



Gender differentials in farming efficiency and profits: The case of rice production in the Philippines



Ashok K. Mishra^{a,*}, Aditya R. Khanal^b, Samarendu Mohanty^c

^a Kemper and Ethel Marley Foundation Chair, Morrison School of Agribusiness, W. P. Carey School of Business, Arizona State University, 7231 E Sonoran Arroyo Mall, Mesa, AZ 85212, United States

^b Assistant Professor, Department of Agricultural and Environmental Sciences, Tennessee State University, 204D Farrell-Westbrook Hall, Nashville, TN 37209, United States

^c Principal Scientist and Division Head, Social Sciences Division, International Rice Research Institute, DAPO Box 7777, Metro Manila, Philippines

ARTICLE INFO

Article history:

Received 19 May 2016

Received in revised form 24 August 2016

Accepted 25 January 2017

JEL classification:

Q12

Q15

J43

C21

Keywords:

Gender

Average treatment effect

Rice

Female-headed farm households

Farming efficiency

Profits

ABSTRACT

Women make essential contributions to the agricultural and rural economies in all developing countries. Rural women are involved in a variety of production and farm management activities. In the Philippines women engage more intensively in agricultural work than men. However, Filipino women's actual contribution to food production and the rural economy remains undervalued, if not invisible. Using the average treatment effect and farm-level data from the Philippines, this study investigates the effect of gender on farming efficiency, profits, and costs of rice production. Results indicate that female-headed farm households, despite having limited access to land, have higher values of rice production than their male counterparts. However, female-headed households have higher fixed, seed and labor input costs, consequently earning lower profits. In addition, female-headed farm households have lower irrigation costs. Findings from this study also indicate that women are less efficient in farming, but are more likely to adopt improved seed varieties.

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1. Introduction

Women have been recognized as an invaluable resource in the developing world's agricultural and rural economies. For example, approximately half of all rural women are classified as economically active. Statistics show that women comprise about 43% of the agricultural labor force in developing countries, ranging from 20% in Latin America to 50% in sub-Saharan Africa and East Asia (Quisumbing et al., 2014). Female agricultural workers play important roles in the production of cash and subsistence crops and in the rearing of small livestock. Specifically, a larger number of them are involved in the production of rice, coconut, and banana crops. Furthermore, women have a principal role in agribusiness—food processing, marketing, consumer-related activity, and value-added food processing (Lu, 2010).

In many developing countries, agriculture and animal husbandry occupations are not lucrative and result in men migrating to urban areas for better jobs and incomes. This phenomenon has put women, who are left behind, in charge of the farm and production agriculture (Vij and Narain, 2016). A large number of women are involved directly in smallholder agriculture as farm managers and workers on their own families' farms, ranging from 53.5% of the rural adult female population in sub-Saharan Africa to 6.9% in Europe and South Asia. Regional patterns exist and vary. For example, in most countries, between 10% and 30% of households are headed by females. In a recent study Hoppe and Korb (2013) found that the share of U.S. farms operated by women has nearly tripled over the past decades, from 5% in 1978–14% by 2007. Their findings note that most women-operated farms are very small and mostly related to livestock, and that women farm operators are older, highly educated, and often rely on off-farm work and income. But southern African countries tend to have a very large proportion of female-headed households. The trend toward increasing numbers of women in agricultural production is associated with factors including male rural out-migration, the growing number

* Corresponding author.

E-mail address: Ashok.K.Mishra@Asu.edu (A.K. Mishra).

of households headed by women, and the development of labor-intensive cash crops. In addition, from a development perspective, women have a specific importance to food security (see [Smith and Haddad, 2000](#)). Female-headed households account for 3% to 38% of all households and are responsible for 2%–17% of the value of food produced in the developing countries ([Doss, 2002](#)).

Although women play a key role in agriculture in many parts of the world, especially in developing countries, their contribution to food production and the rural economy remains undervalued. As a result, women face significant barriers in agriculture, especially inequalities in access to and control over crucial resources and inputs, such as land, labor, fertilizer, improved seeds, and credit. For example, women in Cameroon provide more than 75% of the agricultural labor but own only 10% of the land ([Mason and Carlsson, 2004](#)). Similar differences were found in Kenya and Zambia ([Quisumbing, 1994a](#)). Research in Burkina Faso on men and women who grew the same crop on individual plots showed that most inputs, such as labor and fertilizer, went to the men's plots ([IFAD, 2012](#)). Agriculture plays a significant role in the Philippine economy, case study in this paper, in which nearly 20% of the gross domestic product comprises agriculture and agriculture-related enterprises. Additionally, nearly half of the labor force is employed in the agricultural sector; two-thirds of the population depends on agriculture for its livelihood. Although women farmers are not counted in official statistics, women are active economic actors, such as landless workers and traders of agricultural and fishery products, and are engaged in micro-manufacturing enterprises. Of the total rural workforce, women comprised 27.3% of the 10.4 million workers employed in the agricultural, hunting, and forestry sector in 2004 ([NSO, 2004](#)).

The inaccessibility to productive resources or assets has negative implications. [Berge et al. \(2014\)](#) studied the issue of gender inequality in land access, lineage, and land reforms and concluded that distributional justice through gender-neutral lineage rights was a real challenge in some countries, such as Malawi, because gender equality is incompatible with the cultural precepts about lineage rights. Moreover, both inter- and intra-household differences are identified as key drivers of the dynamics affecting the resource status of most female-headed farm households ([Swaminathan et al., 2012](#)). Furthermore, [Quisumbing et al. \(2014\)](#) argue that agriculture is underperforming because half of its farmers—women—do not have equal access to resources and opportunities. An empowered woman who can make decisions about planting materials and inputs is more productive in agriculture. In this regard, reducing gender inequality would contribute positively to agricultural productivity.

Gender differences in developing countries are observed mainly in the access to and use of agricultural inputs, tenure security, and related investments in land and improved technologies, market and credit access, human and physical capital, and informal and institutional constraints. These factors explain the difference in agricultural productivity between male-managed plots and female-managed plots ([Palacios-López and Lopez, 2014](#); [Peterman et al., 2011](#)). Gender gaps in the Philippines remain substantial in terms of economic opportunities, decision-making, and access to resources ([Ilo, 2010](#)). According to the Global Gender Gap (GGG) Index, introduced by the World Economic Forum (2013), the Philippines ranks fifth (GGG Index = 0.78) in the world, suggesting a smaller gender gap between men and women. On the other hand, looking at educational attainment in the Philippines (GGG Index = 1.00), the country ranked first among 136 countries, implying that there is no gender gap in the schooling of men and women. Similarly, based on economic participation and opportunity, the Philippines ranked 16th globally (GGG Index = 0.78), indicating a smaller gender gap. Similarly, the report notes that women's access to land ownership was at the 0.5 level, women's access to credit at

0.5, and women's access to property other than land at the 0.00 level. These numbers suggest that a significant gender gap exists for females' access to land ownership, access to credit, and access to property.

Very few studies have discussed the role of gender using the average treatment effect model. For example, [Zanutto \(2006\)](#) investigated gender's effect on salaries in the information-technology sector. We may not consider the effect of gender on outcomes to be a treatment effect in the causal sense because we cannot manipulate gender. The main motivation for using gender in our study is to make a descriptive comparison of the outcomes of similar female-headed and male-headed farm households. Gender's role in agriculture has gained considerable attention among policymakers, donors, and researchers since 2012. Consequently, policymakers need better knowledge and stronger empirical evidence on gender's role in agriculture and in agricultural productivity in particular. Gender equality also can lead to agricultural productivity gains; women's increased control of household resources can improve outcomes for the next generation. Empowering women as economic, social, and political actors can result in more representative decision-making.

Therefore, the objective of this study is to assess gender's impact on rice farming in the Philippines. Specifically, we investigate how gender affects the total value of output, net farm income, farming efficiency, and fixed and variable production costs. With the collective model of the households, we look beyond a single farm unit and examine how gender differences in the control over farming assets, inputs, and information would affect value of production, net farm income, and costs of production.

This study contributes to the literature in several ways. First, unlike most previous studies, we are able to identify female heads of farm households. The female heads make day-to-day decisions in their farming and households. Second, since the farming households are located on the Central Luzon loop, we are able to control for soil characteristics of the land. Studies often have noted the importance of soil fertility, but due to data limitations they often have had to use proxies such as village or regional fixed effects to capture this important variable. Third, unlike previous studies in Africa, all farms (female-headed and male-headed) in our study are engaged in rice farming—a homogenous output. Finally, we use 2012 farm-level data from Central Luzon, Philippines, which, along with socio-economic variables, has detailed information on farm costs and returns.

2. Literature review

In the international arena, female-headed farm households are commonly regarded as the “poorest of the poor” mainly because of their low income ([Chant, 1997](#)). The reasons are manifold. When it comes to the share of value of crops produced by female-headed households, [Doss \(2014\)](#) reports that the share of smallholder households that are female-headed varies from 3.1% in China to 38% in Nicaragua. Yet in each country, the value of crops produced by female-headed households is less than would be expected if male- and female-headed households produced the same amount of crops. This is partly explained by the fact that female-headed households are typically smaller in size (number of family members) and have less access to resources, including land, labor, and capital. Additionally, data from sub-Saharan Africa demonstrate that agricultural output is reduced because of women's limited access to inputs and support services ([Saito et al., 1994](#)).

In the case of hired labor and self-labor hours, [Thapa \(2009\)](#) found that female-headed households reported higher commitments of female labor (6585 h per year) than male labor (1450 h a year). In male-headed households, by contrast, claims were more

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