items was developed for this purpose. Given the anthropologist's limited scope of work and time constraints, such a comprehensive data gathering activities was not possible. A shortened list of questions was therefore developed and incorporated into the anthropologist's survey instrument. The schedules of this consultant and the anthropologist did not overlap sufficiently to allow this consultant to review the findings of his survey.

Both the extended and shortened list of economically-oriented questions are presented in Appendix A. The extended list should form the basis of the economic portion of the household survey instrument to be developed under the PRICOR project.

- o Review Program Membership Recruitments Steps in PID (Task D)

The membership recruitment steps described on pages 30-31 of the PID provides for the following steps to be carried out in sequence:

- Announcement to co-op of establishment of program and its membership fees.
- In individual communities, conducting of survey to determine health care needs and expenditures.
- Negotiation with individual communities concerning services to be provided and financing mechanisms.

Negotiation of these matters at the individual community level would likely result in a wide variety of service packages find financing schemes being offered within the same co-operative. The result would be an administrative nightmare, particularly at the higher levels of the health delivery system (II and III) where one facility would be serving individuals from several communities, each with different service coverage and payment mechanisms.

It is recommended that this methodology be revised so that only one service package and one financing mechanism be set up for each co-operative. The packages finally selected by a co-op could be drawn from a number of possible alternatives designed by provider organization/PRICOR staff. The basis for development of these alternatives should be the analysis of data collected from a sample of households representative of the entire co-op and the final analysis of the viability of various financing mechanisms. Analysis of each benefit package vis-a-vis each financing alternatives need also be carried out to ensure the costs of each service package are met be each financing alternative. A fuller description of the way in which these analyses will be undertaken can be found in the methodology section of the PRICOR proposal found in Appendix B.

- Complete PRICOR proposal

A revised proposal to receive funds from PRICOR for operations research activities associated with the co-op health project has been prepared and is included as Appendix B to this report. This revision has been developed to reflect the concerns of USAID/Bolivia and the comments made by members of PRICOR's grant review panel. This document has been discussed with and approved by Dr. Marco Antonio Tellez, General Manager of FENACRE, the recipient of the award.

ECONOMIC/FINANCIAL ANALYSIS

OF USAID/BOLIVIA COOP HEALTH PROJECT

This document provides an economic and financial analysis of the proposed USAID/Bolivia Coop health project as described in the Project Identification Document (PID). In general this analysis should be seen as an expansion of the one included in the PID. When necessary, however, modifications were made in the basic approach presented in that document.

A review of the costing approach contained in its PID reveals it to be quite sound. Given that the nature and the costs of service inputs has not changed since the PID, it was determined through discussions with Dr. Hougen of USAID/Bolivia that the principal issue on the supply/cost side, after reviewing the financial analysis and correcting any discrepencies in input prices, would be the assessment of whether the proposed financing/pricing policies will generate the utilization and expenditure levels necessary to cover project costs. Given this goal of establishing a health and delivery system which will be self-supporting, an accurate assessment of the target communities' ability and willingness to pay for health services is essential. For this reason, this report will begin with an analysis of the demand side of the health care market in the project's target area.

The outline for this analysis is as follows:

I. Estimation of Future Health Care Demand by Target Populations
   - A. Background
   - B. The 1977 Montero Study
   - C. Projection of Income and Expenditure Levels

II. Analysis of Proposed Project Services and Costs
   - A. Services, Financing and Expenditures
   - B. Comparison with Projections and Baseline Data
   - C. Financing Approaches

III. Cost-Effectiveness Analysis

I. Estimation of Future Health Care Demand by Target Population

A. Background

Historically, health care services to low-income rural or peri-urban populations in developing countries have been provided through governmental health delivery systems (for free or at a nominal charge) and/or through individual entrepreneural providers practicing either traditional or western medicine. A review of attempts to establish community-financed delivery systems indicates that most have not met with any great degree of long-term success (Stinson, 1982). This same review identified the following eight general approaches to generating community contributors:

- Personal service fees
- Drug sales
- Personal Prepayment
- Production-based prepayment
- Income generating schemes
- Community or individual labor
- Donations and ad hoc assessments
- Fund-raising through festivals, raffles, etc.

Before any one or a combination of the above general financing altenatives can be selected as the optimal approach, a thorough understanding of the factors affecting the need and demand for health services must be gained. These factors can be subsumed under five general categories:

Category	Factor
Demographic	• Age, Sex (D_1, D_2)
Biological	• Incidence of disease (B_1)
	• Severity of illness (B_2)
Cultural	• Perception of Illness (C_1)
	• Socio-cultural factors affecting acceptability of different types of services (C_2)
Service-related	• Types of services avaialbe (S_1)
	• Accessibility of services (travel time and transport costs) (S_2)
	• Quality of care provided (S_3)
Economic	• Price of individual services/Cost of contribution (E_1)
	• Total cost of care (E_2)
	• Disposable income/available resources (E_3)
	• Opportunity cost of receiving/net receiving care (E_4)

When services are provided free of charge, the first three economic factors – the price of services, total costs, and available income/resources – may not play a very significant role. However, when some form of financial contribution is required to suport the health care system, these factors become much more important.

Certain of these factors may remain fairly fixed over time; others may change from year to year or may fluctuate on a seasonal basis within a single year. These factors must be carefully considered in both projecting the potential demand for health services and designing appropriate community-financing mechanisms for such services.

The effect of these factors on the project's target population is explored below.

B. The Montero Study

The only baseline data available for assessing the potential health care demands of the target population is provided by the results of a 1977 household survey conducted in the Montero region of Santa Cruz.

This survey asked interviewees to recall the incidence of illness and the amount of health care expenditures incurred during the two week period immediately preceeding the interview. From the survey sample it was determined that the average per capita health expenditure during the two week period was US $2.13 ($b 20 = US $1). These expenditures were divided as follows:

Drugs	76.4%
Service Fees	14.6%
Transportation	5.0%
Other	4.0%
	100%

The Montero study extrapolated these expenditures to a full year period to obtain an estimate of $55.38 in health care expenditures per capita or, when multiplied by an average household size of 5.6 persons, an estimate of $309 in average annual family expenditures on health care. Taking this sum as a proportion of the 1977 net cash income for the average small farm household in Santa Cruz ($898) yields a finding that farm families may have been spending roughly 35% of their net cash income on health care.

The study findings indicated that an average individual became ill about 12.5 times per year and visited a health provider 2.6 times per year. The complete annual behavior pattern of the average individual can be expressed in the following general utilization/expenditure equation:

$$a_1x_1 + a_2x_2 + a_3x_3 + a_4x_4 + a_5x_5 = \$55.38$$

where: a_1 = # illness episodes when no provider was contacted

a_2 = # visits made to a physician/year

a_3 = # visits made to a nurse/year

a_4 = # visits made to other types of health workers/year

a_5 = # hospital admissions/year

x_1 = average cost per illness when no health care provider is contacted

x_2 = average cost per visit to a physician

x_3 = average cost per visit to a nurse

x_4 = average cost per visit to other types of health care provider

x_5 = average cost per hospital admissions

Using the Montero data in this equation provides the following complete utilization/expenditure equation:

$$9.87\ (\$1.46) + 1.69\ (\$10) + .44\ (\$3.28) + .31\ (\$4.05) + .185\ (\$115.52) = \$55.38$$

It should be noted that the Montero household survey was conducted during the months of October, November and December, 1977. If it is assumed that the factors affecting the utilization of, and expenditures for, health services do indeed change either seasonally or from one year to the next, extrapolation of the findings of a point in time study could yield biased estimates of annual levels. For example, the incidence of diarrheal and respiratory disease – which accounted for nearly half of all reported illness espisodes in the Montero study – are believed to be positively related to, respectively, the arrival of the rainy and cold seasons in Santa Cruz. Evidence of this can be found comparing the incidence of diarrheal diseases, presented in a report prepared by staff at the Hospital de Saavedra (Bacherer, 1982) with the average rainfall recorded in that area over a 20 year period (See Figure 1). As illustrated in the same figure, the incidence of respiratory problems was found by the hospital to increase during the cold months of May, June, and July.**

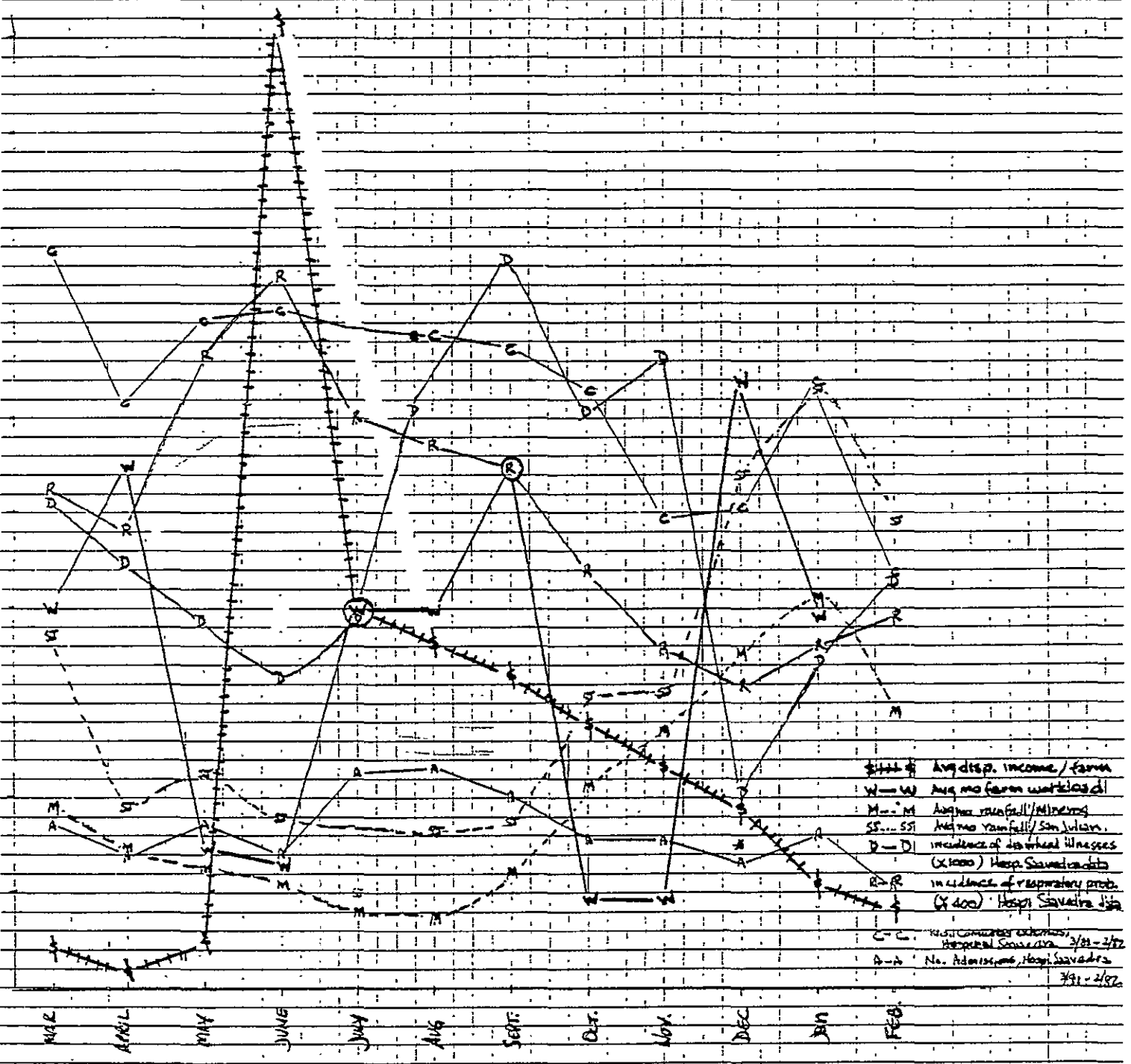
**It should be noted that while they may be indicative of the fluctuations in the incidence of different diseases, these charts should be viewed with some caution as the methodology used for determining incidence rates is not described in the report.

Similarly, given the cyclical nature of farm production, substantial seasonal variation in the economic factors affecting health service utilization/expenditures can be expected. A recent study prepared by the Menonite Economic Development Associates (MEDA) (Graber, 1982) estimated the relative level of income available to an average farm household during the course of a year. As illustrated in Figure 1, income for those farmers unable to store their harvest is estimated to arrive in one lump sum in June when the bulk of his crops (in the MEDA report, assumed to be rice and corn) are sold. Based upon a projected monthly family budget, available or disposable income is shown to be progressively reduced during subsequent months until it reaches its low point in April. Income is increased slightly in May from the projected sale of an early rice harvest, with the replenishment of the family's income coming once again after the June sale of its crops.

Just as monthly disposable income levels could be expected to vary in an agricultural society, so too might workload requirements differ from month to month. The MEDA study also estimated the amount of manpower needed by a farm family to accomplish certain tasks during the course of a crop year, including land preparation, seeding, weeding and harvesting. Indices of these requirements are also presented in Figure 1 for a small farmer cultivating two hectares each of rice and corn. As can be seen, the workload is highest during April - when the rice and corn harvest overlap, in September -- when land preparation activities predominate, and in December -- when the farmer is busy with weed and pest control.

With respect to health services utilization, farm workload or manpower requirements can be viewed to some degree as a surrogate for the cost of using/not using health services. Several possible relationships could be hypothesized. In the first, the farmer may be more concerned about the opportunity cost (a loss in productivity, cost of hiring replacement) of taking time out to

Figure 1. Comparison of Indices of Factors Affecting Health Services Utilization and Sample Utilization Levels



seek health services for problems which develop during peak work periods and therefore not seek care. Conversely, a second hypothesis might claim that the farmer would be more concerned about the potential opportunity costs of not receiving care for a health problem which develops immediately before or during peak manpower periods, i.e., the possibility of the problem becoming worse and incapacitating him even further for the remainder of the busy period. Yet a third possibility could be that the farm household's reaction to the need for health services during busy periods might be determined by which household member becomes ill (highly productive male vs young child), the perception of the severity of the illness, and other factors such as available income. For example, during the high workload month of April, the farmer may choose to continue working, and ignore most health problems because available income is near exhausted and paying for needed care or drugs might require selling off certain household possessions or taking out a loan. During the busy month of September, however, available income is greater and the relative cost of receiving care may not be so great.

It should be noted that the seasonal fluctuations in disposable income and the opportunity cost of receiving/not receiving care were modeled upon a small rural farm family which cultivated two hectares of rice and two of corn, who had no storage facilities, and whose sale income was derived from crop sales. While the general principles would also apply to small farmers producing other crops such as vegetables, or who had some small ancillary sources of income, the timing and magnitude of the seasonal fluctuations would be expected to vary. Indices of these factors as well as actual utilization data from the Hospital Saavedva are also plotted on the chart shown in Figure 1. These fluctuations would not apply, however, to low-income peri-urban families which relied on family members' salaries as their major source of income. In these

cases, disposable income (at least in nominal terms) would likely be much more stable over the course of a year, as would the opportunity cost of an income-generating member of the family being ill.

The purpose of the previous discussion has been threefold:

- to present a rough approximation of the significant fluctuations in factors likely to affect health care utilization and expenditures which occur during the course of a year.
- to highlight the fact that the variations in these factors often move in contradictory directions, i.e. the factor positively influencing utilization may be increasing at the same time another positive factor may be decreasing or a negative fator increasing.
- to identify the potential biases which may be introduced if, without giving adequate consideration to changes in these and other underlying factors, the findings of a single point in time crossectional survey is extrapolated to a full year or compared to the results of a similar survey conducted at another time in the year or on a substantially different population (e.g. far vs peri-urban).

Despite the above caveats, it appears that the timing of the Montero study (October through December) may represent a relatively "average" period for both utilization and disposable income, certainly more representative than months such as April or June. For the purposes of this analyses, the extrapolation of the Montero findings will therefore be assumed to represent a relatively valid estimate of annual expenditures.

C. Projection of Income and Expenditures

The discussion so far has focused only on examples of the seasonal variations in factors affecting health care utilization/expenditures. There are, however, important factors the relative values of which may change from one

year to the next. Certain of these, such as the individual's perception of illness, may without intervention change slowly from year to year. For others, the changes may be more precipitous. An examination of the effect of inflation in Bolivia in recent years will provide a good example of how certain factors move in one direction, rather than cyclically, during the course of a year and therefore change their absolute level from one year to another.

As described earlier, an estimate of the relative proportion of farm income in Santa Cruz which was spent on health services in 1977 (34.5%) could be obtained by projecting the average household expenditure level found in the Montero study to a full year ($309) and then taking it as a percentage of the average income at that time of a small farmer ($898). Since that time, however, the economic situation in Bolivia has been very volatile, with high rates of inflation sending prices soaring. These 1977 expenditure and income figures can be used as a baseline to estimate in very rough terms what the effect of the country's economic crisis has been in both real and nominal terms on the cost of health services and other consumer goods and on the income of the small rural farmer. An attempt can also be made to relate these findings to wage-earning peri-urban families.

For the purpose of this analysis, an index of 100 is assigned to both the 1977 average income of a small farmer and the composite price level for consumer goods during that year. It is assumed for purposes of this exposition that health care prices will move in line with overall consumer prices. Estimates of annual growth in wholesale agricultural product prices and in the consumer price index (La Paz) found in a recent International Monetary Fund (IMF) document are used respectively, as surrogates for the increases in small farmer income and consumer prices faced by the farmer (including those for health care). These rates of growth are presented in the table below.

Annual Rates of Growth in

Selected Economic Indicators

(%)

Item	1978	1979	1980	1981
Consumer Price Index	10.4	19.7	47.2	32.4
Wholesale Price Index/ Agricultural Products	20.6	27.8	54.7	24.8

To determine price and income levels from the end of 1981 to the present, different methodologies were used for each measure. To estimate price levels, the rate of increase in the CPI for 1981 (32.4%) was carried through to March, 1982 when the exchange rate of the unofficial market in which most non-central government activities take place was reported to be $b 115 = US$ 1. In March, 1983 that rate had increased to approximately $b 500 = US$ 1, a monthly increase of 13% or 334% over a 12 month period. It is assumed that 75% of consumer good inputs were affected, either directly or indirectly, by this drop in the unofficial purchasing power of the peso and therefore their prices raised accordingly, while 25% of consumer good inputs were domestic inputs whose prices (e.g. salaries) were downwardly sticky and therefore are assumed to have risen at a rate of only 100% during the same period. The composite inflation rate for March 1981 to March 1982 resulting from this methodology is 275.5%, calculated in the following manner:

$$.75 \times 334\% = 250.5\%$$

$$.25 \times 100\% = \underline{25.0\%}$$

$$275.5\%$$

It should be noted that the Montero study found that 76% of all health care expenditures went toward the purchase of drugs. That the price of drugs, most of which are imported in either final form or as raw materials, has risen at a rate at least comparable with the one just estimated is evidenced by the data

which indicate that the wholesale retail prices of certain drugs and medical supplies purchased in Santa Cruz have risen during the period June to November, 1982 at an average rate of over 19% per month, or an annual rate of over 700%. Interestingly, however, a more recent review of wholesale drug prices in Santa Cruz found almost no increases in prices from November through March. This was the result of an agreement between pharmaceutical manufacturers and the government in which the manufacturers agreed to freeze prices in return for access to dollars needed for the purchase of foreign goods. How long this accord will continue is uncertain.

To estimate increases in small farm income from 1981 through the 1983 harvest period, estimates were obtained from MEDA for the following: a) the average price received by the previously described "average small farmer" per unit of rice and corn, and b) an estimate of the relative contribution of each crop to the farmer's total net income from both harvests (66% rice, 34% corn).

These estimated prices are shown in the table below. Where MEDA officials indicated a range of possible prices for the 1982 and 1983 harvest, a value in the lower range was used to reflect the decline in the size of the yields for those harvests.

Estimates of Prices for Selected Crops

1981 - 1983

Crops	PRICE 1981	PRICE 1982	1981-82 increase	PRICE 1983	1982-83 increase
Rice ($b/fanega)	1300	2100	61.5%	7500	257.1%
Corn ($b/quintale)	135	225	66.7%	750	233.3%
% increase weighted to reflect relative impact on income			63.25%		249.2%

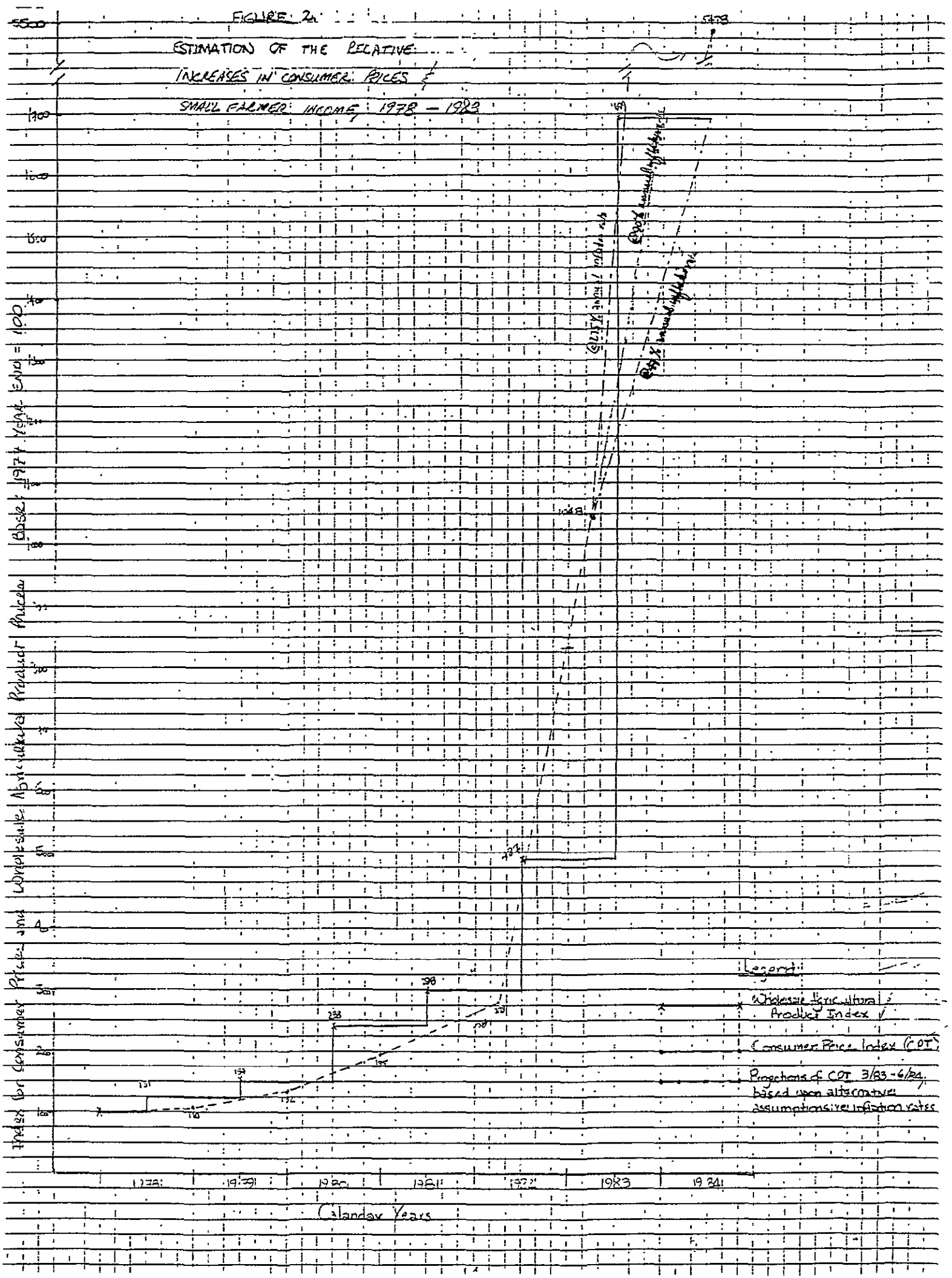
Combining these estimates for the recent growth in these surrogates for prices and small farm income with those of the IMF report for 1978-81 will allow us to assess the present economic status of the small farmer. A graph increasing the 1977 baseline indices for these two items by the estimated annual rates of growth is presented in Figure 2.

The income of the small farmer is shown as a step function to reflect the assumption that the bulk of his income is received at roughly one point during the year. This amount is presumed to be the total available until the following year's harvest is sold. The graph for the consumer price index is a smooth function, reflecting continuous movement in price levels during the course of a year. The small farmer is "better off" than he was in late 1977 (i.e. his income could buy more than it did then) whenever his income line is to the left of the CPI line. According to this analysis, the small farmer more than maintained the purchasing power of his income through the early part of 1982, about the time prices for the 1982 harvest were being negotiated. Shortly after that period, however, the rate of inflation skyrocketed and despite an increase of approximately 63% in the unit price of his rice and corn crops, the purchasing power of the small farmer's income plummetted in the later half of 1982 and the first part of 1983. The farmer's situation is likely to improve in June of this year as the result of an anticipated 249% increase in crop prices. Depending upon the rate of inflation experienced during that period, however, this improvement may be short-lived.

As illustrated by the projections for the growth of the CPI in Figure 2, for the small farmer's income to have the same or better purchasing power than it did in 1977 during the entire July 83-June 84 period, the inflation rate for that period could not exceed 47%. If the present 275% rate of inflation were to continue, farmers' purchasing power would quickly drop below 1977 levels. At a 90% inflation rate, it is estimated that famers would be better off than in 1977

FIGURE 2a

ESTIMATION OF THE RELATIVE INCREASES IN CONSUMER PRICES & SMALL FARMER INCOME, 1978 – 1983



for the first half of July 83 - June 84 period, with the purchasing power of their incomes dropping below 1977 levels for the second half of that period.

The net effect of recently high inflation rates and the uncertainty of the magnitude of further increases in price levels leaves the future purchasing power of the small farmer in doubt. If the annual inflation rate abates to an average of 90% over the next 12 months, the farmer's purchasing power will remain about what it was in 1977. That is, by allocating 35% of his income to health services he will be able to buy the same quantity of services as he was able to purchase at the time of the Montero study. If inflation is greater than 90%, the farmer will have to spend an even greater proportion of his income to purchase the same amount of services as in 1977, or he will have to settle for purchasing smaller quantities of health care with his 35% allocation.

How changes in these economic factors actually influence the small farmer's health care expenditures is not known. As the average household income changes, its health care expenditure patterns may be affected in one of three ways:

1) it may stay as a constant proportion of nominal income (i.e., the income elasticity of these expenses = 1);
2) it may increase at a higher rate than income (elasticity > 1);
   or it may drop as a proportion of the total income (elasticity < 1).

Inflation may also affect the elasticity of health care expenditures. For example, if the purchase of certain units of health care is relatively insensitive to price increases (i.e., price elasticity < 1) and prices rise more rapidly than income, expenditure might also be seen as income elastic.

If it is assumed that crop prices will reach the levels projected in Figure 2 and that the farmer will maintain health expenditures at the proportion of his household budget as in 1977 (i.e., the income elasticity of health care expenditures is 1), then the following estimate of household expenditures can be made:

1977 income	x	1983 index factor	=	1983 income	x	1983 % of income on health care	=	Total household expenditures on health care	
$b 17,960	x	16.99	=	$b 305,140	x	.345	=	$b 105,273	= US$526.37*

This figure of $526.37 is extrapolated from 1977 Montero expenditure levels, of which approximately 39% went toward inpatient hospital costs ($21.37 of the $55.38 per capita amount). However, the benefit package proposed for the coop project includes very little inpatient services, estimated to be only 21.6% of the projects' target population's requirements (again based on Montero utilization rates). Thus the project benefit package would make up only 69.4% of total 1977 health care expenditures, or approximately 24% of household income. If this percent is applied to 1983 estimated income, this will provide a per capita budget constraint within which the revenues required to cover project services must fall, as calculated below:

est. 1983 income	x	% exp. on project health services	÷	average family size		÷	b/US exchange rate	=	per capita budget constraint
$b 305,140	x	.24	÷	5.6	= $b.13,077	÷	200	=	US$65.39

It should again be noted that as the result of inflation, this amount of $65.39, although equal to 24% of the average household income, may not be able to buy the same amount of services that 24% of the average 1977 household income could purchase.** If overall prices, including health care

*At the current official exchange rate of $b 200 = US $1.

**It should in fact be realized that the important figure for estimating the budget constraint is the Bolivian peso value, for this will be the currency used for paying for health care services. Different US $ estimates would result from converting this amount at either the official or unofficial exchange rate.

prices, rise between March 1983 and January 1984 rise at an annual rate of 90%, the purchasing power of the household's income would remain at 1977 levels. If the rate was 105%, 24% of the household budget would be able to be only about 80% of the services it could have purchased in 1977. However, because the actual prices of project services will be determined by a direct analysis of input prices, the major value of this figure of $65.39 will be to serve as a budget constraint giving a preliminary indication of the maximum amount individuals would be willing to pay for the type of health services to be offered by the project.

It must be stressed, however, that this issue of the price and income elasticity of health care expenditures is in fact a critical factor in affecting people's ability and willingness to pay for services in the current economic environment of Bolivia. While the asusmption of unity elasticity may be valid based upon the important nature of these services, an empirically-based estimate of this aspect can only be obtained through the type of household survey and analysis to be carried out in the PRICOR project. This project may also allow the determination of different elasticities. The results of these studies will provide up-to-date information for the final design of program benefit packages. For the purpose of the analyses in this document, the assumption of unit elasticities will continue to be used.

Sufficient information, including baseline expenditure and income data, is not available to fully analyze the effect of inflation on wage-earner's income and health care expenditure patterns. Figure 3 presents some information on the reported rate of increase in salary levels in Bolivia. Whereas the small farmers' income was estimated to have kept pace with inflation up until early 1982, average salary levels appear to have not kept up with inflation during the period 1978-1981. This situation is likely to have been severely exacerbated in

FIGURE 3

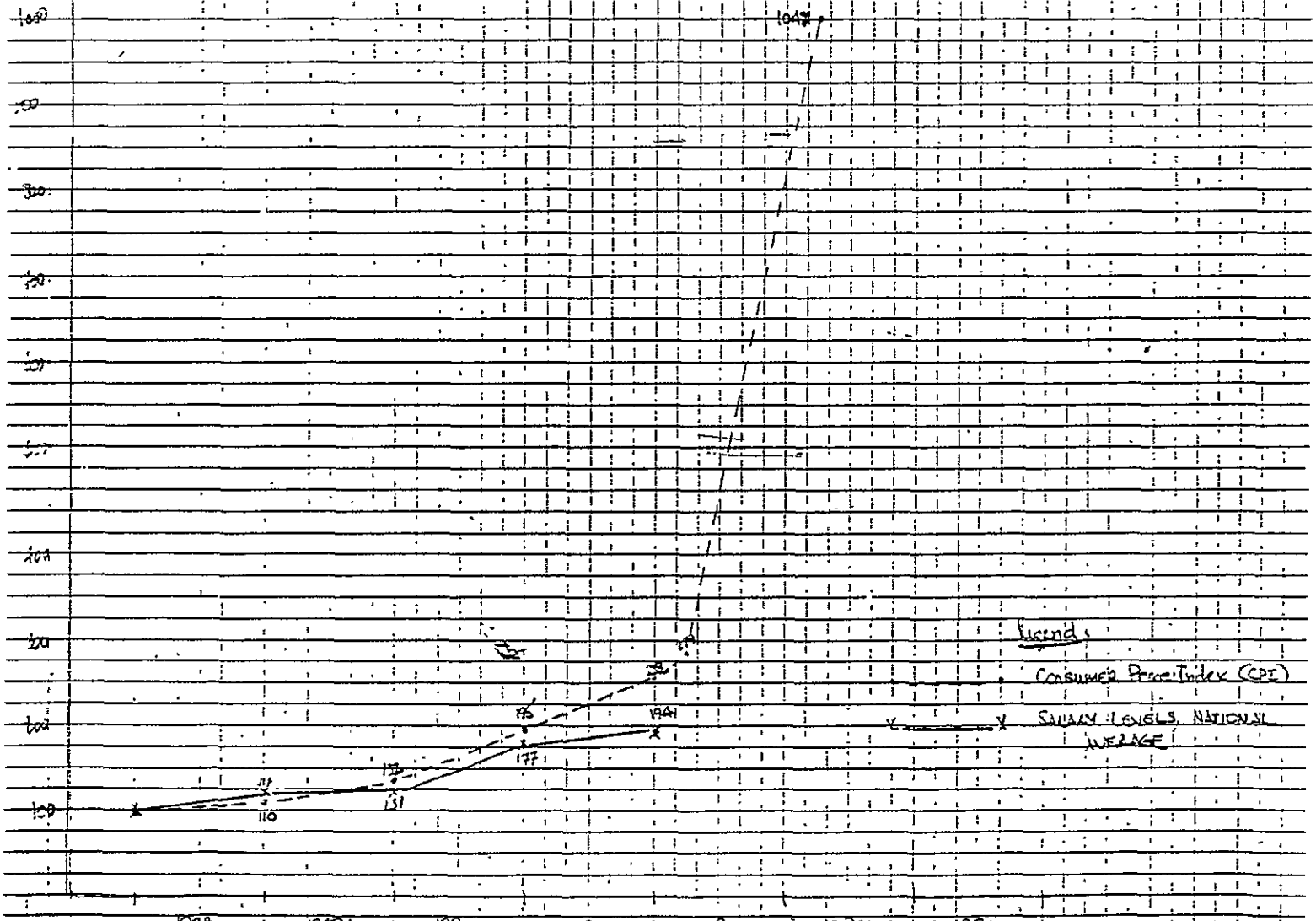
ESTIMATION OF THE

RELATIVE INCREASES IN

CONSUMER PRICES &

NAT. AVG. OF SALARY LEVELS

1978 - 1981



1982, although there is some indications that employers may have in some cases provided support in the form of bonuses, subsidized food, or through other means. Nonetheless, it is thought that the peri-urban wage earner, whose income is not directly tied to the increasing prices of consumer products, has probably suffered more from inflation over the past five years than the small farmer. To address this situation to some degree, the Bolivian government recently announced an across-the-board increase of $b 3,010 per month for employees earning up to $b 50,000 per month. Additional increases will be made on a semi-annual basis, the amont to be determined by the level of inflation during that period.

Because of the dearth of information on wage-earner's health care expenditure patterns the remainder of this analysis will concentrate upon the comparison of the extrapolated Montero findings with the costs associated with the project's proposed service package. Until better data on the behavior of the peri-urban household can be obtained from the PRICOR project, the assumption must be made that the absolute income and expenditures patterns of the rural area are relatively applicable to the peri-urban population as well. Thus a per capital budget constraint of $65.39 is used for the peri-urban target population as well.

II. Analysis of Proposed Project Services and Costs

A. Services and Expenditures

An analysis of the utilization and financial data contained in the PID indicate that the per capita expenditure pattern presented in Table 1 is anticipated.

These expenditures are based upon certain assumptions concerning the types of services to provided, the charges to be assessed for each service, and utilization levels for each service. Since the time the PID was prepared, several minor changes in project inputs have been made which would increase slightly the amount of revenue to be generated by each individual to cover total costs. These are:

	Yearly Cost (US$)	Per Capita @ year avg. of 36,900 indiv. covered for the 3 years (US $)
a) Addition of two drivers, a pharmacist, a pharmacist assistant to the provider org. staff	6,980	.189
b) Addition of two vechicles to provider organization		
- Yearly amortization @ $25,000 base cost and 4 year useful life	6,250	.169
- Gas, maintenance	2,000	
c) Recent increase in minimum wage @ 2.8% of original per capita revenues)		.41
		.78

Yearly per capita revenues to support the updated cost estimates would thus be $14.47 + .78 = $15.23.

Two important comparisons can be made between the expenditure levels and patterns extrapolated from 1977 data to 1983 and those proposed in the PID. Table 2 highlights these comparisons using the updated revenue figure of $15.23.

TABLE 1

Annual Projected Per Capita Expenditures (US$)

	Member Fees	Drugs	Service Fees	First Aid Fees	Inpat. Fees	Lab Fees	Delivery Fees	Coop Save	Total	% Total Exp.
Level I (225 persons)	3.84	2.218	.347	-	-	-	-	.222	6.627	(45.8%)
Level II (1,575 persons)	-	1.75	.63	-	-	-	-	.032	2.412	(16.7%)
Level III (6,300 persons)	-	2.66	1.189	.929	.223	.357	.048	.028	5.43	(37.6%)
Total All Levels	3.84	6.63	2.17	.93	.22	.36	.05	.28		
% Total	(26.5%)	(45.8%)	(15%)	(6.4%)	(15%)	(2.5%)	(3%)	(2%)	$14.47	

TABLE 2

	Anticipated per capita expenditures through Coop project (US$)	Anticipated health care expenditures projected from Montero data (US$)	% of Anticipated health care expenditures accounted for by Coop project
Drugs	6.97 (46.8%)	49.96 (76.4%)	14%
Fees, Miscellaneous Charges	8.26 (54.2%)	15.43 (23.6%)	53.5%
	15.23	65.39	23.3%

First, and perhaps most importantly, the total revenues needed to support the proposed project health delivery system fall well within the previously estimated per capita health budget constraint of $65.39, accounting for only 23.3% of that amount. Even if the assumption of the unit price elasticity of health care is relaxed, projected project expenditures may still be within the new budget constraint. For example, if an annual health services inflation rate of 150% is projected through the rest of 1983 along with a very low long-term price elasticity of .5 for health care services from 1978 through 1983 and the price of health care services prior to March 1983 rose roughly at the same rate as the consumer price index, the annual budget constraint for health care

set in early 1984 would be approximately $60.50.* Projected project revenues would still be only 25% of this figure.

A similar analysis can be conducted to assess the sensitivity of health care expenditures to changes in real income. If the assumption of 150% annual inflation through the remainder of the year is applied to all consumer goods and the estimated index of 1983 farm income from Figure 2 is used, real farm income would be about 82% of 1977 levels (1/2083/1/1699). If an estimate of 1 is used for the real income elasticity of health care is used, real 1983 expenditures would be 82% of 1977 levels or $45.19 per person. If the income elasticity of health care expenditures were increased to 1.25, 1983 expenditures would be $42.64.** In these cases, the per capita revenues required of the project would be 34% and 36% respectively of projected expenditure levels.

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*Extrapolating from data shown in Figure 2, if an annual inflation rate is assumed from March 1983 to the end of the year, the index value for the price of health care services will be 2083 in January 1984. Per capital health care expenditures were $b 1108 in 1977 ($55.38 x 20 pesos to the US$1 = $b 1108). Therefore:

$$Ep = \frac{\%\ \text{expenditures}}{\%\ \text{price}}$$

$$.5 = \frac{\frac{1108-x}{1108}}{\frac{100-2083}{100}}$$

$$x = \$b\ 12{,}093 - 200\ \$b/\$US = US\$60.47$$

where EP = price/elasticity

x = 1983 health care expenditures

** $$E_I = \frac{\%\ \text{expenditures}}{\%\ \text{real income}}$$

if E = 1 $= \dfrac{\frac{US\$55.38-x}{55.38}}{\frac{1-.815}{1}}$ if E = 1.25 $= \dfrac{\frac{US\$55.38-x}{55.38}}{\frac{1-.816}{1}}$

x = US$45.19 x = US$42.64

where E_I = Income elasticity
x = 1983 health care expenditures

In summary, the PID's estimates of annual per capita expenditures required to be made on project services appear to be well within the projected budget of the average farm family. For the project's revenue requirements to be beyond the ability or willingness to pay of the target population in early 1984, inflation would have to continue at 250% per annum and the elasticity of health care expenditures with respect to real income would have to be greater than 1.95.* In essence, such a situation would indicate that health care expenditures are very sensitive to changes in real income and during inflationary times would drop at nearly double the rate at which real income declines.

In fact, however, different components of total health care expenditures may have different elasticities. For example, in times of tight money, individuals may reduce their expenses on health care provider fees through increased frequency of self-diagnosis and self-prescribing of drugs. In other words, payment of provider fees may be more strongly effected by reductions in real income, while drug-related expenses may be less elastic, or even negatively elastic (i.e., as real income drops, overall health care expenditures may drop while drug expenses are reduced at a lesser rate or remain fairly constant). For this reason, it is important that the benefit package to be offered through the coop health project take this into consideration.

B. Financing Approaches

This point then leads to several other observations which can be made of the data presented in Tables 1 and 2. First, as seen in Table 1, nearly 27% of total revenues are projected to be obtained through monthly membership fees.

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*If inflation continues at 250%, price index by early 1984 will be 2682. Real income index will be 1/2682/1/1699 = .63. Therefore,

$$E_I = \frac{\frac{55.38-15.23}{55.38}}{\frac{1-.63}{1}} = \frac{.72}{.37} = 1.95$$

The significant fluctuations in the rural family's disposable income, however, make the successful collection of equal monthly payments highly unlikely. A recommended alternative would be to collect the bulk of these fees soon after crop sales (June - July) either in a lump sum payment or through a few monthly front-loaded payments.

In addition, it should be noted from Table 2 that the project's proposed allocation of revenues by type of service – 45% for drugs, 54% non-drug services – differs substantially from the breakdown of expenditures observed through the Montero study (76% drugs, 24% other). As a result, the project's non-drug fees would account for over half the anticipated expenditures the average family might make on non-drug services had the Montero pattern been projected to 1984. These revenues are based on relatively reasonable fees and on these less flexible assumptions:

- 80% of the community will register to participate in the program;
- each facility in the system will reach full capacity by its third month of operation; and
- the number of paid provider contacts will be 4.86 per year per community resident (an 87% increase over the Montero rate of 2.6 per person).

Were one or more of these assumptions to be violated to any great extent, given the proposed revenue structure, the financial self-sufficiency of the project might be jeopordized. A closer look at the proposed pricing of drugs, however, provides evidence that additional revenues might be generated which could be used to subsidize non-drug related service delivery activities at Levels II and III or support the provider organization if utilization/participation rates fall short of expectations.

In the PID, drug revenues were estimated at the cost of a certain quantity of drugs (assumed to include transportation and taxes) plus a 20% markup. However, as shown in Table 3, the base prices of a sample of drugs to be used in

TABLE 3

Comparison of Costs of Selected Drugs, By Source

(US$)

Drug	Amount Req. (units) (1 year)[1] (Courses of Treatment x units/treat.)	Lowest Avail.[2] Unit Cost	Bolivian Wholesale Unit Cost[3]	Bolivian Retail Unit Cost[4,5]	Total Cost Lowest Available Wholesale	Total Cost Bolivian Wholesale	Total Cost Bolivian Retail	U.S. Wholesaler Costs
1) Antidiarrheal	13,710 x 15 = 205,650 tabs	.004 (US wholesale)	.028	.036	823	5,759	7,313	823
2) Piperazine	575 x 15 = 36,250 tabs	.003 (Act. Medeor)	.019	.024	259	1,639	2,070	895
3) Anticholinergic	7,170 x 20 = 143,400	.004 (US wholesale)	.035	.044	574	5,019	6,310	574
4) Antacid pills	5,205 x 30 = 156,150 bills	.004 (US wholesale)	.028	.035	625	4,372	5,465	625
5) DS Lactated Ringer's W Solution	600 x 2000cc	10.00 (UNICEF)	30.44	33.66	6,000	18,264	23,196	price not avail.
6) Ampicillin, Oral	800 x 20 = 16,000 plus	.031 (UNICEF)	13.4	.17	496	2,144	2,720	698
7) Ampicillin Suspension	400 x 2 = 800	.50 (UNICEF)	3.479	4.43	400	1,396	3,544	price not avail.
8) Tetracycline HCl oral 250 mg.	2,520 x 34 = 85,680	.012 (UNICEF)	.069	.087	1,028	5,912	7,554	1,259
9) Sulfa	630 x 40 = 25,200	.021 (US wholesale)	.019	.024	479	479	605	529
10) Cold Tablets	4,890 x 20 = 97,800	.006 (US wholesale)	.021	.027	587	2,054	2,633	587
11) Ophthalmic Antibiotic ointment	7,170x1(5mg)= 7,170	.10 (UNICEF)	.53	.67	717	3,800	4,804	8,589
12) Aspirin	35,150x30= 1,054,500	.002 (UNICEF)	.007	.009	2,109	7,382	9,160	3,610
					14,097	58,220	75,374	
Comparison of prices for which wholesale US prices available					7,697	38,560	48,634	18,129

1. Number of courses of treatment and dosage per treatment estimated by public health physician consultant.
2. Sources: Recent price lists of Action Medeor (W. German exporter), NY-based US wholesaler and UNICEF.
3. Sources: INTI and VITA price lists (Santa Cruz, March 1983).
4. Bolivian wholesale prices + 27% markup (maximum set by government).
5. Actual retail prices higher when purchases made in small quantities. Survey of several retail pharmacies in City of Santa Cruz and Mineros found sale price for one aspirin tablet to be US$ 0.023 to US$ 0.04 ($b 4–8).

Findings

Local wholesale prices 400% higher than lowest available wholesale prices (not including transport, handling taxes).

Local retail prices at least 532% higher than lowest available wholesale.

US wholesale prices 135% higher than lowest available wholesale prices.

Local wholesale prices 113% higher than US wholesale prices.

Local retail prices 168% higher than US wholesale prices.

the project varies subtantially from one source to another. Local retail prices were found to be, on average, over 530% higher than the lowest available wholesale prices (exclusive of taxes and transportation).

Further, Table 4 indicates that, depending upon the efficiency of the drug procurement process, a much greater markup may be applied to drugs while still pricing them substantially below current market prices. Five alternative sources of project drug supplies are considered:

a) The purchase of drugs from the cheapest available source, with one-half of drugs purchased from U.S. wholesalers with USAID funds at the official 200-1 exchange rate and drugs from other sources purchased with foreign exchange obtained at the unofficial $b500 - US$1 rates;

b) Drugs purchased entirely from US wholesalers (whose prices are sometimes higher than other sources) using USAID funds which are replaced in the project with local currency at 200 to 1;

c) Bolivian wholesale;

d) Bolivian retail; and

e) Same as (a) above but local currency used for all purchases at 500-1 exchange rate.

If a policy is adopted to see the prices of these drugs at 80% of local retail prices,* various markups are possible, ranging from 1.6% to 115% of acquisition costs. If a policy is established of placing 25% of the markup in reserve to cover systems losses and unanticipated increases in replacement costs, from 1.2% (Procurement C) to 90% (Procurement A) of acquisition costs could be available to support other project activities. These amounts range from

*It should be noted that this estimate of local prices is based on wholesale bulk prices plus the supposedly "maximum markup set by the government. It most likely underestimates considerably the actual retail price to families who purchase drugs in small quantities. For example, as indicated on a footnote in Table 3 the actual selling price for one adult aspirin tablet ranged from 2¢-4¢ as opposed to the estimated retail price of less than 1¢.

TABLE 4

Potential Markup for One-Year Project

Drug Supply, By Source

	A Wholesale drug costs, lowest available	B US Wholesale	C Bolivian Wholesale	D Bolivian Retail	E Lowest available wholesale, using local currency for all purchases
Base (US$)* price	65,842	155,387	329,210	418,096	65,842
Transport @ 25%					
Taxes @ 10%	23,045	54,385	-	-	23,045
	88,887	209,772	329,210	418,096	88,887
Conversion to peso	½ @ 200/1 ½ @ 500/1	x 200	x 200	x 200	x 500
Total acquisition cost	31,110,900	41,954,400	65,842,000	83,619,200	44,443,500
80% of local retail				66,985,360	
Allowable markup to set prices @ 80% of local retail (%)	35,874,460 (115%)	29,940,960 (59.4%)	1,053,360 (1.6%)	**	22,451,860 (50.5%)

*Calucalted from list of drugs prepared by Public Health Consultant Dr. R. Lebon. Other prices determined using relationhips between prices of sample drug found in Table 3.

**Losses incurred.

$b790,020 (US$3,950) (Option C) to $b26,905,845 (US$134,529) (Option A). The dollar value of these estimated "profits" represent a substantial portion of acquisition costs in alternatives (A) and (E) because of the different exchange rates used in the process: 500-1 for half of (A) purchases and all of (E), and 200-1 to convert peso profits to dollars.*

Thus, it is estimated that if the utilization, cost, and membership assumptions on which the PID's financial analysis is based are met, the project may be expected to achieve self-sufficiency somewhat earlier than projected due to the additional income to be generated through drug sales. If these assumptions are not met, these additional funds will serve as a reserve to subsidize other activities and thus maintain the project's fiscal integrity. The exact amount of these revenues will depend on the efficiency of the drug procurement procedures developed.

On the topic of pricing policies, task E of this consultant's terms of reference asks for guidelines for establishing an actuarial table that would allow the project to determine a fee schedule based on the pathology encountered, rates of utilization of services, and service delivery costs. The establishment of fee levels should be predicated on the idea of meeting or exceeding the total cost of providing such care, both fixed and variable. The idea presented in the PID of offsetting fixed costs with fixed sources of income and variable costs with variable revenues is conceptually an attractive one. It should be viewed with some caution, however, if such an approach generates fee levels which are significantly at variance with existing prices of competitors in the marketplaces. For example, such an approach might recommend setting drug prices slightly above acquisition costs, thereby leaving the service delivery side of the system potentially vulnerable to fluctuations in the demand for such

*Such profit margins are predicated on the project's ability to charge prices which, while substantially less than local retail, are, in fact, in excess of the 27% and 15% markup limits set for local retailers on national and foreign produced drugs, respectively. This legal point should be explored carefully.

services. Variations from the basic concept of the fee for a service covering all attendant costs should be based not directly on the specific pathology encountered but, to the extent possible, on:

- estimation of the relative sensitivity of the demand for service to changes in the price charged for that service (price elasticity) and
- the perceived value of the utilization of that service to the sponsors of the delivery system.

The sensitivity of demand for changes in services will be determined by:

- The individual's perceived need for a particular service;
- the existence of alternative sources of that service and the cost of that alternative (including travel costs, waiting time, etc.);
- the relationships between utilization of one service and access to another (e.g., the demand for provider diagnostic services will likely be less sensitive to price increases if it is a prerequisite to the purchase of low-cost drugs).

Consideration of the second factor (i.e., the value assigned to it by project sponsors) would be the basis for subsidizing substantially preventively-oriented services such as health education and pre-natal and well-baby care.

III. Cost-Effectiveness Analysis

The time constraints of this consultancy did not allow a detailed cost-effectiveness analysis of the proposed project. However, several brief points can be made with respect to the cost-effectiveness of the proposed coop health project.

First, the preceding analysis of drug costs has indicated that through more efficient procurement practices, the potential exists for substantial reductions in drug costs. These lower costs can be passed on to the consumer through two approaches: lower drug prices, reduced travel costs, and subsidization of provider service costs to keep these in line with alternative sources (i.e., Ministry of Health facilities). As a result, it is estimated that services can be provided to the target population at a total cost lower than the existing situation.

A second point to be made is the fact that the services to be delivered through the coop health project as well as the manner in which they will be delivered are not the same as the current situation. If the measurement of alternative approaches' cost-effectiveness is based upon each's achievement of certain goals related to the health status of the target population, these differences are very important. In the current situation,

- many needed drugs are simply not available,
- services are not coordinated, i.e., substantial amounts of drugs are being consumed without adequate diagnostic and treatment controls, and
- effective preventative services are not being provided.

The proposed coop health project would address these shortcomings of the present system by providing a coordinated delivery system. Th effect of this situation will be to improve the effectiveness of project inputs in actually achieving improvements in the health status of the populations to be served.

In addition to contrasting the proposed project to current health care delivery system, comparisons with other alternatives can also be made. The most frequently discussed possibility would be for USAID/Bolivia to establish solely a revolving fund for the purpose of purchasing low-cost drugs and providing these drugs through Ministry of Health facilities. This approach was not estimated to be as cost-effective as the proposed project design because of the serious deficiencies in Ministry administration and service delivery infrastructure that have been identified through the Montero project experience and discussed in the PID. These shortcomings would likely raise projected costs somewhat, dilute the effectiveness of services delivered, and have the end result of requiring a higher cost to effect a unit change on health status than the project approach.

APPENDIX A

Preliminary List of Information to be Gathered as Part of PRICOR/Co-op Health Project Household Survey

I. Community Specific

(Assign unique ID to each community)

A. General Characteristics

- # families
- # families who are members of participating co-op
- existence of other co-ops - # families in community who are members
- geographic size of community
- access to roads
- quality of roads
- health care providers accessible to community
- existence of health promoter (Y/N)
- rural vs. peri-urban
- other characteristics
  - source of potable water
  - age of community/fluctuations in size

II. Household Specific

A. General

Assign unique ID to each household and to each member of household.

1. Basic socio-demographic data

- size of household
- ages of household members
- ethnic background
- years at present location
- condition of house
- primary residence
  - other residences
- access to potable water
- sanitation facilities

2. Income

a. Peri-Urban

i. identify each individual bringing in income
ii. type of work - manner of payment (salary, commission, etc.)
iii. date employment began/date of recent terminations
iv. income level/worker
v. other regular sources of income/identify source, amount
vi. increases in salaries over past year
  - amount of increase/worker
  - date of increase

vii. renumeration by employers informs other than salaries
- super-sueldos
- subsidized food
- other

viii. if payment other than salary - any change in hours worked

ix. is land/home owned or rented
- amount of land
- condition of home
- if rented monthly rent

x. any crops grown for commercial purposes (Y/N)
- if yes continue with first set of rural questions concerning crops

b. Rural

i. size of land
- owned/rented

ii. condition of house

iii. types of crops grown this year and last year

iv. hectares cultivated/crop - this year and last year

v. yield/crop - this year and last year

vi. price received/unit/crop (at farm gate, if possible), this year and last year

vii. cost of harvesting - this year and last year - per crop
a. mano de obra (hired) - specify amount
b. transportation - specify amount
c. other (specify nature) - specify amount

vii any other sources of income, this year and last year - specify sources and amount

viii plans for income from cocheca
- expand cultivated land (identify percents, is possible)
- capital purchases
- savings

c. Both Groups (rural and peri-urban)

i. levels of savings - current and this time last year - interest rate in both periods

ii. any loans outstanding
o if yes - how much
- for what purpose
- from whom
- date indicated
- anticipated payment date
- interest rate

o if no, what was date of last loan
- for what purpose
- from whom
- date iniciated
- anticipated payment date
- interest rate

o if current or last loan was not to cover cost of health problem, ask date of last loan for this purpose and repeat questions

- how was health care problems resolved?

iii. have you had to sell any of your possessions over the last 12 months
- if yes, what, when, how much received

iv. do you anticipate selling any items in the next 12 months

vi. what are your average daily recurrent costs
- food, other items

vi. to what extent is family self-sufficient, i.e., grows its own food

3. Health Care Utilization and Expenditures

A. Begin with Montero-type questions if possible, determine type and quantities drugs were purchased and at what price, travel time home and distance to pharmacy and other sources of care re unless utilization during last two weeks for hospitalizations seek up to 3 month recall. After all illness incidences identified, proceed to additional specific questions.

B. i. if no illness reported, ask what would be done if someone mildly sick and if very sick.

ii. if illness reported, but no contact made with health professional, inquire where person would go if condition became a) slightly more serious or b) much more serious.

iii. Location of nearest pharmacy - distance/travel time, (rainy and dry), mode of transportation. If drugs purchased during last two weeks and were from here, ask if price is lower than other places.

If drugs not purchased from nearest pharmacy, why not?

iv. Determine location, travel time, etc. of nearest hospital, possible sources of physician and nurse consulta externa.

v. If these providers used in past two weeks, ask about reasons for selecting facility:

- location
- cost
- if usual site of service
- quality

v. If a health care provider was used in past two weeks but it was not be closest one identified in B. v. above, or response in B. ii. above was to use a different provider, ask why closest facility not selected.

- price
- personality of provider/quality
- other things - e.g., no drugs

vi. For visits to provide:

- if drugs were to be purchased as part of treatment, were they purchased:
  - from provider
  - from other source
- if from separate source, why?
- not available for provider
  - cheaper at other source
- if other source, distance/travel from
  - provider
  - home
- were drugs purchased during same visit to provider?

C. In past 12 months, have you needed services but had been refused because you had no money?

- when
- where

D. If no hospitalization reported in last 3 months,

- identify date of last hospitalization
- cause
- facility
- duration
- total cost
- service of financing
  - savings
  - loans
  - income
  - items sold
  - other
- outcome
- impression of facility

4. <u>Co-op Participation</u>

A. i. member of co-op (Y/N)
   - La Merced, Mineros, San Julian

   ii. if yes, how long

   iii. reason for decision to join/not join

   iv. if La Merced member
   - ever use its physician referral service
     - when last time
     - cause
     - cost
     - frequency - source of care
   - ever use its pharmacy,
     - if no, why
     - if yes, why
   - are prices lower than in other places, e.g., closest pharmacy identified in B. ii.

5. Other

- open ended questions about views concerning provision of health care thru co-ops, etc.
- questions about desired services, willingness to pay for such services.

APPENDIX B

THE DEVELOPMENT OF A SELF FINANCING HEALTH CARE DELIVERY SYSTEM THROUGH COOPERATIVES IN BOLIVIA

A Proposal Submitted to :

FRICOR

by

Federación Nacional de Cooperativas de Ahorro y Credito
de Bolivia

and

USAID/Bolivia

INDEX

I. Research Problem

A. The Health Problem

B. The Proposed Health Care System

C. The Health Interventions

D. The Target Populations

II. The Operational Problem

III. Utilization of Research Results

IV. Methodology.

A. Phase I: Baseline/Diagnosis

1. Tasks

a. Literature Review

b. Key Informant Interviews

c. Case studies

d. Longitudinal Data Collection/Analysis

e. Household Surveys

f. Analysis of Data

g. Preparation of Reports

B. Phase II: Development of Service Packages/Financing Mechanisms

1. Decision variables

2. Tasks

a. Identification of Possible Services

b. Analysis of Service Costs

c. Development of Benefit Package Options

d. Identification and Analysis of Financing Policies

e. Development of Interactive Computer Capability

f. Preparation of Reports

C. Phase III: Implementation of Co-op Health Project

1. Tasks

a. Development of Management Information System

b. Periodic Analysis of MIS Data

c. In depth Program Evaluation

V. Management Plan

A. Organization

B. Institutional Capability

C. Workplan and Reporting Requirements

D. Research Staff

VI. Budget

ABSTRACT

Ranking lowest on key health indicators in all Latin American, Bolivia urgently needs primary health care services for marginal areas. This project proposes to develop self-financing PHC services through the large and active cooperative movement in and near the city of Santa Cruz. Over a two year peri baseline studies, needs assessments, health manpower training, and well-define PHC programs will be developed for the populations served by three agricultura cooperatives in the area. In the end, all programs will be community financed and operated mainly by cooperative leaders and health promotors.

The project is unique in its nontraditional approach to providing PHC services. The major research interest will be the community financing and sel diagnosis/needs assessment. Quasi experimental research designs using a combination of interviews, observations and an encounter based management information system will be utilized to record cost and health service ut iliza data. The responsible institution in Bolivia will be the Federación Nacional de Cooperativas de Ahorro y Crédito de Bolivia (FENACRE) with technical assistance from the Tulane University Department of Biostatistics and Epidemiology. The results of this research will be important to leadership of the targeted cooperatives as well as the directors of other cooperatives in Bolivia. Additionally, it will be useful for the USAID/Bolivia mission to have concrete information on self-financing models for health care.

PRICOR PROPOSAL

DESIGN OF A SELF-FINANCING HEALTH CARE DELIVERY SYSTEMS THROUGH THREE COOPERATIVES IN THE DEPARTMENT OF SANTA CRUZ, BOLIVIA

I. RESEARCH PROBLEM

Bolivia, among all the nations in Latin America ranks lowest on key indicators of the health status of its population. Efforts to address the health needs of the country's predominatly rural population through the public health care delivery system operated by the Ministry of Social Welfare and Public Health (MSW/PH)have historically been hampered by serious administrative and fiscal shortcomings within that organization. Indeed, the experience in a recent USAID-supported rural health program yielded the conclusion that without major administrative changes and dramatic increases in financial resources, there is little hope that the MSW/PH could establish the complex systems needed to support the delivery of rural health services with any degree of continuity.

The Ministry's problems have been exacerbated by the recent economic crisis in Bolivia which has forced the government to reduce its 1982 health operating budget by 70 percent in real terms from the 1981 level. As a result, government funds are barely sufficient to cover the salaries of health facility personnel and perhaps food for patients who are admitted. Adequate quantities of medical supplies are not available, and very few facilities carry even minimal supplies of essential drugs.

In view of the inherent weknesses of the MSW/PH delivery system and the pressing health care needs of the country's population, USAID/Bolivia began exploring alternative ways of making essential health services more readily available. The Mission has proposed utilizing several existing savings and loan and agricultural cooperatives in the Department of SantaCruz as a vehicle for providing primary health care services to their rural and peri-urban members. This private sector delivery mechanisms is envisioned to be self-supporting. With the communities serviced generating sufficient revenues to cover all delivery system costs. A fuller description of this project can be found in the project identification paper presented in Appendix A.

The research problem to be addressed by this PRICOR project will be to design the community financing mechanisms necessary this USAID-supported cooperative health project to achieve self-sufficiency. To achieve this objective, PRICOR-supported activities will also be directed at developing those service packages which each co-op community could reasonably be expected to support and at periodically assessing and revising as necessary the finance/services packages which are initially selected by each co-op.

A. The Health Problem

The complex of diseases found in Bolivia is standard to developing countries, including infectious, often-vaccine preventable diseases, diarrheal diseases aggravated by malnutrition, and others. Although population specific data is difficult to get, hospital based mortality in Santa Cruz, the target region of this proposal, had as the first causes of death accidents and poisonings, diarrheal disease, tuberculosis, perinatal infections and acute respiratory infections (Dept. de Planificación, 1982).

More specific community based data from the rural areas of Santa Cruz us available which specifies the conditions in the target area. At the end of 1977 a baseline interview and rudimentary clinical examination of 3372 persons was conducted in the NE and NW sections of the Montero region of Santa Cruz (Frerichs, 1979). Although the data was collected 4 years ago there is no reason to suspect that conditions have improved drastically. Indeed the recent economic collapse in Bolivia may have aggravated them.

This survey covered 51 communities using three teams of two interviewers, each with Quechua language speaking capability. As well as standard morbidity and mortality information obtained through interviews, information was also obtained by taking samples and a physical examination, including a blood sample for hematocrit, weight, height and measurements of mid upperarm, chest and head. Some of the results of the survey were:

- 51% of males and 53% females are less than 15 years of age. demostrating large proportion of children dependent on the working age population.
- Child dependency ratio is 112.2 indicating that there are 1.12 children less than 15 years of age for every person aged 15 - 64 years
- Languages spoken in the household were Spanish and Quechua.
- Common occupational designation 75% self employed agriculture worker woman 94%
- Based on blood samples taken to children of both sexes from 0.5 - 10 years results show that, based on WHO definition, nearly one half of all children below six years are anemic.
- Infant mortality rate - 113.5 per 1,000 live births (4 times more infant deaths than USA population of comparable age). Overall mortality was 11.6 death per 1,000 pop.
- General fertility rate 277.6 births per 1,000 women aged 15 - 44 years.
- Of all children aged 0.5 years 41.0% had at one time received DPT vaccine, 37.4% been baccinated for measles and 34.5% had been immunized for Polio. Only 3.5% had even received BCG vaccine for Tuberculosis and only 1.4% ever been vaccinated for yellow fever.

While the overall sample was a bit small for calculating mortality rates, this survey information is consistent with 1982 hospital mortality and is typical of a medically underserved population where known health interventions can have a rapid and major impact. It should also be noted that the rest of Bolivia follows the same general pattern as the Santa Cruz region. A summary list of vital indicators is illustrated in Table 1.

Although no recent data exists regarding the causes of infant mortality recent estimates of overall infant mortality show little change in the last decade. Accordingly, it is reasonable to use Puffer's report of over a decade ago as a benchmark to the causes of infant mortality. She reported that the principal causes of infant mortality were nutritional deficiencies (34%), respiratory disease (29%) and diarrheal disease (13%). (Puffer, R. and Serrano C., 1973)

An added source of health information for the target area in and around Santa Cruz comes from the national nutrition survey completed in 1981 by the Instituto Nacional de Alimentación y Nutrición in coordination with the Ministerio de Planeamiento y Coordinación and the United States Center for Disease Control (1981). Using the cluster sampling techniques traditional for these studies a total of 885 children were submitted to anthropometrics in the urban and semi-urban areas of Santa Cruz with another 1,007 taken from rural plains area similar in most respects to the region around Santa Cruz.

Table 2 illustrates the relative rates of malnutrition for both areas.

Table 1

GENERAL BOLIVIAN DEMOGRAPHIC AND HEALTH PROFILE

(2)	Population total (1981) in 1,000s	5,755
(1)	Density	5.94 Hab/km^2
(1)	Population in communities of less than 200	50%
(2)	Growth rate	2.64%
(1)	Average age	18.5 years
(1)	Masculinity index	97.10
(1)	Crude mortality rate	16.68/1,000
(1)	Crude fertility rate	130
(1)	Life expectancy	49.69
(1)	Economically active population 15 - 65 years	41.52%
	Literacy rate	36.79%

(1) Ministerio de Planeamiento y Coordinación e Instituto Nacional de Alimentación y Nutrición, 1981 Estado Nacional de La Población Boliviana.

(2) Laboratory for Population Statistics Summary Series # 3. The 1980 Bolivian National Demographic Survey: A Summary of Results. The University of North Carolina at Chapel Hill, 1981.

Table 2

PERCENTAGE DISTRIBUTION OF CHILDREN
ACCORDING TO WATER LOW CLASSIFICATION

Santa Cruz (urban) and Valley rural population

Bolivia 1981* [1]

Area	Weight/Height*	Height/age*	Combined Categories	Normale	Total
Santa Cruz urban	.7	26.5	.6	72.7	885
Llanos rural	1.2	35.1	0.0	63.7	1,009

* All anthropometrics classfy critical individuals as those outside of a range 2 standard deviations from the reference standard.

1 Table constructed from table No. 4 page 69 (Ministerio de Planeamiento y Coordinación et al, 1981).

While the Santa Cruz area, urban and rural, is one of the better areas nutritionally of Bolivia the levels of malnutrition are still unacceptably high and combine with our other indicators to justify the need for the delivery of basic health services to a relatively large portion of the population.

8 Community Based Primary Health Case System: The proposed Health Care System

To describe the current available community based health system in Bolivia and the logic that has been used to arrive at this proposed rather non-traditional approach to expanding health care some background material on the experience regarding health interventions and options in Bolivia might be useful.

The following observation from Mission documentation illustrates the rationale for this kind of thinking.

"A major observation of the Bolivian medical care-system is that many resources exist which are not being used efficiently. Rather than asking for new hospitals, new equipment, new personnel, etc., the present resources should be more effectively organized and utilized. This includes lab material, X-Ray machines, operating tables, hospital beds, and trained personnel, who are often utilized to less than ten percent of their capability. Better supervisors and administration are needed even more than more financial resources, although one cannot deny that the financial resources are meager for rural health. (Appendix I provides a more detailed summary of this rationale)."

Within the above context, USAID/Bolivia began to turn to the large and active cooperative movement as a mechanism to improve health care.

In the search for alternative mechanisms for the delivery of health care in the rural areas, the Mission conducted a brief review of the health care delivery capability of three cooperatives in the Santa Cruz area. The cooperatives had particular appeal as they are client-oriented, privately managed organizations arranged in part to deliver health care as a service to their membership. Also, coops in Bolivia are well known for assisting the economically active portion

of the population from different social and economic classes. Savings and loan or consumer coops serve from the middle class urban dweller to the small farmer in the rural areas. Some coops offer farm credit and technical assistance in improving agricultural practices. By and large, the coop movement responds to the staff interests of its members and there is considerable motive for providing quality services and continuity in the programs they offer.

C. The health intervention

Three existing cooperative organizations ting cooperative organizations receive technical assistance and financial support from USAID to develop self-financing rural health programs. These programs will build on the experience gained over the years from other rural health care projects including the USAID financed Montero project which operated in the Santa Cruz area between 1976-1980. The objective of the planned project will be to provide essential primary health care services to unserved or underserved, high-risk populations in selected rural and marginal urban areas of Santa Cruz that are served by cooperatives. Given the nature of the illnesses encountered in rural Bolivia, and in order to have an impact on infant and maternal mortality and morbidity, the health services provided by the project will emphasize prevention backstopped by simple curative services that address the most common debilitating illnesses. A proposed "package" of services would contain a mix of the following. The final package will upon in consultation with the community leadership structure.

Preventative Health Care

Prenatal and postnatal education

Referrals based on high-risk assessment

Education in breast feeding and weaning food preparation

Oral rehydration therapy and education

Growth monitoring

Immunizations

Basic home sanitation education

Dental hygiene

Curative Health Care

Asistance in routine births

First Aid

Administration of a pre-selected set of drugs to treat common maladies: colds, ear and eye infections. skin infections, poisoning, snake bites. severe dehydration.

The PHC services will be delivered through a five-level. community-based system, which is a modification of the six-level system utilized in the Montero project. The co-op project will concentrate on providing services at Levels I and II and III. At Level I, the community level, two health promoters will cover between 40-50 families (200-250 people). Health posts staffed by auxiliry nurses will comprise Level II, covering approximately 9 communities of 280 families. The Area Clinic at Level III will be staffed with a physician and auxiliary nurse, and will provide general outpatient care. It will be designed to take referrals, conduct simple X-ray and lab tests, supervise the community health workers, and make referrals as necessary to higher levels of the health care system. These higher level facilities --- the Referral Hospital (Level IV), Specialty Hospital (Level V) and Regional Hospital (Level VI) --- will continue to be operated by the MSW/PH. About 4 Level II health posts will report to each Level III facility. A Central Provider Organization will be established to give the necessary administrative and logistical support to these facilities.

The Target Populations

The service components to be studied by this project will be ~~potentially~~ directed towards the memberships of three different cooperative units. One of these, La Merced, serves the marginal urban population of Santa Cruz, the majority of whose members are engaged in agriculturally related occupations. The cooperatives Agrícola Integrada Mineros (CAIM) and Cooperativa Agrícola San Julian (CASJ) are agricultural-cooperatives in rural areas north of Santa Cruz. CAIM's membership is representative of those families who have participated in "spontaneous" colonization programs. These are primarily highland families from the Departments of Potosi and Chuquisaca settled over the past decade with little assistance from the Government of Bolivia. CASJ is an example of the Cooperatives established by the Government of Bolivia using land grants to attract families with generally the same background. Thus the three selected cooperatives represent a large urban base coop providing services to low and middle income families, a spontaneous rural coop developing along traditional lines and a government sponsored Agricultural coop. Based on preliminary reviews, the USAID Bolivia Mission feels that cooperatives attract their membership from a sufficiently wide range of community residents so as to be representative of the typical rural and marginal urban residents of the AID-selected developmental corridor. These cooperatives also attract and serve that segment of the rural population which is essentially the same target population as used by the Mission's agricultural projects.

When calculating the exact parameters of the proposed primary care projects it is important to note that all three of these cooperatives have agreed that membership in the proposed projects be open to all members of the community who meet the prerequisitias of participation. Therefore the target populations of each of these cooperatives can be realistically conceptualized at three different levels as

per figure A.

POTENTIAL LEVELS OF INVOLVEMENT IN COOP HEALTH PROGRAM

Active Members of Co-op interested in Health Components	Members of Co-op not initially interested in Health Components	Members of Community who qualify for services.

Since the success of the financing mechanism and its configuration ultimately depends upon the absolute number of individuals participating, the pool to draw from is important. Taking the membership of La Merced to Santa Cruz urban co-op as an example we can establish some rough population parameters.

The city of Santa Cruz is reported by Instituto Nacional de Estadística (1981) as having 254,682 individuals living in the Departmental capital. La Merced with a reported 28,000 members at an average of between 5 family members per co-op member would give us about 140,000 individuals potentially covered. About 4,000 of these co-op members however do not reside in the urban area but in the towns and villages around same. Establishing the precise mix of accessible urban co-op members and others would be one initial objective of this research project.

The rural cooperatives are primary recent migrants arriving within the last decade. From a recent census department survey in the same general geographic area we can

cite high fertility levels 6.37 versus 4.71 in the urban areas for 1980. Frerichs (1979) documented a mean family size of 5.6 persons. The total Bolivian population from the 1976 census shows a 0-4 proportional population of 15.9 percent, a figure which might be slightly increased for the somewhat younger population in Santa Cruz rural areas. As of this moment there are roughly 3,000 families living in the San Julian catchment area and 500 members and 14 co-ops of the Mineros groups. Using the San Julian colonization as an example case and assuming 5.6 family members per co-op member we would arrive at a total population estimate of between 16,800 of which 17% or roughly 2,900 would be in the 0-5 category. Taking overall Bolivian census figures (1976) for the proportion of females in the 15-45 year age range we would add another 21% or 3,528 individuals for and approximate figure of 38% of the population as primary targets for preventive care. In the case of San Julian some 6,384 individuals are targeted. This figure would be increased for first aid and related services administered to the active male population. While more accurate population parameters need to be calculated for the intervention areas during the first phase of the project, the primary target population could be considered between 40-45% of the population ultimately served.

II. THE OPERATIONAL PROBLEM

Given that the goal of the USAID-supported project is to establish through these three cooperatives a primary health care delivery system which will be supported entirely by community-generated funds at the end of the project's third year, the objective of this PRICOR project will be to design a financing system which will result in achievement of this target. Because the amount of revenues requires within such a closed system is directly related to the cost of the services delivered, PRICOR activities will also be directed toward identifying those packages of services which not only contain essential primary care services but are also financially supportable by the target communities.

As described earlier, the organizational structure for the delivery of care through Level I, II. and III facilities and a list of services to be provided at each level have tentatively been established during the preparation of the USAID project documents. Final decisions concerning the scope of services to be provided will be made by each cooperative, within certain limits. ONe such limit will be the community's ability to support such services, which will be estimated by the PRICOR project.

Historically, health care services to low-income rural or peri-urban populations in developing countries have been provided through governmental health delivery systems for free or at a nominal charge and/or through individual entrepreneural providers practicing either traditional or western medicine. A review of attempts to establish community-

financed delivery systems indicates that most have not met with any great degree of long-term success (Stinson, 1982. This same review identified the following eight general approaches to generating community contributors:

- Personal service fees
- Drug sales
- Personal Prepayment
- Production-based prepayment
- Income generating schemes
- Community or individual labor
- Donations and adhoc assessments
- Fund-raising through festivals, raffles, sc.

Before any one or a combination of the above general financing alternatives can be selected as the optimal approach, a thorough understanding of the factors affecting the need and demand for health services must be gained. These factors can be subsumed under five general catagories:

Category	Factor
Demographic	. Age, sex (D_1, D_2)
Biological	. Incidence of disease (B_1)
	. Severity of illness (B_2)
Cultural	. Perception of illness (C_1)
	. Socio-cultural factors affecting acceptability of different types of services (C_2)
Service-related	. Types of services available (S_1)
	. Accessibility of services (travel time/cost)(S
	. Quality of care provided (S_3)

Economic

- Price of individual services/Cost of contribution (E_1)
- Total cost of care (E_2)
- Disposable income/available resources (E_3)
- Opportunity cost of receiving/net receiving care (E_4)

When services are provided free of charge, the first three economic factors — the price of services, total cost, and available income/resource—may not play a very significant role. However, when some form of financial contribution is required to support the health care system, these factors become much more important.

Certain of these factors may remain fairly fixed over time; others may change from year to year or may fluctuate on a seasonal basis within a single year. An example using data from Bolivia will illustrate this fact and will also highlight the importance of considering changes in these factors when designing a community financing scheme.

The household survey carried out in the Montero region of Santa Cruz was conducted during the months of October, November and December, 1977. This survey asked interviewees to recall the incidence of illness and the amount of health care expenditures incurred during the two week period immediately preceeding the interview. From the survey sample it was determined that the average health expenditure during the two week period was US$2.13 ($b 20=US$1). The Montero study extrapolated this figure to a full year period and multiplied it by an average household size of 5.6 persons to arrive at an estimate of $309 for average annual family ex-

penditures on health care. Taking this sum as a proportion of the 1978 net cash income for the average small farmers household in Santa Cruz ($1,086)* yields a finding that farm families may have been spending roughly 28% of their net cash income on health care.

However, if it is assumed that the factors affecting the utilization of and expenditures for health services do indeed change either seasonally or from one year to the next, extrapolation of the findings of a point in time study could yield biased estimates of annual levels. For example, the incidence of diarrheal and respiratory diseases — which accounted for nearly half of all reported illness episodes in the Montero study — are believed to be positively related to, respectively, the arrival of the rainy and cold seasons in Santa Cruz. Evidence of this can be found comparing the incidence of diarrheal diseases, presented in a report prepared by staff at the Hospital de Saavedra (Zacherer, 198 with the average rainfall recorded in that area over a 20 year period (See Figure 1). As illustrated in the same figure, the incidence of respiratory problems was found by the hospital to increase during the cold months of May, June, and July*.

Similarly, given the cyclical nature of farm production, substantial seasonal variation in the economic factors affecting health service utilization/expenditures can be expected. A recent study prepared by

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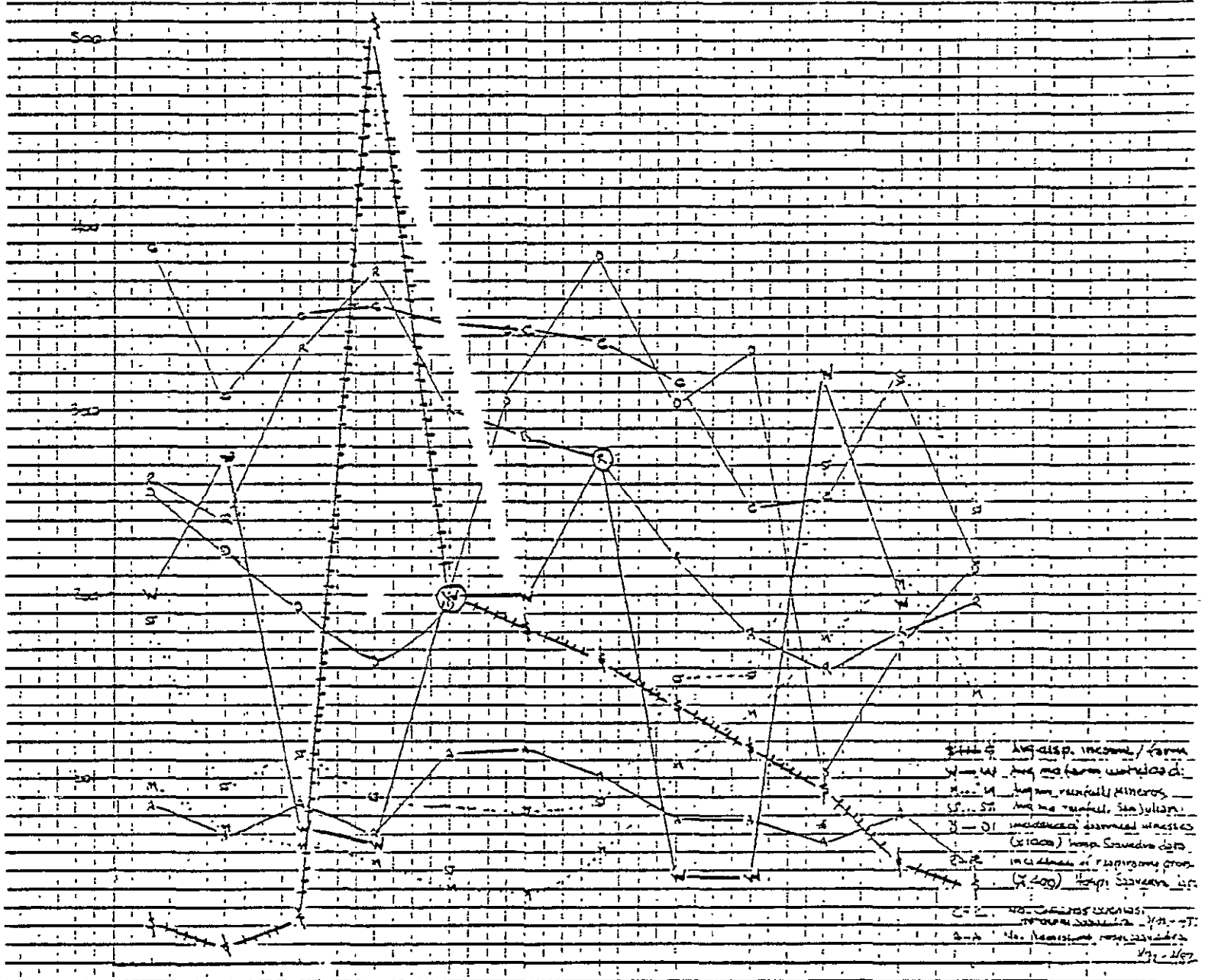
* It should be noted that while they may be indicative of the fluctuations in the incidence of different diseases, these charts should be viewed with some caution as the methodology used for determining incidence rates is not described in the report.

Exhibit — Comparison of indices of factors affecting farm income in Sweden, Washington and Simple Washington Farms



the Mennonite Economic Development Associates (MEDA) (Graber, 1982) estimated the relative level of income available to an average farm household during the course of a year. As illustrated in figure 2, income for those farmers unable to store their harvest is estimated to arrive in one lump sum in June when the bulk of his crops (in the MEDA report assumed to be rice and corn) are sold. Based upon a projected monthly family budget, available or disposable income is shown to be progressively reduced during subsequent months until it reaches its low point in April. Income is increased slightly in May from the projected sale of an early rice harvest, with the replenishment of the family's income coming once again after the June sale of its crops.

Just as monthly disposable income levels could be expected to vary in an agricultural society, so too might workload requirements differ from month to month. The MEDA study also estimated the amount of manpower needed by a farm family to accomplish certain tasks during the course of a crop year, including land preparation, seeding, weeding, and harvesting. Indices of these requirements are also presented in Figure 2 for a small farmer cultivating two hectares each of rice and corn. As can be seen, the workload is highest during April— when the rice and corn harvest overlap, in September, during which land preparation activities predominate, and in December, when the farmer is busy with weed and pest control.

With respect to health services utilization, farm workload or manpower requirements can be viewed to some degree as a surrogate for the cost of using/not using health services. Several possible relationships could be hypothesized. In the first, the farmer may be more concerned about the opportunity cost (a loss in productivity, cost of hiring replacement) of taking time out to seek health services for problems which develop during peak work periods and therefore not seek care. Conversely, a second hypothesis might claim that the farmer would be more concerned about the potential opportunity costs of not receiving care for a health problem which develops immediately before or during peak manpower periods - i.e, the possibility of the problem becoming worse and incapacitating him even further for the remainder of the busy period. Yet a third possibility could be that the farm household's reaction to the need for health services during busy periods might be determined by which household member becomes ill (highly productive male vs young child), the perception of the severity of the illness, and other factors such as available income. For example, during the high workload month of April, the farmer may choose to continue working, and ignore most health problems because available income is near exhausted and paying for needed care or drugs might require selling off certain household possessions or taking out a loan. During the busy month of September, however, available income is greater and the relative cost of receiving care may not be so great.

It should be noted that the seasonal fluctuations in disposable income and the opportunity cost of receiving/not receiving care were modeled upon a small rural farm family which cultivated two hectares of rice and two of corn, who had no storage facilities, and whose sale income was derived from crop sales. While the general principles would also apply to small farmers producing other crops, such as vegetables or who had some small ancillary sources of income, the timing and magnitude of the seasonal fluctuations would be expected to vary. These fluctuations would not apply, however, to low-income peri-urban families which relied on family members' salaries as their major source of income. In these cases, disposable income (at least in nominal terms) likely be much more stable over the course of a year, as would the opportunity cost of an income-generating member of the family being ill.

Indices of these factors as well as actual utilization data from Hospital Saavedra are also plotted on the chart shown in figure I.

The purpose of this exercise is threefold:

- to present a rough approximation of the significant fluctuations in factors likely to affect health care utilization and expenditures
- to present a rough approximation of the significant fluctuations which occur during the course of a year.
- to highlight the fact that these variations in these factors often move in contradictory directions

  i.e. the factor positively influencing utilization may be increasing at the same time another positive factor may be decreasing or a negative factor increasing.

- to identify the potential biases which may be introduced if, without giving adequate consideration to changes in these and other underlying factors, the findings of a single point in time crosssectional survey is extrapolated to a full year or compared to the results of a similar survey conducted at another time in the year or on a substantially different population (eg. farm vs peri-urban).

The discussion so far has focused only on examples of the seasonal variations in factors affecting health care utilization/expenditures. There are, however, important factors the relative values of which may change from one year to the next. Certain of these, such as the individual's perception of illness may without intervention change slowly from year to year. For others, the changes may be more precipitous. An examination of the effect of inflation in Bolivia in recent years will provide a good example of how certain factors move in one direction, rather than cyclically, during the course of a year and therefore change their absolute level from one year to another.

As described earlier, an estimate of the relative proportion of farm income in Santa Cruz which was spent on health services in 1977 (28%) could be obtained by projecting the average household expenditure level found in the Montero study to a full year ($309) and then taking it as a percentage of the average income at that time of a small farmer. ($1,086). Since that time, however, the

economic situation in Bolivia has been very volatile with high rates of inflation sending prices soaring. Using these 1977 expenditure and income figures as a baseline (with all the aforementioned caveats about extrapolating longitudinally from cross-sectional studies), to estimate in very rough terms what the effect of the country's economic crisis has meant to in both real and nominal terms to the cost of health services and other consumer goods and to the income of the small rural farmer. An attempt can also be made to relate these finding to wage-earning peri-urban families.

For the purpose of this analysis, an index of 100 is assigned to both the average income of a small farmer and the composite price level for consumer goods. It is assumed that health care prices will move in line with overall consumer prices. Estimates of annual growth in wholesale agricultural product prices and in the consumer price index (La Paz) found in a recent International Monetary Fund (IF) document are used as surrogates for the increases experienced in small farmer income and consumer prices faced by the farmer (including those for health care), respectively these rates of growth are presented in the table below.

Annual Rates of Growth in

Selected Economic Indicators

Year: / Item	1978	% 1979	1980	1981
Consumer Price Index	10.4	19.7	47.2	32.4
Wholesale Price Index/Agricultural Products	20.6	27.8	54.7	24.8

To determine price and income levels from the end of 1981 to the present differing methodologies were used for each. To estimate price levels, the rate of increase in the CPI for 1981 (32.4%) was carried through to March,1982 when the exchange rate of the unofficial market in which most non-central government activities take place was reported to be $o 115 = US$ 1. In March, 1983 that rate had increased to approximately $o 500= US$1, a monthly increase of 13% or 334% over a 12 month period. It is assumed that 75% of consumer good input s were affected, either directly or indirectly, by this drop in unofficial purchasing power of the peso and therefore had their prices raised accordingly, while 25% of consumer good inputs were domestic inputs whose prices (e.g. salaries) were downwardly sticky and therefore ave have risen at a rate of only 100% during the same period. The composite inflation rate for March 1981 to March 1982 resulting from this methodology is 275.5%, calculated in the following manner:

$$.75 \times 334\% = 250.5\%$$

$$.25 \times 100\% = 25\%$$

$$275.5\%$$

It should be noted that the Montero study found the 76% of all health care expenditures net toward the purchase of drugs. That the price of drugs, most of which are imported in either final forms or as raw materials, has risen at a rate at least comparable with the one just estimated is evidenced by the data 3 which indicates that the wholesale retail prices of certain drugs and medical supplies purchased in Santa Cruz have risen during the period June to November, 1982 at an average rate of over 19% per month, or an annual rate over 700%. Increasing a more recent review of wholesale drug prices in Santa Cruz found almost no increases in prices from November through March. This was the result of an agreement between pharmaceutical manufacturer and the government in which the manufacturers agreed to freeze prices in return for access to dollars needed for the purchase of foreign goods. How long this accord will continue is uncertain.

To estimate increases in small farm income from 1981 through the 1983 harvest period, estimates were obtained from MEDA of: a) the average price received by the previously described "average small farmer" per unit of rice and corn, and b) an estimate of the relative contribution of each crop to the farmer's total net income from both harvests (66% rice, 34% corn).

These estimated prices are shown in the table below. Where the MEDA official indicated a range of possible prices for the 1982 and 1983 harvest, a value in the lower range was used to reflect the slight decline in the size of the yields for those harvests.

Estimates of Prices for Selected Crops

1981 - 1983

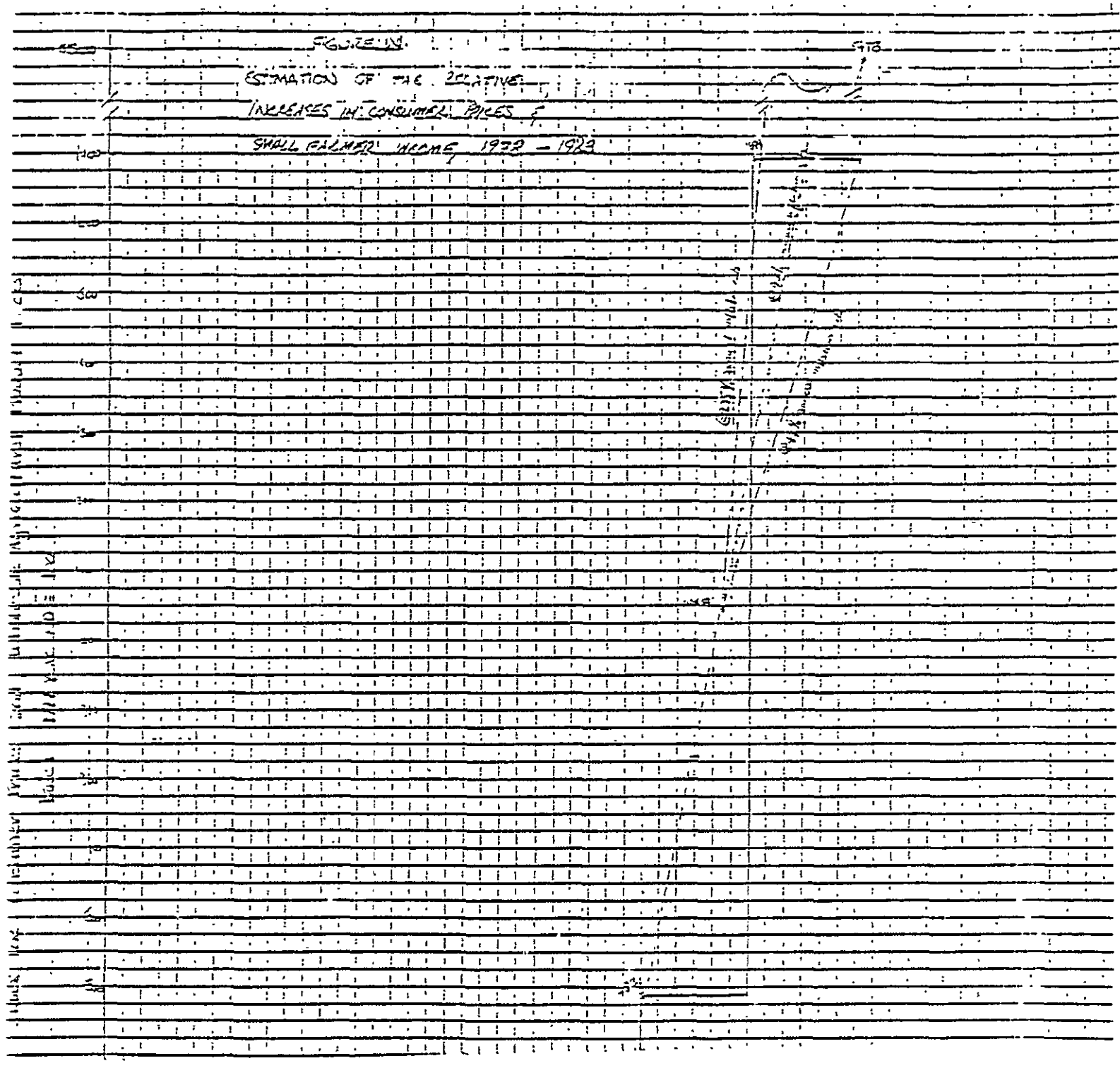
	PRICE 1981	PRICE 1982	1981-82 increase	PRICE 1983	1982-83 increase
Rice ($/fanega)	1300	2100	61.5%	7500	257.1%
Corn ($/quintale)	135	225	66.7%	750	233.3%
% increase weighted to reflect relative impact on income			63.25%		249.2%

Combining these estimates for the recent growth in these surrogates for prices and small farm income with those of the ~~IIC~~ IMF report for 1978-81 will allow us to assess the present economic status of the small farmer. A graph increasing the 1977 baseline indices for these two items by the estimated annual rates of growth is presented in Figure 2.

The income of the small farmer is shown as a step function to reflect the assumption that the bulk of his income is received at roughly one point during the year. This amount is presumed to be the total available until the following year's harvest is sold. The graph for the consumer price index is a smooth function, reflecting continuous movement in price levels during the course of a year. The small farmer ~~seemed to~~ is ~~be~~ "better off" than he was in late 1977 (i.e. his income could buy

FIGURE IV

ESTIMATION OF THE RELATIVE INCREASES IN CONSUMER PRICES & SMALL FARMER INCOME 1972 - 1973



more than it did then) whenever his income line is to the left of the CPI line. According to this analysis, the small farmer more than maintained the purchasing power of his income through the early part of 1982, about the time prices for the 1982 harvest were being negotiated. Shortly after that period, however, the rate of inflation skyrocketed and despite an increase of approximatelly 63% in the unit price of his rice and corn crops, the purchasing power of the small farmer's income plummetted in the later half of 1982 and the first part of 1983. The farmer's situation is likely to improve in June of this year as the result of an anticipated 249% increase in crop prices. Depending upon the rate of inflation experienced during that period, this improvement may be short-lived. As illustrated by the projections for the growth of the CPI in Figure III, for the small farmer's income to have the same to have the same or better purchasing power than it did in 1977, during the entire July 83-June 84 period the inflation rate for that period could not exceed 47%. If the present 275% rate of inflation continued, farmers' purchasing power would quickly drop below 1977 levels. At a 90% inflation rate, it is estimated that farmers would be better off than in 1977 for the first half of July-83-June 84 period, with the purchasing power of their incomes dropping below 1977 levels for the second half of that period.

The net effect of recently high inflation rates and the uncertainty of the magnitude of further increases in price levels leaves the future purchasing power of the small farmer in doubt. If the annual inflation rate abates to an average of 90% over the next 12 months, the farmer's

purchasing power will remain about what it was in 1977, that is, by allocating 28% of his income to health services as he was able to purchase at the time of the Montero study. If inflation is greater than 90%, the farmer will have to spend an even greater proportion of his income to purchase the same amount of services as in 1977, or he will have to settle for purchasing smaller quantities of health care with his 28% allocation. Given the likelihood of increases in the prices of other essential items such as food and transportation, the latter scenario is likely to occur with health care expenditures increasing in nominal terms but decreasing in real terms.

Sufficient information, including baseline expenditure and income data is not available to fully analyze the effect of inflation on wage-earners' income and health care expenditure patterns. Figure V presents some information on the reported rate of increase in salary levels in Bolivia. Whereas the small farmers' income was estimated to have kept pace with inflation up until early 1982, average salary levels appear to have not kept up with inflation during the period 1978-81. This situation is likely to have been severely exacerbated in 1982 although there is some indications that employers may have in some cases provided support in the form of bonuses, subsidized food, or through other means. Nonetheless, it is thought that the peri-urban wage earner, whose income is not directly tied to the increasing prices of consumer products, has probably suffered more from inflation over the past five years than the small farmer. To address this situation to some degree, the Bolivian government recently announced an across-the-board increase of $61,010 per month for employees earning up to $650,000 per month. Additional increases will be made in a semi-annual basis, the amount to be determined by the level of inflation during that period.

FIGURE 2

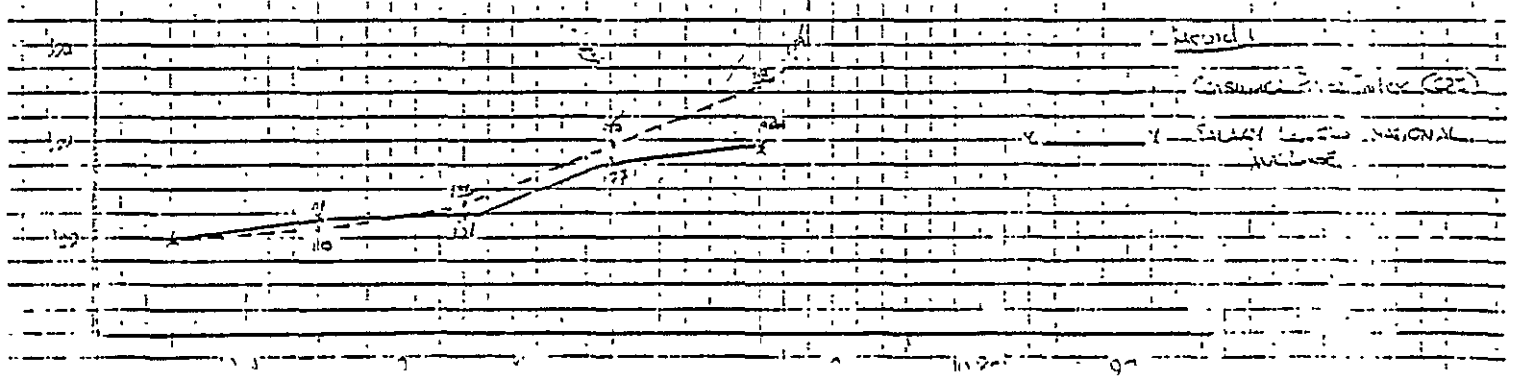
ESTIMATION OF THE

RELATIVE INCREASES IN

CONSUMER PRICES &

NAT. AVG. OF SALARY LEVELS

1953 - 1951



III. UTILIZATION OF RESEARCH RESULTS

The principal decision makers who will benefit from the results of this research are USAID/Bolivia, the board of Directors and staff members of the co-op health project's provider organization, and through these groups, the families in the communities served by the three co-operatives participating in the project. USAID officials will base the design, the benefit packages and financial mechanisms to be offered the co-op communities in large part upon the results of the PRICOR research.

In the longer run, the f ndings of this research are expected to be of value to other co-ops i olivia which may be interested in organizing a similar health del ery system. The organization implementing this research, the Federación acional de Cooperativas de Ahorro y Crédito (FENACRE), currently provides technical assistance to over 100 co-ops in Bolivia and will be an excellent conduit for disseminating information on the project to other co-ops.

Finally, the findings of this project will be of great value to the research and provider community worldwide which is seeking innovative ways to finance th delivery of primary health care services. The work to be carried out under this project, in particular the longitudinal analysis of factors affecting the demand for health care (see Methodolo sect will greatly add to the existing knowledge base in this area.

IV. METHODOLOGY

The activities to be completed under this PRICOR project, which will be very closely integrated with the ongoing activities of the larger USAID/B supported cooperative health project, can be divided into three relatively distinct phases. There are the following:

I Baseline/Diagnostic Phase

II Service Package/Financing Mechanism Development Phase

III Systems Implementation/Refinement Phase

The activities of each of these phases which will be carried out sequentially, although with some overlap in phases I and II and will be designed in such a way as to provide the information necessary to move to the next phase of the methodology. Phase I activities will be concentrated upon the collection of data essential to projecting the anticipated demand for, and cost of, health services in the areas to be served under the USAID project. In Phase II, these data will be analysed to estimate the population's ability and willingness to pay for health care and also to design alternative service packages, the cost of which fall within the household/community/coop's budget constraint. Based upon the characteristics of the population and the nature of the services to be provided, phase II will also generate recommendations concerning the optimal way of collecting the necessary financial support from the population.

Phase III will coincide with the actual implementation of the USAID co-op health project. PRICOR-supported resources will be directed toward carrying out ongoing analysis of the co-op health project activities, including analysis of utilization and revenue data. These activities to yield the

insight needed to make those fine tuning/mid-course adjustments in the financing mechanisms, pricing structures, and even service packages which may be necessary to ensure the self-sufficiency of the delivery systems established under the USAID/B project. Phase III will also include near the end of the 3 year co-op health project a major household survey/data collection effort similar to the one carried out in phase I. This final effort should yield valuable information about the effect of the health system on participating households, both health-wise and economically, and is expected to provide recommendations concerning: 1) ways to maintain the self-financing aspect of the co-op delivery system once USAID/B inputs have ended, and 2) ways of transferring the concepts developed and experience gained under this project to other co-ops in Bolivia.

Greater detail about the specific approaches to be employed under each of these phases is provided in the following sections.

A. PHASE I: Baseline/Diagnosis

The goal of Phase I will be to develop a thorough understanding of the environment in which the USAID/B-supported co-op health project will operate. More specifically, emphasis will be on the following:

- Identification of those factors affecting the target population's general need and demand for health services.
- When possible, estimation of the levels, in either absolute or relative terms of these factors during the course of a year and from year to year.

- Estimations of the existing utilization patterns for each co-op population.

- Identification of any substantial variation across sub groups of the target population (eg, between the different co-ops, and/or across different socio-economic grouping) in the nature and/or strength of factors affecting the need and demand for health services.

- Identification of those types of services (either existant or currently unavailable) for which the target population has expressed or exhibited the greatest willingness to pay.

1. Tasks

The tasks necessary to achieve the goals of phase I are the following:

- Literature Reviews
- Key Informant Survey
- Case Studies of Innovative Health Care Financing Approaches in Bolivia
- Longitudinal Data Collection/Analysis
- Household Surveys
- Analysis of data
- Preparation of Reports

Each of these tasks is discussed below

- Literature Review

One of the first tasks to be accomplished under Phase I will be an exhaustive review of the literature relevant to this project. While a substantial amount of time has already been dedicated to this task in the preparation of the USAID/B project documentation, additional effort in this area may prove fruitful. These literature topics which should be reviewed include:

- Analysis of factors affecting the need and demand for health services
- Community financing of primary health care/community health workers
- The experience of primary health care projects in Bolivia
- General characteristics of Bolivia, with special emphasis on the Santa Cruz area --- health conditions, economic conditions, health services, cooperatives, etc.
- Methodological issues associated with household surveys, costing procedures, etc.

The result of this literature review will be development of preliminary list of those factors likely to a ffect the need and demand for health care and therefore the ultimate success of the USAID/B self financing project. An initial list of possible factors, already discussed to some degree in Section III, is presented below:

CATEGORY	FACTOR
Demographic	. Age, Sex
Biological	. Incidence of disease (seasonality issue)
Cultural	. Perception of illness . Socio cultural factors affecting acceptability of different types of services
Service related	. Types of services available . Accessibility of services . Quality of services . Price of services . Total cost of care affected by inflation . Disposable income available resour . Opportunity cost of receiving/nor receiving care

For some of these, the initial literature review may also yield some information as to the relative impact of these factors on health service utilization levels as well as further ideas concerning sources of measurement of these factors (ie, additional studies, reports). The bulk of the literature review will take place during the first three months of the PRICOR project, although additional documents which are identified during the course of the project will also be carefully reviewed. The information obtained from the initial intensive review will certainly influence the direction and esign of either Phase I activities (eg, the key informant interviews, household surveys, etc.)

b) Key Informant Interviews

A second Phase I task will be to interview individuals who are particularly knowledgeable about the various issues to be addressed in this project. Semi-structured interviews of approximately one hour each will be conducted in La Paz and Santa Cruz with individuals drawn from health providers, researchers, international organizations, co-op officials, village leaders, agricultural economistas, and others. The purpose of these interviews will be to gather as much background and substantive information as possible on needs, services, cost, economic conditions, financing options. This information will be used to identify further factors likely to affect the self-financing aspect of the co-op health project and will also influence the direction of subsequent secondary data gathering efforts and the design of household survey questions.

These key informant interviews will be conducted during the first three months of the project.

c) Case Studies of Innovative Health Care Financing Approaches in Bolivia

Several cooperatives in Bolivia, including the La Merced Co-op in Santa Cruz, provide some form of health care to their members. La Merced, for example, has its own pharmacy and operates a physician referral service for its members, paying 25% of the cost of the office charges of the referral physicians. In addition, at least one physician group practice in La Paz attempted to establish a pre-payment financing system. The experiences of these entities, as well as those of other innovative financing mechanisms which may be identified through the literature review or key informant interviews, will be closely examined through a case study approach to be carried out in the first two to three months of Phase I.

d) Longitudinal Data Collection/Analysis

An important task to be carried out during Phase I will be the collection and analysis of data which directly or indirectly provides measures of those factors identified earlier as affecting individual's need for health services, as well as their ability and willingness to pay for such services. In large part, this effort should focus on these factors which are likely to change in a cyclical pattern during the course of a year or exhibit a trend to increase or decrease from one year to the next. This task will thus concentrate on a longitudinal analysis of changes in health care utilization factors.

The analysis of the cyclical trends in disease incidence, disposable income, and opportunity costs and the long run trends in income and price levels discussed earlier in Section II of this proposal are examples of the types of data collection and analysis activities which should be carried out as part of this task. One activity to be carried out under this task would be to seek other datasets which would support, update, or modify these analyses. Certainly the income and workload cycles for farmer growing sugarcane should also be analysed.

These analyses, which to the extent possible should be quantitative in nature, can be expected to yield substantial insight into the appropriateness of certain financing mechanisms. Where possible, models will be developed to depict the hypothesized relationships. An example of this type of modeling for monthly membership fees is presented as part of a later discussion of Phase II activities. In examining yearly rather than seasonal changes in certain factors, modeling exercises directed at anticipating the effects of inflation on the cost of providing future health services will be of critical importance in order to determine at what level membership or service fees would have to be set to be sufficient to cover escalation in the replacement costs of drugs and supplies. The modelling of projected charges in the relative changes in income levels and consumer price for the target populations will also play a critical role in estimating reasonable health care expenditure levels or budget constraints for households in these populations.

An up-to-date market study of wholesale and retail drug prices in the Santa Cruz, Mineros, San Julián areas will be carried out initially (and updated periodically, even through Phase III) to measure the increases in

local market prices and to ensure that drug prices established during Phase II will be competitive. Similarly, a supplement to current inventory of health care facilities in the areas of the three co-ops will be carried out if necessary to identify the specific location, range of services available, and monthly utilization and locally generated income levels at these facilities and to generally assess quality of care provided. This information, along with data to be developed in the next ask on target population distribution, will be used in determining locations for the level II and III facilities to be operated under the USAID/3 project.

Finally, an effort will also be made through the use of multivariate regression analysis and other appropriate statistical techniques to more clearly identify and quantify the relationship between the factors identified and examined as part of this task (the independent variables in this particular exercise) and the monthly utilization and local income levels at MSW/FH facilities (dependent variables). The general form of the equation will be:

$$U = a + b_1 x_1 + b_2 x_2 + b_3 x_3 + b_4 x_4 + \ldots + b_n x_n$$

Where U will be one of the following four variables:

1) No. outpatient visits/mo. in area MSW/FH facilities
2) No. admissions/mo. in area MSW/FH facilities
3) Local revenue collected/admission/mo. in area facilities
4) Local revenue covered/OPD visit/mo. in area facilities

and

x_1= monthly surrogate values for incidence of diarrheal problems (eg, rainfall, data from Saavedra hospital report)

x_2= monthly surrogate values for incidence of respiratory problems (eg. dummy variable for cold months)

x_3= monthly index value for available income for avg. farmer in area

x_4= monthly index value for farm workload

x_n= monthly measures of other variables thought to affect utilization/ expenditure and for which values are obtainable.

For the peri-urban facilities, the agriculturally related variables (x_3 and x_4) will not be used. If any significant findings result from this analysis, they will provide important information to be used in projecting the utilization of co-op health project services. To carry out this analysis data will be input into computer database and a statistical software package will be used to perform the analysis. Activities under this task are anticipated to be carried out during the first five months of the PRICOR project.

e) Household Surveys

The largest task to be carried out in Phase I will involve the design, testing, and implementation of a household survey in the communities serviced by the three cooperatives participating in the USAID project and the subsequent analysis of the data connected.

The steps to be carried out as part of this task are:

i. Identification/mapping of the target population for each co-op health system

ii. Finalization of sampling methodology based upon characteristics of population and selection of samples

iii. Design, pretest, and refinement of survey instrument

iv. Training of interviewers

v. Implementation of surveys

- interviews
- field edits/verification
- re-interviews, when necessary

vi. Cleaning and entering of data

vii. Analysis of data

viii. Preparation of summary tables, reports.

The survey, which will be administered to a small sample of the co-op health project's target populations, will be a relatively comprehensive one It will gather information on the basic socio-demographic characteristics o the household and will attempt to assess health status through a two week recall of illness episodes, health care utilization and expenditures. It will also include fairly detailed questions about general health care utilization and referral patterns and about the economic status of the household, both currently and in the previous year. Lastly, questions will be included which solicit information about the types of health services people would like to have access to and for which they are willing to pay. A list of suggested data elements to be collected through this survey is presented in appendix B.

Despite the previously described limitations of cross-sectional, point-in time survey, there are several reasons for conducting such a survey as part of this project:

- It will provide up-to-date information about existing utilization and expenditure patterns. The longitudinal analysis of cyclical fluctuations in these patterns described under task (d) above should allow a relatively sensitive extrapolation of these findings to an annual basis.
- Its findings will provide a mechanism for heightening each co-op's and community's awareness of the nature and extent of their current health problems and expenditure levels. This will be an integral part of the co-op's benefit package selection and membership recruitment and enrollment processes.
- It will identify point-in-time differences in average expenditure, utilization, and income levels across co-ops, as well as assess the degree of variation in these items across communities and households within a particular co-op.
- The utilization data will peovide guidance in formulating a reasonable estimate of what utilization levels might be anticipated under the co-op health delivery system. The self sufficiency of the system will be extremely sensitive to utilization if any costs other than those which are completely variable (eg, drug, supplies) are to be supported through utilization-based fees.
- A careful estimation of annual health care expenditure and income figures will provide the basis for establishing an upper limit on the cost of the packages of services which will be offered to a particular co-op (eg, no benefit package option should cost the average household more than x% of its annual net income).

- The instrument developed for the household survey can also be expected to serve, with perhaps some refinement or condensation, as a registration for families wishing to enroll in the co-op health program.

The baseline survey will focus on a small sample of the target population rather be administered to all households.

The reason for this is that the information obtained from the household survey combined with the longitudinal analyses, will be the basis upon which the various package options and financing approaches to be ach co-op will be developed. Given the size of target population (3.700 rural families and 6.000 urban families) and the amount of information to be obtained, a survey of this magnitude would require substantial time and costs not only could a relatively long period between the start and the finish of the survey bias the finding beacuse of monthly fluctuations in utilization and expenditures, but it would also delay the project's ability to present aggregate information to each co-op about the health needs, utilization, and expenditure patterns of its member communities. This information will be part of the basis for each co-op's selecting a service package and financing mechanism.

An estimated 720 households will be interviewed as part of this survey. This number will be roughly divided among the three participating co-ops and control groups as follows:

Mineros:	120
San Julián:	150
La Merced:	300
Control:	150
Total:	720

This number is based upon the stratification of the populations at each of the three co-op sites to reduce the anticipated variance in responses. The Mineros population will be divided into two strata: individuals living close in with resonable access to health services and individuals living in remote, inaccessible communities. The San Julian population will be divided into two strata based upon this criterion or perhaps the length of time the nucleo has been established. The criterion for stratifying the peri-urban La Merced population will be determined once better general information on this population is obtained. Assuming: 1) the total number of households in the Mineros, San Julia and La Merced catchment areas of 2030, 1670, and 6,000 families, respectively; 2) the equal division of each of these populations into the two strata; 3) as expected variance of approximately .25 in the value of responses within each strata, and 4) a normal distribution, thus the above samples should provide measures of within 5% of the true population means, as indicated by the calculations of standard error for each strata given below:

Mineros

$$ES = \sqrt{\frac{N-n}{N-1} \times \frac{s^2}{n}}$$

$$= \sqrt{\frac{835-60}{834} \times \frac{.25}{100}}$$

$$= 4.8\%$$

San Julián

$$ES = \sqrt{\frac{1015-75}{1014} \times \frac{.25}{100}}$$

$$ES = 4.3\%$$

La Merced

$$ES = \sqrt{\frac{3000-150}{2999} \times \frac{.25}{100}}$$

$$= 4.9\%$$

It must be stressed that this sample selection methodology is only provisional. A critical step in the execution of this task will be to assess the populations to be surveyed, and revise the methodology as required. As more information concerning the characteristics of the populations and their dispersion on certain key items is obtained, this methodology may require modification and the sample size changed accordingly.

The benefits of structuring the household survey sample in this manner are the following:

- It will provide each co-op with a profile of the health needs and care seeking behavior of a cross section of its membership. Since decisions concerning benefit packages and financing mechanisms will be made at the co-op level and will in large part be driven by the findings of the survey, this is the appropriate level of aggregation for the data.

- By also including households in the community which are not co-op members, the data will allow a profile of this segment of the population to be developed and comparisons to be made between co-op member and non-member households. As non-member families are potentially an important source of demand for project-supported services, it is important that their characteristics and patterns be known.
- Comparison of the samples of both member families and all families in the Catchment Area of each co-op health project will allow the better tailoring of the service packages/financing mechanisms to each co-op.
- The survey data will provide an important baseline for a subsequent evaluation of the impact of co-op health project. The inclusion of non-member families as well as a rural control group will facilitate analysis of the effects of the program at both the community and individual level. This evaluation, which will take place 24 months after this first household survey, is discussed in a subsequent section describing Phase III activities.

The survey will be administered at each site by a team of 3 to 4 well-trained local informers under the direction of a field supervisor at each site. If the survey is not carried out during a period of high farm activity, a maximum of 4 interviewes could be expected per interviwer per day at the rural sites. A maximum of 3 interviewer per day is anticipated in the rural areas. The field supervisor will oversee the administration of the interviews, checking at the end of each day for incomplete forms, inconsistencies, and other problems. Follow-up contacts will be made as necessary.

The field edited versions will then be forwarded to the PRICOR project office in Santa Cruz where the data will be entered in a computer and cleaned. It is envisioned that the minimum computer facilities required at PRICOR project headquarters will be a high quality microcomputer (such as an IBM Personal Computer) with a large capacity hard-disc drive for the necessary storage capacity a good quality printer, and multiple software programs. This system should be fully compatible with the computer system the USAID/B project's central provider organization will operate. Final selection of the type of computer should be strongly influenced by the availability of compatible statistical software systems (such as SAS or SPSS) which are available or should be available in the near future.

The survey instrument will be designed and tested in the second and third months of phase I. The survey will be administered simultaneously in the three co-op areas during months four and five.
The type of analysis which will be performed on the survey data at the end of Phase I are described in the next task.

f. Analysis of Data

The first round of analysis will be primarily descriptive in nature, with summary tables prepared for each co-op which describe health care problems, utilization, expenditure, and referral patterns cross tabulated tables will also be prepared which identify these values by member/nonmember families by age and sex, by types of services, income etc. The first analysis will yield a cross-sectional profile of the general population serviced by each co-op. In the second analysis, this point in-time information will be combined with the analysis of longitudinal and seasonal variations in factors affecting health needs and service utilization (see Phase I, task c) to project more accurately a full year's profil

these factors than would be possible through straight extrapolation of household survey findings. The results of this analysis will generate the following:

- a model of average annual household health care utilization and expenditures, both total and for individual services. for members and non-members in each co-op catchment area.
- an estimate of the average annual income for families (member and non-member in each co-op's catchment area current and subsequent year (projected)
- an estimate of the average percent of income currently spent on health services.

A third analysis to be undertaken in Phase I will be to attempt to define relationships at the individual or household level between various characteristics (eg. age, sex, income, etc.) (independent variables) and health care utilization and expenditure levels (dependent variables). Because the values of the dependent variables may be clustered around zero, logit or tobit model would appear to be the preferred procedures to employ in carrying out this third analysis.

g. Preparation of Reports

The following reports/documents will be prepared during Phase I:

1. Summary Report: Background Research on Community Financing of Primary Health Care

   a. Summary of Findings from Literature Review

   b. Summary of Findings from key informant interviews

   c. Analysis of longitudinal/Seasonal Factors Affecting Health Care Utilization and Expenditures

   d. Development of Model for Addressing Changes over Time in Health Utilization and Expenditures

2. Documentation for Carrying Out Household Survey

   a. Description of Target Populations

   b. Final Sampling Methodology

   c. Final Survey Instrument

   d. Protocol for Training of Interviewers

   e. Data Analysis Plan

3. Analysis of Household Survey Data

   a. Descriptive analyses

      - summary tables

      - cross tabulations

   b. Projection of cross-sectional findings to annual basis

   c. Results of multivariable analysis of relationships between individual/household characteristics and health care utilization expenditures.

The workplan presented in Figure identifies the months in which these reports are due.

3. Phase II: Development of Service Packages/Financing Mechanisms

For the USAID/3 coop health project to be self-financing, a sample relationships must ultimately be achieved, namely:

$$TE_p = TC_s$$

Where: TE = total expenditures by households within the community on health services provided through the co-op health system, and

TC_s = total cost of providing these services through the co-op health system.

Phase I activities have been concentrated on the first have of this equation, attempting to identify the factors affecting health care utilization and expenditures and to define a range of possible (or rather probable expenditure levels. Because the communities' willingness or ability to pay for health services is more of a given at this point that the packages of services to be offered to these communities, it is logical to concentrate first on defining the likely upper limits of utilization and expenditures, and, working backward, design a series of service packages which will fit with these limits, both in terms of anticipated utilization and costs.

Phase II efforst are therefore directed at defining the second half of the above tautology, the supply side. These activities will begin in the second month of the project and therefore overlap Phase I work considerably. They will, however extend past the seven months of Phase I, becoming much more intensive once the final products of Phase I are available.

1. Decision Variables

It is during Phase II that the values of the project's major decision variables will be set. These variables include the following:

- the services which are to be included in the various benefit packages to be offered to each co-op.
- the cost to be associated with each service/benefit package
- the pricing/financing structure which is to be associated with each service/benefit package.

While the ultimate decision as to what array of services and financing mechanisms will be implemented will be left to each co-op membership, the range of options from which they select will be set by the PRICOR-USAID/E project.

Five general criteria will be used to select the types and number of services to be offered in any benefit package. The service must:

- address the primary health care needs of the population,
- be of high quality,
- be acceptable to the population to be served,
- be delivered in the most cost-effective manner possible, and
- be part of a total package, which, based upon reasonable utilization levels estimated in Phase I, will not require excessive financial contributions from the community to be supported.

With respect to the mechanisms for financing such services, the criteria for evaluating them will be:

- their ability to generate funds sufficient to cover total systems costs, including supply replenishment costs.
- the burden they place on the community is equitably distributed across the community
- they foster utilization of services at the most appropriate, least cost level in the system
- they provide incentives for the utilization of preventively-oriented primary health care services
- to the extant possible, they consider seasonal variations on the population's need for and ability to pay for health services

Data from Phase I as well as further analysis to be completed in Phase II will be used to evaluate various service packages and financing mechanisms against the above criteria. The tasks involved in carrying out this assessment are described below.

2. Tasks

The following tasks will be completed during Phase II:

- identification of services to be included in benefit packages
- analysis of service costs
- development of benefit package options
- identification and analysis of possible financing mechanisms/pricing policies
- development of interactive computer capability to assist co-ops in analyzing/selecting a benefit package/financing approach
- preparation of reports

Each of these is described briefly below

a. Identification of Possible Services

A substantial amount of effort by USAID/B in identifying services which could potentially be included in the various benefit package options offered to the co-ops. The PRICOR project staff will review this list and suggest additions/revisions based on the results of the key informant interviews and household surveys.

b. Analysis of Service Costs

PRICOR project staff will identify the inputs and related costs necesary to provide the services identified in task (a). Estimates of participating household and utilization estimates derived on Phase I will be used to estimate the volume of each service likely to be provided. These analysis will identify:

- fixed costs
- variable costs
- anticipated increase in cost of inputs over time
- anticipated replacement costs for consumables

c. Development of Benefit Package Options

Based upon the above cost analysis, several service package options will be developed for each co-ops. Special attention will be paid to ensuring that the estimated total cost of any benefit package will not exceed the co-ops communities' ability to pay, as estimated in Phase I. This limit is set to minimize the possibility that insufficient funds to support the delivery system would be generated by the community. With this overall constraint in mind, services will be added to the package in line with how well each meets the service selection criteria identified earlier.

d. Identification and Analysis of Possible Financing/Pricing Policies

Using the general categorizations found in Stinson (1982) and those uncovered through the Phase I literature review and key informant interviews, PRICOR project staff will develop a list of possible financing mechnisms/ pricing policies. These will be evaluated against the criteria set for the earlier. Where possible, quantitative models will be developed to assess the feasibility of different alternatives.

As an example, the finding illustrated in Figure 2 (page) that the disposable income of the farmer varies widely during the course of a year might well rule out the possibility of generating a given sum of money by assessing monthly membership fees, each equal to one-twelfth of the desired sum. If payment of such monthly sums is linked to the level of disposable income for the month, this situation might be modeled in the following fashion:

$$E(X) = p1\left(\frac{E(X)}{12}\right. - p2\ \frac{X}{12} - \ldots\ + p12\ \frac{X}{12}\ ;$$

Where: $E(X)$ = the desired or expected amount to be collected in one year through membership fees

Pn = the probability that the monthly membership fee is paid for month n

However, if Pn is assumed to be positively related to the level of available income in month n, then following the fluctuations on income depicted in Fugure III, then Pn might drop by 1/12 from an initial value of 1.0 for every month after a one time receipt of income from the harvest. This could be expressed as:

p_1 = 1.0 for $month_1$, if month 1 = June

p_2 = .92 for $month_2$, if month 2 = July

p_{12} = .08 for $month_{12}$, if month 12 = May

If the desired level of membership fees were So 1000 (i.e., X = So 1,000), then the above situation would yield only So 540 not So 1,000 if the monthly fee was set at So 83.3 (So 1,000/12), as illustrated below.

$$X = 1.0\ (83.3) + .92\ (83.3) + .83\ (83.3) + .75\ (83.3) + .67\ (83.3) + .58\ (83.3) + .5\ (83.3) + .42\ (83.3) + .33\ (83.3) + .25\ (83.3) + .17\ (83.3) + .08\ (83.3)$$

$$X \quad 539.78$$

Where X = total membership fees collected during year

This model indicates that if the objective is to collect So 1,000 in membership fees over a year and the probability of the sum being paid during any one month is directly related to income available in that month, at least 3 other options are preferable to the first if membership fees are to be collected.

a) Raise the monthly membership fee to an amount greater than $E(X)/_{12}$. In the case modeled above, setting the monthly amount at So 154.3 rather than So 83.3 would yield So 1,000;

b) Set the monthly membership fee on a sliding scale, pegged at a fixed percent of available income for month n; or

c) More away from monthly membership fees toward one lump sum payment at the time of highest income or payments during only those months in which income is high.

e. Development of Interactive Computer Capability for Analysis/ Selection of Benefit Packages/Financing Policies

Once the various benefit packages, and financing/pricing options have been developed, these will be presented to co-op/community members for discussion and selection of the option preferred for that co-op. In the course of these discussions, the co-op members may suggest certain variations to one or more proposed options. To allow project personnel to respond to these suggestions and provide the co-op with immediate feedback on the cost implications of these modifications, the project's computer facilities will be brought to this meeting and will be used to generate these estimates. This will require beforehand the adoption of existing software applications (eg Visi Calc) or the development of new programs to process changes to the variables in the formula equating total costs with total expenses. This rapid analysis of the co-op members suggestions should prove valuable in reaching agreement on these decision variables without the need for a long series of meeting in which successive options are manually casted out, then modified once again.

f) Preparation of Reports

A report shall be prepared at the end of Phase II which will document:

- the development and evaluation of the service package options, including
  - detailed cost analyses, including estimation of replacement cost of supplies
  - comparisons of total costs with community budget constraints (percent of average family income)
  - estimation of break-even participation (membership) and utilization rates
- analysis of financing mechanisms and presentations of models developed
- analysis of estimated relationships between benefit packages and financing/pricing approaches
- the development of the software to estimate impact of changes in package options
- results of meetings with co-op leaders concerning selection of services and financing approaches.

C. Phase III. Implementation of Co-op Health Project

Once a service package and a financing structure, the USAID/B co-op health project will then proceed to enroll households into the program and provide services to them. The household survey instrument developed in Phase I, or a modified version thereof, will be used as a registration form for families enrolling in the health program. The aggregate information on the health problems and expenditure of each co-op program's target population

as well as pamphlets describing the health program will be used to educate household about the potential benefits of the project.

During the implementation of the co-op health program, the PRICOR-funded component will support the large project the following ways:

- provide assistance in the development of a management information system.
- undertake periodic analyses of the data in this MIS to identify as early as possible unanticipated changes in membership, utilization rates, revenues, and/or costs and develop solutions to these problems.
- conduct an in-depth evaluation of the program 24 months after initiation of the first haousehold survey.
- preparation of reports

These tasks are described in more detail below.

1. Tasks.

a. Development of a Management Information System

PRICOR-funded staff will assist co-op health project personnel in the development of a computerized management information system (MIS) and related data collection instruments assistance will be provided in designing appropriate coding structures and software programs to allow easy data entry, retrieval analysis, and report generation. The principal purpose of the MIS will be to store and analyse information concerning service utilization, revenues, and costs. In addition to the registration forms, each level of the co-op health care system will also record on a standard form the following information for each health care encounters: the unique ID of the family

(or if possible the individual) provided at time of registration in the health program (a dummy code to be used for non-enrolled families) type and quantity of services provided, and the charges/revenues for each. These forms will be periodically forwarded to through the higher levels of the system to the central provider organization where the data will be entered into the MIS. Family data from the registration forms and/or Phase I household survey will be linked with subsequent utilization expenditure entries for that household.

The database will be utilized by the provider organization as the basis for establishing both revenue and inventory control systems. In addition, as third use of this MIS will be to generate the data needed to carry out various analyses of program performance. The nature and utility analyses is discussed as part of the next task description.

b. Periodic Analyses of MIS Data

At least semiannually, PRICOR-funded resources will be devoted toward undertaking a through analysis of the information contained in the MIS. These analyses will be used to document the performance of each component of the health delivery system, act as an early-warning system for identifying problems which may be developing solutions to these problems.

The statistics which should be generated as part of these analyses will include:

- health program enrollment rates/community
- cross tabulations of enrollment rates and
  - -co-op member/non-member
  - -economic characteristics
  - -participating co-op
- utilization rates, by service, level, community
- disenrollment data
  - -by community
  - -by co-op
  - -by family characteristics
- a comparison of revenue generated at each treatment setting (each level I, II, and III site) with anticipated utilization/revenue levels to identify sites with low productivity.
- identification of those sites where there is a discrepancy between reported utilization rates and reported revenue levels to assess whether certain providers are not charging for services, not promptly forwarding revenues to central provider organization, or overcharging for services.

The prompt and thorough review and analysis of these types of data, particularly when coupled with other sources of information concerning such important factors as changes on farm income or inflation levels, will be critical to the project's ability to develop modifications to its policies and procedures during the course of the implementation period which will both respond to identified operational problems and be acceptable to the co-ops and communities being served.

c) In-depth Program Evaluation

Approximately twenty-months into Phase III (PRICOR project month), project resources will be focused on undertaking a comprehensive review of the co-op health program. The purpose of this review will not only be to evaluate the impact of its activities, but also to develop a final set of recommendations designed to refine the project's self-financing policies and procedures.

The basic approach to this evaluation will be to repeat several of the tasks carried out in Phase I, namely:

- key informant interviews
- analyses of longitudinal and seasonal factors affecting health care utilization/expenditures
- household surveys

In addition, a report will also be prepared which documents the operational and policy issues encountered during the course of program development and implementation and how each was addressed, provides recommendations concerning future program improvements and ways the program might best be transferred to other co-ops.

It will be important that the household survey to be begun exactly 24 months after the first survey was initiated so that the findings can be compared without any seasonal biases. The key informant interviews will follow the same general structure of Phase I interviews although the individuals identified as key informants will likely change and the topics for discussion focused more directly on program activities and impacts. Similarly, collection

Similarly, collection and analysis of values for longitudinal/seasonal factors will be concentrated on data for the previous implementation period, although some projection of variables into the future may also be required.

The household survey will be administered in the same manner as the Phase I survey, utilizing the ssentially same instruments and sample selection methodology. In this case, however, the supplemental sample, if necessary, will be drawn from health program members rather than co-op members to ensure sufficient representation of households participating in the program. As in Phase I, the sampling methodology will again be reviewed in Phase III and minor adjustments necessary to insure the validity of findings will be made. In addition, several slight, although important, change to the survey instrument will be made. One will be/to provide space in the section asking for a two week recall of health care utilization and expenditures, whether or not services were provided through or outside of the co-op delivery system. Another question will ask non-particpants if they had even been members of the health program and, if so, why they left. Several rather open-ended questions will also be added to the end of the survey instrument asking respondents to evaluate the program and explain their reasons for using/not using services.

A sample of households from the co-op area used as a rural control group will also be interviewed in Phase III. Analysis of changes in characterictics/behavior patterns in this control will serve as a baseline for identifying those changes in health status, utilization, and expenditures in the San Julián and numerous co-op areas that could be attributed to the effect of the health project. Because it is anticipated that not all of the

peri-urban communities served by La Merced will have received project health coverage by the time of the survey, this uncovered population will serve as the control group for those peri-urban communities which have reviewed project services.

The analysis of this survey data will be more complex than that carried out in Phase I. In addition to the preparation of summary descriptive statistics and cross-tabulations describing Phase III survey findings, pre and post-intervention comparisons will be made for each group to identify any changes which may have occurred in their levels of health status and health care utilization and expenditures. Comparisons will also be made between the experimental and control groups in an attempt to det out the impact on these values of other factors not associated with the project. As described under task (a) of Phase III, the original household survey or registration form of those families participating in the program will be linked through the MIS with the information on their program utilization and expenditure levels reported on the service encounter forms. These member families included in the Phase III survey will also have their interview responses linked to their MIS records. This integration of records will provide a relatively comprehensive history of these households' health status, income, health expenditures, and other characteristics which spans their participation in the project.

The information in this rich historical database will be analysed using multivariable regression analysis in an attempt to identify more clearly the relationship between the socio-economic characteristics of households, variations in seasonal and longitudinal variables, and the dependent variables

of health status, health care utilization and expenditures. Logit or prebit regression techniques would appear the most appropriate given the level of variable measurement involved. Because the requirements of this ambitious analysis are likely to exceed the computer capacity envisioned for the PRICOR-project, once the Phase III household survey data has been entered a copy of the database along with all supporting documentation will be forward to Dr. William Bertrand of Tulane University's Department of Epidemiology. The analysis of these data will be completed by Dr. Betrand and his colleagues utilizing the university's substantial computer resources.

It is anticipated that the Phase III household survey will be carried out in PRICOR-project months 28 and 29. The data will be entered, cleaned, and forwarded to Tulane in month 30, with the analysis of this data to be completed by the end of project month 34.

V. MANAGEMENT PLAN

A. Organization

The institution which will implement this PRICOR project is the Federación Nacional de Cooperativas de Ahorro y Crédito de Bolivia (FENACRE). As described earlier, FENACRE is the national association of savings and loan cooperatives and presently provides technical assistance to over 100 co-ops in Bolivia.

The activities to be carried out under this grant will be carefully integrated into the overall operations of the larger co-op health project. FENACRE will either share office space in Santa Cruz with the project's provider organization or have its own offices located in the same building. All project staff will reside in Santa Cruz with the exception of the Principal Investigator who will be located at FENACRE headquarters in Cochabamba.

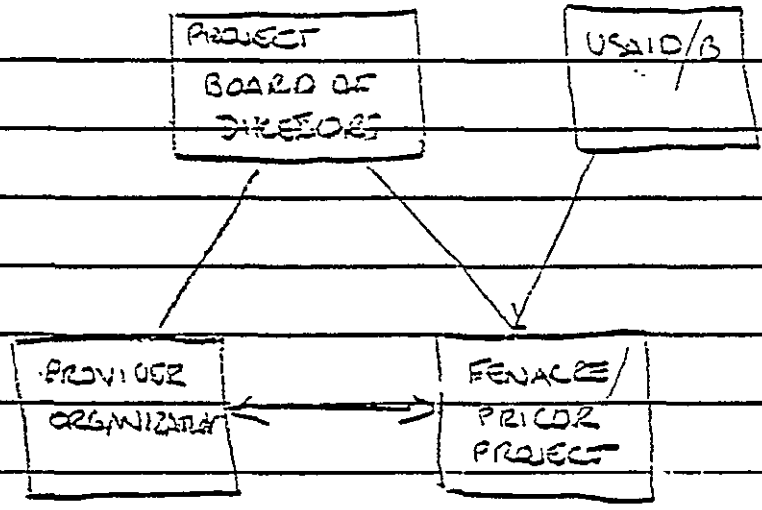
The relationships between the principal organizations involved in the co-op health project are depicted in Figure V-1. The FENACRE/PRICOR project will work in close co-operation with the provider organization and will have its activities overseen by the provider organization's board of directors as well as USAID/Bolivia.

B. Institutional Capability

FENACRE has been identified by USAID/Bolivia as the responsible group for implementing the PRICOR Bolivia project through the following mechanism:

RELATIONSHIPS BETWEEN
MAJOR ORGANIZATIONS

V-2



1) A review of prior work of a similar nature produced by the organization.

2) A site visit to Fenacre headquarters in Cochabamba and their field office in Santa Cruz.

1. The set of documents reviewed were generated as part of a prior USAID contract which produced a socio-economic study of agricultural co-ops Documents prepared and reviewed were:

   a. Manual para el Codificador (coding manual) 1981

   b. Informe de trabajo (1981) progress report

   c. Route sheet for Baseline Survey (no date)

   d. Trabajo de Tabulación de la Boleta Adicional y Codificación de cuestionarios (progress report, no date)

   e. Comentarios adicionales (baseline survey, no date)

The documentation illustrated a clear familiarity with survey research techniques and experience in the management of a field survey. The coding manual in particular was one of the better field guides that I have encountered and indicates a high level of expertise. It should be noted that technical assistance was provided for this activity through the U.D. Department of the Census.

The site visit established Fenacre as having a capable and well organized management team acustomed to modern computer based activities and dedicated to the co-operative movement. A recent series of audits by big eight affiliates indicates sound bookkeeping procedures. All members of management were enthusiastic in support of the project and past AID experience with Fenacre has been sound.

In addition, back up technical assistance to the project during Phase III will be acquired from members of the Tulane School of Public Health Department of Biostatistics and Epidemiology. The data processing and statistical consulting group have routinely assisted in AID, WHO and PAHO small scale research projects. Main frame computer accessibility is through a DEC-20-60 interactive system. The statistical consulting group consists of 5 biostatisticians, 4 programmers, and 3 field epidemiologists. Technical assistance in the area of health economics and financing will be provided during the course of the project by Lawrence Bartlett.

6. Workplan and Reporting Requirements

The schedule for completion of the tasks identified in the methodology section is presented in Figure V-2. Copies of the reports called for in this workplan will be provided by FENACRE to FRICOR, the board of directors and executive director of the provider organization, and USAID/Bolivia. In addition, bi-monthly financial and progress reports will be submitted to FRICOR throughout the contract period.

Since the AID intervention project is designed in such a way as to be dependant upon first phase feedback from this project; every means possible including meetings, exchange of documents and mutual participation in projects will be used to further this objective. The research products are designed to be developed in such a way that full documentation of the research process as well as the basic components of a final report will be ready for reporting of results at the end of project. Continual feedback of intermediate results at every stage will be a major responsability of the Principal Investigator and Project Director.

It is useful to restate at this point that one of the most immediate and potentially important feedback points will be in the communities themselves up through the cooperative level by involving these individuals in the actual research process we expect to make doubly sure that the results will be immediately available to them.

D. Staffing

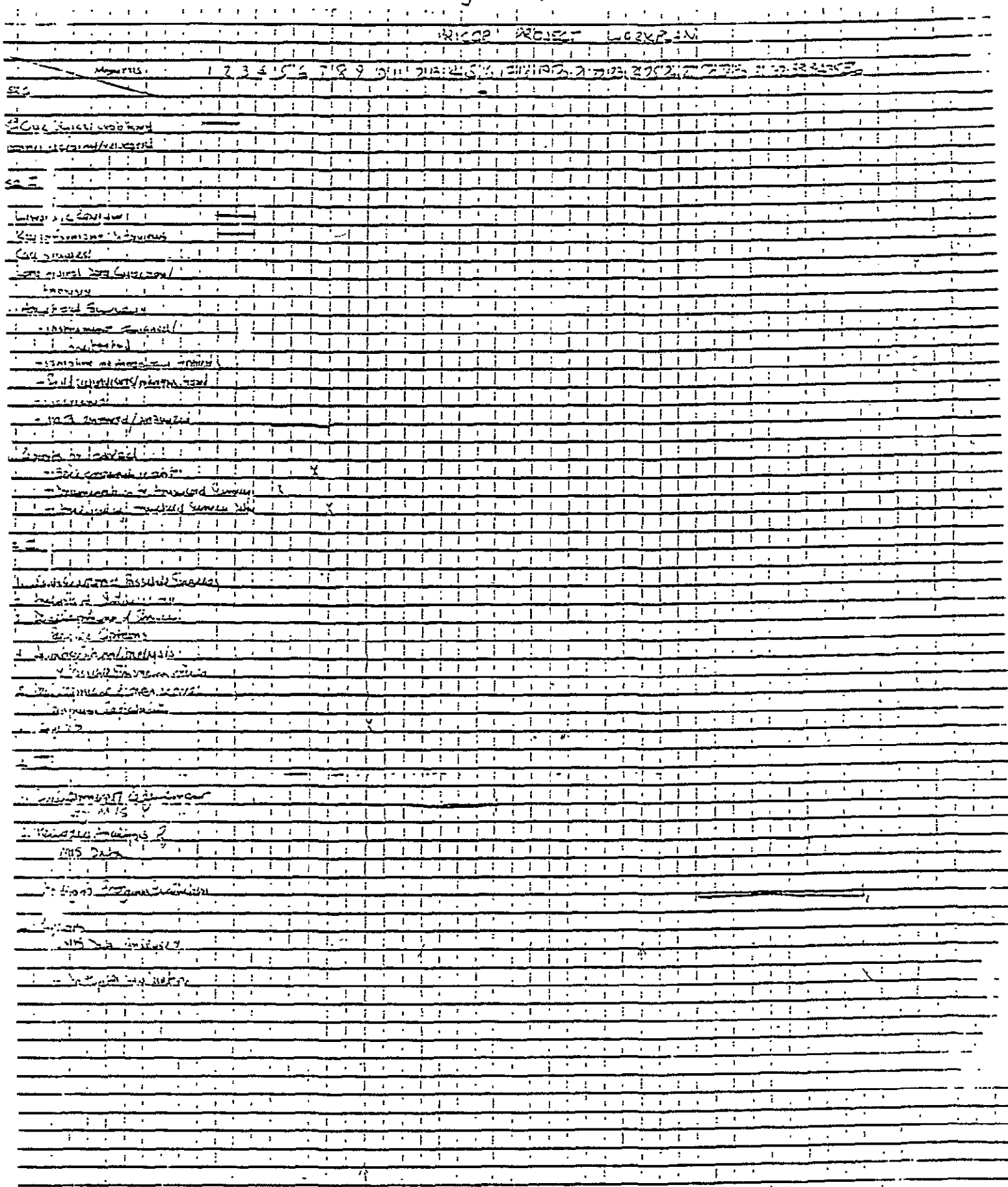
In the first year, the PRICOR/FENACRE project will be staffed by one part-time principal investigator, five full time staff members, seventeen temporary hire field staff, and two consultants. The principal investigator will be located at FENACRE headquarters in Cochabamba, while all other staff will operate from offices to be rented by FENACRE in Santa Cruz.

The five full time staff to work on the project during year one are the following personnel:

- Project Director
- Economist/Systems Analyst
- Statistician
- Programmer/Data entry clerk
- Secretary

The chart on the organizational relationship between project staff is presented in Figure V-3 in general, the principal investigator and project director will have overall responsibility for management of the project. The economist/systems analyst will be principally responsible for conducting the data analysis and costing tasks, while the statistician will have primary responsibility for the development, implementation and analysis of the household survey. The programmer and secretary will provide administrative and technical support services as needed to all tasks. A chart allocating each of these individual's

Figure V-2



time across year 1 tasks is presented in Table V1. In addition, four field supervisors and therteen interviewers will be brought on as temporary help to administer the household survey. The epidemiology and health economics consultants will participate for approximately two weeks each in both the questionnaire data analysis plan development stage and the actual data analysis stage.

The project will most require the services of the statistician or the seventeen temporary full staff in year two. The workload allocations of the remaining project staff is presented in Table V2. The project's epidemiological and health economist consultants will both travel to Santa Cruz for a trip of approximately two weeks to assist in the analysis of the MIS data base.

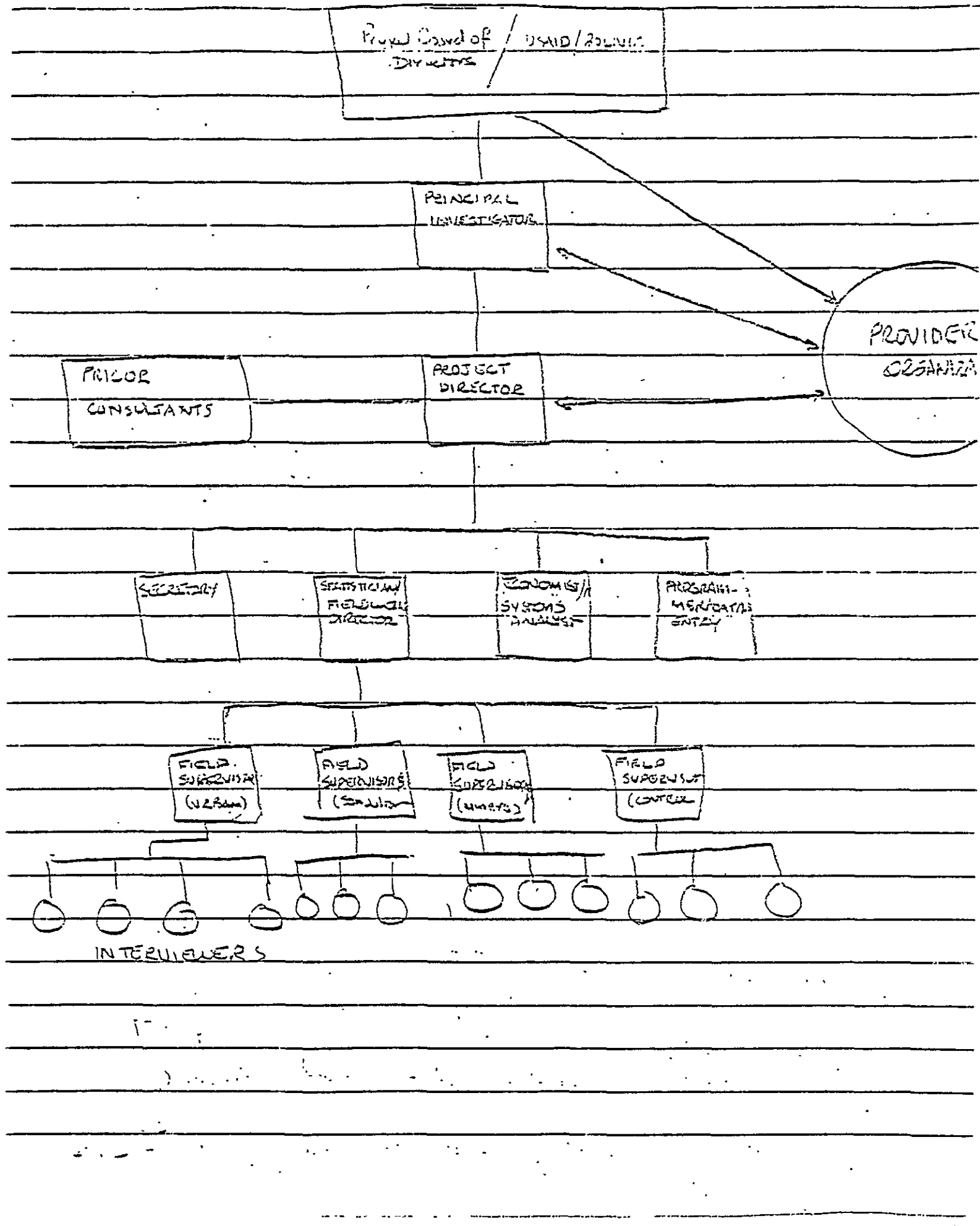
In year three, the need to carry out another household survey will require the project to contract for the services of a statistician for approximately 6 months. As in year 1 seventeen field staff will be hired for short-term interviewing and field supervision activities. The project's two consultants will both spend two weeks in Santa Cruz assisting in the end-of-project evaluation. In addition Tulane University School of Publich Health and Epidemiology will process this large quantity of end project data. Table V3 identifies the allocation of project staff's time to year 3 tasks.

Upon notice of award of this grant, FENACRE will begin recruiting to fill these project positions. Sr. Marco Antonio Tellez, General Manager of FENACRE will serve as principal investigator. The candidates for these positions will be assessed against the optimal qualifications criteria for each position presented in Table V4. Once appropriate personnel have been identified by FENACRE the curriculum vitae and USAID biodata sheets for these individuals (including Sr. Tellez) will be submitted

to USAID/Bolivia for review, then forwarded to PRICOR/Washington for final approval. Similarly, any change in project personnel during the life of the project will also require USAID/Bolivia and PRICOR prior approval.

CHART OF FEDASSE/PRICOR PROJECT

(YEAR 1)



FENACRE/PRICOR Project

Workload Allocation year 1

	Principal Investig.	Project Director	Econ.	Stat.	Programmer data inf.	Total/ tasks
Central Adm.	26	39	-	-	10	75
Phase I						
1. Werehouse Review	-	7	10	5	-	22
2. Key informant interviewers	-	3	6	3	-	17
3. Case studies	-	6	5	-	-	11
4. Longitudinal Data collection/Analysis	-	22	35	25	25	107
5. Household survey						
a. design/test	-	10	4	10	-	24
b. sampling method.	-	3	-	10	-	13
c. field superv. travel	-	3	-	15	-	18
d. interviewers	-	5	-	40	-	45
e. data entry/analysis	-	25	25	70	85	200
6. Report prepared	-	12	10	15	10	47
Phase II						
1. identification serv.	-	5	5	-	-	10
2. analysis of services costs	-	20	45	5	15	85
3. dev. of services package options	-	10	10	5	20	45
4. identification of alt. formulating policies	-	20	30	5	10	65
5. development inf. computer capacity	-	20	35	22	40	117
6. Reports	-	15	15	15	10	55
Phase III						
development of MS	0	30	25	15	40	110
	26	260	260	260	260	1.066

FENACRE/PRICOR PROJECT

Year 2 Workload allocation

	Principal Invest.	Project director	Economist syst/anal	Progr.	Total
General administrator	26	26	-	10	62
Phase III					
Dev/refinement of MIS	-	34	80	125	239
Periodic Analysis of MIS data (including special system)	-	200	180	125	505
	26	260	260	260	806

FENACRE/PRICOR PROJECT

Year 3 Workload Allocation

	Princip Inv.	Proj Dir.	Econ.	Stat.	Programmer/ data entry	Total task
General Adm.	26	35		-	-	-
Phase III						
Periodic Analysis of MIS data	-	40	75	5	70	
In depth evaluation						
Longetudinal data analysis	-	25	40	10	40	
special studies of data, other	-	50	60	5	40	
key inform interv. implementation	-	25	20	-		
	-	5	-	10		
survey instrument review/revision	-	10	5	10	10	
training of field supervision/interviewers	-	-	-	15		
Adm. of instrument	-	10	-	20		
Analysis of data	-	40	40	40	30	
Reports	-	20	20	15	20	
	26	260	260	260	260	

Suggested Qualifications for PRICOR Project Personnel

Principal Investigator

1. Holds senior level administrative position within FENACRE
2. Experience in the administration of research projects

Project Director

1. Educational background in some analytic field (e.g statistics, economics)
2. Previous senior level administrative experience, experience in project management prefered
3. Knowledge of computer systems/applications
4. Previous experience in manipulation of large data sets
5. Knowledge of health care issues
6. Previous experience in survey administration/analysis

Economist/Systems Analyst

1. Educational background in economics, finance or related field (training in computer sciences with experience in these types of applications may be substituted)
2. Previous experience in primary data analysis
3. Previous experience in the design and implementation of management information system
4. Knowledge of health care issues
5. Fluency in computer language (BASIC,FORTRAN) (optional)

Statistician

1. Educational background -statistics
2. Experience in sample selection household survey design, implementation and analysis
3. Previous experience in analysis of large data sets

Programmer/data entry clerk

1. Training in computer sciences or related field
2. Fluency in at least one computer language.

6. BUDGET SUMMARY

PRINCIPAL INVESTIGATOR: DR. MARCO ANTONIO TELLEZ

ORGANIZATION: FENACRE

ADDRESS: Casilla 829
Cochabamba, Bolivia

DURATION: From (mo/yr) 5/83 through (mo/yr) 4/86 No. months 36

BUDGET CATEGORIES		U.S. DOLLAR AMOUNT REQUESTED Year 1	Year 2	YEAR 3	TOTAL
A. Personnel (Direct Labor)		16,194	10,560	17,926	44,680
B. Fringe Benefits		9,716	6,336	10,756	26,808
C. Overhead on Labor		-	-	-	-
D. Consultant Costs	PRICOR	13,365	5,100	5,360	23,825
E. Other Direct Costs		10,707	8,180	10,608	29,495
F. Travel and Per Diem		4,872	662	4,196	9,730
G. Subagreements	PRICOR	7,900	3,938	4,431	8,369
				6,000	6,000
H. Total Direct Costs		41,489	25,738	49,486	116,713
I. Indirect Costs	PRICOR	21,265	3,938	9,791	34,994
		8,298	5,148	8,697	22,143
J. Total Budget		49,787	30,886	58,183	138,856
	PRICOR	21,265	3,938	9,791	34,994

Principal Investigator

DR. MARCO ANTONIO TELLEZ
Typed Name and Title

Signature

Date

Authorized Institutional Representative

Typed Name and Title

Signature

Date

DETAILED BUDGET
PROVIDE ONE FOR EACH YEAR
YEAR: 1

A. Personnel (Direct Labor) Name Position	Time/Effort Estimated %	Days	Rate ($/Day)	Total $US
Principal Investigator	15	39	11.54	450
Project Director (TBN)	100	260	13.84	3,598
Economist/Systems analyst (TBN)	100	260	9.81	2,551
Statistician (TBN)	100	260	9.81	2,551
Programmer/data entry clerk (TBN)	100	260	7.63	1,938
Secretary/typist (TBN)	100	260	4.50	1,170
Temporary				
Field Supervisor (4) (TBN)	20	52	8.75	1,820
Interviewers (13) (TBN)	20	52	3.13	2,116
Total				16,194

B. Fringe Benefits (if Applicable) (See Schedule ____) Rate 60% x Base 16,194 = Total 9,716

C. Overhead on Labor (if Applicable) (See Schedule ____) Rate ____ x Base ____ = Total ____

D. Consultant Costs Name	Speciality	Estimated Days	Rate ($/Day)	Total $US
Dr. William Bertrand	Social Epidemiology design and field methods	30	243	7,290
Lawrence Bartlett	Health Financing and Economist	25	243	6,075
Total			PRICOR	13,365

E. Other Direct Costs (Supplies, Postage, Material) Item Description	Number of Units	Cost Per Unit	Total $US
Paper/supplies	12 mos.	100	1,200
Printing-general			510
questionnaires			1,000
Office rental/Santa Cruz	12	170	2,040
Field kits (sleeping bags, lanterns)			857
Lease of Micro computer, hard disc drive, printer	12	300	3,600
Miscellaneous supplies and software			1,500
Total			10,707

F. Travel and Per Diem International Travel				Per Diem		
Itinerary	Cost x No. Trips	=	Total	Rate x No. Days	=	Total
New Orleans/La Paz/Sta Cruz	1300 x 2	=	2,600 PRICOR	40 x 60	=	2,400 PRICOR
Washington, D.C./La Paz/ Sta Cruz (RT)	1,450 x 2	=	2,900 PRICOR			

Domestic Travel				Per Diem		
Itinerary	Cost x No. Trips	=	Total	Rate x No. Days	=	Total
1. Sta Cruz Sta Cruz/La Paz (2 mos)	$35 x 24		840	10 x 240*		400
2. Transport from Sta. Cruz to and within San Julian-vehicle Leased from fides	$110 x 12 mo	=	1,320			
3. Gasoline @$.30 galon x 10gls/car wk x 52 weeks			312			
Total						4,872 PRICOR 7,900

G. Subagreements (A "Detailed Budget" must be submitted for each) List by Name	Total
1.	
2.	
3.	
4.	
Total	

H. TOTAL DIRECT COSTS: 41,489
PRICOR 21,265

I. Indirect Costs (General and Administrative Costs) (See Schedule _____) Rate 20% × Base 41,489 = Total 8,298

J. Total Budget 49,787
PRICOR 21,265
Year 1 $ US

DETAILED BUDGET
PROVIDE ONE FOR EACH YEAR
YEAR: 2

A. Personnel (Direct Labor) Name Position	Time/Effort Estimated %	Days	Rate ** ($/Day)	Total $US
Principal investigator (Tellez)	10	26	12.70	330
Project Director (TBN)	100	260	15.22	3,957
Economist/Systems Analysis (TBN)	100	260	10.79	2,805
Programmer/data entry clerk (TBN)	100	260	8.39	2,181
Secretary/typist (TBN)	100	260	4.95	1,287
** Includes 10% increase over year 1				
Total				10,560

B. Fringe Benefits (If Applicable) (See Schedule ____) Rate 60% × Base 10,560 = Total 6,336

C. Overhead on Labor (If Applicable) (See Schedule ____) Rate ____ × Base ____ = Total ____

D. Consultant Costs Name	Speciality	Estimated Days	Rate* ($/Day)	Total $US
Dr. William Bertrand	Social Epidemiology design and field methods	10	255	2,550
Lawrence Bartlett	Health Financing and Economist	10	255	2,550
* Assumes 5% increase over year 1				
Total			PRICOR	5,100

E. Other Direct Costs (Supplies, Postage, Material) Item Description	Number of Units	Cost Per Unit	Total $US
Office supplies, postage	12 mos.	125	1,500
Printing			400
Office rental	12	190	2,280
Misc. supplies (computer and data)			400
Lease of computer	12	300	3,600
Total			8,180

Travel and Per Diem International Travel					Per Diem			
Itinerary	Cost	x No. Trips	=	Total	Rate	x No. Days	=	Total
New Orleans/La Paz/Sta Cruz (RT)	1430	x 1		1,430 PRICOR	44	x 22		968 PRICOR
Washington, D.C./La Paz Santa Cruz (RT)	1,540	x 1		1,540 PRICOR				

Domestic Travel					Per Diem			
Itinerary	Cost	x No. Trips	=	Total	Rate	x No. Days	=	Total
Sta. Cruz/La Paz or Santa Cruz/Cochabamba	38.50	x 12		462	10	x 20		200

Total		662
	PRICOR	3938

G. Subagreements (A "Detailed Budget" must be submitted for each) List by Name	Total
1.	
2.	
3.	
4.	
Total	

H. TOTAL DIRECT COSTS: 25,738

PRICOR 3,938

I. Indirect Costs (General and Administrative Costs) (See Schedule _____) Rate 20% x Base 25,738= Total 5,148

J. Total Budget

Year 2 $ US 10,886

PRICOR 3,938

DETAILED BUDGET
PROVIDE ONE FOR EACH YEAR
YEAR: 3

A. Personnel (Direct Labor) Name Position	Time/Effort Estimated %	Days	Rate** ($/Day)	Total $US
Principal investigator (Tellez)	10	26	13.97	363
Project Director (TBN)	100	260	16.74	4,352
Economist/systems analyst (TBN)	100	260	11.87	3,086
Programmer/data entry clerk (TBN)	100	260	9.23	2,400
Secretary/typist (TBN)	100	260	5.45	1,417
Temporary				
Statistician	50	130	11.87	1,543
Field Supervisors (4)	20	52	10.59	2,203
Interviewers (13)	20	52	3.79	2,562
** Includes 10% increase over year 2				
Total				17,926

B. Fringe Benefits (If Applicable) (See Schedule ____) Rate 60% × Base 17,926 = Total 10,756

C. Overhead on Labor (If Applicable) (See Schedule ____) Rate ____ × Base ____ = Total ____

D. Consultant Costs Name	Speciality	Estimated Days	Rate ** ($/Day)	Total $US
Dr. William Bertrand	Social Epidemiology design and field methods	10	268	2,680
Lawrence Bartlett	Health Finance and Economics	10	268	2,680
** Assumes 5% increase over year 2				
Total			PRICOR	5,360

E. Other Direct Costs (Supplies, Postage, Material) Item Description	Number of Units	Cost Per Unit	Total $US
Office supplies, postage	12 mos	167	2,000
Printing Questionnaires and reports			2,000
Office rental	12	209	2,508
Misc. computer and data supplies			500
Lease of computer	12	300	3,600
Total			10,608

F. Travel and Per Diem – International Travel				Per Diem			
Itinerary	Cost x No. Trips	=	Total	Rate x No. Days		=	Total
New Orleans/La Paz/ Sta Cruz	1,573		1,573 PRICOR	48.5	x	24	= 1,164 PRICOR
Washington D.C./La Paz/ Sta Cruz	1,694	x 1	1,694 PRICOR				

Domestic Travel				Per Diem			
Itinerary	Cost x No. Trips	=	Total	Rate x No. Days		=	Total
Sta Cruz/La Paz or Sta Cruz/Cochabamba	42.35	x 12	= 508	12	x 150*		= 1,800
transport Nineros			1,600				
2 cars rented @ $ 200/mo.							
Gasoline $0.60 gal x 60 gal/mo/car x			298				

Total		
		4,196
	pricor	4,431

G. Subagreements (A "Detailed Budget" must be submitted for each) List by Name	Total
1. University of Tulane (data processing)	6000
2.	
3.	
4.	
Total	6000

H. TOTAL DIRECT COSTS:		49,486
	PRICOR	9,791

I. Indirect Costs (General and Administrative Costs) (See Schedule ____) Rate 20% x Base 43,486 Total 8,697

J. Total Budget

Year 3 $ US 58,183

PRICOR 9,791