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MEASUREMENT OF WOMEN'S ECONOMIC ACTIVITY:
A STUDY OF ILOILO PROVINCE IN THE PHILIPPINES

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INTRODUCTION

Women are an important element in determining a country's productive potential and the success of development efforts. However, women have been largely neglected in the rural development programs of many developing countries (Boulding, 1978; Newland, 1979).

Although women's role in agricultural production has increasingly been documented, adequate measurement of women's contribution has been hampered by current research and methodological approaches. Existing census and labor force statistics have underestimated or overlooked women's contribution to agricultural production (International Center for Research on Women, 1980). Methods of data collection and research techniques in developing countries often involve a Western-biased definition of work which seriously undercounts women's contribution (Buvinic, 1976). However, the definition of labor force participation is perhaps the key factor preventing the adequate measurement of female economic contribution in less-developed countries (Standing, 1978; Boulding, 1978).

Traditional methods of recording female labor force activity tend to define narrowly work as a paid activity performed in the formal sector of the economy without regard to informal sector and home production activities. Rural women's productive activity often occurs in the subsistence sector, the informal labor market, or the household and thus women tend to be classified as economically inactive (Newland, 1980).

The focus on single occupations in census and data collection forms does not capture the complexity of women's work. To a greater extent than men, women participate in multiple work activities. The multiple roles that women play are overlooked due to the traditional view of women as domestic beings without an economic role to perform. The self-perception of women, who though economically active continue to declare themselves as "only housewives," is a crucial factor in the underestimation of the female labor force.

This estimation bias is more pronounced in the documentation of women's work in the agricultural sector. As Schutjer (1982) points out, conceptual and data problems represent effective barriers to women's potential contribution to agriculture. The tendency for women to be engaged in the nonmonetized sector of the agricultural economy on a part-time or seasonal basis increases the likelihood that women will be excluded from agricultural employment statistics (ICRW, 1980). For example, women are often extensively involved in activities such as weeding,

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harvesting, storage, food processing and tending small animals. The extent of women's contribution to agricultural production is underestimated as their labor in these activities remains undocumented.

The present study empirically tests the importance of definitional and measurement issues in the documentation and study of female labor force activity and agricultural time allocation. Alternate specifications of labor force activity and agricultural time allocation are used to analyze the work experience of a sample of rural Philippine women. In contrast to the standard approaches to defining labor force participation, broad definitions of work activity are employed.

THEORY AND METHODS

The present study draws upon the work of Becker (1965) and the branch of economic theory known as the "new household economics." Based on the theory of consumer behavior, recent neoclassical labor supply theory posits that labor force behavior reflects household decisions concerning time allocation and an individual's relative productivity in alternate activities. Viewing the household as a production and consumption unit and time as an input in the production process, variation in labor force participation reflects differences in the "opportunity cost" of a woman's time.

The data are based on a 1979 survey of agricultural households in Iloilo province, a rice-growing region in the West Central Philippines.¹ Interviews were conducted to obtain individual, household and community level information on 785 agricultural households.

Iloilo is predominantly a rice-growing province with 76 percent of the farm households engaged in rice production as their main agricultural activity. The majority of farms in the province are small scale, with 71 percent ranging between 1-3 hectares in size and fewer than 10 percent above 5 hectares (NEDA, 1971). Iloilo is characterized by high rates of tenancy with over one-half of the rice farms operated by tenant farmers. The agricultural households practice relatively labor-intensive production methods while relatively few farms (18.8 percent) have access to irrigation facilities. More than one-half (56.5 percent) of the farms relied solely on family labor to perform agricultural operations, one-third indicated employing outside labor while the remaining households combined family and hired labor.

By primary occupation, the census of Iloilo reports that agriculture is the dominant source

¹ The data were collected as part of a multi-country agricultural demographic survey supported by the Department of Agricultural Economics and Rural Sociology at the Pennsylvania State University and the Ford Foundation.

of employment among 27.04 percent of the women in Iloilo. Other sources of employment include craft production (24.9 percent), service (16.9 percent) and professional (10.6 percent) occupations (Szanton, 1979). The majority of women are also reportedly engaged in informal sector activities related to subsistence agriculture or cottage industries on a part-time basis (Szanton, 1979).

In view of the limitations associated with measuring female labor supply and agricultural participation, multiple indicators of female employment and time allocation to agriculture are specified. The four dependent variables are: 1) self-selected employment (SSEMP), which was measured in response to the question "Are you presently working?" with work defined to include agricultural or nonagricultural activities, paid or unpaid work, and informal or formal labor market pursuits; 2) employment (EMP), which was measured as above but also includes women reported as active in one or more agricultural tasks by the household head; 3) self-selected agricultural work (SSAG), segregates from the first group those women whose current employment was in agriculture; 4) agricultural work (AG), a measure of agricultural work defined to include women reporting themselves as working in agriculture and those women reported active in one or more agricultural tasks by the household head.

In the present study it is hypothesized that variation in female labor force decisions reflects differences in the valuation of a woman's time in alternate activities. Specifically, the model consists of selected individuals, household and community factors which are correlates of female labor activity. Table 1 contains data definitions and their expected directions of influence on the dependent variables.

Individual factors are represented in the model by a woman's age and level of education. Age is viewed as a proxy for a woman's life cycle stage and physical capacity to perform work where a positive relationship has been observed between age and rural women's labor force participation in the Philippines (Rojas, 1977; Castillo, 1979). A positive relationship between age (AGE) and employment is expected in nonagricultural activities, while a curvilinear relationship is hypothesized for agricultural workers. Education is included as a measure of human capital where a negative relationship between education and the employment variables is expected as high rates of labor force participation have been observed among women with low-educational attainment in the Philippines (Castillo, 1976; Perez, 1976; Rojas, 1977). Two dummy variables representing high school education (HS) and college/university-level education (UNIV) are incorporated into the present model.

Household factors are given by household in-

come, farm size, tenure status, hired labor, technology use and the presence of preschool children. Household income (INCOME) is used to measure the effect of the demand for income on the probability of female labor force and agricultural activity. Consistent with previous studies documenting an inverse relationship between household income and rural women's labor force activity (Rojas, 1977; Wery, 1979) a similar relationship is expected in the present study. Farm size (FMSIZE) is included to determine the influence of land availability on resource allocation patterns and variations in female labor participation. An inverse relationship between farm size and female employment is expected due to the lower opportunity cost of family labor on small farms and the tendency for small farms to employ relatively labor-intensive production techniques. Tenure arrangements are associated with female work patterns where land ownership is hypothesized to be negatively related to female participation in work and agricultural activities as compared to tenant-operated households. This is consistent with evidence in less-developed countries that the proportion of family labor engaged in agricultural activity tends to be higher on tenant-operated farms (Ruttan, 1966). In landless households, female work activity is expected to be high while low levels of agricultural participation are expected. As hired labor often operates as a substitute for female labor in agricultural operations (Castillo, 1979; Youssef, 1980), a negative association between female agricultural participation and hired labor use is anticipated, while a positive effect on labor activity is expected. Evidence suggests that the use of labor-intensive technology is positively related to labor requirements in agriculture though differences are observed by class of labor (i.e., family or hired labor) and type of operation (ILO, 1974; Rogers, 1979). An index of labor-using technology (TECHIND) was calculated by assigning a value of 1 to labor-using technology (irrigation, HYV's, transplanted crops, insecticide use) and minus 1 to labor-saving technology (herbicides, small tractors, and threshers). The presence of preschool children is often used as a proxy for the impact of family structure on female labor supply. In the Philippines, the presence of preschool children has not been shown to be a deterrent to female labor force participation (Gonzales, 1976) and thus the effect of preschool children (PRESCH) on women's employment cannot be predicted.

As a measure of community factors, the distance to the city is included to indicate demand conditions and the availability of employment opportunities. Measured in kilometers, the distance variable (LOGDIST) was operationalized using the logarithm of the distance to the nearest city. The importance of distance as a determinant of labor force choice diminishes given longer distances. The relationship between LOGDIST and employment depends on the structure of the labor market. For example, as the majority of rural Philippine women are engaged in informal sector employment (i.e., agricultural work, cottage industries) the distance variable is less relevant as a measure of labor market

² The reporting of female participation in agriculture by the household head represents a potential measurement bias in the recording of women's work in agriculture, however, as women were not asked directly about their participation.

Table 1. Definition of Selected Individual, Household, and Community Variables and Their Expected Influence on Alternate Female Labor Supply and Agricultural Work Choice.

Measure	Definition	Self-Selected Employed ^a	Employed ^b	Self-Selected Ag. Worker ^c	Ag. Worker ^d
Age	In years	+	+	+/-	+/-
Education	Categorical measure represents highest level of education attained.	-	-	-	-
Household Income	Household income from farm and nonfarm sources	-	-	-	-
Farm Size	Number of hectares owned and operated by the agricultural households.	-	-	-	-
Tenure Status	Relationship of the household head to the land.	-	-	-	-
Owner		-	-	-	-
Tenant		+	+	-	-
Landless		+	+	-	-
Hired Labor	Use of hired labor in ag. operations.	+	+	-	-
Labor-Using Technology	Index of labor-using technology based on technology use in agriculture	?	?	+	+
Preschool Children	Presence of preschool children (less than six years) in the household.	?	?	?	?
Distance to the City	Log of the distance to the nearest city (in kilometers).	?	?	?	?

^a Self-Selected Employed - employment as reported by the women in the sample.

^b Employed - employment as defined above and women reported to be active in one or more agricultural tasks by the household head.

^c Self-Selected Ag. Worker - agricultural participation as reported by the women in the sample.

^d Ag. Worker - agricultural participation as defined above and women reported to be active in one or more agricultural tasks by the household head.

conditions.

In summary, selected individual, household and community factors are expected to impact on the valuation of a woman's time in alternate labor market activities, thus influencing labor supply choice among the sample of women.

Four probit equations were estimated using alternate specifications of the dependent variable to analyze female employment and time allocation to agriculture. A probit model based on maximum likelihood estimation was used to avoid problems associated with using ordinary linear regression on limited dependent variables. Table 2 reports the means and standard deviations for the variables included in the model. Tables 3 and 4 present the findings of the probit analysis for each specification of the dependent variable.

RESULTS

The results of the log-likelihood test (comparable to a Chi-Square with 11 degrees of freedom) indicating the goodness-of-fit of the model were significant for each specification of the dependent variable at the .01 level of significance. This suggests that the combined effects of the explanatory variables on female work par-

ticipation and agricultural activity were significantly different from zero.

Contrasting the results of the models, the findings indicate that selected individual, household, and community characteristics were significantly related to the probability of female labor force participation and agricultural time allocation among the sample of rural Philippine women. The results suggest that individual factors such as age and education had a similar effect on the probability of work participation and agricultural work activity. In contrast, household characteristics such as technology use, tenure status and hired labor had different effects on the probability of female work activity and agricultural time allocation. The community factor, distance to the city was (negative) and significant in determining female work activity among self-selected employed women while proximity was not significant in the other specifications of the model.

The R-Squared statistic (a "pseudo R-Square" analogous to the coefficient of determination in OLS regression) reveals the explanatory power of the probit model (Judge and Hill, 1982). In the present study, the low R-Square values corresponding to the SSEMP and EMP equations given by

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Table 2. Means and Standard Deviations of Variables Used in the Model of Female Labor Supply and Agricultural Activity.

Variable	Mean	Standard Deviation
SSEMP	.5032	.5003
EMP	.6408	.4801
SSAG	.1541	.3613
AG	.3019	.4594
HS	.2229	.4165
UNIV	.0561	.2302
LNDLS	.2892	.4537
OWNER	.2000	.4003
TECHIND	.9554	1.1950
HIRED	.5389	.4988
PRESCH	.6854	.4647
FMSIZE	1.356	4.313
INCOME	3892.507	7821.2
AGE	35.49	7.647
LOGDIST	.5717	.3861

Table 3. Probit Estimation of Self-Selected Employment and Employment

Variable	Maximum Likelihood Estimate	Partial Derivatives ^a	Maximum Likelihood Estimate	Partial Derivatives
<u>Individual</u>				
HS	-.1981*	-.0787	-.1875	
UNIV	-.1120		-.2193	
AGE	.0241**	.0095	.0269**	.0097
<u>Household</u>				
INCOME	.00001		.00001	
FMSIZE	.0025		.0060	
TECHIND	-.1071**	-.0427	-.0464	
OWNER	.1288		-.0272	
LNDLS	.2510*	.0984	-.6104**	-.2363
HIRED	.3957**	.1532	-.1800	
PRESCH	-.0451		.0434	
<u>Community</u>				
LOGDIST	-.2118*	-.0841	-.1168	
Constant	-.8298**		-.1560	
Dependent variable	SSEMP ^b		EMP ^c	
Number of observations	785		785	
-2 x log of likelihood ratio	41.096**		48.777**	
Degrees of freedom	11		11	
R-Square	.080		.096	

* Statistically significant at .10.

** Statistically significant at .01.

^a Partial derivatives indicate the change in the probability associated with a one-unit change in the response variable.

^b SSEMP = 1 if woman reports work activity.

^c EMP = 1 if woman reports work activity or household head reports participation in agricultural activity.

Table 4. Probit Estimation of Self-Selected Agricultural Work Activity^a and Agricultural Activity^b

Variable	Maximum Likelihood Estimate	Partial Derivatives	Maximum Likelihood Estimate	Partial Derivatives
<u>Individual</u>				
HS	-.3511**	-.0627	-.1977	
UNIV	-.4910*	-.0806	-.4767*	-.1420
AGE	.0151*	.0062	.0272**	.0096
<u>Household</u>				
INCOME	.00001		.00001	
FMSIZE	.0085		-.0292	
TECHIND	-.1225*	-.0232	.131**	.0468
OWNER	-.0713		.0872	
LNDLS	.1513		-.2025*	-.2960
HIRED	.6332**	.1924	-.6943**	-.1892
PRESCH	-.0340		.1294	
<u>Community</u>				
LOGDIST	-.0684		.0616	
Constant	-1.735**		-.9151*	
Dependent variable	SSEMP ^a		AG ^b	
Number of observations	785		785	
-2 x log of likelihood ratio	41.096**		211.972**	
Degrees of freedom	11		11	
R-Square	.080		.433	

* Statistically significant at .10.

** Statistically significant at .01.

^a SSAG = 1 if woman reports participation in agricultural activity.

^b AG = 1 if woman reports participation in agricultural activity or household head reports participation in agricultural activity.

the values .08 and .10 respectively) suggest that relatively little variation in female labor force choice was accounted for by the specified model. The explanatory power of the equation representing SSAG was comparable with an R-Square value of .10 while the model was most useful in explaining time allocation to agriculture using the modified definition of agricultural work (AG) where the R-Square was .43. This indicates that the specified model was more useful in explaining the correlates of female time allocation to agriculture relative to the other response variables.

Referring to self-selected employed women (SSEMP), slightly over one-half of the women in the sample (50.32 percent) were counted as economically active. Of these, the majority were engaged in nonagricultural pursuits (69.62 percent) while approximately one-third (30.88 percent) indicated participation in agriculture. An additional 111 women (14.51 percent) were viewed as employed on the basis of the alternate definition of employment (EMP) which included women working as defined above and women reportedly active in one or more agricultural tasks by the household head. While initially 121 women (15.41 percent of the sample) were recorded as working in agriculture (SSAG), and an additional 116 women were reported to be active in agricultural work using the fourth measure of agricultural activity (AG).

These findings reveal that the definition

of work activity is an important factor impacting on the documentation of female work roles particularly in the agricultural sector (where the majority of women in the province are employed).

CONCLUSIONS AND RECOMMENDATIONS

The findings reveal that selected individual, household, and community level factors were significant correlates of female labor supply choice in the rural Philippines. Differences were observed according to the definition of work employed suggesting that conceptual and measurement issues were key elements influencing the recording and measurement of female activity patterns. By employing concepts and methodologies designed to overcome previous limitations associated with measuring female labor supply, more accurate estimates of female labor force patterns may be obtained.

Using an expanded measure of female employment, more women in the sample were included in the economically active (working) group. This lends support to previous studies which have found that conceptual and measurement issues have a significant impact on the recording of female labor force activity, particularly in the rural areas (agricultural sector) of less-developed countries. The findings suggest that the explanatory power of the model differs significantly on the basis of the definition of labor force activi-

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ity employed.

In our study the best explanatory model was obtained by using the expanded definition of female labor force activity and agricultural participation. This does not necessarily imply that we have arrived at the most appropriate definition of labor force activity. The following recommendations are suggested to measure more adequately women's productive contribution. First, data should be attained on actual time allocation to specific activities, including formal and informal sector activities. Second, more creative methods of measuring female employment should be employed to reduce the likelihood of underrecording women's contribution, particularly in the agricultural sector. Finally, the phrasing of questions regarding participation in work activities should carefully be considered within each cultural context.

While the geographical focus of the present study precludes broad generalizations, the findings raise issues with regard to rural development and female employment strategies. A more precise awareness of existing labor market conditions may increase the success of employment creation and training efforts for women, particularly in rural areas of less-developed countries.

As Boulding (1981) has pointed out, economic or "statistical" invisibility may translate into substantive invisibility as the needs of rural women are overlooked or not accurately assessed by planners and policymakers. A failure to recognize the scope of female involvement in work activities will reduce the likelihood that programs and policies will be relevant to the needs of rural women or to rural society as a whole.

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