

Gender Differentiation among Farmers in the Agricultural Sector in Benguet, Philippines

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Abstract

This is a cross sectional study on gender differences in work distribution, means of production, decision making, illness and hazard exposure among male and female vegetable farmers. Personal interviews were conducted among 39 vegetable growers in Benguet. Bivariate analysis showed that the husband's control over income is associated with decision making power in regard household expenditures, except food ($p=.050$). The illness data showed that the most common illness among the wives involves the respiratory tract, such as cough (7.7%) and asthma (5.1%). Among the husbands, the most common was back pain (10.3%) followed by hypertension, blurred vision and cough (7.7% each). For the adult female, results show that chemical hazards are positively associated with the following farm operations: ploughing ($P=0.008$), sowing ($P=0.001$), weeding ($P=0.000$), manuring ($P= 0.000$), plant protection ($P=0.026$), harvesting ($P=0.000$) and threshing ($P=0.042$). Association is strongest with chemical hazard and manuring at 0.370 ($P=0.000$) followed by harvesting at 0.358 (0.000). This shows that women mainly perform manuring and pesticide application, and consequently exposed to chemical hazards. The nature of hazard exposure is related to the task being performed. The results of the study are similar to experiences of developing countries, however, the novelty of this study is its being the first study for such subject population using a quantitative analysis, as well as the inclusion of occupational health- gender issues in the agricultural sector.

Keywords: Gender and Agriculture, Occupational Health, Means of Production, Decision-making

Introduction

The issue of gender in agriculture has had an increasing interest for many investigators across the years because the debate on the role of women in economic development, as well as the double burden that they encounter from both housework and agricultural work. The terms and conditions of women's involvement in the economic sphere are important issues that continue to dominate the debate on gender relations. In other words, the new developments led to an increase in the number of women in the labour force, but the impact on their quality of life and decision making processes is still to be felt (Palmer, 1977).

Gender has been demonstrated to permeate the different aspects of production and life in the agricultural setting of various countries and cultures. Men and women work together, but they have been shown to work differently across various tasks.

The sexual division of labor has long existed. Traditionally, men are thought to be the stronger, more active sex and are therefore expected to perform labor-intensive and

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manual tasks. In agriculture, this usually involves activities such as plowing, harvesting and threshing. Women, on the other hand, have conventionally been considered as more emotional and less physically adept. Their stereotyped tasks therefore usually include household maintenance, taking care of children, marketing and others. In agriculture, most women are delegated to light work such as weeding or manuring (Palmer, 1977).

This work related specialization and differentiation has been seen across cultures and has its roots in evolution. Evolutionary researchers have posited that men's focus on hunting and women's aptitude for gathering are for the realization of potentially conflicting mating and parenting goals. Brain-wiring studies have also linked sex differences in spatial and cognitive abilities to sex-specific foraging activities (Panter-Brick, 2002).

This study aims to identify gender differences in work distribution, means of production, decision making and hazard exposure among male and female vegetable farmers. The data may serve as a baseline for related studies in the future and will help us elucidate the mechanics of gender-based work in the local agricultural setting.

Methodology

Personal interviews were conducted among 39 vegetable growers residing in the municipality of Benguet. They were asked questions regarding gender distribution of the type of work, means of production, type of operation, decision making, illnesses and hazard exposure. The latter was categorized into chemical (pesticides, etc.), biological (pests, manure), physical (noise, heat) and ergonomic hazards.

Social investigation was done on the area prior to implementation of the project. Extensive community network was prior to entry into the community to identify participants, and to facilitate entry into the community. The municipal office assisted by disseminating information to various community levels called the barangay. However, in the actual interviews, the municipal officials were not present.

The farming community was selected as it is mainly a vegetable farming community in a province that is considered as the vegetable bowl of the Philippines. Cluster sampling technique was done, first at the level of the municipality, then at the level of zonal areas. With a significance level of $P=0.05$, the number of household respondents was 39. Both the female and male heads of the family were interviewed separately. The interviews were conducted early in the afternoon when the families were at home from work. The interviewer-guided questionnaire was given to the respondents by public health research assistants. These research assistants had training on the interview process, as well as in obtaining informed consent. The questionnaire was written both in English and in the vernacular language, Ilokano, to ensure comprehension of the questions and items asked.

Data were analyzed using SPSS 11.0. Statistical tools used were descriptive statistics and inferential statistics.

Presentation of Data

Demographic Data of the Respondents

Among the 39 respondents, majority (28 or 71.8%) were males while only 11 or 28.2% were female. This indicates a male predominance among the participants. It is expected since agriculture has traditionally been dominated by males. With regards to age,

most of the respondents were in middle adulthood. More than 40% belonged to the 36 – 50 age group, followed by those aged from 51 - 66 (38.46%). The ages range from 32 to 72 years old and the mean age is 49.56. This shows a relatively elderly group of farm workers.

Most of the respondents were married (84.6%) and finished high school (43.6%). Only 3 individuals or 7.7% were able to finish college. This indicates a high dropout rate in both the elementary and high school levels. This is probably because the farmers, being sons and daughters of farmers themselves, already consider agriculture as an adequate source of income and subsistence. Education, therefore, is not considered a priority as land and work is passed on from parents to offspring.

As for occupation, majority of the farmers (32 Or 82.1%) were agricultural workers, meaning they grow, cultivate and harvest vegetables. Meanwhile, 13 Or 33.3% are employed as pesticide applicators/mixers/loaders. These individuals deal directly with hazardous chemicals and are responsible for pest control. The third largest group of workers comprised of growers (23.1%). The rest of the respondents were employed as distributors, housewives, vector control officers and others. See Table 1.

Table 1: Demographic Data of Respondents (N= 39)

Demographic Data	Number	Frequency
Sex		
Male	28	71.8
Female	11	28.2
Age (mean= 49.56)		
Early Adult (20-35)	4	10.2
Middle Age (36-50)	16	41
Late Adult (51-66)	15	38.46
Elderly (>66)	2	.05
Civil Status		
Single	2	5.1
Married	33	84.6
Widower	4	10.3
Educational Attainment		
Grade School	15	38.5
High School	17	43.6
College	3	7.7
Vocational	2	5.1
Occupation		
Agricultural worker	32	82.1
Pesticide applicator/mixer/loader	13	33.3
Grower	9	23.1
Distributor	3	7.7
Housewife	3	7.7
Vector Control Officer	2	5.1
Other	2	5.1

Data on Gender Distribution of Working Hours

The following tables contain data on the working hours of the 39 respondents and their family members as categorized by sex and age. For the adult males in the family, majority worked for an average of 8 hours a day (14 or 35.9%). This is followed by 9 and 10 hours a day (7.7% each). The number of working hours ranged from 4 to 18. This is expected since the tasks performed in agricultural work vary according to season and cropping, so that there variability in the number of working hours.

Table 2.1 Number of Hours the Adult Male Works in a Day

Number of Hours	Number	Percent
4	1	2.6
8	14	35.9
9	3	7.7
10	3	7.7
11	2	5.1
11.5	1	2.6
12	2	5.1
18	1	2.6
NA	1	2.6

For the adult females, majority also worked for an average of 8 hours a day (13 or 33.3%). Six or 15.4% worked for an average of 10 hours while 4 (10.3%) worked for 12 hours. The number of working hours ranged from 1 to 16.

Table 2.2 Number of Hours the Adult Female Works in a Day

Number of Hours	Number	Percent
1	1	2.6
3	1	2.6
6	2	5.1
8	13	33.3
9	1	2.6
10	6	15.4
12	4	10.3
13	1	2.6
16	1	2.6

Among the respondent's families, only four male children were reported to work in the field. Two of them (5.1%) worked for an average of 10 hours a day, while the other two worked for half and hour and 12 hours. The rest of the respondents reported that their male children were too young to work in the farm or simply did not help.

Table 2.3 Number of Hours the Male Children Work in a Day

Number of Hours	Number	Percent
.5	1	2.6
10	2	5.1
12	1	2.6

For the female children, 6 were reported to help in the field. Half of them worked for an average of 10 hours a day, longer than the working hours of most of the adults surveyed. The rest worked for 1.5, 8 and 12 hours per day.

Table 2.4 Number of Hours the Female Children Work in a Day

Number of Hours	Number	Percent
1.5	1	2.6
8	1	2.6
10	3	7.7
12	1	2.6

Table 2.5 presents the descriptive analysis of the above data. This shows that adult males and females almost have the same number of working hours. This is not the case between male and female children. Female children on the average worked longer hours than their counterparts. Male children also had a greater variation in their working hours as compared to other family members. Adult males, adult females and female children spent an almost equal number of time working in the field.

Table 2.5 Descriptive Statistics of Gender Distribution of Working Hours

Family Member	Mean	S. D.
Adult Male	8.8750	2.95530
Adult Female	8.8667	2.86156
Male Children	6.5000	5.76628
Female Children	8.5833	3.69346

Data on the Preparation of the Land for Farming

Majority of those involved in the preparation of the land for farming were adult males (17 or 43.6%). This is closely followed by adult females (15 or 38.5%). Only 3 respondents (7.7%) reported hiring laborers to help them in this task. Preparation of the land involves clearing of the field, weeding, digging, plowing and fertilizer application. See Table 3.

Table 3: Frequency Distribution of Family Members involved in the Preparation of the Land for Farming

Family Member	Frequency	Percent
Adult Male	17	43.6
Adult Female	15	38.5
Hired Laborer	3	7.7

Gender Distribution of Type of Operation

Data were gathered on the gender distribution in the different tasks and operations involved in agriculture. For plowing, majority of the workers were adult males (24 or 61.5%). This was followed by females (28.2%), hired males (10.3%), male children (7.7%) and female children (2.6%). For sowing, the gender distribution in decreasing order includes - adult male; adult female; male children; and female children, hired male and hired female equally.

It is observed that adult males dominate all the agricultural operations, including miscellaneous tasks. The second most involved family member is the adult female, most likely the mother. This is followed by the female children, who are involved in all but two farm operations. Moreover, it is also observed that hired male and female laborers have more participation in farm work than the male children, who only participate in five operations, namely: plowing, sowing, transplanting, weeding and harvesting. Hired laborers engaged in heavy farm work such as plowing, weeding, sowing and harvesting. See Table 4. The greater involvement of the female children compared to the male children is a new finding of the study in the country as the prevailing notion based on the interviews is that male children were more engaged in this kind of activity. Hired laborers across cultures engage in more or less hazardous work (Wood and Eagly 2002).

Table 4: Gender Distribution of Type of Operation

Operation	Adult Male		Adult Female		Female Children		Male Children		Hired Male		Hired Female	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Plowing	24	61.5	11	28.2	1	2.6	3	7.7	4	10.3	0	0
Sowing	23	59	19	48.7	3	7.7	4	10.3	3	7.7	3	7.7
Transplanting	26	66.7	19	48.7	3	7.7	3	7.7	2	5.1	3	7.7
Weeding	28	71.8	17	43.6	1	2.6	1	2.6	6	15.4	6	15.4
Manuring	23	59	11	28.2	1	2.6	0	0	1	2.6	4	10.3
Interculture	15	38.5	4	10.3	1	2.6	0	0	0	0	1	2.6
Irrigation	26	66.7	6	15.4	1	2.6	0	0	0	0	0	0
Plant protection	13	33.3	5	12.8	1	2.6	0	0	0	0	0	0
Harvesting	27	69.2	23	59	7	17.9	7	17.9	3	7.7	1	2.6
Threshing	15	38.5	9	23.1	2	5.1	0	0	0	0	0	0
Miscellaneous	10	25.6	3	7.7	1	2.6	0	0	0	0	0	0
All operations	10	25.6	3	7.7	0	0	0	0	0	0	0	0
Others	7	17.9	1	2.6	0	0	0	0	0	0	0	0

Gender Distribution of Means of Production

Data were also gathered regarding the gender distribution of means of production. The income generated from the farm is mostly handled by the wife or mother (28 or 71.8%) followed by the husband or father (9 or 23.1%). One of the respondents reported that in his family, the daughter handles the income from the farm (2.6%). In contrast, the husband is most frequently the owner of the tilled land (24 or 61.5%) followed by the wife (13.3%).

Meanwhile, husbands were more likely to have access to credit (10 or 25.6%) followed by the wife (8 or 20.5%). Access to credit involves dealing with bank loans and other sources of agricultural funding. Lastly, majority of the respondents reported that the husband was more often a member of cooperatives (20 or 51.3%) as compared to the wife (11 or 28.2%). See Table 5.

In general, the male often possessed the means of production. But in holding and managing the family income, females are more involved since they traditionally in the Philippines budget and allocate the family money. This again is in contrast with studies done where males hold the income (Wood and Eagly 2002).

Table 5: Frequency Distribution of Gender Distribution of Means of Production

Means of Production	Husband		Wife		Son		Daughter		Male Relative		Female Relative	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Income from Farm	9	23.1	28	71.8	0	0	1	2.6	0	0	0	0
Ownership of Land	24	61.5	13	13.3	1	2.6	1	2.6	1	2.6	1	2.6
Access to credit	10	25.6	8	20.5	0	0	0	0	0	0	0	0
Membership in cooperatives	20	51.3	11	28.2	0	0	0	0	0	0	0	0

Data on Gender Distribution of Food Preparation and Cooking

Table 6 shows data for food preparation and cooking. This task is performed predominantly by the wife (29 or 74.4%) followed by the husband (18 or 46.2%). As for the children, daughters are more involved in the task as compared to sons. This shows the continued perpetuation of family roles traditionally ascribed to women.

Table 6: Gender Distribution of Food Preparation and Cooking

Family Member	Frequency	Percent
Husband	18	46.2
Wife	29	74.4
Son	6	15.4
Daughter	9	23.1

Data on Farm Size and Number of Farms

Majority of the farmer's lands were 500 square meters in size (17.9%). The farm size ranged from 100 to 15,000 square meters. The mean farm size was 2,580 square meters. The data indicates that most of the farmers till relatively small land areas and produce for small markets only. See Table 7.

Table 7: Frequency Distribution of Farm Size

Size (in square meters)	Frequency	Percent
100	2	5.1
200	1	2.6
300	1	2.6
400	1	2.6
500	7	17.9
700	2	5.1
900	1	2.6
1000	3	7.7
2500	5	12.8
5000	4	10.3
10000	2	5.1
15000	1	2.6

Mean: 2580

Meanwhile, more than half of the respondents worked with single farm only (21 or 53.8%) while less than one-fourth work with 2 farms (9 or 23.1%). Others worked with 3, 6 and 7 farms (7.7, 2.6 and 2.6%, respectively). The mean farm size is 1.74 and the variability is low (1.34). Again, this indicates that the farmer most likely produced on a small-scale basis. See Table 8.

Table 8: Frequency Distribution of Farm Number

Number of Farms	Frequency	Percent
1	21	53.8
2	9	23.1
3	3	7.7
6	1	2.6
7	1	2.6

Mean: 1.7429

Data on Decision Making in the House

The following tables contain data on the respective contribution of husband and wife in various decision making areas. For household food expenditures, the wife has the greater contribution, as 27 or 69.2% of them contribute more than 50% in the decision-making process, as opposed to 24 or 61.5% among the husbands. See Table 9.1.

Table 9.1 Frequency Distribution of Family Member's Contribution to Decision Making in Household Food Expenditures

Percent Contribution	Husband		Wife	
	Freq.	%	Freq.	%
0	7	17.9	5	12.8
10	1	2.6	0	0
20	2	5.1	0	0
25	1	2.6	1	2.6
40	1	2.6	2	5.1
41	0	0	1	2.6
50	15	38.5	15	38.5
60	3	7.7	1	2.6
75	1	2.6	1	2.6
80	0	0	2	5.1
90	0	0	1	2.6
100	5	12.8	7	17.9

Decision making regarding family expenditures outside of food is mainly decided by husbands. Respondents reported that 30 or 76.9% of wives contribute more than 50% in the decision as compared to 59% in the husbands. See Table 9.2

Table 9.2 Frequency Distribution of Family Member's Contribution to Decision Making in Other Household Expenditures

Percent Contribution	Husband		Wife	
	Freq.	%	Freq.	%
0	12	30.8	5	12.8
25	0	0	1	2.6
50	17	43.6	18	46.2
75	1	2.6	0	0
100	5	12.8	12	30.8

As for decision making concerning children's education, husbands and wives are almost equal. Twenty-nine or 74.4% of the wives contribute more than 50% in the decision making process. See Table 9.3. Using the Paired-Samples T-test in comparing the means of percentage decision done between husband and wife, the population means for the percentage decision done by the wife and the percentage decision done by husband are equal. They almost equally decide for this particular area.

Table 9.3 Frequency Distribution of Family Member’s Contribution to Decision Making in Children’s Education

Percent Contribution	Husband		Wife	
	Freq.	%	Freq.	%
0	6	15.4	5	12.8
20	1	2.6	1	2.6
25	1	2.6	1	2.6
50	21	53.8	21	53.8
75	1	2.6	1	2.6
80	1	2.6	1	2.6
90	0	0	1	2.6
100	5	12.8	5	12.8

In contrast, decision regarding the care of family’s children are largely delegated to the wife. Twenty-seven or 69.2% of wives contribute more than 50% to the decision making compared to only 17 or 43.6% among the husbands. This is to be expected since taking care of children has traditionally been seen as a female preoccupation.

Table 9.4 Frequency Distribution of Family Member’s Contribution to Decision Making in Taking Care of Children

Percent Contribution	Husband		Wife	
	Freq.	%	Freq.	%
0	12	30.8	7	17.9
10	1	2.6	0	0
20	2	5.1	0	0
25	2	5.1	1	2.6
50	9	23.1	9	23.1
75	1	2.6	2	5.1
80	0	0	3	7.7
90	0	0	1	2.6
95	0	0	1	2.6
100	8	20.5	12	30.8

However, when it comes to decisions regarding farming activities, an overwhelming number of husbands have the greater command. Thirty or 76.9% of husbands contribute more than 50% while only 11 or 28.2% of wives do so. Few respondents reported an equal contribution between husband and wife (17.9%). The male dominance in this aspect of decision making is reflected in the greater involvement of males in farming operations and means of production, as was presented earlier. See Table 9.5.

There is reason to believe that the population means for percentage decision done by wife and husband for farming activities are not equal, since the test statistic result of – 6.059 is significant with $P=0.000$. Hence, the husband decides more when it comes to farming activities than the wife does. It also holds true for marketing of vegetables

decision with test statistic equals -2.733 with $P=0.007$. With mean paired difference equal to -13.14 , the husband also decides more when it comes to marketing of vegetables than the wife does.

For household expenditures except food (electricity, clothing etc.), how to take care of children, and food expenditures, the wife decides more than the husband with mean paired difference of 9.39, 25.69, and 16.22 respectively.

Table 9.5 Frequency Distribution of Family Member’s Contribution to Decision Making in Farming Activities

Percent Contribution	Husband		Wife	
	Freq.	%	Freq.	%
0	3	7.7	17	43.6
20	1	2.6	0	0
25	0	0	5	12.8
30	0	0	1	2.6
50	7	17.9	7	17.9
70	1	2.6	0	0
75	5	12.8	0	0
80	0	0	1	2.6
100	17	43.6	3	7.7

The study shows that decision making process in the household and the farm is a gendered experience. Men are considered to have their specialties, and so do women. Men have more power when it comes to decisions regarding farming since they are most involved in this activity. Household tasks and raising children are delegated largely to women, since these are activities that have been traditionally ascribed to women and they have shown aptitude for. This conclusion is in support of other studies ((Mehra, 1991).

I. Data on Illnesses

The following tables describe the illnesses among different family members. The most common illness among the wives involves the respiratory tract, such as cough (7.7%) and asthma (5.1%). There are also reports of hypertension, musculoskeletal pain and headache (5.1% each). The predominance of respiratory complaints may probably represent exposure to certain chemical and biological hazards such as pesticides, pollen and dust. See Table 10.1

Table 10.1 Illnesses of the Wife

Illness	Frequency	Percent
Cough	3	7.7
Asthma	2	5.1
Hypertension	2	5.1
Musculoskeletal pain	2	5.1
Headache	2	5.1
Headaches, vomiting, blurring	1	2.6
Heart Failure	1	2.6
Chest pain, ulcer, headache	1	2.6
Goiter	1	2.6
Breast operation	1	2.6
Uterine operation	1	2.6

Among the husbands, the most common complaint was back pain (10.3%) followed by hypertension, blurred vision and cough (7.7% each). The predominance of musculoskeletal complaints among the men maybe due to their labor-intensive farming activities such as plowing and harvesting. Blurred vision and cough may be secondary to pesticide exposure and other chemical or biological hazards. See Table 10.2

Table 10.2 Illnesses of the Husband

Illness	Frequency	Percent
Back pain	4	10.3
Hypertension	3	7.7
Blurred vision	3	7.7
Cough	3	7.7
Chest pain, ulcer, asthma	1	2.6
Flu	1	2.6
Headache	1	2.6
Vomiting	1	2.6
Heart Failure	1	2.6
Stomachache, chest pain	1	2.6
Tremors, coughing	1	2.6
Ulcer	1	2.6
Difficulty breathing	1	2.6

Table 10.3 lists the reported illnesses among the male children. Almost all of the complaints were respiratory in nature, namely cough (10.3%), asthma and primary complex (5.1% each). There was a single report of a cyst in the thorax.

Table 10.3 Illnesses of Male Children

Illness	Frequency	Percent
Cough	4	10.3
Asthma	2	5.1
Primary complex	2	5.1
Cyst (thorax)	1	2.6

The same pattern was also seen for the female children. The most common complaints were cough (7.7%) and primary complex (5.1%). Nose bleeds and asthma was also reported (2.6% each). The incidence of primary complex among the children may indicate that adults in the community may have undiagnosed TB and may have transmitted the disease to their children.

Table 10.4 Illnesses of Female Children

Illness	Frequency	Percent
Cough	3	7.7
Primary complex	2	5.1
Nose bleeds	1	2.6
Asthma	1	2.6

Hazard Exposure of Family Members

Table 11 shows the hazard exposure of different family members. For the husband, the most prevalent hazard reported is ergonomic in nature (i.e. back pain, wrist pain), with 30 or 77% of respondents being exposed to it. This is consistent with the prevalence of low back pain in the reported illnesses of this group. Chemical hazards, most probably in the form of pesticide exposure, and exposure to extreme heat for prolonged periods were also prevalent (59% and 56.4%, respectively). The pattern of exposure follows the same trend for the wives (38.5% for ergonomic hazards, 28.2% for chemical hazards and 23.1% for heat exposure).

Comparing across family members, we can see that the degree of exposure is related to work patterns. Husbands had greatest exposure to the various hazards, most likely because they perform the bulk of work in the field. The second most exposed group were the wives. Differential exposure to hazards is influenced by differences in work patterns and activities among the members of the family, as shown in other studies (Mehrah, 1991).

Table 11. Frequency Distribution of Hazard Exposure of Family Members

Hazards	Husband		Wife		Male Children		Female Children	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Chemical	23	59	11	28.2	2	5.1	3	7.7
Biological	3	7.7	1	2.6	0	0	0	0
Noise	1	2.6	1	2.6	0	0	0	0
Heat	22	56.4	9	23.1	4	10.3	2	5.1
Ergonomic	30	76.9	15	38.5	5	12.8	2	5.1

Chi Square Test for Independence

Table 12 contains the farming operations associated with various hazard exposures among the different family members. Based on the chi-square analysis, the wife's exposure to chemical hazards was associated with involvement in plant protection which deals with pesticide use. Furthermore, ergonomic hazards in both husbands and wives were associated with harvesting by adult males and females, respectively. Therefore, among the many tasks involved in agriculture, harvesting seems to pose the greatest risk for ergonomic hazards among adults such as low back pain. For the female children, ergonomic hazards are associated with interculture among adult females. This may be because children often accompany parents and assist in more tedious farming operations; hence, their exposure to hazards goes hand in hand with the farming activities of their parents.

Table 12: Factors Associated with Various Hazard Exposures

Hazard Exposure	Likelihood Ratio	Fisher's Exact Test
Chemical Hazards: Wife Plant protection adult female	7.837 (.005)	.026
Ergonomics: Wife Harvesting adult female	6.692 (.010)	.020
Ergonomics: Husband Harvesting adult male	6.917 (.009)	.037
Heat: male children Plowing adult male	5.938 (.015)	.032
Sowing adult male	5.938 (.015)	.028
Transplanting adult male	6.239 (.012)	.032
Ergonomics: Female Children Interculture adult female	7.343 (.007)	.038

Bivariate Analysis

Means of operation and decision making were analyzed using bivariate analysis. Spearman rho was used to account for nonlinear relationships and outliers. From the data, the husband's control of the farm income is associated with dominance in decision making with regards to household expenditures, with the exception of food ($p=.050$). For the wife, control over the farm income is related to greater decision making power in terms of food expenditures ($p=.004$), children's education ($p=.002$), other household expenditures ($p=.003$), marketing of vegetables ($p=.026$) and taking care of the children ($p=.010$). On the other hand, female dominance in decision making regarding the marketing of harvested vegetables is associated with access to credit and ownership of the land by the wife ($p=.006$ and $.011$, respectively.)

Table 13: Bivariate Analysis of Means of Operation and Decision Making

Factors	Spearman rho	Significance
Holder of income: Husband Expenditures except food	.356	.050
Access to credit: Husband Food expenditures	.633	.020
Holder of income: Wife Food expenditures	.497	.004
Children's education	.533	.002
Expenditures except food	.513	.003
Marketing of vegetables	.400	.026
Taking care of children	.456	.010
Access to credit: Wife Marketing	.717	.006
Ownership of land: Wife Marketing	.484	.011

Test of Independence and Measure of Linear Association

Table 14 depicts the farming operations associated with various hazard exposures among the different family members using the Phi-coefficient, Likelihood Ratio and Fisher's exact test.

For the adult male farmers, significant and positive association between biological hazards and irrigation is confirmed with the value of 3.417 ($P=0.065$). Biological hazards such as parasites and microorganisms thrive in water and soil, thus, the positive relationship present among male farmers.

Physical heat, on the other hand is evidently associated with transplanting ($P=0.030$), interculture (0.005), threshing (0.000), and miscellaneous operations (0.004) which are all significant at 5%. Positive associations are evident by using the Phi coefficient strongest with threshing at 0.257(0.001), significant at 1%. Farmers are mainly exposed to extremes of temperature, which may affect their physiologic functioning.

Also, ergonomics hazards leading to low back pain and musculoskeletal disorders are positively associated with interculture, irrigation, threshing, and miscellaneous operations. This shows that farming is indeed an arduous and physically demanding work.

Table 14. Farming operations Associated with Hazard Exposure for Male Adult

Associations	Likelihood Ratio Test	Fisher's exact Test	Phi
Physical Heat- husband* Adult Male Translating	4.725 (0.030)	0.035	0.163 (0.031)
Physical Heat-husband* Adult Male Interculture	7.908 (0.005)	0.008	0.218 (0.005)
Physical Heat –husband* Adult Male Threshing	11.373 (0.001)	0.001	0.257 (0.001)
Physical Heat-husband* Adult Male Miscellaneous	8.121 (0.004)	0.006	0.221 (0.005)
Physical noise –husband* Adult Male all operations	3.159 (0.076)	0.088	0.151 (0.060)
Ergonomics – husband* Adult male- interculture	7.931 (0.005)	0.008	0.207 (0.007)
Ergonomics –husband* Adult Male Threshing	13.431 (0.000)	0.001	0.255 (0.001)
Ergonomics-husband* Adult Male All operations	4.888 (0.027)	0.037	0.163 (0.036)
Ergonomics-husband* Adult Male Miscellaneous	7.410 (0.006)	0.011	0.198(0.011)
Ergonomics –husband* Adult Male Irrigation	3.864 (0.049)	0.064	0.145 (0.052)
Biological Hazard- husband* Adult Male Irrigation	3.417 (0.065)	0.067	0.148 (0.062)

For the adult female, results show that chemical hazards are significantly and positively associated at 5% level of significance with the following farm operations: ploughing (P=0.008), sowing (P=0.001), weeding (P=0.000), manuring (P= 0.000), plant protection (P=0.026), harvesting (P=0.000) and threshing (P=0.042). Association is strongest with chemical hazard and manuring at 0.370 (P=0.000) followed closely by harvesting with 0.358 (0.000). See Table 15. This shows that women mainly perform manuring and pesticide application, and consequently exposed to chemical hazards.

Table 15. Farming Operations Associated with Hazard Exposures for Adult Female

Associations	Likelihood Ratio Test	Fisher's exact Test	Phi
Physical Heat – wife* Adult female translating	3.929 (0.047)	0.060	0.146(0.052)
Physical Heat-wife* Adult female manuring	6.957 (0.008)	0.011	0.196 (0.010)
Physical Heat –wife* Adult female threshing	9.755 (0.002)	0.002	0.249 (0.001)
Physical Heat Hazard-wife* Adult female harvesting	5.817 (0.016)	0.022	0.174 (0.021)
Chemical hazard-wife* Adult female manuring	24.864 (0.000)	0.000	0.370 (0.000)
Chemical Hazard- wife* Adult female weeding	14.892 (0.000)	0.000	0.284 (0.000)
Chemical Hazard-wife* Adult female threshing	4.132 (0.042)	0.059	0.154 (0.044)
Chemical Hazard-wife* Adult female Harvesting	24.704 (0.000)	0.000	0.358 (0.000)
Chemical hazard-wife* Adult female plant protection	4.932 (0.026)	0.030	0.169 (0.027)

Risk Factors and Health Symptoms According to Gender as Controlling Variable

Among those who use damaged backpack sprayer, easy fatigability (OR= 5.6), muscle pain (OR= 2.4), eye redness (OR=2.4), palpitations (OR=5.864), change in taste (OR= 9.565) and coughing (OR=2.95) are more likely to occur. Using damaged backpack sprayer results to greater exposure to pesticides since leakage may occur that may be absorbed by the body through inhalation or dermal exposure thus causing weakness or other pesticide related symptoms.

Directional and Symmetric Measure of Means of Production and Decision-Making in the House using ETA and Pearson R

To measure the association between means of production and decision making in the household, ETA coefficient was used which is appropriate for a dependent variable measured on an interval scale (e.i., percentage decision making, interval 1 (0-24%), interval 2 (25-49%), interval 3 (50-74%) and interval 4 (75-100%) and an independent variable with a limited number of categories (e.i., means of production). Meanwhile, the Pearson R coefficient is also utilized to see the significance of the associations. Both coefficient results show equal values.

The table shows positive but not very strong associations between the variables that are significant at 5% level of significance. With regards to the variable - income from farm, it is associated at most with percentage decision in household expenditures (except food) with coefficients equal to 0.330 (P=0.000). It is also associated equally with decision in marketing of vegetables and child care both with 0.259 (P=0.000).

Table 16: Linear Regression of Certain Means of Production with Decision Making Processes

Means of Production Variables	% decision in household food expenditures	% decision in education of children	% decision in farming activities	% decision in household expenditures except food (Electricity, clothing, etc.)	% decision in marketing of vegetables	% decision in child care
Income from farm	*0.229 **0.229 (0.001)	*0.170 **0.170 (0.019)	*0.173 **0.173 (0.017)	*0.330 **0.330 (0.000)	*0.259 **0.259 (0.000)	*0.259 **0.259 (0.000)
Ownership of Land	*0.155 **0.155 (0.033)	*0.212 **0.212 (0.004)	*0.156 **0.156 (0.033)	*0.246 **0.246 (0.001)	*0.139 **0.139 (0.058)	
Access to Credit	*0.205 **0.205 (0.007)		*0.181 **0.181 (0.017)	*0.297 **0.297 (0.000)	*0.250 **0.250 (0.001)	
Membership in cooperatives	*0.164 **0.164 (0.026)	*0.193 **0.193 (0.009)	*0.151 **0.151 (0.041)	*0.232 **0.232 (0.002)	*0.183 **0.183 (0.013)	

* ETA

** Pearson R
(P value)

Meanwhile, for ownership of land, association is highest with household expenditures (except food) which is 0.246 (P=0.001) followed closely by children's education (0.212; P=0.004). On the other hand, highest with 0.297 (P=0.000), access to credit is associated with household expenditures except food and lowest at 0.181 is associated with farming activities. Lastly, for membership in cooperatives, it is associated, highest with household expenditures except food with 0.232 (p=0.002). It is evident based on the result above that for husband's means of production, they are associated at most with percentage decision in other household expenditures than food.

Discussion

Gender Differentiation in the Agricultural Sector

This study has shown the differentiation of males and females in the agricultural sector and the association of access to various means of operation to decision making power. In general, agriculture is still a male dominated field, with females often acting as helpers. Females are usually delegated to tasks and activities traditionally relegated to women like marketing and taking care of children.

Other studies have explored this sexual division of labor and its origins. Wood and Eagly (2002) considered social constructionism, evolutionary psychology and their own biosocial theory in evaluating the origins of sex-typed division of labor and

patriarchy. Based on their analysis, they concluded that sex differences arise from the interaction between the unique physical attributes and capabilities of each sex and the economic and social structure of the societies they belong to. In agriculture, Bolwerk (2002) conducted an ethnographic study of 15 farm women and men in Southeastern Wisconsin and found that the cultural meaning of work is learned by both males and females during childhood, and this in turn influences their health and safety, leisure time, and social relationships. The data also indicated that farm work created family unity and was a source of identity and self-worth for both sexes. However, it provided little opportunities for leisure (Wood and Eagly, 2002).

The use of new farm technology has also been found to have gender-related consequences. Kolli and Bantilan (1997) examined the effects of a new groundnut production technology (GPT) package in two Indian villages and found that the adoption of GPT reduced the control of women over resource use and resulted in more work in field cleaning, fertilizer application, and sowing. They also found that men specialized in agricultural tools and equipment and hard labor, while women utilized hand skills and small tools. Kidder (2000) found that among informal economies, which are largely comprised by agriculture, men perform more technical or mechanized production while women do tasks associated with traditional women's roles. It was also seen that women's contribution to the household income was constantly underestimated by men.

In developing countries, women provide the bulk of agricultural labor and maintenance and are integral members of agrarian systems. However, they are usually relegated as merely helpers of men. This may be attributed to societal structure and tradition, division of labor and perceptions of male and female roles in society. Women labor are also "statistically invisible" since they often work in areas of agriculture which are largely unpaid (Carew, 1981). The area of investigation in this study is a developing community, hence, societal culture and tradition may have affected the perception and actual experience of women in agricultural work.

Women and Poverty

After analyzing the sexual division of labor in villages in the Kathmandu Valley, Joshi (2000) found that women significantly contributed more work in agriculture and household activities than men. In spite of this, women's work has been consistently underrepresented in many national statistical surveys due to inadequacies in conceptualization, definition of terms and data gathering methods. Regmi and Weber (1997) assessed existing gender relations in agriculture and concluded that women are more affected by poverty than men and that men are more privileged than women and children in almost all societies.

In India, a 12-month study on women's role in agriculture found that economic, social, and cultural factors work together to reinforce gender differences in ownership, control over, and access to critical agricultural resources. Frequently, land owned by women through inheritance or marriage is sold, with gains going to men. Vlassoff in 1982 analyzed the status of rural Indian women and found that gender inequalities persisted throughout all age groups but were less pronounced at younger ages. This inequality in the ownership and control of property was found to be the most significant contributor to the gender differences in economic well-being, social status and empowerment. In the Philippines, however, women are allowed to hold income, and

consequently the income can affect decision making in food expenditures, rearing of children, and others.

A study by Salmona in France in 1985 found that men have generally refused to share decision making with women and do not recognize distinctive qualifications and potential contributions that the opposite sex can bring to agricultural work, such as attention to detail, accuracy and ease with living things. Women have been found to respond to such conditions through neurotic hyperactivity and illness.

Recent global development has brought about certain changes in gender roles, but many inequalities still exist. A study done by Ibrah (1992) on rural Pakistani villages found that social change has resulted in women taking over work previously assumed by men. Women were significant contributors to the year-round production and processing of major crops. However, most of them were unaware of their indirect contribution to the household. Also, the mobility of women beyond the fields and home was limited and they did not earn cash. Lastly, women were seen as lacking in reasoning and ability in coping with external affairs due to their household responsibilities. In rural Africa, there is reduction of women's productivity and control over resources and to increased total work burden (Lado, 1992). Female farmers have also been found to have limited access to resources, credit, agricultural extension and information, land ownership, education and time (Mehra, 1991).

Even rural development projects in Sub-Saharan Africa have been found to ignore the role of women and their significance in agricultural production because they do not participate in political activities and decision making. This is in spite of the fact that women constitute 70% of agricultural workers and 80% of food producers. In this area of the world, drought has resulted in male labor emigration, resulting in a work force consisting of 95% women. But they have been found to have virtually no land ownership rights and thereby do not possess credit. They are also often illiterate and are hired mostly as hired hands. In Brazil, traditional concepts on division of labor, female domestic roles and gender hierarchies are still predominant and contribute to the marginalization of women agricultural workers (Sardenberg, Costa & Passos, 1999).

Gender issues and inequality have also been found in agricultural cooperatives, which are meant to increase productivity, income and political power for the marginalized. Mayoux (1993) studied agricultural cooperatives in Nicaraguan regions and found differences in the needs and priorities of men and women in cooperatives arising from division of labor and power structures among both family and society. It was also seen that child care, housework, and the opposition of their husband's limited women's involvement in production. Labor laws that were meant to give more opportunities to women did little to change current practices.

A local study by Siar (2003) on small-scale fishing industries in Palawan also found that gender, age and differences in resource knowledge and socioeconomic status among men and women influence access to resources.

Health Issues in the Agricultural Sector

Controversial issues such as division of labor in the family are often a contested topic. In fact, family members work side by side in some activities while assuming different roles in other activities (Paulson, 2003; Mccoy, et al., 2002). The nature of work in the household and occupation of the family members predispose them to certain

health problems. Both men and women farmers experienced breathing problems and were equally likely to report disability, emotional problems or stress. However, more men reported back injuries as also shown in the study of Thurston et al., 2003. Working in the farm is very tedious. Carrying heavy loads over a prolonged period of time can predispose a farmer to musculoskeletal disorders.

Among the husbands, the most common complaint was back pain (18.87%) followed by headache (10.4%), cough (8.96%) and flu (5.2%). The predominance of musculoskeletal complaints among the men is most probably because they perform labor-intensive farming activities such as plowing and harvesting. However, other studies show that women are also at high risk for ergonomic-related injuries because of increased physical strain, low maximal oxygen uptake and size and stature limitation. (Mccoy, 2002). In a study by Carruth, et al. in 2001 among women in Louisiana, Texas, lower extremities were the most frequently injured body parts due to falls and overdoing or lifting or hauling. Risk factors that are associated with increased farm injury included working on large-animal farms, longer hours spent in farm work, persistent back pain or weakness, driving a tractor and hauling farm goods to market.

The study showed that hazard exposure was related to the nature of work that the respondents performed. For instance, ergonomic hazards, associated with agricultural activities and exposure to extreme heat for prolonged periods were also prevalent (64.6% and 47.2%, respectively). This is consistent with the prevalence of low back pain in the reported illnesses of this group. There was also significant and positive association between biological hazard and with a value of 3.417 ($P=0.065$). We can therefore state that a particular hazard may be found in a particular type of work. The type of hazard exposure, in turn, affects the type of health symptom or illnesses that the farmer experiences.

Contribution of the Study

The prevailing ideology in society has a historical significance. It is a long enduring set of value systems that becomes manifested and embedded in the ways of life of people, including their ways of thinking. The dominance of men in society is a historical reality. We see this in both the sphere of the household, and the sphere of work.

Positional power is operationalized in terms of the decision making processes between the husbands and the wives, or between male members and female members. In this study, decision making processes in the productive sphere (farm and agriculture) were evidently male roles. On the other hand, household matters were mainly roles taken by the women. The findings show the following trend: that men dominate in the decision making in farming activities, household expenditures except food, and marketing of vegetables; and women, on the other hand, had more decision making in household expenditures and care of children.

Positional power is eventually translated into functional tasks. The study showed that farm operations are mainly done by men, except harvesting which is predominantly done by women. Household activities, however, are mainly done by women such as cooking. Again, this shows us that women are not only confined to household work, but also share in farming activities.

Although the contribution in the productive sphere is seen to be made by men, the functional tasks show us in the study that women must also be credited for their

productive work. Women do not only contribute to household goods, but also to productive goods.

Occupational hazard exposure was related to the nature of work that the male or female performs in the agriculture. Males who mainly performed irrigation were exposed to biological hazards like microorganisms in the water and soil. They were also exposed to physical heat that may pose skin cancer due to the nature of their task such as transplanting, interculture, threshing and miscellaneous operations. Women, on the other hand, were mainly exposed to chemical hazards such as pesticides and other organic chemicals because they handled manuring, plant protection and harvesting. The nature of hazard exposure is related to the task being performed. Therefore, the approach to illness prevention and health protection should look into these specific findings.

Conclusion

This research has demonstrated that gender differentiation still exists among agricultural workers with respect to type of work, means of production, type of operation, decision making, illnesses and hazard exposure. Given this, we can now gain insight into gendered work patterns and power relationships in the Philippine agricultural work, and identify certain work activities for each sex that predispose them to various hazard exposures. However, a more in depth and comprehensive investigation is needed in order to thresh out these relationships and elucidate the sexual division of labor in agriculture and its impact on both sexes. But given as it is, the study has a significant contribution in the existing literature on gender issues and gender differentiation in the country, especially in the relations of type of work, nature of decision making process, hazard exposure and type of illnesses.

The study concludes that:

- Men dominate in the decision making in farming activities, household expenditures except food, and marketing of vegetables.
- Women, on the other hand, had more decision making in household expenditures of food, and care of children.
- Both had no significant difference in decision making on education of children.
- Occupational hazard exposure was related to the nature of work that the male or female performs in the agriculture.

The gender issues that have been discussed affect not only women but their families and the community as well. Therefore, a number of measures and suggestions have been put forth to alleviate the situation. Agarwal (1994) suggested that instead of individualized, covert action, an organized, collective resistance of women is needed to modify entrenched power and property relations. Structural adjustment programs (SAPs) have also been introduced in various countries. These aim to improve economic efficiency and promote more rapid economic growth. However, inconsistent results have been found. This has been attributed to improper implementation of reforms and overly optimistic assumptions (Mehra, 1991).

On the other hand, Gala (1997) found encouraging results with the formation of all-women village councils in Maharashtra, India. These councils reportedly increased women's interest in local political power and changed their attitudes toward themselves and their daughters. They also improved the accessibility of fuel, water, and fodder,

which increased female mobility and assets and decreased work burden. Incidents of female abuse declined and women gained more respect.

Meanwhile, Zaman (1995) emphasized the creation of nontraditional employment and business opportunities for poor women in rural areas and consciousness-raising and among women. Lastly, Regmi and Weber (1997) point to gender analysis as an essential tool for solving agricultural and environmental problems "...because it exposes inequality, exploitation, or oppression and leads to a proper acknowledgement of women's role in agriculture."

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