

RURAL ELECTRIFICATION IN THE SOUTHERN PHILIPPINES:  
A PRELIMINARY REPORT ON SOCIAL IMPACT STUDY

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The Misamis Oriental Rural Electric Service Cooperative (MORESCO) began in 1967 with a feasibility study and in 1969 it started construction operations. It electrified the first section of its project area on September 26, 1971. Thus it has just completed its 8th year of operations. By that time, it had brought electricity to some 8,200 households (about 35 per cent) in the ten municipalities<sup>1</sup> of Misamis Oriental Province westwards of Cagayan de Oro City.

Misamis Oriental is a coastal province in north central Mindanao Island, the second largest island of the Philippine archipelago. Of the 3,570 square provincial kilometers, the ten western municipalities of MORESCO coverage include 812 square kilometers, about 23 per cent of the provincial territory. The western municipalities are characterized by a relatively narrow coastal strip, which rises fairly abruptly (to heights of 20 to 100 meters) within one to three kilometers from the coast. Peaks in the Katanglad Mountain Range are as high as 900 meters above sea level. The topography of the inland area is therefore rugged and hilly, with a drainage characterized by short, swift rivers and creeks. The climate is rainy with high relative humidity and maximum daily temperatures in high and mid-80's Fahrenheit. The approximate coordinates are 8 degrees, 15 to 40 minutes north and 124 degrees, 15 minutes east to 125 degrees, 18 minutes east. As much of 45 per cent of the MORESCO territory is estimated agriculturable by the Bureau of Lands with clay, clay loam, loam and rocky, mountain soils predominating. The bulk of the working populace is occupied in farming, although fishing is a second, usually part-time, occupation. Crops are coconut, palay (rice), corn, fruits and vegetables, bananas, coffee, cabbage, root crops, and tobacco. Livestock is an additional important although generally small scale, source of income. Fishing is still somewhat under-exploited. It consists of inland fishing, small scale marine fishing, and commercial fishing. The present population was estimated in June, 1979, the time of the survey at approximately 140,000 persons.

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<sup>1</sup>A Philippine province is a large territorial division of the country something like an American State, and a municipality is a subdivision of a province much LIKE a county subdivides an American State. Five barrios (villages) of Cagayan de Oro City are also energized by MORESCO but these are not included in the RIMCU study. A chartered city is a kind of supermunicipality in the Philippine political arrangement.

## MODEL AND HYPOTHESES

The overall model of the infrastructure studies which are being carried out at the Research Institute for Mindanao Culture is presented in Figure 1. This conceptual framework has grown out of the RIMCU rural electrification studies which began in 1975. The research design of particular projects has of course modified the manner in which the model has been applied to particular projects. The model of Dr. Herrin is somewhat similar, because all these projects have evolved since 1975 from the same mother project, an exploratory study of the MORESCO (funded by USAID/Manila), closely followed by a second exploratory study in greater depth (funded by IDRC). Dr. Herrin, a RIMCU economist, is interested in higher and more abstract levels of conceptualization and of aggregation in model building. The RIMCU sociologists tend to be more interested in specifying concrete inputs and in household and barrio level changes. Notable in Figure 1 among rural inputs (infrastructural) are a large-scale pig-iron plant of Kawasaki, a Philippine KAO cosmetics plant, a resins factory, a new concrete highway linking Butuan City to Iligan City through Cagayan, and specific health, nutrition, and water components. Under household change aspects notable are allocation of household time, relative economic status, and increase in women's wages. On the demographic output side, noteworthy are fertility behavior as affected by intervening variables involved in perceived opportunity costs and perceived values of children. These are viewed in the model as operating upon fertility both directly (through delayed marriage, absorption in work, etc.) and indirectly through family planning.

The study I report upon at present is a 3,445 household survey of the northeast segment (1,200 of the 3,445 in the northeast, often called simply east, hereafter) and of the Southwest segment of Misamis Oriental Province (2,245 of the 3,445) which is divided near the middle by Cagayan de Oro City, which is politically independent of the Province.

The sampling design consisted of a two stage PPS approach, with selection in both stages by systematic sampling, so there is implicit stratification of the MORESCO area. The PSU's in the first stage were selected two to a zone. The first stage sampling frame consisted of all barrios (villages) of the entire MORESCO area. The ideal number to be interviewed in any barrio if Census and actual survey counts should coincide was in the Northeast 24 households and 50 households in the Southwest. Rate of growth of population including migration was estimated by the survey at 0.6% per annum in the northeast which excluded the Gingoog City poblacion and the electrified municipalities of Tagoloan, Villanueva, and Jasaan, and of 2.9% in the southwest. There has been out-migration from the northeast and some in-migration in the southwest. Estimated population sizes at median date of interview (September 8, 1978) were 41,567 households or 251,100 persons in the northeast (including Jasaan, Villanueva, and Balingasag), and 23,291 households or 140,700 persons in the southwest at median date of interview (June 5, 1979). Variances have not yet been computed and therefore the design effect is not yet known. If this effect is less than 4.0, many of differences in categories of the results are significant.

The study was a large, multifocussed survey which of its nature cannot do many of the things which the model may suggest. Its objective was to gather data to test hypotheses of association, not hypotheses of causality. Testing the latter represents a stage in the RIMCU rural electrification studies which is still one or two years in the future, and which will require very sharply focussed field studies.

The research design includes a quasi-before and after approach to the problem. Electrification had already gotten well started (some four years) in the MORESCO I area by the time funding was obtained to study its socio-economic and sociocultural effects. Therefore, no baseline or benchmark data for MORESCO I to show that groups which at present diverge, e.g., in income, were fairly homogeneous before the introduction of electricity into the area in 1971. However, the northeastern segment of the province exclusive of Tagoloar, Villanueva, and Jasaan was not electrified, and in many respects of economy, educational level, and occupation was very similar to the southwest. The province runs from northeast to southwest along the north coast of Mindanao. Sometimes for short this report may speak of east and west, but northeast and southwest is meant).

A baseline survey in the east was therefore done to obtain quasi-benchmark data for the west. Thus the present two surveys constitute a quasi before and after study. However, the use of such a design should not be construed to mean that the present study is an experiment. While the study may have traces of control over the main variables, it lacks the strict control over the experimental variable, rural electrification, that is required in an experiment. It is of interest to note that at present the east, which we studied when it was not electrified, is now under going cooperative electrification by MORESCO. The area is known now, electricity-wise, as MORESCO II, and the west as MORESCO I. In three to four years RIMCU hopes to do a second survey in the east. This will permit RIMCU to carry out a true before and after study on MORESCO II. At present however the comparison is between the unelectrified east as a quasi before area of research and the electrified west as a quasi after area. The assumption of the comparison is that east and west were relatively homogeneous in income, occupation, education, culture, and in other important variables relevant to the study.

The hypotheses that particularly interest RIMCU are first and foremost those which relate rural cooperative electrification to fertility. Having already noted an association in small, purposive samples, RIMCU hypothesized its continuance in a large probability sample.

Specifically, electric illumination was hypothesized to have such great appeal to the poor, rural inhabitants of MORESCO I, the west, that when these households realized, against all expectations, that they actually could obtain electrification although living in rural areas, and without inputs beyond their ability to pay, they were willing to undergo great financial straining and saving to provide this facility for themselves. Most of these households were near the subsistence level of income, so that costs of installation of electricity in their homes plus cost of electric power itself during the initial six months or year, would demand a great deal of discipline

and scrimping on their part. Most of them, presumably, would have to borrow money to make the payment for the installation, and would have to amortize this cost over the first year or longer. To appreciate and empathize with the intensity of their desire for electrification, one have had to experience the dirt, the poor quality illumination, and the other inconveniences of the various types of pressurized and unpressurized oil lamps, not least of which in a tropical country is the heat which is generated.

In this picture of financial straining and scrimping to pay for electrification of the home, the hypothesis was that the household would think of family planning services (already present in each municipal town center or poblacion). It was believed that the households would conceive of these as means to help them save necessary sums for monthly electricity payments and amortization of installation loans because they would avoid the expenses of another child otherwise soon to be conceived. At the same time the desire and liking of Filipino parents for children together with the rural farm nature of the area, suggested that mental conflict and ambivalence would characterize the first year of family planning practise. However, RIMCU believed that when the family or household finally had paid off electricity costs, they would have realized that they could pay, not only for these costs but for other electric appliances, by repeating this discipline of deferred gratification. The hypothesis therefore stated that use of family planning per household would continue long enough to make a decline in birth rates apparent. Finally, although the rural nature of the area would probably always motivate a family size somewhat larger than that which urban households in the same general SES circumstances might desire, the hypothesis stated, once fertility had began to decline, because couples had found that they could pay for electricity and for electric appliances by deferment of birth, that these couples would continue use of family planning methods long enough to cause permanent decline in completed family size. Finally, we hypothesized that the next generation, brought up in such smaller families, would prefer smaller sized families as more desirable than the large families of their grandparents.

In this large hypothesis, many sub-hypotheses are implied. Among these are increasing opportunities for employment outside the family farm, in both agricultural and non-agricultural sectors. Increased opportunities are hypothesized to accompany the use of electricity to make irrigation (pumps) and intensive farming techniques feasible; by illuminating the home at night to make possible doing the housework at night thus making feasible a woman's entry into the town or city labor force; attracting already existing industries into the area to take advantage of cheap electricity and labor rates; and to generate the initiation of new small-scale and medium sized industries. The irrigation of farms and the use of electric light and power on farms is hypothesized, to cause increase in household income level. Further, the increase in employment opportunities is also hypothesized to result in higher household income levels.

The effect upon fertility of a woman's participation in the labor force, even when the woman is single, was hypothesized to encourage deferment of marriage or restriction of fertility within marriage on the condition that place of work is far enough from home to make simultaneous care of children and carrying out of work obligations conflicting responsibilities.

The Easterlin hypothesis of relative economic status has been kept in mind and also the somewhat conflicting view of the "New Home Economics" school, which ties decline in fertility less to relative household or family income than to increase in women's earnings and which thus emphasizes the importance of allocations of women's time. The importance of a woman's definition of her own sex role (the importance of giving her personal attention to her children during their period of growth, the more traditional definition, as opposed to a more recent outlook in which women lay greater emphasis upon their extrafamily roles and less upon childrearing aspects).

As indicators of these variables, among others RIMCU has chosen income from the main occupation of husband, total cash household income, and total income (cash and real of the household. RIMCU believes that if the woman works, differences between income from husband's main occupation and total cash income will constitute a good proxy for wife's income, although direct inquiry was also made about wife's contribution to household income and the contributions of other family members, especially female. RIMCU chose educational level as an indicator of female general social status in the community and also of status in the family. Some comparative control over this variable was attempted by comparing grade completed and literacy of respondent women with that of respondent's mother.

Education of wife was used as a proxy for "tastes" of women with regard to quantity and quality of children. RIMCU hypothesized that quantity of children is determined to a considerable extent by the quality of children desired (i.e., level of education imparted, health inputs, artistic training, special department training, etc.) It was assumed that parents believe that the higher the quality of children desired, the greater the resources that have to be allocated to each child, and therefore the smaller the quantity of children that is possible for a given quality level with a given amount of income. RIMCU assumed that the higher the educational level of parents, the higher the quality of children that they desire. It also assumed that the higher the actual educational level of children, the higher the quality of children the parents desire.

RIMCU took employment of women in extrafamily or extrahousehold work (excluding merely auxiliary farm tasks which increase farm income, but not excluding family businesses run separately by wife or other female member of the family which have incomes distinguishable from the main family-farm income) as a second indicator of increase in general social status and of intra-family status of women.

Fertility was measured by children ever born. This is not an ideal measurement as CEB covers the whole period of a woman's life, whereas the period of electrification of any particular woman, especially an older woman, may be relatively short compared to her childbearing period. However, the sample size, 1224 households in the east and 2245 in the west, would make data on birth rates and of general fertility rates somewhat tenuous. RIMCU has therefore also drawn on data from other RIMCU studies to supplement the CEB, and also has computed birth rates from this study's data, although the data are rather sparse for stability.

## RESULTS

Tabulations are not yet complete for the west, and this makes the nature of findings at present tentative.

Income: incomes from main occupation of household head, from all cash sources accruing to the household, and from all sources (real and cash) differ among themselves by large and significant\* amounts both in the east and west Province areas. This supports the hypothesis that female labor participation has enhanced female social status, on the condition that females working constitute a substantial proportion of all women.

Median incomes for the three levels of income, east and west, were:

<u>East</u>		<u>West</u>	<u>Difference*</u>
₱1626	Main occ of hhh	₱2021	19.5%
₱2287	Total cash	₱2970	23.0%
₱3310	Total (real & cash)	₱4994	33.7%

$$*(1 - \text{East/West}) \times 100.$$

Note that though the median incomes are not very different (change to dollars at ₱7.38 is US\$1.00; or ₱1.00 is US\$0.135), the Provincial west has consistently higher income than the Provincial east. This supports the hypothesis that rural electrification has increased household income in the west.

*correlates w/*

One also wishes to examine the incomes of households in the Provincial west in terms of whether they have installed electricity in their homes or not. The results show greater income in electrified homes in undoubtedly significant amounts between electrified and non-electrified households. Median incomes were:

<u>Non-Electrified</u>		<u>Electrified</u>	<u>Difference*</u>
₱1946	Main Occupation	₱4266	54.4%
₱1929	Total Cash	₱5593	34.5%
₱4050	Total (Real & C)	₱7096	42.9%

$$*(1 - \text{East/West}) \times 100.$$

One half of all households were in the interquartile range between first and third quartiles. For total income (real & cash), these quartiles were:

\*If design effect is less than 4.0.

<u>The East</u>			<u>The West</u>			
		<u>% Difference</u>		<u>Non Elec</u>	<u>Elec</u>	<u>% Difference</u>
Q1	₱2072	22.8%	2,683	2100	4536	53.7%
Q3	₱5288	36.9%	8,384	6594	10,534	37.4%

These data strongly support the hypothesis that rural electrification has been associated with increased income in households that are located in electrified areas, and, within electrified areas, in households that have electrified their homes.

Number of electrified households is estimated from the sample at 8,196 out of 23,291 households, or 35.2% (790/2,245). This finding confirms the hypothesis that a large and substantial number of households have had electricity installed in their homes. A substantial increase in income level in such houses would undoubtedly modify upwards to an important degree the income of the whole western sector of the province, i.e., the area of the ten municipalities. The data support the view that such an increase has in fact occurred.

### Occupation

Household heads. The number of household heads per thousand heads by occupational categories was:

<u>East</u>		<u>West</u>
17	Professional, Technical, and Related Occupations	16
2	Administrative, Executive, and Managerial Occupations	9
3	Clerical Occupations	7
762	Farmers	670
493	i. Owners & Managers	406
234	ii. Tenants, w/ or w/o small plot of land	242
35	iii. Farm laborers	22
42	Fishing, Hunting, Logging Workers	86
4	Miners, Quarrymen, and Related Workers	3
47	Transport, Communications Workers	65
54	Craftworkers, Factory Workers and Related Workers	61
13	Service, sports, and related Occupations	21
13	Not employed (aged, disabled, unemployed, retired, housewives, students, not seeking work, etc.)	24

Principal occupational percentage differences noted are the larger proportion of persons employed in administrative functions in the west, the smaller proportion of farmers in the west, the larger number of fishing, logging, and related workers, and finally the larger proportion of non-employed persons.

The smaller proportion of farmers indicates that in the Provincial west a larger number of household heads are engaged in other occupations or are not employed. The not-employed category however is large enough to blanket this difference. The data do not support the hypothesis that rural electrification has significantly changed occupational patterns. The smaller number of farm laborers in the west suggests such a rise in status of farmers because of increased income that agricultural laborers have become scarce. The difference in proportion of administrators in the west may be an indicator of increased employment status in the west due to electrification.

Male workers. An intervening variable is probably obscuring results in the Provincial west. Since the west is now an area of opportunity, a large in-migration of households has occurred, partly from the east. These in-migrants, to a large extent poor, tend to take whatever jobs are available. Since not all can obtain work, the non-employed tends to be large at any particular time.

We turn now from a consideration of the occupations of household heads to the occupation of males.

Results were:

<u>East</u>		<u>West</u>
9	Professional, technical, and related	7
1	Executive, managerial, administrative	91
2	Clerical	3
17	Sales	10
512	Farmers	226
(235)	Owners/Managers	(130)
(277)	Tenants w or w/o small plots	( 96)
45	Fishers, Hunters, Loggers, & Related	27
2	Miners, Quarrymen, Related	2
34	Transport and communication	31
33	Crafts, factory, and related workers including workers nec.	24
10	Service, sports, entertainment and related Students	11
	Other occupations (unemployed, disabled, retired, not seeking work, etc.)	(266)
345		558

Again, noteworthy are the large percentage difference in executives, managers, and administrators, the smaller proportion of farmers, and the larger number of non-farm workers. The large number of students and of those not seeking work suggests that further investigation may be fruitful. Perhaps some will not accept types of work they consider "beneath" them. Or perhaps the larger number of students indicates ambitions to rise higher (own/or parental) generated by rising household income levels.

These data again suggest a change in occupational patterns from an almost complete emphasis on agriculture as in the east to one in which agri-business and crafts as well as off-farm employment have become more important. This would support the hypothesis that rural electrification has generated more jobs in the non-family farm sector. A problem is again constituted by the in-migration of persons because of job opportunities in the area. Since in-migrants quickly become residents, the flooding of the area by in-migrants in search of jobs reduces the proportion of peoples holding outside the family farm.

Female workers. The data for women are our next point of interest. Per 10,000 women, these break down as follows:

<u>East</u>		<u>West</u>
11.8	Professional, Technical, and related	14.5
4	Administrative, managerial, executive	9.7
26	Clerical	32
54.9	Sales	37.2
300	Farmers	158
165	Owner/manager	129
135	Tenant w or w/o small plot	29
30	Fishing, Logging, Hunting, and Related	3
13	Transport & Communication	3
65	Crafts, factory, and workers not classified workers elsewhere	
182	Domestic and other service, sports & related workers	127
	Students	2771
	Housewives	2879
8683	Others (Unemployed, not seeking work (disabled, retired, aged, chronically sick, etc.	3382
<u>10000</u>		<u>10000</u>

Number of working women in the samples is of course partly a function of sample size. As previously noted, the western sample was almost twice as large as the eastern sample. Nevertheless this does not fully explain the much larger number of employed women of the Provincial west, 601, as compared to the 195 found in the east. Percentagewise, in the west 18.8 per cent of all women of working age (601/3198) were employed, but in the East only 11.3 per cent (195/1724) were employed. If the design effect is 3.45 or less, this difference is significant. Note that the comparison does not include women who work on family farms of their own households.

These data support the hypothesis that participation of the women in the labor force has increased because of electrification.

Subclassification of the data from the east by place of work give the following table:

<u>East</u>			<u>West</u>		
i	Working at home	108	55.9%	96	40.8
ii	less than 300 m. away	26	13.3	61	26.0
iii	300-900 m. away	16	8.2	26	11.1
iv	1 km. or more away	45	23.1	52	22.1
		195	100.0	235	100.0

} 31.3

} 33.3

These data show that about 31 per cent of currently working women were working far enough from home as not to be able to exercise a supervisory role over their small children. One would not expect much impact in this situation of work for the other 69 per cent. It is of course hypothesized that more women work in the west, which is supported by the above data, and that of these, a large enough proportion work far enough from the home to make carrying out the child care responsibility conflict with the work role.

#### Fertility and the Practise of Family Planning

Ever used family planning. A larger proportion of women in the west used family planning. This supports the hypothesis that problems of paying for installation costs, monthly power costs, and electricity-dependent appliance and facility costs stimulated interest in and usage of family planning methods. The percentage data are:

<u>Usage of Family Planning</u> <u>Currently Married Women</u>	<u>Eastern</u> <u>Couples</u>	<u>Western</u> <u>Couples</u>
Ever Used	33.0	44.9
Never Used	67.0	55.1

2.7. The difference is significant if the design effect is less than

Reasons for practise. Respondents who had used family planning were asked the reason or reasons why they had practised family planning. They were permitted to give as many answers as they wishes. Most however gave but one reason. The main categories of answer were:

<u>Response</u>	<u>Eastern</u> <u>Couples</u>	<u>Western</u> <u>Couples</u>
Wanted electrification of home	8.2	--
Wanted to obtain appliances (electricity dependent or not)	6.1	--
Wanted (new or continued) employment away from home	14.3	20.7

<u>Response</u>	<u>Eastern Couples</u>	<u>Western Couples</u>
No child wanted for one or more years	32.7	10.3
No further children wanted	14.3	8.6 <sup>35.1</sup>
Wanted less than three children	2.0	0.0 <sup>41.6</sup>
Wanted better education for children	12.2	0.0
Wanted to avoid the troubles of bearing and rearing a child	2.0	0.0
Wanted to provide better diet and clothes for the children	0.0	0.0

Apparently, in the west, less women had procurement of electricity or appliances in mind. This may be because these expenses had been taken care of in past years and uppermost in their minds were present problems. However, in the East where electrification was imminently at the time of Survey, 14.3 per cent, put down installation costs and/or appliance costs. The data from the east support the hypothesis that desire for electric goods and appliances motivate practise of family planning. The data from the west do not, although they do not contradict it.

A large factor in the East was the desire for employment (new or continued). This supports the hypothesis that electrification motivates family planning by stimulating new employment opportunities for women away from home. Presumably, it also encourages the continued existence and even expansion of previous businesses (for example, tailoring, dressmaking, and other garment industries), and thus also stimulates family planning.

In both east and west a very large proportion of respondents replied that they had begun practise of family planning because they wanted no more children for one year or longer, 47.0 in the east and 35.1 per cent in the west. In fact, 14.3 per cent in the east and 35.1 per cent in the west wanted no more children at all. Presumably, the desire for more goods of some description for themselves and/or their families underlies these sets of responses. Desire to install electricity and/or to own various electricity-dependent appliances may have played a large part in their motivation. Further research on this point might prove fruitful.

Twelve per cent in the east replied that their motive for practising family planning had been to provide better education for their children, while 41.6 per cent so replied in the west. Increased education for their children was thus perceived, especially in the west, as a very important good, presumably because of the relation of education to superior employment opportunities.

After their spontaneous answers, currently married women of the eastern sample were handed a form and asked to check off any additional reasons that had actually influenced them to use family planning, but which they had not yet mentioned. Results are shown below:

1. Wanted electricity installed in their home	22.4
2. Wanted to obtain electrical appliances	20.7
3. Wanted to obtain other appliances	17.2
4. Wanted to begin or continue employment outside the home	20.7
5. Wanted no child for one or more years	10.3
6. Wanted no more children at all	8.6

This set of responses appears to confirm that a desire for electrification and for purchase of electricity-dependent appliances and facilities were important causes for practise of family planning. Altogether, 30.6 per cent of Eastern respondents stated that desire for electrification of their homes had motivated them to begin practise of family planning as a help to meeting installation costs. These questions were not asked in the western sample. The experience in the eastern sample had raised a doubt as to whether respondents, asked to check a set of responses, checked reasons that had actually motivated them at the time they began family planning or rather reasons which now appealed to them but which actually had not motivated them at the time.

#### Methods Used

By far the most popular first method chosen was the anovulant pill in both east and west. Ever users were distributed by method first used as follows:

	<u>East<sup>a</sup></u>	<u>West<sup>b</sup></u>	<u>East<sup>c</sup></u>	<u>East<sup>d</sup></u>	
1. Anovulant pills	34.8	30.8	41.0	119	36.7
2. Intrauterine devices	11.6	21.0	4.0	30	9.3
3. Condom	3.6	7.3	5.0	13	4.0
4. Foam	0.9	0.1	0.0	2	0.6
5. Injectibles	0.0	0.1	1.0	1	0.3
6. Calendar Rhythm	21.9	11.3	18.0	67	20.7
7. Temperature Rhythm	8.5	3.5	8.0	27	8.3
8. Withdrawal ("Natural Method)	8.9	3.0	5.0	25	7.7
9. Abstinence	2.7	1.0	4.0	10	3.1
10. Male sterilization	2.2	2.8	5.0	10	3.1
11. Female sterilization	3.6	9.8	9.0	17	5.2
12. Other Methods	1.3	0.6	0.0	3	0.9
13. Combinations of Methods	—	8.6	—	—	—
<u>All Methods</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
-(N)	-(224)	(723)	(100)	(324)	

<sup>a</sup>Self-reported

<sup>b</sup>All but 2 are self-reported

<sup>c</sup>Proxy reported

<sup>d</sup>Self and proxy reported

The distribution shows more IUD, female sterilization, and condom use in the west than in the east. On the other hand the east had made greater use of abstinence, withdrawal and rhythm, both calendar and temperature, than the west. In short, users in the east had used methods with higher failure rates per cycle than users of the west.

Proxy-reported women may be principally working women, or women spending more time than is common away from home. If the proxy reporters are accurate, they used sterilization (male and female), anovulant pills, and the condom to a greater extent and use the IUD, rhythm, and withdrawal less.

Current users. Anovulant pills were, overall, still the most popular method but less so.

The data were:

	<u>East</u> <sup>a</sup>	<u>West</u> <sup>b</sup>	<u>East</u> <sup>c</sup>	<u>East</u> <sup>d</sup>
1. Anovulant	25.0	22.9	33.7*	28.0
2. IUD	11.5	17.9	5.2	9.3
3. Condom	0.7	8.9	3.9	1.8
4. Foam	0.0	0.2	0.0	0.0
5. Injectibel	0.0	0.0	1.3	0.4
6. Calendar Rhythm	28.4	14.8	16.9	24.5*
7. Temperature Rhythm	12.1	4.3	9.1	11.1
8. Withdrawal	9.5	3.9	6.5	8.4
9. Abstinence	2.7	1.2	5.2	3.6
10. Male Sterilization	3.4	4.1	6.5	4.4
11. Female Sterilization	5.4	14.6	11.7	7.6
12. Other Methods	1.3	0.2	0.0	0.9
13. Method Combinations	—	7.0	—	—
<u>All Methods</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
(N)	(148)		(77)	(225)

<sup>a</sup>Self-reported

<sup>b</sup>Self-reported

<sup>c</sup>Proxy reported

<sup>d</sup>Self and proxy reported

\*24.449 raised to 24.5 to make 100.0.

One notes a decline in both east and west in the use of anovulants. IUD use remained about the same in the east but in the west declined from 21.0 per cent of first users to 17.9 per cent of current users. Use of the condom declined in the east but increased in the west. Calendar rhythm increased from 20.7 per cent of first users in the east to 24.5 per cent among current users. In the west it increased from 11.3 to 14.8 per cent. Temperature rhythm (BET) remained about the same in the east and increased slightly in the west. Withdrawal increased slightly in both eastern and western samples. Abstinence remained fairly constant. Male and female sterilization, which is in practise not reversible, remained constant, although (because of drop-outs from family planning) percentages increased.

Summing these results up, the notable declines were in the "strong" methods of the pill and the IUD. The usage of sterilization actually remained constant, but increased percentagewise among current users due to drop-outs from other methods, moving in the east from 3.1 to 4.4 per cent for vasectomy, and in the west from 2.8 to 4.1 per cent, and from 5.2 to 7.6 per cent on the east for ligatomy (or hysterectomy, etc.) and from 9.8 to 14.6 per cent in the west. Method switchers seem to have turned to calendar rhythm in larger numbers and to withdrawal and abstinence to a lesser extent. It is strongly recommended that an attempt to get calendar rhythm users to switch to the temperature rhythm method, which is a quite effective method when learned well and practised carefully. Granted that these couples are going to use some type of rhythm, it seems better that they should use the more effective method.

Drop-outs. The largest number of drop-outs came from those who had previously used anovulant pills, 57 per cent of the eastern women who had terminated family planning and 47 per cent of the western terminators. Next largest sets of method terminators were bunched into much less numerous groups: calendar rhythm 12.1 per cent, east, and 4.2 per cent west; the IUD 11.9 per cent east and 27.4 per cent west. (The Western figure is notable); and 9.2 per cent in the east for the condom versus 4.2 per cent in the west. The data are:

	<u>East</u> <sup>a</sup>	<u>West</u> <sup>b</sup>	<u>East</u> <sup>c</sup>	<u>East</u> <sup>d</sup>
1. Anovulant	54.0	47.3	65.2	56.6
2. IUD	11.9	27.4	0.0	9.1
3. Condom	9.2	4.2	8.7	9.1
4. Foam	2.6	0.0	0.0	2.0
5. Injectibles	0.0	0.4	0.0	0.0
6. Calendar Rhythm	9.2	4.2	21.7	12.1
7. Temperature Rhythm	1.3	1.7	4.4	2.0
8. Withdrawal	7.9	1.3	0.0	6.1
9. Abstinence	2.6	0.4	0.0	2.0
10. Male sterilization	0.0	0.0	0.0	0.0
11. Female sterilization	0.0	0.0	0.0	0.0
12. Other methods	1.3	1.3	0.0	1.0
13. Method combinations	—	11.8	—	—
<u>All Methods</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
(N)	(76)		(23)	(99)

<sup>a</sup>Self-reported

<sup>c</sup>Proxy reported

<sup>b</sup>Only 2 proxy reports

<sup>d</sup>Proxy and self-reported

The seriousness of the change in method mix due to change of methods and to termination of planning is obvious. The largest number of drop-outs came from the anovulants and the IUD, which are among the more effective family planning methods. The switch is toward withdrawal and calendar rhythm which are not very effective methods. Reasons for terminating planning by drop-outs give some clues as to why the more effective methods lost followers.

Reasons for Terminating Family Planning.

<u>Reasons</u>	<u>East</u>	<u>West</u>
1. Expense	1.0	1.3
2. Travel	1.0	1.3
3. Hard to learn	7.1	0.4
4. Spouse objects	5.1	2.1
5. Side effects	58.2	62.8
6. Religious/moral reasons	0.0	0.0
7. No more need to practise (reached menopause, widowhood)	8.2	6.3
8. Want another child	—	7.6
9. Wish to stop from practise	—	5.5
10. Method failure resulting in pregnancy	—	11.4
11. Other reasons	19.4	0.0
12. No response or not applicable	0.0	1.3
<u>All reasons</u>	<u>100.0</u>	<u>100.0</u>
(N)	(98)	(237)

Clearly, the main reason that respondents gave for stopping family planning was side effects. Other specific reasons were: no longer needing it, desire for another child, disappointment over method failure, and difficulties in learning how to practise the method properly.

Those who specified side effects talked of headaches, dizziness, stomach trouble, pain, and similar unpleasant sensations. Taking into consideration the pattern of drop-outs just mentioned, the side effects cited appear to relate principally to the anovulant pill and the IUD.

It is possible that the pill in present use in the Philippines (only one pill type is offered) contains too large a dose of estrogen or other hormonal materials for the short and often small Filipino woman. (It appears to be manufactured more with an eye to European and North American female builds.) Possibly another type or brand of pill might be more successful. A pilot project on this research point might well prove fruitful in providing insight into reasons for the remarkably high drop-outs from planning by women who had chosen the pill as their first choice.

Children Ever Born

Children ever born were used as the indicator to measure fertility. While not an ideal indicator for this item, it facilitated comparison of fertility in northeastern Misamis Oriental with fertility in southwestern Misamis Oriental, a comparison not possible by crude or age-specific birth rates because of limited size in both samples.

The principal question of interest related to electrification. Did electrified areas have less children ever born than areas not electrified? And did households who had installed electricity in their homes have fewer children than households which had not so installed electric current?

Results showed lower fertility in the electrified west. The two sets of data are not significantly different at .05. Nevertheless, the western area exhibited lower fertility at all ages except 20-24 (when in the Philippines most couples are trying to have their first or second child and not thinking of family-planning), and at 45-49.

<u>Ages</u>	<u>East</u>	<u>West</u>	<u>Difference</u>
15-19	1.3	1.1	0.2
20-24	2.0	2.0	0.0
25-29	3.5	3.1	0.4
30-34	5.0	4.6	0.4
35-39	6.6	6.0	0.6
40-44	7.7	7.2	0.5
45-49	7.4	8.0	0.6
50-54	6.9	---	---
55 +	7.2	---	---
All Ages	5.6	---	---
15-49 (4592/869)	5.3	5.0	0.3

*That may be significant*

Households which had installed electric current in their homes also exhibited lower fertility. In every age group without exception households with electrification were characterized by lower numbers of children ever born. The data are drawn from the 1979 Dual Record Study because this probability proportionate to size area sample obtained data upon 4,000 households. All ten municipalities were sampled. The results indicate association between electrification of the home and fertility as they are significant beyond .05.

MORESCO I ELECTRIFICATION AREA WESTERN  
MISAMIS ORIENTAL

MEAN CHILDREN EVER BORN

<u>Ages</u>	<u>Home Electrified</u>	<u>Home Not Electrified</u>	<u>Difference of Mean</u>
15-19	0.6	0.9	0.3
20-24	1.6	2.0	0.4
25-29	2.7	3.3	0.6
30-34	3.9	5.0	1.1
35-39	5.3	6.4	1.1
40-44	6.5	7.9	1.4
45-49	7.7	8.1	0.4
50-54	8.1	8.2	0.1
55-59	8.0	8.8	0.8

The mean difference between ages 15-49 was 0.8 children. The magnitude of the difference increases with age up to the 44th year. As a mean score, this is suggestive of the growing effects of deliberate control exerted over fertility by home-owners who have introduced electricity into their homes.

Basically the same differences appear when fertility is studied from point of view of duration of marriage. Again households that have installed electricity were characterized by lower fertility than households that had not.

#### CHILDREN EVER BORN

<u>Duration of Marriage</u>	<u>Had Installed</u>	<u>Had Not</u>
0 - 4 years	1.2	1.3
5 - 9 years	2.8	3.2
10- 14 years	4.1	4.8
15- 19 years	5.7	6.5
20 or more years	8.1	8.6

Again, these data are significantly different at beyond .05.

The foregoing data do not of course prove that electrification is causally related to lower fertility and to a decline in fertility. A carefully designed and complex field experiment would be necessary to prove such a causal influence. However, these data do show that an association exists between electrification and lower fertility. In any case, the decreased fertility almost certainly would not be linked to electrification of an area in a simple monotonic manner but would rather be connected through a complex set of motivations, desires, and goals. Nevertheless, results do suggest strongly that rural cooperative electrification is a catalyst which initiates a situation whose result is lowered fertility.

Family planning by currently married women. Children ever born measures did not distinguish well between the fertility of currently married women who were current users, who were drop-outs, and who were never users. This may perhaps be due to the cumulative nature of the measure, children ever born. This measures children at every stage of a woman's life between approximately ages 15 and 49. Women who are very fecund are likely to be more fertile and therefore to feel after 5 or 6 children a greater need for family planning. On the other hand, the category, women who have never used family planning, may contain a substantial number of women who are sterile, nearly sterile, and below average in fecundability. Such women would obviously feel little need for practise of a family planning method.

CHILDREN EVER BORN

<u>Ages</u>	<u>Current Users</u>		<u>Previous Users</u>		<u>Never-Users</u>	
	<u>East</u> *	<u>West</u>	<u>East</u>	<u>West</u> **	<u>East</u>	<u>West</u>
15-19	1.0	1.4	4.0	1.0	0.9	0.9
20-24	2.3	2.0	2.8	2.1	1.8	1.8
25-29	3.6	3.2	3.4	3.0	3.4	2.9
30-34	5.1	4.8	5.4	4.1	4.8	4.4
35-39	6.7	6.2	7.6	6.6	6.6	5.5
40-44	6.7	7.1	9.2	7.2	7.9	7.2
45-49	6.8	8.2	11.6	8.3	6.8	7.9
50-54	—	6.0	8.2	7.1	7.3	8.3
15-54	—	5.0	—	4.9	—	5.1
15-49	5.0	—	5.9	—	5.8	—

\*Self-reported only.

\*\*Accomplished by subtracting from totals for Ever-Users, current user women from women ever users, births to current user women from births to ever users, and dividing resulting births by resulting women.

Current users in east and west had similar average fertility, but different patterns of completion. Eastern women in general had higher fertility up to age 39. Eastern women of ages 40 or more reported lower fertility than correspondingly-aged women in the west. The difference may be due to lapse of memory among eastern women. This is not a very convincing reason however for two reasons. First, ages 40-49 are not ordinarily ages at which women's memories begin to fade. Secondly, the same phenomenon of forgetting does not seem to occur in western women of the same ages.

Previous users (drop-outs) seem to have higher fertility in later life than either never users or current users. Does this category contain a large proportion of women who were desirous of family planning because of high fecundity but who dropped out of family planning because of various inconveniences? Previous users in the west were characterized by lower fertility than eastern women throughout the length of the entire fertile period. Are such data suggestive of less sophistication on the part of eastern women - perhaps because of less education and similar disadvantages vis-a-vis western women? Or is such data reflective of different age patterns of marriage between the two sets of women.

Never users of the east also had higher fertility than those of the west, as well as higher fertility than current users. The question of education and marriage can be raised in their case, too.

Education of Women

Highest grade completed was chosen as an indicator of female social status in the community as well as a measure of family status. Grade completed data may also provide insight into the questions raised just above.

1 / Socially women have equal opportunity for Educ.

Results are not very illuminating. Average grade completed was 5.6 in the east and 5.5 in the west. Median highest grade completed in the eastern sample was 6.0 and in the west only 5.6. The first quartile for highest grade completed was again favorable to the east, namely, 4.0 as compared to 3.2 grades in the west.

The third quartile of the distribution of women by highest grade completed however does indicate higher achievement for the third and fourth quartiles in the west. The cutting point stood at elementary school graduate (including those who had taken a seventh grade elementary school) in the eastern sample, but at 0.2 years of high school in the western sample (shortly after first year high school had been begun). The interquartile range in the west was larger than in the east. These data are:

School Achievement by Highest Grade Completed, Respondents

<u>Categories</u>	<u>East</u>	<u>West</u>
First Quartile (25 per cent of all are below this point)	4.0	3.2
Average	5.6	4.9
Median	6.0	5.6
Third Quartile	7.0 <sup>a</sup>	6.9 <sup>b</sup>
Interquartile Range	4.0 - 7.0	3.2 - 6.9

<sup>a</sup>The third quartile cutting point included all who had taken a seventh grade of elementary school, and none who had completed first year high school.

<sup>b</sup>The third quartile cutting point included all who had taken a seventh grade of elementary school plus 20 per cent of all who had completed first year high school.

From the interquartile range, one sees that 50 per cent of respondents in the east had completed four to seven grades of elementary school, 25 per cent had completed less than 4 grades, and 25 per cent more than the seven grades of elementary school. In the west, 50 per cent of the respondents had completed 3.2 grades of elementary school to part of first year high school, 25 per cent less had completed less than 3.2 years of primary school, and 25 per cent had completed more than part of first year high school.

It follows from these data that the upper 25 per cent of women in the west may enjoy higher social status than women in the east because they have higher educational achievement. The data are distributed as follows:

Not  
True  
I think until  
NS Grad.

<u>Categories</u>	<u>East</u>	<u>West</u>
High School 1	22.9	20.7
2	17.0	19.2
3	13.7	16.1
4	21.9	20.2
Vocational		
After High School		
1 year	---	0.2
2 year	---	0.8
College 1	5.2	4.5
2	6.5	5.8
3	2.0	4.1
4	10.8	8.1
Post Graduate	---	0.1
<u>No Response</u>	<u>---</u>	<u>0.2</u>
	100.0	100.0
(n)	(306)	(1217)

Finally in both east and west, women had higher educational achievement than their mothers. Presumably, they should have higher community and family status than their mothers enjoyed.

Educational Status of Respondent's Mother:<sup>a</sup>

	<u>East</u>		<u>West</u>
First Quartile	0.6	grades completed	0.5
Median	2.4	grades completed	1.4
Third Quartile	4.7	grades completed	4.4

Income and Education

Total annual household income increased steadily with grade completed of respondent. These data are:

	<u>No Grade</u>	<u>Some Elementary</u>	<u>Elementary Graduate</u>	<u>Some High Sch.</u>	<u>High Sch. Graduate</u>	<u>Some College or More</u>
East	¥2,208	¥3,098	¥3,057	¥4,283	¥4,643	¥9,583
West	3,089	3,103	4,726	5,814	7,263	9,813

These data also show a positive advantage of west over east in terms of income by education. These data also support the hypotheiss of an association between electrification and increased income.

<sup>a</sup>See supplemental page, following this page.

Differences in Educational Achievement (Highest Grade Completed) of  
Respondents and Respondents' Mothers

Western Sample

	<u>Respondent's Educ. Achievement</u>	<u>Respondent's Mothers</u>	<u>Difference, R's and Mother's HGC</u>
First Quartile	3.25	0.53	2.72
Second Quartile	5.58	1.45	4.13
Third Quartile	6.88	4.44	2.44
Average	4.93	2.18	2.75

Eastern Sample

First Quartile	4.01	0.65	3.36
Second Quartile	6.01	2.43	3.58
Third Quartile	7.00	4.70	2.30
Average	5.64	2.47	3.17

Difference of Eastern and Western Differences

	<u>Eastern</u>	<u>Western</u>	<u>Difference of Differences</u>
First Quartile	3.36	2.72	+ 0.64
Second Quartile	3.58	4.13	- 0.55
Third Quartile	2.30	2.44	- 0.14
Average	<u>3.17</u>	<u>2.75</u>	<u>+ 0.42</u>
			Sum 0.37
			Mean 0.09

## CONCLUSIONS

This study hypothesized that electrification of their homes appealed very strongly to the needy inhabitants of western Misamis Oriental Province in terms of convenience, cleanliness, advantages, and costs. The study hypothesized that paying for such installation costs, for monthly electric current charges, and for monthly charges on electrical items bought on credit would require a different discipline over expenditures because of which couples would almost inevitably think of family planning services, already established in the municipalities, as a means to help them save through avoidance of the costs of another child-bearing and rearing period during payment time.

The study also hypothesized that having learned to acquire goods through avoidance of a birth during a particular period, couples would generalize their experience to the acquisition of other goods as well in large enough proportions to initiate and continue a decline in fertility. The study also hypothesized that children brought up in smaller families would prefer such smaller families themselves when they reached adult ages.

W at /  
at  
The data presented have given strong support to the first two of these hypotheses. They show a larger number of users of family planning in the west (electrified) than in the eastern sample. They also show a greater proportion of current users in the western sample using the more effective methods, 63.8 per cent, than in the east, 57.4 per cent (pills, IUD, temperature rhythm, sterilization). This may indicate a greater earnestness to be successful in family planning among western sample couples.

The third hypothesis cannot be tested adequately at the present time. Indications exist however that it is in fact supported, from statements of younger couples and adolescents as to family size, offered informally at time of interview and otherwise.

The present research had also hypothesized that electrification would decrease fertility by increasing opportunities for women to enter the labor force by working outside the home and family farm. The data presented showed a considerably larger proportion of women so employed in the west than in the east. These data support the hypothesis if a substantial proportion of these women work at a distance from the home to make supervision of small children at home a task conflicting with work obligations. Data for the east were presented to show that in fact a substantial proportion for women workers do work far enough from home to make personal child care a problem. While the number of women workers is relatively small in the east, it is relatively larger in the west. Thus the proposition that the fertility decline in the west that occurred, came about partly because rural electrification stimulated the employment of women receives support from the data. It is presumed that illumination of the household, making possible housework done at night makes feasible the response of particular women to these increased opportunities.

The data do not shed much light on the debate between Easterlin and the New Home Economics School. Fertility has declined in the west as compared to the east. Is this because of the increase of relative economic status of the western households or because of increased women's earnings? It is difficult to answer this question because the decline has accompanied both phenomena. One might in fact on the basis of the MORESCO West data ask must the Easterlin theory and the New Home Economics theory be mutually exclusive? Can they not be supplementary. The importance to a couple's fertility behavior of the woman's income from employment and consequently of the allocation of her time may relate fairly closely to the relative economic status of the household, especially to husband's income.

Women in both the eastern and western samples seemed to define their sex roles in typically different fashion than American women. They generally believed that their babies should be breastfed, and mainly, if not exclusively, by themselves if they are physically able. But this does not seem to make the typical woman feel they need stay at home with a new child for more than three to four months. They feel that they can take a job if they have an opportunity because the baby can be left with relatives or a maid (yahya).

The difference between total cash income and income of household head from his main occupation was taken as an indicator of wife's contributions to the family income, and therefore of wife's social status in the community, and also of her family status.

The data presented have shown a median difference of almost three hundred pesos (P288) between east and west in the amount of total cash household income left over when income from main occupation of household head has been subtracted. In addition, the same type median difference in the western sample between households which have had electricity installed and those which had not totalled P1,344. These amounts are taken as indicators of increased female community and family status, and support the hypothesis that electrification occasioned the increase in employment and/or income-making opportunities of women associated with this gain in status. They indicate moderately substantial gains in female status in electrified homes of western Misamis Oriental. Differences in grade completed between female respondent and respondent's mother, taken as a control, were compared between east and west. The east-west differences of differences were small, and varied from favoring east to favoring west. If means are taken as the measure, the eastern difference is larger. If medians are taken, the western difference is larger.

If the first quartile difference is taken as the measure, the eastern difference is greater, while on the other hand, the difference between third quartiles is larger in the west.

In short, the gain in education of respondents over their mother's educational achievement was roughly comparable between east and west. Thus from this point of view gains in status were about the same. On the other hand, the gains in contributions to household income of western women over eastern women, chosen as indicator of social status, were large. Thus one

concludes that this gain, controlled by the comparison with mother's education, is due to increased opportunities stimulated by rural electrification and not merely to a general advance of women in social status throughout the Province caused by their educational achievement.

Education of wife was also taken as an indicator of "tastes" of women for quality and quantity of children. It appears from the data that women with higher levels of education have higher income and fewer children. However, differences between eastern and western sample women in education were not large and thus the indicator did not prove very useful for singling out women in the west who would have fewer children because of tastes for higher quality children (i.e., more income spent on education and other necessities per child).

Summarily, the study found evidence of increased social status of women as compared with women of the eastern sample in the west because of increased employment and income of women in the west as compared to women in the east.

It found reason to attribute this increased employment and income to the stimulation of the local economy by the availability of rural cooperative electricity.

It also found larger numbers of family planners in the west and reason to attribute this difference to a determination to save on avoidable expenses in order to be able to pay for home electrification, monthly electricity bills, and (in some cases) for electricity-dependent appliances bought on installments. It also found reason to believe that the initial use of family planning to pay such bills had been carried over to the buying of other goods and services, thus accounting for the lower fertility found in the western sample, where rural cooperative electricity is available to residents.