OCTOBER 2018

DISCUSSION PAPER SERIES NO. 2018-15

The Wage Gap between Male and Female Agricultural Workers: Analysis and Implications for Gender and Development Policy

Roehlano M. Briones

CONTACT US:

RESEARCH INFORMATION DEPARTMENT
Philippine Institute for Development Studies

18th Floor, Three Cyberpod Centris - North Tower
EDSA corner Quezon Avenue, Quezon City, Philippines

publications@mail.pids.gov.ph
(+632) 372-1291/(+632) 372-1292

https://www.pids.gov.ph

The Wage Gap between Male and Female Agricultural Workers: Analysis and Implications for Gender and Development Policy

Roehlano M. Briones

PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

October 2018

Abstract

The gender gap is a key policy issue across the economic sectors, including agriculture. While the Philippines has in general made considerable progress in addressing the gender gap, in the case of agriculture the gender gap in average wages remains a key concern. Such wage gap can be attributed to differences in activity composition by sex of worker and differences in daily pay for the same activity. This study performs for the first time a decomposition of the average wage gap into these two sources, using official data, supplemented by data from an ongoing survey of agricultural workers. The study finds that activity composition is only a minor contributor to the gender wage gap; most of the gap rather arises from differences in pay for the same activity. Further research is recommended to confirm this finding. The study discusses some policy implications, related to promoting gender equality in daily pay in agriculture.

Keywords: gender gap, gender and development, agricultural labor market, wage gap decomposition

Analysis of the wage gap between male and female agricultural workers: Analysis and implications for gender and development policy

Roehlano M. Briones*

1. Introduction

The *gender gap* is a key development concern worldwide. In agriculture in particular, the issue of a gender gap in developing countries has been highlighted in a number of studies (Food and Agriculture Organisation [FAO], 2011). Women comprise on average 43 percent of the agricultural labor force in developing countries, with their contribution varying widely depending on activity. However, women in agriculture and rural areas face higher barriers in gaining access to productive resources and opportunities compared to men, namely for land, livestock, labor, education, extension, finance, and technology. Closing the gender gap in agriculture could potentially raise yields on their farms by 20 to 30 percent, thereby raising agricultural output of developing countries by up to 4 percent, and the number of hungry people in the world by up to 17 percent.

Among developing countries, the Philippines has apparently made considerable progress in addressing the gender gap. A Gender and Development (GAD) perspective and process was explicitly adopted as state policy under a landmark law enacted in 2008, the Magna Carta of Women (RA 9710). GAD seeks to achieve gender equality as a fundamental value that should be reflected in development choices.

This policy appears to have been successful: Out of 144 countries, the Philippines ranks 10th in the Global Gender Gap score (World Economic Forum [WEF], 2017), with high rankings in educational attainment (1st) and political empowerment (13th). Ranking is still high for economic participation and opportunity (25th). The score for the last criterion though has been hardly changed since 2006 (when the index was first estimated), even as political empowerment score has shown a rapid improvement. David et al (2017) look at the gender pay gap by occupation; they find that in the Philippines (contrary to the pattern in other ASEAN countries), women seem to be earning more than men on average.

In the case of agriculture though, wages of men are six percent higher on average than that of women. Data on average daily basic pay shows an even greater disparity: a 15 percent difference in 2015, almost the same as the disparity in 2008 (16 percent).

Wage data are typically imputed by sector or occupation, which aggregares over a different various tasks or activities, each of which may correspondent to a different wage rate. Heterogeneity across different sets of activities is especially common in agriculture. Hence, any difference in wages reported in the aggregate between men and women, may arise from two sources, namely: differences in activity composition; and differences in wage for the same activity. Policy implications differ depending on the relative importance of these

* Senior Research Fellow, Philippine Institute for Development Studies. Email: rbriones@mail.pids.gov.ph.

sources. If the wage gap is primarily due to activity composition, then the policy response may be to promote, to the extent possible, equal access to higher paying activities to women. On the other hand, if the wage gap is primarily due to differences in pay for the same activity, then the policy response may be promoted equal pay for equal work.

This study analyzes the gender wage gap in Philippine agriculture using available secondary data. Specifically, the study undertakes the following:

1. Review the literature on gender gaps and related policies in Philippine agriculture, with focus on recent studies in the Philippines;
2. Characterize the wage gaps in Philippine agriculture using official data, supplemented by data from other sources;
3. Decompose the sources of wage disparity between male and female agricultural workers;
4. Draw implications from the decomposition analysis and wage gap characterization for GAD policies in Philippine agriculture.

This pay gap in agriculture will serve as a lens to examine other gender gaps in Philippine agriculture, an area within GAD which is relatively less studied. The findings of this study will inform policies and programs related to addressing gender disparities in economic opportunity within Philippine agriculture. The remainder of this paper is organized as follows: Section 2 presents the method of the study. Section 3 performs the analysis of the gender wage gap in agriculture. Section 4 draws implications for policy, and concludes.

2. Method of the study

2.1 Data sources

The main source of data is the Agricultural Labor Survey (ALS), which was started in 1974 under the Bureau of Agricultural Statistics. It covers four major crops: palay, corn, coconut, and sugarcane. For palay and corn, the ALS is conducted every January and July with a reference period of the past six months. For coconut and sugarcane, the ALS is conducted every January with the past year as reference period. The survey samples 81 provinces for palay, 53 provinces for corn, 48 provinces for coconut and 19 provinces for sugarcane.

The methodology for data collection of ALS has evolved over time; in 1994, disaggregation of wages between male and female workers became available. Average wage is computed at the regional level, based on the ratio of amount paid to labors in all provinces to the number of man-days of work in all provinces. The totals are obtained by a weighted average using number of farms by type as weights, based on the 2002 CA. Wages can be disaggregated by crop and sex of worker.

Regular release of the publication, *Trends in Agricultural Wage Rates* (TAWR), largely based on ALS, began in 2010 (which covered the period 2007-2009). Since then the publication has been available annually up to 2017 (covering 2014-2016). The publication is currently available online in PDF format; a spreadsheet version which is used in this study is available for 2016 (spreadsheet data for 2014 and 2015 is available but incomplete).

Another data source is the Labor Force Survey (LFS), a quarterly survey of households providing data on employment and wages of household members. The reference period is the prior to interview, disaggregated by basic sector.

Neither of these data sources disaggregate payment by activity and by sex of worker; in the case of ALS, the data which is disaggregated by activity and mode of payment makes no distinction between male and female workers. This may be remedied by the Survey of Agricultural Workers conducted by PIDS. The survey covers a sample of at least 400 households spread across two (2) provinces, namely Nueva Ecija and Negros Occidental. These provinces are among the largest in the country in terms of agricultural employment. The data from this survey will be used to check whether payments by activity and mode of payment are the same regardless of sex of worker. The survey is conducted once every quarter of 2018 beginning May. The information from the first round is available for this study.

2.2 *Decomposition analysis*

The decomposition analysis attempts to break down the gender wage gap into two sources, namely: differences in activity composition; and differences in wage for the same activity. The decomposition begins with the following definition:

$$w^j = \sum_{i=1}^{n} \frac{w_i^j x_i^j}{XT^j} = \sum_{i=1}^{n} w_i^j s_i^j \,,$$

where:

$j = m, f$, denotes sex of worker, i.e. male and female, respectively;

$i = 1, 2, ..., n$ denotes a vector of activities;

w_i^j denotes wage per activity;

x_i^j denotes man-days per cropping per ha;

$XT^j = \sum_{i=1}^{n} x_i^j$ denotes total man-days by sex of worker;

$XT_i = \sum_{j=m,n} x_i^j$ denotes total man-days per activity per ha;

$s_i^j = x_i^j / XT^j$ denotes the share in total man-days per cropping per ha, by sex.

Furthermore, let $\beta_i = w_i^f / w_i^m$; $\beta_i = 1$ implies the same wage per activity regardless of worker's sex; abstracting from other worker characteristics, then $\beta_i < 1$ implies a bias against women; and $\beta_i > 1$ implies a bias favoring women.

The gender wage gap is therefore:

$$w^m - w^f = \sum_{i=1}^{n} w_i^m s_i^m + \sum_{i=1}^{n} w_i^m \beta_i s_i^f \ .$$

In percentage terms:

$$\frac{w^m - w^f}{w^m} = \frac{1}{w^m} \sum_{i=1}^{n} w_i^m \left(s_i^m - \beta_i s_i^f \right)$$

Adding and subtracting 1 to the bracketed term yields the following:

$$\frac{w^m - w^f}{w^m} = \frac{1}{w^m} \sum_{i=1}^{n} w_i^m \left(s_i^m - s_i^f \right) + \frac{1}{w^m} \sum_{i=1}^{n} w_i^m s_i^f \left(1 - \beta_i \right) \qquad (1)$$

If $\beta_i = 1$, then the percentage wage gap is composed entirely of differences in allocation of time across activities. If $\beta_i < 1$ then Equation (1) decomposes the percentage wage gap into two parts, one due to differences in allocation of time across activities, and the remainder due to differences in wage rates for the same activity.

2.3 Incorporating wage bias

The TAWR publishes wage by activity, implicitly assuming $\beta_i = 1$. Instead, suppose reported figures corresponding to average wage $\overline{w}_i$ aggregates over possible sex-related differences. Hence Equation (1) of Section 2.2 requires a preparatory step to calculate w_i^j from $\overline{w}_i$, described in the following.

Denote $\theta_i^j = x_i^j / XT_i$; this is the share in total man-days per ha per cropping for an activity. To estimate **male** wages, given β_i, consider the expanded version of $\overline{w}_i$ as follows:

$$\overline{w}_i = \frac{w_i^m XT_i^m + w_i^f XT_i^f}{XT_i} = \theta_i^m w_i^m + \beta_i \theta_i^f w_i^m \ .$$

Solving for w_i^m:

$$w_i^m = \overline{w}_i \frac{1}{\theta_i^m + \beta \theta_i^f} . \qquad (2)$$

Clearly, $\beta = 1$ implies $\overline{w}_i = w_i^m = w_i^f$; $\beta_i < 1$ implies $w_i^m > w_i^f$; and $\beta > 1$ implies $w_i^m < w_i^f$. From (2), one may compute w_i^f using the definition of β_i .

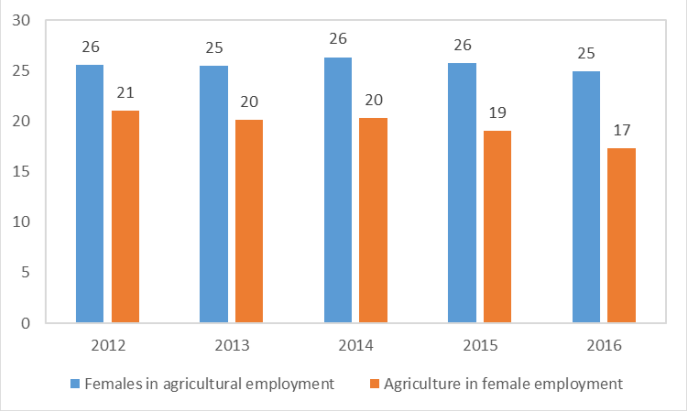
3. Gender issues in Philippine agriculture

3.1 Gender patterns of agricultural employment in the Philippines

In 2012, the Census of Agriculture and Fisheries (PSA, 2016) recorded 5.6 milllion holders/operators of farm parcels, of whom only 16 percent were females. The Census typically found that in most households, the male was identified as the household head; a female becomes a household head only in the absence of the male head (i.e. has migrated, or is deceased).

In terms of employment, the share of females in agricultural employment has remained fairly constant at about 25 percent (Figure 1). The share of workers primarily employed in agriculture in 2012 was 32 percent; for female workers though the share was only 26 percent. The disparity has widened further: by 2016, the share of agriculture in total employment was down to 27 percent, whereas the share of agriculture among female workers was only 17 percent.

Figure 1: Shares in employment (%)

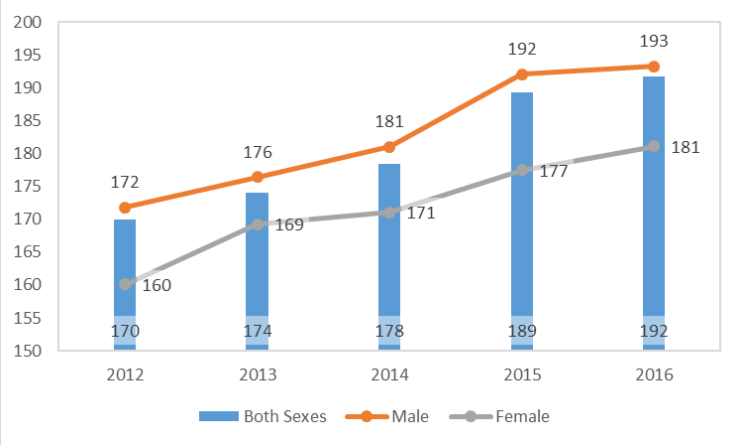


Source: PSA Countrystat.

More importantly, wages of male farm workers are higher than that of female farm workers (Figure 2). Wages have been increasing over the period 2012 – 2016 when growth was sustained at over 6 percent, for both male and female farm workers, though the relative disparity between the types of workers remains virtually unchanged.

The disparity is more clearly displayed in Table 1. The relative wage of females is 6 to 8 percent lower across for all farms. However, there are significant differences in relative wage gap trends across the major crops. In the case of coconut, the relative wage is highly erratic; in 2013 – 2014 relative wage of females actually exceeded that of males, before falling back to 92 percent. The lowest relative wages are consistently found in sugarcane though the disparity narrowed in 2016.

Figure 2: Wages of farm workers in pesos per day, 2012 – 2016 (2006 prices)



Source: PSA Countrystat.

Table 1: Female/male wage of farm workers by crop, 2012 – 2016 (%)

	2012	2013	2014	2015	2016
All farms	93	96	94	92	94
Palay	91	89	91	92	95
Corn	95	93	93	90	95
Coconut	93	106	102	98	92
Sugarcane	87	83	89	83	93

Source of basic data: PSA Countrystat.

Man-day requirements per ha vary considerably across crops. The largest labor requirements are for corn, followed by sugarcane; the least is for coconut. What is common between crops is the lopsided allocation for male employment; the share is just over four-fifths for palay, and corn, rising to 89 percent sugarcane and 94 percent for coconut.

Table 2: Employment per ha per cropping season, 2016, in man-days

	Man-days per ha			Shares in total (%)		
	Male	Female	Total	Male	Female	Total
Palay	51	11	62	82	18	100
Corn	180	41	221	81	19	100
Coconut	21	1	22	94	6	100
Sugarcane	70	8	79	89	11	100

Source of basic data: PSA Countrystat.

Valientes (2015) measures and decomposes gender wage gaps in agriculture-based employment based on LFS data. He applies Oaxaca-Blinder decomposition, which identifies three components of the gap, namely: human capital (which reflect underlying productivity differences); a coefficient effect, corresponding to unequal pay for the same occupation and worker characteristics; and an interaction term. Over the period 2006-09, the average male wage workers in agriculture are paid 13 to 18 percent higher than average female wage; of

this gap, only only 12 percent is due to human capital difference; 74 percent is due to a "coefficient effect", corresponding to unequal pay for the same work and worker characteristics. The remainder (14 percent) is an interaction term. The study concludes that wage discrimination is a pervasive and persistent feature in the agricultural labor market.

Specialized gender roles in agriculture are prominent in the Philippines, indeed in Southeast Asia (Akter et al, 2017). For rice farming, land preparation, seedbed preparation, fertilizer spraying, and pesticide application, are primarily done by men. Meanwhile, transplanting, weeding, manual harvest, and post-harvest activities are activities shared by men and women. Meanwhile preparation of food for workers (said to be very time-intensive) are done primarily by women. In the Philippines, women tend to dominate the task of clearing and maintaining paddy dikes/bunds. Given differences in payment by activity, then activity composition is a plausible explanation for the gender wage gap.

For palay farms, Table 3 shows activity shares by sex of worker. Female labor is concentrated on the planting stage (including pulling and bundling of seedlings), followed by harvesting. Care of crops takes up 10 percent of their time. Meanwhile for men, the allocation of time across tasks is more evenly spread compared to that of women, though the largest concentration is in harvesting, followed by planting/transplanting, with an almost identical share for care of crops. Only men have any allocation of time for land preparation.

Table 3: Shares in total man-days of labor per ha, palay farms, 2016 (%)

	Male	**Females**	**Daily wage (Php/day)**
Land preparation	0.20	0.00	1,246.5
Plowing	3.91	0.00	509.3
Harrowing	5.24	0.26	530.2
Levelling	0.35	0.00	454.6
Pulling & bundling of seedlings	5.38	21.25	271.3
Planting / Transplanting	15.57	26.82	283.8
Irrigation / Watering	7.95	0.80	272.2
Care of crops	15.38	10.52	283.9
Picking of snails	0.04	0.12	289.5
Harvesting	21.33	31.20	278.2
Threshing	8.90	3.02	336.0
Hauling	5.38	0.22	353.0
Drying	10.33	5.75	280.4
Winnowing/Blowing	0.02	0.04	
TOTAL (computed)	100.00	100.00	

N.B. Published data on totals replaced by computed data.
Source: PSA TAWR (2016).

Activity breakdown for corn farm corresponds to an identical set of activities as palay farms (Table 4). Allocation of time by sex of worker however varies considerably from that of palay farms. The largest concentration of female labor time is for harvesting, followed by planting (including care of seedlings). Women devote some (but minimal) amount of time for

land preparation. For men, the largest concentration of time is for care of crops, followed by harvesting.

Table 4: Shares in total man-days of labor per ha, by sex of worker, corn farms, 2016 (%)

	Male	Females	Daily wage (Php/day)
Land preparation	0.02	0.07	302.72
Plowing	2.86	0.07	480.61
Harrowing	3.24	0.09	476.03
Furrowing	5.01	0.08	494.81
Mending / Care of seedlings	0.17	0.06	216.14
Planting / Replanting	13.33	26.73	233.41
Irrigation / Watering	1.41	0.06	251.08
Care of crops	21.45	14.63	242.15
Off-barring	2.20	0.49	472.81
Hilling-up	2.67	0.34	490.50
Harvesting	20.19	39.60	251.58
Shelling	8.87	11.18	291.83
Hauling	5.60	0.44	363.18
Husking / detasseling of corn	1.33	0.22	270.99
Drying	11.66	5.93	240.25
TOTAL (computed)	100.00	100.00	

Source: PSA TAWR (2016).

The types of activities for coconut and sugarcane differ from the cereals, and from one another. Management of cover crops, gathering and splitting of nuts, and removal of meat, is unique to coconut; off-barring and hilling up is unique to sugarcane.

In the case of coconut, women's time is most concentrated on postharvest activities, namely the removal of coconut meat, and gathering of nuts, followed by splitting of nuts. For men the largest allocation of time is harvesting; the rest of their time is fairly evenly allocated among the other activities.

Lastly for sugarcane farms, time allocation of women is greatest for care of crops, followed by harvesting, and then planting activities. Meanwhile men mostly allocate their time to harvesting and hauling activities, followed by planting/replanting.

Table 5: Shares in total man-days of labor per ha, coconut farms, 2016 (%)

	Male	Females	Daily wage (Php/day)
Land preparation	1.21	2.64	279.92
Planting / Replanting	1.12	3.90	246.93
Care of crops	5.81	7.37	1,173.61
Clearing of underbush	1.18	0.41	266.24
Rolling over of cover crops	0.32	0.00	279.74
Harvesting	22.32	1.58	314.51
Gathering/Piling of nuts	14.33	22.75	241.38
Hauling	13.38	8.44	284.31
Husking	6.18	0.36	228.21
Splitting of nuts	10.79	10.52	240.53
Removal of coconut meat	11.35	25.01	242.95
Drying	12.03	17.02	247.66
TOTAL (computed)	100.00	100.00	

N.B. Published data on totals replaced by computed data.
Source: PSA TAWR (2016).

Table 6: Shares in total man-days of labor per ha, sugarcane farms, 2016 (%)

	Male	Females	Daily wage (Php/day)
Land preparation	0.31	0.22	272.20
Plowing	1.43	0.36	422.77
Harrowing	0.89	0.02	494.50
Furrowing	1.09	0.03	581.42
Care of seedlings	0.81	0.35	188.84
Planting / Replanting	8.41	28.21	262.28
Care of crops	16.31	38.53	239.69
Off-barring	2.65	0.03	446.34
Hilling-up	2.83	0.00	509.26
Harvesting	45.12	30.92	318.09
Hauling	20.14	1.35	340.34
TOTAL (computed)	100.00	100.00	

N.B. Published data on totals replaced by computed data.
Source: PSA TAWR (2016).

3.2 Related literature

The "gender gap" in wages has long been observed in labor markets. A straightforward explanation is discrimination in the workplace itself. Women may less welcome in the workplace: if they opt to work, they may be paid lower wages than men of equal marginal product. Such an inefficiency was attributed by Becker (1971) to a "taste" for discrimination by employers; if sufficiently widespread then this becomes a market-level feature (as women

are unable to find enough alternative employers that will pay them their marginal product). Alternatively, workers themselves may practice workplace segregation, i.e. one group (males) may prefer to work with other males. The persistence of a gender wage gap has been shown to be inconsistent with the discrimination model; Becker shows that, under constant returns to scale, or free entry, if at least some employers are gender neutral, then the gender pay gap vanishes in the long run. Likewise, in the long run workplace segregation should lead to non-diverse workplaces, but not necessarily unequal pay.

An alternative explanation was presented by Mincer and Polachek (1974) which focuses on the supply conditions of female labor. Differences in pay between men and women are related to the lower labor force participation of women, as well as greater intermittency of employment among working women. Ultimately this is traceable to differences in gender roles in the home, as women are more apt to take part-time work or cease work altogether to devote more time and effort for home work child rearing. This may be consistent with findings reported in Dacuycuy and Dacuycuy (2017) from a 2002 survey, showing that husbands devote less time for house work compared to wives, although wives roughly the same amount of time for market work as their husbands, even as they earn a lower wage.

Theoretical and empirical developments since then have explored both aspects of the labor market in accounting for the gender pay gap. Introducing costly search allows employers who practice discrimination to simultaneously wield monopsony power, thereby perpetuating a gender wage gap (Black, 1995). Discrimination may be amplified by disparities in access to workplace authority, to hiring and promotion, and in gender representation. However, owing to scarcity of studies, the empirical relevance of these disparities remains indeterminate (Bishu and Alkadry, 2017).

An alternative to taste-based discrimination is statistical discrimination, owing to real or perceived differentials in productivity by gender, or in stability of employment, particularly in the face of uncertainty (Phelps, 1972). Statistical discrimination may lead to persistent wage gaps owing to feedback and reinforcement effects. The uncertainty may be about inherently unobservable traits such as the private cost of labor force participation, which may be an empirically significant factor behind the pay gap (Gayle and Golan, 2012).

More recently, differences in psychological attributes correlated with pay (e.g. negotiating skill, risk aversion, etc.) have been subjected to experimental analysis; in a laboratory setting, such differences have been found to potentially significant. However, statistical analysis of actual labor markets suggests such psychological differences may have little to moderate explanatory power for the pay gap (Blau and Kahn, 2017).

Straddling the labor demand/labor supply explanations are social norms: such norms may induce employers to set lower prices for female workers, which themselves are accepted by both males and females, leading to persistent wage gaps. An experimental factorial survey found that both men and women respondents reproduce a gender wage gap in their estimates of fair compensation, with the mean female-male wage difference of about 8 percent (Ausperg et al, 2017).

An alternative set of explanations relate to female labor supply. An obvious source of wage difference is biology: some manual occupations may simply demand greater physical strength, e.g. land preparation in agriculture. Also attributed to biology (though confounded

by social expectations) is the need for temporal flexibility on the part of childbearers and caregivers, which has turned out to be a disadvantage for some occupations or firms which place a premium on working long hours and/or specific hours of the day (Goldin, 2014). In China, up to 28 percent of the gender earnings gap is attributed to differences in time spent on unpaid care work (Qi and Dong, 2008).

Time allocation of household members has been traditionally modeled in terms of unitary decision-making and utility maximization at the household level. Subsequently however the empirical literature began to note significant empirical failings of the unitary household model. For instance, the development literature has typically rejected the pooling model of household resources, i.e. specific types of resources under control of different household members will lead to different household decisions.

Rubalcava et al (2009) find that in household beneficiaries of a cash transfer scheme in Mexico, where transfers are directly received by women, investments in livestock and children's education (both directly controlled by women) is higher. Hence theoretical explanations of time allocation have expanded to include collective models.

One approach is to examine intra-household bargaining among members, especially between spouses. Supposing human capital and asset ownership at time of marriage correlates with bargaining power, Quisumbing and Maluccio (2003) find that, in Bangladesh and South Africa, households with a greater share of women's assets are associated with a higher household expenditure share for education. Antmann (2014) has found that when both spouses are employed, the likelihood of joint decision-making in the household is greater, compared to households where only the male head is employed.

3.3 GAD policy and Philippine agriculture

Since the early 20th century, gender had been evolving as a priority agenda for public policy. One of the earliest feminist organizations was the *Association Feminista Filipina* established by Concepcion Felix and several other "prominent ladies" who sought social reforms (schools, prisons, factories, and other workplaces of women). In 1906 the *Association Feminista Ilonga* was founded, and soon became politically active, with women's suffrage being the key advocacy (Aquino, 1994). Sparked by visits by two suffragetes, namely Aletta Jacobs of Holland, and Carrie Chapman Catt of the United states, the cause was taken up by the newly-organized Women's Club of Manila (Casambre and Rood, 2012).

In 1919, leading feminists conducted a rally in Malacanang before Governor General Harrison, after which several women's suffrage bills were introduced into the Senate, though the House of Representatives remained opposed. In 1921 the drive towards women's suffrage movement widened into a grassroots and nationwide movement, with organization of the National Federation of Women's Clubs and the activities of the League of Women Suffragettes.

The anachronistic-sounding provision on suffrage of the 1935 Constitution (Art. V Sect. 1) provides for the right to vote for adult **male** citizens. Suffrage for women was **conditional** on approval by plebiscite drawing at least 300,000 thousand qualified women voters. This had been deemed by the male-dominated Constitutional Convention Committee as an impossible

requirement. In an extraordinary mobilization effort, women's organizations mustered 500,000 women voters, of whom 447,725 voted in the affirmative (Aquino, 1994).

The right to vote led to other reforms in law and policy. In 1981 the Philippines ratified the United Nations Convention on the Eradication of All Forms of Discrimination Against Women (CEDAW). Gender equality as a principle in law and policy was enacted by the Magna Carta of Women in 2008 (RA 9710). The Magna Carta prohibits all forms of discrimination in both public and private spheres, thereby formalizing in domestic law its existing international obligation under CEDAW. For instance, the law prohibits expelling female students from school owing to teenage pregnancy. The Magna Carta provides for equal treatment before the law, providing for amendment or repeal of existing laws discriminatory to women. A striking omission though is the absence of an explicit repealing clause for past discriminatory laws.

The Magna Carta provides an official definition of Gender and Development (GAD) as follows: *the development perspective and process that are participatory and empowering, equitable, sustainable, free from violence, respectful of human rights, supportive of self-determination and actualization of human potentials.* Part of the implementation of the Magna Carta is Gender Mainstreaming, which is *the strategy for making women's as well as men's concerns and experiences an integral dimension of the design, implementation, monitoring, and evaluation of policies and programs in all political, economic, and societal spheres so that women and men benefit equally and inequality is not perpetuated*. The law mandates all government agencies to adopt gender mainstreaming; towards this end, at least 5 percent of each agency or local government unit (LGU) budget shall be utilized for GAD programs.

In the area of agricultural development, the policy framework is shaped by several key laws, all of which reveal the influence of the gender equality movement. **Agrarian tenure** is largely governed by RA 6657, enacted in 1987, which forms the legal basis of the Comprehensive Agrarian Reform Program (CARP). Chapter X of the CARP law contains a section on Rural Women, which provides for equal rights to ownership of land, equal shares of farm's produce, and representation in advisory or decision-making bodies, for qualified women members of the agricultural labor force.

Another "Magna Carta", enacted in 1992, this time for **small farmers** (RA 7607), requires the state to ensure that women and youth be provided ample opportunity to develop their skills, acquire productive employment, and contribute to their communities to the fullest of their capabilities. Lastly, the overarching legislative framework for agricultural development, the Agriculture and Fisheries Modernization Act (AFMA) of 1998 (RA 8435), also contains special provisions for women. The mandated Agriculture and Fisheries Modernization Plan (AFMP), is required to include women, together with rural youth, senior citizens, indigenous peoples, etc., as areas of Special Concern. AFMA also explicitly provides for a focus on women in terms of access to credit, information and marketing support, and for special training projects.

Lastly, the Magna Carta of Women itself singles out agriculture. It widens the tenure provision of the CARP law, providing for equal treatment of women and men, whether married or not, in the titling of land and issuance of stewardship contracts and patents over

public land; customary tenure in ancestral domains; and in the sharing of the produce of farms and aquatic resources, together with other asset entitlements.

4. Decomposition analysis of gender wage gap

4.1 *Differences in activity share by sex of worker*

The first step of the decomposition based on Equation (1) is to arrive at difference in activity share by sex of worker. The data reported (Section 3.1) earlier is adjusted further to apply the decomposition formula, though the resulting data (Tables 7 to 10) remain close to the original. Adjustments are as follows: first, wages are based on daily pay figures, omitting other bases of compensation (i.e. per unity quantity; ha; by contract; by sharing), unless daily pay is unavailable. Second, wages are limited only to the estimates for "man-labor", i.e. excluding "man and animal" and "man and machine". Third, activities with below 0.01 man-days on average are set to zero (consistent with non-reporting of miniscule man-day figures in the TAWR).

Table 7: Man-days of labor per ha per cropping, palay farms, by sex of worker, 2016

	Male	Female	Share in male labor (%)	Share in female labor (%)
Land preparation	0.08	0.00	0.18	0.00
Plowing	0.73	0.00	1.68	0.00
Harrowing	0.63	0.00	1.45	0.00
Levelling	0.13	0.00	0.30	0.00
Pulling & bundling of seedlings	2.74	2.30	6.29	21.64
Planting / Transplanting / Replanting	7.94	2.90	18.23	27.28
Irrigation / Watering	4.06	0.09	9.32	0.85
Mechanical weeding	0.11	0.00	0.25	0.00
Manual weeding	3.87	1.04	8.88	9.78
Fertilizer application	1.83	0.04	4.20	0.38
Chemical application	2.04	0.06	4.68	0.56
Picking of snails	0.02	0.01	0.05	0.09
Harvesting	10.88	3.38	24.98	31.80
Threshing	1.56	0.19	3.58	1.79
Hauling	1.73	0.00	3.97	0.00
Drying	5.21	0.62	11.96	5.83
Totals	**43.56**	**10.63**	100.00	100.00

Source: PSA TAWR (2016).

Table 8: Man-days of labor per ha per cropping, corn farms, by sex of worker, 2016

	Male	Female	Share in male labor (%)	Share in female labor (%)
Land preparation	0.01	0.01	0.02	0.06
Plowing	0.46	0.01	1.87	0.06
Harrowing	0.19	0.00	0.77	0.00
Furrowing	0.36	0.00	1.46	0.00
Mending/Care of seedlings	0.05	0.00	0.20	0.00
Planting/Replanting	3.79	2.17	15.39	26.92
Irrigation / Watering	0.40	0.00	1.62	0.00
Manual weeding	2.27	0.45	9.22	5.58
Fertilizer application	2.29	0.72	9.30	8.93
Chemical application	1.52	0.01	6.17	0.12
Off-barring	0.62	0.04	2.52	0.50
Hilling-up	0.76	0.03	3.09	0.37
Harvesting	5.74	3.22	23.31	39.95
Shelling	1.81	0.89	7.35	11.04
Hauling	0.76	0.02	3.09	0.25
Husking/Detasseling of corn	0.38	0.02	1.54	0.25
Drying	3.22	0.48	13.08	5.96
Total	**24.625**	**8.06**	**100.00**	**100.00**

Source: PSA TAWR (2016).

Table 9: Man-days of labor per ha per cropping, coconut farms, by sex of worker, 2016

	Male	Female	Share in male labor (%)	Share in female labor(%)
Land preparation	0.25	0.04	1.31	3.10
Planting / Transplanting / Replanting	0.23	0.05	1.21	3.88
Mechanical weeding	0.01	0.00	0.05	0.00
Manual weeding	0.83	0.08	4.36	6.20
Fertilizer application	0.37	0.02	1.94	1.55
Chemical application	0.01	0.00	0.05	0.00
Clearing of underbush	0.25	0.01	1.31	0.78
Rolling over of cover crops	0.07	0.00	0.37	0.00
Harvesting	4.67	0.02	24.51	1.55
Gathering/Piling of nuts	3.00	0.30	15.75	23.26
Related nut-gathering	0.76	0.02	3.99	1.55
Husking	1.46	0.05	7.66	3.88
Splitting of nuts	2.26	0.14	11.86	10.85
Removal of coconut meat	2.37	0.33	12.44	25.58
Drying	2.51	0.23	13.18	17.83
Total	**19.05**	**1.29**	**100.00**	**100.00**

Source: PSA TAWR (2016).

Table 10: Man-days of labor per ha per cropping, sugarcane farms, by sex of worker, 2016

	Male	Female	Share in male labor (%)	Share in female labor (%)
Land preparation	0.21	0.01	0.33	0.12
Plowing	0.18	0.03	0.28	0.36
Harrowing	0.08	0.00	0.13	0.00
Furrowing	0.22	0.00	0.35	0.00
Mending/Care of seedlings	0.57	0.03	0.89	0.36
Planting / Transplanting / Replanting	5.91	2.38	9.28	28.30
Manual weeding	7.46	2.51	11.71	29.85
Fertilizer application	2.95	0.74	4.63	8.80
Chemical application	1.05	0.00	1.65	0.00
Off-barring	1.86	0.01	2.92	0.12
Hilling up	1.99	0.00	3.12	0.00
Harvesting	31.71	2.61	49.77	31.03
Hauling	9.52	0.09	14.94	1.07
Total	**63.71**	**8.41**	**100.00**	**100.00**

Source: PSA TAWR (2016).

4.2 Estimate of wage bias

Data from the PIDS Agricultural Workers Survey for wages is summarized in Table 11. The total number of workers for which there are observations are 497, divided into 374 male and 123 female workers. To remove clutter, activities for which total number of observations is under ten are omitted. Most of the remaining observations for male workers are in excess of 10. However, in only three activities are there ten or more observations encountered among female workers. These are: fertilizer/pesticide application; weeding; and planting and related activities.

Table 11: Average wage by agricultural activity and sex of worker, April 2018 (Php/day),

	Male workers (n=374)		Female workers (n=123)	
	Observations	Average	Observations	Average
Fishing	21	222.43	0	
Other preharvested activities	42	157.60	6	190.90
Fertilizer/pesticide application	28	171.88	26	131.62
Weeding	55	177.76	50	143.04
Planting and related activities	29	214.47	30	165.82
Land preparation	18	258.33	0	
Vegetable raising	13	207.15	2	80.00
Drying	51	136.27	1	150.00
Hauling	63	113.10	3	108.33
Threshing of palay	15	127.33	1	50.00
Harvesting of palay	23	125.22	1	130.00

Source: Author's data.

Note that in none of these activities are demanding in terms of skill (e.g. palay harvesting) or physical strength (e.g. land preparation), rendering productivity difference as an implausible explanation for any wage gap for the same activity. Despite the equivalence of male and female labor, wages paid to women are significantly lower than wages paid to men. For the three activities (chemical application, weeding, and planting), the respective differences are 13, 20, and 13 percent.

This finding is a substantial advance over official data which assume outright the equality of male and female worker wages paid at the activity level. In fact, the survey provides evidence of a wage bias (earlier referred to as β_i) against women in agriculture. Unfortunately, the activity list in the Survey do not match the TAWR activity list. To continue the analysis, we assume $\beta_i = \beta$, i.e. posit only one wage bias parameter common across activities. A natural estimator for β is the ratio of weighted average women's wage to weighted average men's wage, for the three activities, where the weights equal the number of observations divided by total observations. The resulting estimate for the wage bias is 0.78949 or about 79 percent.

4.3 Full decomposition (with estimated male and female wages)

Using the estimated wage bias, activity wages can now be computed based on TAWR average wages (by activity), presented in the first two columns of Table 12 in the case of palay farms.

Table 12: Estimated male and female wages by activity, palay farms, 2016, Php/day

	$\beta = 1$		$\beta = 0.78949$	
	Male	**Female**	**Male**	**Female**
Land preparation	571.85	571.85	571.85	451.47
Plowing	297.74	297.74	297.74	235.06
Harrowing	306.33	306.33	306.33	241.84
Levelling	299.78	299.78	299.78	236.67
Pulling & bundling of seedlings	271.33	271.33	300.17	236.98
Planting / Transplanting / Replanting	293.78	293.78	311.31	245.78
Irrigation / Watering	272.18	272.18	273.43	215.87
Mechanical weeding	316.28	316.28	316.28	249.70
Manual weeding	265.67	265.67	278.07	219.53
Fertilizer application	316.81	316.81	318.24	251.25
Chemical application	313.97	313.97	315.87	249.38
Picking of snails	289.52	289.52	311.37	245.82
Harvesting	278.15	278.15	292.76	231.13
Threshing	261.08	261.08	267.19	210.94
Hauling	296.33	296.33	296.33	233.95
Drying	280.62	280.62	287.05	226.62
Average on computed data	284.05	279.86	295.08	234.70
Wage gap relative to male (%)	**0.00**	**1.47**	**0.00**	**20.46**
Published data	307.40	290.65		
Wage gap relative to male (%)	0.00	5.45		

Source: Author's data.

Note that when $\beta = 1$, average wage, male wage, and female wage, are identical. A distinction is created when $\beta < 1$, which corresponds to the last two columns of Table 12. Even with no wage bias, average wages differ between male and female workers, as shown in the fourth-to-the-last row of Table 12. The gap though is minimal (only 1.5 percent). The gap as computed from published official data is also small, at 5.45 percent, though it is larger than computed wage gap. Allowing for wage bias leads to a much larger figurer for the gender wage gap, at about 20 percent.

Similar calculations are shown for corn, sugarcane, and coconut farms, respectively in Table 13, 14, and 15. For corn and sugarcane farms, without wage bias, computed wages and published wages are fairly close, hence the wage gap is nearly identical at 5 to 6 percent. However, with wage bias, the gender wage gap is quite large, indeed comparable with the wage gap among palay farms, at about 20 to 25 percent. Similar patterns are found for sugarcane farms though the ranges are wider: with no wage bias, the computed wage gap is about six percent, versus eight percent for published data. However, with wage bias, the computed wage gap balloons to as much as 28 percent, the largest among the crops.

Table 13: Estimated male and female wages by activity, corn farms, 2016, Php/day

	$\beta = 1$		$\beta = 0.78949$	
	Male	**Female**	**Male**	**Female**
Land preparation	190.77	190.77	213.21	168.33
Plowing	285.80	285.80	286.45	226.15
Harrowing	292.78	292.78	292.78	231.15
Furrowing	289.61	289.61	289.61	228.64
Mending/Care of seedlings	216.14	216.14	216.14	170.64
Planting/Replanting	233.41	233.41	252.79	199.57
Irrigation / Watering	251.08	251.08	251.08	198.22
Manual weeding	223.53	223.53	231.60	182.84
Fertilizer application	243.47	243.47	256.38	202.41
Chemical application	262.56	262.56	262.92	207.57
Off-barring	472.81	472.81	478.92	378.10
Hilling-up	490.50	490.50	494.45	390.36
Harvesting	251.58	251.58	272.17	214.88
Shelling	235.88	235.88	253.47	200.11
Hauling	268.19	268.19	269.65	212.88
Husking/Detasseling of corn	270.99	270.99	273.87	216.22
Drying	240.25	240.25	247.00	195.00
Average on computed data	258.66	244.06	270.97	206.47
Wage gap relative to male (%)	**0.00**	**5.64**	**0.00**	**23.80**
Published data	253.41	239.72		
Wage gap relative to male (%)		5.40		

Source: Author's data.

Table 14: Estimated male and female wages by activity, coconut farms, 2016, Php/day

	$\beta = 1$		$\beta = 0.78949$	
	Male	**Female**	**Male**	**Female**
Land preparation	276.38	276.38	284.65	224.72
Planting / Transplanting / Replanting	246.93	246.93	256.58	202.56
Mechanical weeding	246.93	246.93	246.93	194.95
Manual weeding	218.49	218.49	222.61	175.75
Fertilizer application	245.16	245.16	247.84	195.66
Chemical application	300.87	300.87	300.87	237.53
Clearing of underbush	266.24	266.24	268.41	211.91
Rolling over of cover crops	279.74	279.74	279.74	220.85
Harvesting	314.51	314.51	314.79	248.52
Gathering/Piling of nuts	241.38	241.38	246.09	194.28
Related nut-gathering	252.88	252.88	254.25	200.73
Husking	228.21	228.21	229.81	181.43
Splitting of nuts	240.53	240.53	243.52	192.26
Removal of coconut meat	242.95	242.95	249.37	196.87
Drying	247.66	247.66	252.12	199.04
Average on computed data	259.78	246.74	263.00	196.29
Wage gap relative to male (%)	**0.00**	**6.17**	**0.00**	**25.36**
Published data	257.33	236.53		
Wage gap relative to male (%)	0.00	8.08		

Source: Author's data.

Table 15: Estimated male and female wages by activity, sugarcane farms, 2016, Php/day

	$\beta = 1$		$\beta = 0.78949$	
	Male	**Female**	**Male**	**Female**
Land preparation	272.20	272.20	274.83	216.97
Plowing	287.15	287.15	296.05	233.73
Harrowing	319.23	319.23	319.23	252.03
Furrowing	350.48	350.48	350.48	276.70
Mending/Care of seedlings	188.84	188.84	190.85	150.67
Planting / Transplanting / Replanting	262.28	262.28	279.15	220.39
Manual weeding	231.96	231.96	244.94	193.38
Fertilizer application	252.06	252.06	263.17	207.77
Chemical application	266.72	266.72	266.72	210.57
Off-barring	446.34	446.34	446.84	352.78
Hilling up	509.26	509.26	509.26	402.05
Harvesting	318.09	318.09	323.27	255.21
Hauling	301.29	301.29	301.89	238.33
Average on computed data	**304.85**	**270.13**	**311.18**	**222.17**
Wage gap relative to male (%)	**0.00**	**11.39**	**0.00**	**28.60**
Published data	270.26	252.34		
Wage gap relative to male (%)	0.00	6.6		

Source: Author's data.

The computed wage gaps in the case of a wage bias is disaggregated into differences in activity shares, and differences in wages per activity (Table 16), following Equation (1). In the case of palay, activity difference actually reduces the wage gap (time allocation of female workers are skewed towards higher paying activities), by about 0.75 percentage points. However, the wage bias contributes 21.21 percent wage gap, accounting for the total wage gap of 20.46 percent. Hence over one hundred percent of the computed gender wage gap is due to the wage bias.

Table 16: Decomposition of gender wage gap, by crop, 2016, case of $\beta = 0.78949$ **(%)**

	Components			Shares in total (%)		
	Activity difference	**Wage difference**	**Total**	**Activity difference**	**Wage difference**	
Palay	-0.75	21.21	20.46	-3.6	103.6	100.0
Corn	3.49	20.32	23.80	14.6	85.4	100.0
Coconut	5.46	19.90	25.36	21.5	78.5	100.0
Sugarcane	9.57	19.04	28.60	33.4	68.6	100.0

Source: Author's data.

For the other crops, the bulk of the gender wage gap is likewise contributed by the wage bias, but much less than one hundred percent; the lowest contribution is for sugarcane (69 percent) followed by coconut (79 percent) then corn (85 percent).

5. Policy implications

This paper began by citing a stylized fact of a gender wage gap in agriculture. Given heterogeneity of wage activities in agriculture, the policy implications of the gender wage gap remained murky. It was unknown whether there was a true wage gap in terms of unequal pay for the same activity; or simply due to aggregation over different sets of activities depending on sex of worker. The gap is compounded further by the implicit assumption made in the official data of agricultural wages, essentially equating wages paid by activity, irrespective of sex of worker.

This study has attempted to address this data gap, first by decomposing sources of wage variation to two sources, namely: differences in activity shares; and differences in wages for the same activity. Second, the latter is calibrated based on primary data from a farm workers survey, covering two large agricultural provinces of the Philippines. The latter does confirm the presence of wage differences for the same activity, i.e. a wage bias against women of just over one-fifth (21 percent).

Third, the actual decomposition is performed, breaking down the gender wage gap to its components, namely. The study finds that the main source of gender wage gap in Philippine agriculture is the difference in wage for the same activity; for corn, coconut, and sugar, the activity share accounts for one-eight and one-third of the wage gap in percent. The remainder is due to wage bias by activity. In the case of palay workers, the wage gap is more than one hundred percent.

An important caveat behind this finding is the admittedly sparse evidence being brought to bear on the wage bias. Additional survey work must be done specifically focusing on farm

workers as well as gender differences in equivalent daily compensation for **each** activity (rather than averaged over activities, as done in Section 4.3). This is necessary to firm up a stronger policy conclusion from the gender wage gap. Similarly, it is proposed that ALS data on payments at the activity level be disaggregated by gender, and the breakdown be reported in the TAWR.

Supposing that the decomposition findings are robust to an expanded data gathering effort, two sets of policy options come to mind. The first set of options may be denoted as *compulsory approaches*, namely to compel farm operators to pay identical wages for the same activity; and to compel equal hiring of men and women for each activity. The second of options may be denoted *empowerment approaches*, eschewing coercion and ensuring rather that women are able to themselves bargain for and win fair treatment in the rural labor market.

Compulsory approaches are probably doomed to failure in the setting of informal labor markets in remote rural areas. Enforcement will remain a perennial problem, placing unreasonable demands on an already stressed monitoring and policing system of government. Moreover, there are many ways compulsory approaches may turn out to be counterproductive, by erroneously forcing equality for what are essentially different types of workers and work.

This leaves empowerment approaches, which are consistent, indeed strongly endorsed, by existing state policy frameworks reviewed in Section 3.3. More specific measures may be suggested as follows:

- **Prioritization of women as recipients of government services and transfers** – many programs of agricultural grants, subsidies, training, and sundry services, lack explicit focus on women and tend to be captured by men. Instead, in many of these programs, identity of recipient can be explicitly specified as the female spouse or head of household, increasing women's control over household resources, and indirectly their bargaining power.
- **Establishment of women's groups active in rural labor market information and advocacy –** government labor programs tend to concentrate in urban labor markets for services and industry; community organization efforts, together with information and advocacy campaigns, with a strong gender dimension, must be rolled out to rural areas. For instance, in women-dominated rural improvement clubs, experiences and data on wages paid by activity can be publicized and disseminated.
- **Support for gender mainstreaming and protection of women's rights at the grassroots –** grassroots campaigns informing stakeholders, including male farm operators, about women's rights and gender equality, and perhaps stigmatizing discriminatory treatment of women. It goes almost without saying that the full instrumentality of the state, down to the barangay level, must be applied to protect women's rights against violence and violations at all levels, at the domestic, community, and national levels.

6. Bibliography

Akter, S., P. Rutsaert, J. Luis, N. Htwe, S. San, B. Rahorjo, and A. Pustika. 2017. Women's empowerment and gender equity in agriculture: A different perspective from Southeast Asia. Food Policy 69(2):270-279.

Aquino, B. 1994. Filipino women and political engagement. Review of Women's Studies 4(1): 32–53.

Ausperg, K., T. Hinz, and C. Sauerc. 2017. Why should women get less? Evidence on the gender pay gap from multifactorial survey experiments. American Sociological Review 82(1):179-210.

Bishu, S., and M. Alkadry. 2017. A systematic review of the gender pay gap and factors that predict it. Administration and Society 49(1):65-104.

Blau, F., and L. Kahn. 2017. The gender wage gap: extent, trends, and explanations. Journal of Economic Literature 55(3):789-865.

Briones, R. 2017. Characterization of agricultural workers in the Philippines. Discussion Paper Series No. 2017-31.

Casambre, A., and S. Rood. 2012. Early feminism in the Philippines. In Asia. The Asia Foundation. https://asiafoundation.org/2012/03/07/early-feminism-in-the-philippines/. Accessed 7 August 2018.

David, C., J. Albert, and J. Vizmanos. 2017. Sustainable Development Goal 5: How does the Philippines fare on gender equality? Discussion Paper Series No. 2017-45. PIDS, Quezon City.

FAO. 2011. State of Food and Agriculture 2010-11. Women in Agriculture: Closing the gender gap for Development. FAO, Rome.

Gayle, G-L., and L. Golan. 2012. Estimating a dynamic adverse-selection model: Labour-force experience and the changing gender earnings gap 1968–1997. Review of Economic Studies 79 (1): 227–67

Phelps, E. 1972. The statistical theory of racism and sexism". American Economic Review 62(4): 659–61.

Qi, L., and X-Y. Dong. 2015. Unpaid care work's interference with paid work and the gender earnings gap in China. Feminist Economics 22(2):143-67

Quisumbing, A., and J. Miluccio. 2003. Resources at Marriage and Intrahousehold Allocation: Evidence from Bangladesh, Ethiopia, Indonesia, and South Africa. Oxford Bulletin of Economics and Statistics 65(3):283-327.

World Economic Forum. 2017. The Global Gender Gap Report 2017. Insights Report. World Economic Forum, Geneva.

Valientes, R. 2015. Male-female wage-gap decomposition in agriculture-based employment in the Philippines. Journal of Economics, Management and Agricultural Development 1(1): 45-62.