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Agricultural Employment and the Rural Household: A Characterization for Selected Provinces in the Philippines

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Abstract

This study aims to address a gap in existing data and literature regarding the socio-economic profile of agricultural workers within rural households. It implemented a survey collecting panel data on the full range of labor and economic activities of rural households with agricultural workers, including patterns of employment and seasonality; other relevant worker and household characteristics; and the community-level context. A socio-economic profile of rural and agricultural workers was developed. Statistical analysis confirmed that individuals of working age are more likely to become an agricultural worker if they are male, older, less educated, and are in a barangay with better rural infrastructure and more remote from the urban center. Moreover, weekly working hours for agricultural workers is greater for younger workers, those better educated, and in barangays nearer the urban center. Several implications for policy and further research were stated.

Keywords: agricultural worker, rural employment, structural change, seasonality, agricultural wage, underemployment, gender, human capital, rural infrastructure

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Agricultural employment and the rural household: A characterization for selected provinces in the Philippines

Roehano M. Briones[1]

1. Introduction

Inclusiveness of growth has a distinct structural dimension. In 2018, the employment share of agriculture was 24.3 percent, though the GDP share of agriculture was only 9.7 percent. Hence, the average agricultural worker is only 32 percent as productive the average worker in industry and services. The disparity is also reflected in average daily basic pay: agriculture's daily basic pay in 2018 was only 57 percent that of industry and 47 percent that services. Given these disadvantages, no wonder that 62.5 percent of heads of poor households were primarily employed in agriculture in 2015.

Structural change is a critical dimension in the Philippines' quest for inclusive growth and poverty eradication. From 1995 to 2018, the share of agriculture in output shrank by 10 percentage points; likewise, the share of workers in agriculture fell by 19 percentage points. Inclusive growth requires acceleration of this structural change: poorer workers gain by shifting better-paying jobs outside agriculture; in response to labor scarcity within agriculture, even wages of the remaining workers will tend to rise.

Inclusive economic transformation involves, in addition to structural change, a geographic dimension. It is well-known that poverty in the Philippines is primarily a rural phenomenon (ADB 2009). Rural households are seen to be highly dependent on agriculture; in 2006, agriculture's share in employment of rural households was 59 percent. However, this represents an 11 percentage-point drop from its level in 1990 (Balisacan et al. 2011), which suggests a transformation of sectoral sources of employment even among rural households. Rapid rural transformation is essential for rapid reduction in rural poverty; such transformation must occur within a wider context of of structural transformation shaped by "rising agricultural productivity, commercialization, and diversification of production patterns and livelihoods within the agricultural sector and the rural non-farm sector" (IFAD 2016, p. 17).

The stereotypical notion of employment is a regular job, in a specific industry, of definite pay per unit time. In fact, the notions of *employment*, *sector of employment*, and *compensation* conceal subtle complications in real world labor markets. This is especially true of the agricultural sector where employment is often seasonal and payment is irregular. For the Philippines, comprehensive characterization of conditions of agricultural employment is a significant gap in research (Briones 2017a).

Development of a detailed socioeconomic profile will facilitate identification and prioritization of issues, and constraints, and opportunities facing agricultural workers, leading to the design of relevant productivity-oriented and social protection programs. However, design of such programs remains uninformed by a comprehensive socio-economic characterization of agricultural workers and their households.This study addresses this gap by a socio-economic profile of agri-workers has been conducted, focusing on the following:

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- Full range of labor and economic activities of rural households with agricultural workers, including patterns of employment and seasonality;
- Other relevant worker and household characteristics are useful, such as schooling, other formal education, trainings, memberships in cooperatives and associations, formal and informal sector work experience

The profiles also include the community-level context of rural households with agricultural workers, in terms of: access to infrastructure; and to fixed capital such as agricultural equipment. These will determine level of development and economic diversification at the barangay level, as well as potential displacement of labor by machinery.

2. Stylized facts and explanatory models

Dual development and agricultural employment

The neoclassical model of the economy can readily explain structural change in terms of the shift in demand associated with the Engel effect: household expenditure share of non-food products rise with income (Kongsamut et al. 2001). There are also supply-side effects: with capital deepening, resources move away from agri-based industries, which are labor-intensive, towards more capital-intensive industries (Acemoglou and Guerrieri 2008).

Lewis (1954) on the other hand proposes a classical explanation for structural change; this was later extended by Ranis and Fei (1961) to link agriculture and industry. This model posits a **modern sector** and a **traditional sector.** The neoclassical model is deemed to be a valid account of the modern sector, where savings translates to capital accumulation; labor is scarce; and wage is set by marginal product. Meanwhile the classical model is a better description of the traditional sector, where labor is in surplus, marginal product is effectively zero, and wages are set by average product, buttressed by egalitarian norms.

The process of development is driven by capital accumulation in the modern sector, which undergoes two stages: in the classical stage, surplus labor moves from the traditional to the modern sector, but wages remain stagnant. When surplus labor is exhausted, economic development enters the neoclassical stage where wages are set by marginal product throughout the economy, and begins to trend upward.

The model (in its extended form) makes some definite predictions:

- Supposing that **involuntary underemployment** is an observable correlate of surplus labor, then agricultural employment in low income countries will be characterized by higher levels of involuntary underemployment compared with the rest of the economy. Within agriculture, one key source of underemployment is seasonality; during peak seasons (e.g. harvest and planting), underemployment may temporarily vanish, only to return during the lean season.
- Economic development (as measured by rising per capita incomes) is accompanied by an initial stage where labor moves across sectors but wages remain stagnant;
- After the period of stagnation, the economy transitions to a stage where agricultural wages start to rise together with that of the rest of the economy – the so called “Lewis turning point.
- Rising agricultural productivity is associated with a longer classical phase before approaching the turning point.

A fairly extensive literature has developed around the Lewis turning point, with focus on China. While studies argue both for and against the passage of the turning point, the weight of the evidence points to an approach to (rather than traversal of) the turning point (Kwan et al. 2017). Note that mere increases in rural or agricultural wages is no proof of a turning point, as such an uptrend has been observed throughout developing Asia (Wiggins and Keats 2016). The key distinction of the turning point is the equalization of wage with marginal product throughout the economy; and the sustained increase in rural and agricultural wages together with the rest of the economy.

Bandiera et al. (2017) shed some light on the role of seasonality in agricultural employment. In Bangladesh, it is the poorest women in rural areas that mostly engage in low return and seasonal casual work; wealthier women tend to specialize in raising livestock. A randomized controlled experiment involving support for livestock rearing led to the following results: poor women started to engage in livestock rearing; aggregate labor supply of supported women increased; earnings of supported poor women increased. The increases accelerated capital accumulation and led to long-lasting effects measurable 4-7 years after the intervention.

The link between migration and convergence in sector incomes is well-established (Butzer et al. 2003). Similarly, in Vietnam, the type of migration is highly dependent on education level; basic education is associated with unskilled migration, while higher education is associated with skilled migration (Thinh et al. 2015). Lastly, migration out of agriculture must be accompanied by rising agricultural output to feed a growing population despite a declining work force, which is possible only with intensified mechanization.

Agricultural employment and income is often conflated with rural employment and income. However, a considerable literature has evolved on the rural nonfarm economy, which establishes the significance of nonagricultural employment and incomes in rural areas, and even for farming households (Briones 2017b). Related research has borne out the following:

- Rural nonfarm employment is a sizable component of rural employment, tends to concentrate in services, and over time has grown faster than agricultural employment.
- The share of nonfarm employment in rural employment is roughly about 30 percent in developing countries (Haggblade et al. 2007). The biggest contributor of nonfarm employment by far is services.
- Households with more educated workers have higher participation in rural nonfarm employment.

Stylized facts for the Philippines

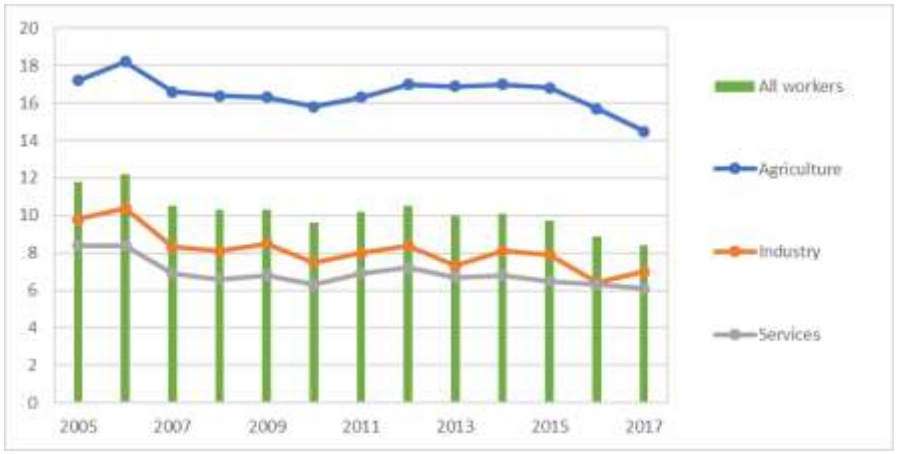
The following draws on Briones (2017b), with updates for more recent data, and integrating results of PSA (2013) and other studies:

Since 2011, the absolute number of workers in agriculture has been decreasing. While structural change is inferred from sectoral shares, in fact the actual number of workers classified as agricultural has been falling. In 2011, the number of workers in agriculture was about 12.67 million; by 2017 the number had gone down to 10.26 million, or a loss of 2.41 million workers (PSA Openstat 2019). The decline in number of agricultural workers have been falling in all regions nationwide. This has been interpreted in an alarmist way for some time now; for instance, back in 2013, a Department of Agriculture (DA) official was quoted

as stating: "…we might reach a critical [shortage] of farmers in just 15 years" (New Humanitarian 2013).

The visible underemployment rate in agriculture has been far higher than in the other sectors, though trending downward very recently. "Visible underemployment" refers to a state in which a worker currently works below 40 hours a week in the primary occupation, and seeks more work. In the past five years the visible underemployment rate in agriculture (considered as primary occupation) has been averaging about 18 percent workers, compared to just a 5-10 percent share in other sectors (Figure 1). However, since 2014 the visible underemployment has fallen from 20 percent down to 17 percent.

Figure 1: Visible underemployment rate by sector, 1995 – 2017 (%)



Source: PSA Openstat (2019).

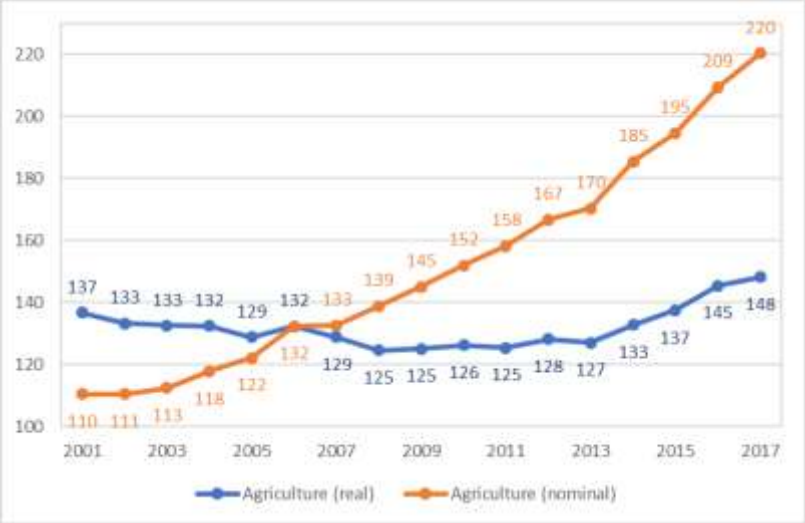
Given lack of full-time employment in agriculture, workers in that sector have had to resort to other jobs; hence considering other jobs, the time-related underemployment is lower, averaging 16 percent. The good news though is that both visible underemployment and time-related underemployment rates have been declining in the past three years, respectively reaching 17 percent and 16 percent by 2017. Across regions, the visible underemployment rate is highly variable; some regions with high concentration of agricultural workers also exhibit above-average rates of visible underemployment.

Agricultural employment is dominated by males; agricultural workers are on average older older and have fewer years of schooling than typical worker. In terms of worker characteristics, the following information is summarized in Briones (2017a):

- Workers in agriculture and industry are dominated by males; workers in services are evenly split between males and females.
- Workers in agriculture tend to be older and on average age faster than other workers.
- A majority of workers are high school graduates; however, workers in agriculture tend to have fewer years of schooling. Estudillo et al (2006) confirms that agricultural productivity growth in the Philippines allowed farm households to increase investments in human capital and enable future migration.
- In the case of agricultural workers, educational attainment is the same whether fully employed or visibly underemployed;, however in the case of industry and services workers, the visibly underemployed are those with fewer years of schooling.

Daily basic pay in agriculture has been increasing from 2001 onward, but in real terms its value had been falling between 2001 and 2013.2013. Daily basic pay has been rising consistently in nominal terms since 2001 (Figure 2). In real terms the value has fallen gradually (by an average of 0.8 percent annually) to 2011. With acceleration of nominal wage growth from 4 percent (2001-2011) to 6 percent from 2012 – 2017, together with deceleration of the inflation rate from 4.4 to 2.3 percent over the same intervals, real wages have picked up, increasing in value by 2.8 percent annually from 2011 onward.

Figure 2: Nominal and real daily basic pay in agriculture in Php (2006 prices), 2001 - 2017

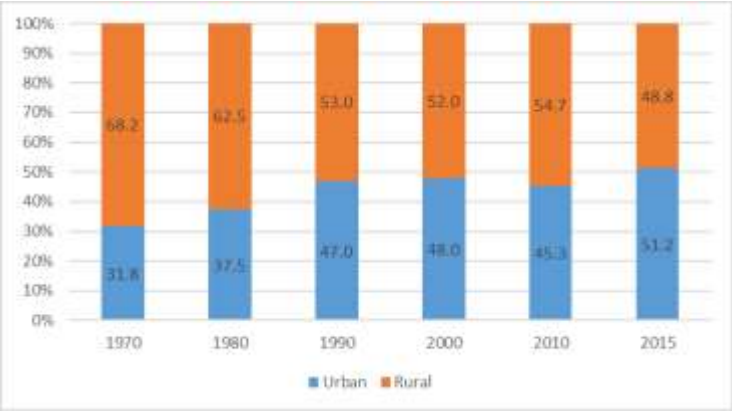


Source: PSA Countrystat (2019).

Further disaggregation done in Briones (2017a) shows that daily pay in agriculture is tends to be lower for workers who are female, with fewer years of schooling, and either higher or lower than prime working ageThere has been a tendency for daily pay between males and females to converge over time, as well as between less educated and better educated workers. Given its erratic movement over time, sustained growth of real wages in agriculture is far from guaranteed.

Poverty is highly correlated with rural residence, agricultural occupations, and underemployment. The country as a whole has been urbanizing (Figure 3).

Figure 3: Urban and rural population shares, Philippines, 1990 – 2015



Source: PSA.

By 2015, majority of the population (51.2 percent) was classified as urban, compared to just 31.8 percent of the population in 1990. Nonetheless close to half of the population remains rural. Based on merged data set of the 2015 Family Income and Expenditure Survey, and the October round of the 2015 Labor Force Survey, poverty is much higher among rural households compared with urban households (Table 1). Given their larger share in population, as much as 79 percent of the poor are in rural areas. Among poor workers, up to 62.4 percent find their primary occupation in agriculture. Among agricultural workers, poverty incidence was about 36 percent; this is somewhat higher than official figures for poverty incidence among farmers at 34.3 percent (PSA 2015.)

Household groups with high poverty tend to also be those with high visible underemployment; the visibly underemployed tend to be poorer than poorer than the average worker;; and more than one-fifth of working poor are visibly underemployed, whereas only one-eighth of all workers are visibly underemployed. In contrast to underemployment, poverty is **negatively** correlated with **unemployment,** consistent with the adage that "the poor cannot afford to be unemployed."

Table 1: Shares of poor by various groups and subgroups, 2015 (%)

Group	Subgroup	Share of subgroup in group	Share who are poor, in subgroup	Share of subgroup in poor households of group
Population	Total	100.0	23.3	100.0
	Rural	60.1	30.7	79.0
	Urban	39.9	12.3	21.0
Labor Force	Total	100.0	20.0	100.0
	Unemployed	2.8	18.8	2.6
Workers	Total	100.0	20.0	100.0
	Visibly underemployed	12.1	34.2	20.6
	Agricultural workers	35.0	35.7	62.4

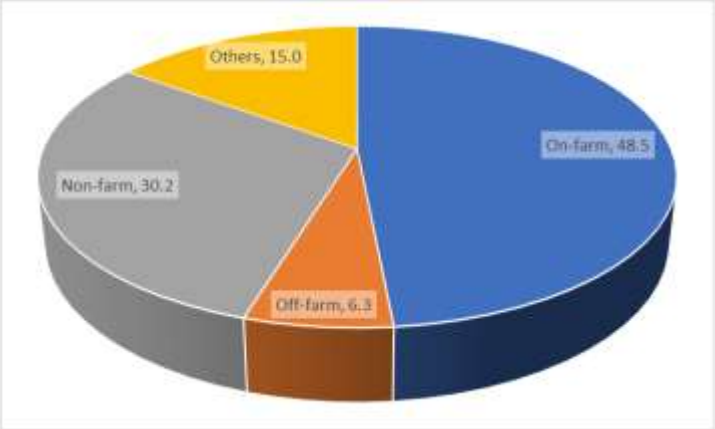
Source of basic data: PSA (2015).

Structural change is apparently the most important driver of poverty reduction since 2006. A recent World Bank (2018) examines the decline in poverty from 2006 to 2015. Of the measured poverty decline over this period, about 67 percent came from the increase in wage income and movement of workers out of agriculture. Structural change in employment, together with an increase in agricultural wages and for unskilled labor, were identified as key drivers of poverty reduction. However, entrepreneurial activities accounted for a negative 15 percent reduction, i.e. such activities actually worsened poverty. It is likely that own-account activities among poor rural households in agriculture, together self-employment among urban poor, actually suffered worsening economic prospects over the period. Fortunately, government transfers, together with private transfers, accounted for 25 percent and 18 percent of poverty reduction, respectively, offsetting the loss in incomes of the poor from entrepreneurship.

Even for agricultural households, off-farm and non-farm incomes account for the majority of household income. PSA (2013) conducted a survey in 2011 covering agricultural households,

meaning a household with at least one member as an agricultural operator; and either operates a farm of at least 1000 m^2, or for which farm income is its principal source of income and operates any land. Even for such households, on average for the Philippines, only 48.5 percent of household income is derived on-farm (Figure 3). Income generated from other farms or off-farm income is 6.3 percent; hence farm incomes together still account for a majority of household income. Income from non-farm activities of the household account for 30 percent of income; other sources (such as transfers and remittances) account for the remainder (15 percent). Hence "farm households" on average are no longer dependent on their own farms for the bulk of their earnings, but well-diversified into other activities and income sources.

Figure 4: Sources of income of agricultural households, 2011 (%)



Source: PSA (2013).

The average farmer is middle-aged and has secondary schooling or lower. The same survey finds that the average age of the agricultural operator is 48; 27 percent fall into the 41-50 age bracket; a smaller proportion (23.7 percent) are in the 51-60 age bracket (Table 2).

Table 2: Distribution of agricultural operators by age bracket and educational attainment (%)

Age bracket (years)	Distribution	Educational attainment	Distribution
<21	1.3	Elementary level	29.9
21-30	7.4	Elementary graduate	20.2
31-40	19.1	High school level	15.8
41-50	26.8	High school graduate	16.5
51-60	23.7	College level	6.4
61-70	14.6	College graduate	5.6
>70	7.3	Post graduate	0.2
Total	**100.0**	Vocational	2.7
		Pre School/Day Care	0.1
		No Schooling	2.8
		Total	**100.0**

Source: PSA (2013).

The usual statistic about the Filipino farmer is an average age in the late-50s; this figure arises usually in surveys of rice farmers. Meanwhile the low level of schooling of the farmer is consistent with previous studies; Briones (2017a) shows that the characterization applies as well for agricultural workers in general; moreover, workers outside agriculture tend to have higher educational attainment than agricultural workers.

3. Method of the study

Gaps in existing secondary data

The previous section has summarized several stylized facts that can be discerned from existing secondary data. However, there are numerous gaps that point to key unknown characteristics or trends in labor markets, some of which should qualify the facts as summarized above:

- The one-week reference period of LFS limits seasonality data in that survey. There is furthermore no information on underemployment spells.
- Daily basic pay is available, but not the activities for which wage income is being earned. Moreover one cannot relate pay information with other variables such as skill level, or community variables such as access to fixed capital. Further disaggregation based on the socioeconomic profile will be useful in characterizing heterogeneity in the supply of labor.
- Other characteristics of workers and households are relevant, including: memberships in cooperatives and associations; other types of training such as technical and vocational education; other activities including outside agriculture; household assets; member of household sending migrant remittances; and so on.
- Also critical are community indicators such as access infrastructure (e.g. roads, ports, etc.), and technology. such as farm machinery; these will determine level of development and economic diversification at the barangay level, as well as potential displacement of labor by machinery (especially in relation to seasonality of job opportunities).

The PIDS agricultural workers survey

Overview

To address the aforementioned data gaps, an agricultural workers panel survey was conducted to cover rural households with at least one agricultural worker. To capture information on seasonality, the household survey shall be administered to the same set of households once every quarter, scheduled as follows:

1st Round: April 2018

2nd Round: July 2018

3rd Round: October 2018

4th Round: January 2019

The reference period is the previous month of the actual conduct of the survey.

Given the high cost of conducting such a survey, it was decided statistical representation of the whole population of agricultural worker households was unrealistic. The survey instead

was administered to at least 400 rural households spread across two (2) provinces, namely Nueva Ecija and Negros Occidental. Selection of these provinces is based on the following:

- Regions III (Central Luzon) and Region VI (Western Visayas) were selected based on those with the largest number of agricultural workers in Luzon and in Visayas;
- At the provincial-level, Nueva Ecija and Negros Occidental were selected as the provinces with the largest agricultural area in the selected regions.

While the coverage is far from nationwide, at least the survey was able to cover what are presumably the largest provinces in terms of employment of agricultural workers in two island groups (Luzon and Visayas) in the Philippines.

Two types of questionnaires will be used in this survey. One is a household-level questionnaire, "Survey of agricultural workers in the Philippines." It shall be used to gather information on the full range of labor and economic activities of the farm worker household, workers' employment history, patterns of employment, and income seasonality. The other questionnaire is the "Barangay Survey." For each selected barangay, one (1) barangay official will be asked to respond to questions about community-level variables, such as access to infrastructure and technology. The barangay survey will be administered once, which should coincide with the 1st Round of the household survey.

The target respondents for the household-level survey are agricultural worker households. Screening questions will be asked to ensure that the randomly sampled households are agricultural worker households, i.e. households with at least one (1) member whose primary occupation is wage/salary worker in agriculture, fisheries, and forestry sector ("agricultural wage worker") any time during the past twelve (12) months.

Sampling design

The survey covers rural barangays in the two provinces. Given the time and financial constraints of this study, a quota sampling will be administered (which is the same method adopted by the Philippine Statistics Authority (PSA) in Agricultural Labor Survey).

At the first stage, the top three (3) municipalities will be selected based on the size of rural barangay population for each of the chosen provinces. The second stage includes the selection of the top seven (7) rural barangays based on the size of rural barangay population for each chosen municipality. The information on rural barangay population was obtained from PSA's Philippine Standard Geographic Code, while the urban-rural classification of barangays was based on 2010 Census of Population and Housing.

At the third and final stage, ten (10) households will be randomly sampled in each chosen barangay from a Barangay Master List (which shall be secured by the survey firm from the selected barangay offices). Initially, fifteen (15) households will be randomly sampled, but only the first ten (10) households successfully interviewed will be recorded. This results into a sample of 420 households, which incorporates an oversample of 20 households to account for attrition, in order to retain at least 400 households by the fourth round.

4. Results of the survey

Sample and demographic information

In the first round, 420 households (divided evenly between the two provinces) were interviewed. For each round the panel households were repeat interviewed with some attrition in each round until 408 households of the original remained, for an average of 414 households per round, well over the target sample of 400. The attrition was almost evenly split between the two provinces.

Table 3: Description of the sample

	Round 1	Round 2	Round 3	Round 4	Average
Completed interviews, no.	420	416	411	408	414
Total individuals, no.	2,114	2,172	2,190	2,197	2,168
Nueva Ecija:					
Completed interviews, no.	210	208	206	204	207
Total individuals, no.	1,139	1,163	1,179	1,168	1,162
Negros Occidental:					
Completed interviews, no.	210	208	205	204	207
Total individuals, no.	975	1,009	1,011	1,029	1,006

Source: Survey data.

Household members of working age are almost evenly split between males and females; however, employed persons are disproportionately male. Only few employed persons are in members of an organization, and fewer still in an IP group. Some demographic information about households and their members is shown in Table 4; note that any change between rounds is entirely due to attrition from the original sample. Average household size is 5.2 (similar to the national average); on average, 3 members per household are working. Of the persons of working age in the sample, just under half of working age individuals are female, and about half of them are married. On average, the working age individual is about 38 years old and is halfway through secondary school.

Table 4: Demographic indicators, sample households and members

	Round 1	Round 2	Round 3	Round 4	Average
Household size, average	5.0	5.2	5.3	5.4	5.2
Members of working age:					
Total	1,390	1,326	1,315	1,260	1323
Average per household	3.3	3.2	3.2	3.1	3.2
Share of females (%)	47.6	46.9	46.9	47.2	47.2
Share of married (%)	50.7	51.9	51.3	52.7	51.6
Average age, years	37.1	37.8	37.6	38.1	37.7
Average schooling, years	7.7	7.6	7.5	7.5	7.6
Employed individuals (shares in %):					
Share in total working age individuals	60.6	61.5	54.5	54.8	57.9

	Round 1	Round 2	Round 3	Round 4	Average
Share of females	32.5	35.3	33.5	33.5	33.7
Share in working age females	41.4	46.3	38.9	38.8	41.4
Share in working age males	78.2	74.9	68.3	69.2	72.8
Share of cooperative/association members	8.8	7.7	8.9	8.6	8.5
Share of IPs	1.5	1.3	2.2	1.6	1.7

Source: Survey data.

Among persons of working age, about 58 percent are employed. Only a third or so of employed persons are female. Among females of working age, only 41 percent are employed; in contrast, among males of working age, 73 percent are employed. Only 8.5 percent of employed persons are members of a cooperative or worker association; and under 2 percent are members of an IP community. Characteristics of household members below working age are shown in Box 1. Henceforth we focus exclusively on working age and especially employed individuals with paid work, whether on own- or other-account.

Box 1:

Characteristics of household members below working age

Across survey rounds, the average number of individuals *below* working age is 736; their mean age is 7.5 years, and their mean years of schooling is 3.5 years. Between 7 to 10 of these individuals are working, equivalent to 0.9 to 1.4 percent of all sample members below working age. Only a few instances of working minors ("child labor") were observed in our sample.

Age and educational profile is summarized in Table 5. More than half of persons of working age are in of prime working age (i.e. the 25-54 years old bracket); the second largest proportion is the youth category; the lowest shares are found in the elderly category (65 and above). Distribution is similar for females and males, except females have slightly greater share for the elderly and lower shares of youth compared to males.

Table 5: Distribution of males and females of working age, by age bracket and educational attainment (%)

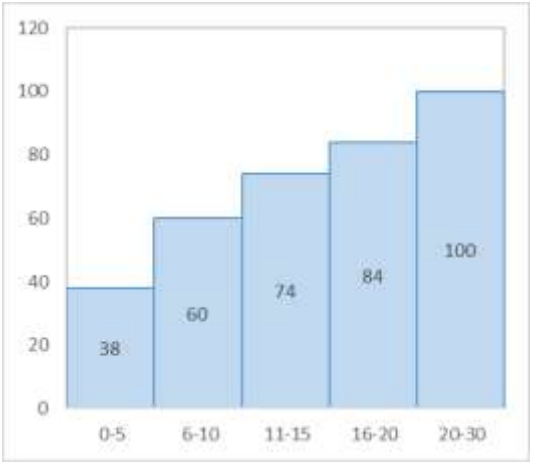
	Male	Female	Total
Age bracket, years:			
15-24	29.0	27.3	28.2
25-54	52.9	52.9	52.9
55-64	10.9	9.8	10.4
65 and above	7.1	9.9	8.4
Total	100.0	100.0	100.0
Educational attainment			
No schooling	2.1	1.5	1.9
Primary school, undergraduate	37.5	25.8	31.9
Primary school graduate	7.6	11.1	9.3
Secondary school, undergraduate	29.0	28.5	28.8
Secondary school, graduate	16.5	21.3	18.8
Tertiary school, undergraduate	5.1	7.7	6.3
Tertiary school graduate or higher	2.1	4.2	3.1
Total	100.0	100.0	100.0

Source: Survey data.

The education bracket with the largest share for all individuals is Primary school, undergraduate (32 percent); this is followed by secondary school, undergraduate at 29 percent. Up to 72 percent have not finished high school. By sex, a larger share of females has completed secondary school, as well as have completed primary school, compared to males.

Figure 5 profiles the sample barangays by distance from nearest municipal hall; note that while all the sample barangays are officially classified as Rural, the distance variable captures the spectrum of "Rurality" from close to urban centers (and virtually urban itself), and remote from urban centers (and almost certainly rural). Most of the barangays (60 percent) are within 10 km; less than a quarter (24 percent) are in the 11-20 km zone; and just 16 percent are in the most distant, 20-30 km zone.

Figure 5: Cumulative distribution of sample barangays, by distance from nearest municipal hall (N =50)



Sources: Survey data; barangay distances from maps.google.com.

Further characterization of sample barangays by the state of infrastructure is summarized in Table 6. Barangays are classified as: Minority share of population with easy access; Majority of population with easy access; Most of the population with easy access; and Almost all the population with easy access. In terms of potable water, the share of barangays with almost all the population having easy access to potable water is only 28 percent; the share having Most of the population having easy access is 38 percent; together these two categories account for 56 percent. Only 26 percent have only a minority share having access to potable water.

Table 6: Barangay distribution by share of population with easy access to infrastructure (%)

Population share (%)	Potable water	High school	Farm machinery
0 – 49.99 (Minority)	26.0	26.0	42.0
50 - 59.99 (Majority)	8.0	16.0	18.0
60 – 89.99 (Most)	38.0	14.0	8.0
90 – 100.0 (Almost all)	28.0	44.0	32.0
0 – 100.0 (All)	100.0	100.0	100.0

Sources: Survey data.

Meanwhile the share (26 percent) of barangays have Minority share of population having easy access to secondary school; a similar share (58 percent) have Most or Almost all of population having easy access to secondary school (though 44 percent of barangays have Almost all the population having easy access.)

Lastly, easy access to farm machinery is much less common than to a secondary school or potable water; as much as 42 percent of barangays have Minority of population with easy access; 60 percent of barangays have 60 percent or fewer of the population having easy access. However, for nearly a third of barangays, almost all the population has easy access.

Profile of employed persons

In the following, a *worker* is one whose primary occupation is to be engaged to work by another person or enterprise; a *business operator* is one whose primary occupation is working on own-account by operating his or her own business. Both are regarded as employed.

Most employed persons are earning paid work for others; there are large changes in employment status within a year. Based on Table 7, employed persons are mostly paid (average of 4 persons in the sample engaged in unpaid work, out of a total of 766 employed persons on average). An overwhelming majority (81 percent on average) of the employed are workers, and the rest (15 percent) are employed as business operators.

Note the large drop in number of employed persons from Round 1, down to Round 4; over the year the number of employed persons dropped by 18 percent. This is largely due to the drop in number of workers (24.6 percent decline between Round 1 and Round 4). In contrast, there was a steep increase in the number of business operators (41 percent increase between Round 1 and Round 4).

Table 7: Categories of employed persons, in numbers and shares (%)

	Round 1	Round 2	Round 3	Round 4	Average
Total number	843	815	717	690	766.3
Number of unpaid workers	15	41	19	50	31.3
Number of workers	753	655	557	534	624.8
Number of business operators	75	119	141	106	110.3
Share of unpaid workers (%)	1.8	5.0	2.6	7.2	4.2
Share of workers (%)	89.3	80.4	77.7	77.4	81.2
Share of business operators (%)	8.9	14.6	19.7	15.4	14.6

Source: Survey data.

While most workers and business operators are engaged in a single occupation at a time, a significant share are able to find a secondary occupation or business. Table 8 presents the occupation profile of employed persons. Most workers are engaged in only in one occupation (81 percent); an even larger proportion (more than 94 percent) of business operators are engaged in only one business. Nonetheless, 23 percent of workers on average have secondary employment (including as business operator); likewise, about 22 percent of business operators on average have secondary employment (including as worker).

Table 8: Occupation profile of employed persons (%)

	Round 1	Round 2	Round 3	Round 4	Average
Share in total workers:					
Single-occupation	75.2	79.8	81.7	88.2	81.2
Multi-occupation workers (no business)	24.8	20.2	18.3	11.8	18.8
With secondary employment	27.4	22.4	22.8	14.6	21.8
Share in total business operators:					
Single-business operators	93.3	95.0	92.2	95.3	93.9
Multi-business operators (non-worker)	6.7	5.0	7.8	4.7	6.1
With secondary employment	22.7	18.5	24.1	17.9	20.8

Source: Survey data.

Members of agricultural worker households are mostly employed in agriculture, whether as workers or business operators; the second most important occupation is services. Among employed persons, the breakdown of sector of employment is shown in Table 9. Agriculture accounts for the majority of workers (58 percent). Meanwhile the biggest sector for business operators is services (77 percent). However, since most employed persons are workers, agriculture is the biggest sector of employment for the employed persons in the sample.

Table 9: Sector of employment of workers

	Round 1	Round 2	Round 3	Round 4	Average
Workers:					
Agriculture					
Number	462	399	283	315	364.8
Share in workers (%)	61.4	60.9	50.8	59.1	58.0
Industry					
Number	93	63	78	76	77.5
Share in workers (%)	12.4	9.6	14.0	14.3	12.6
Services					
Number	198	193	196	142	182.3
Share in workers (%)	26.3	29.5	35.2	26.6	29.4
Business operators:					
Agriculture					
Number	0	22	45	32	24.8
Share in business operators (%)	0.0	18.5	31.9	30.2	20.1
Industry					
Number	2	6	5	1	3.5
Share in business operators (%)	2.7	5.0	3.5	0.9	3.0
Services					
Number	73	91	91	73	82.0
Share in business operators (%)	97.3	76.5	64.5	68.9	76.8

N.B. Sector of employment determined by sector of primary occupation or business.

Based on sector shares, the most stable source of employment for workers is agriculture, followed by services; for business operators the most stable is services, followed by industry. Previously we had shown that the total number of workers has fallen from round to round. For workers, share of agriculture ranges from 50.8 to 61.4 percent (averaging 58 percent); the share of services ranges from 26.3 percent to 35.2 percent. Variability (whether in terms of range or coefficient of variation) is highest for services, and lowest for agriculture. For business operators on the other hand, the most stable sector share is for services, and the least stable is agriculture. In fact, there were no business operators in agriculture in the first round, though the share was to rise to 45 percent by the third round.

While number of workers and business operators vary widely by quarter, hours employed tend to remain above full-time equivalent and be fairly stable across survey rounds. The average duration of employment per week for all employed persons is about 46 hours (Table 10); this holds for both workers and business operators (respectively 45 and 51 hours). Across rounds, there was only a slight dip in average hours employed for workers in Round 2 and for business operators in Round 3; the latter ramp up their working hours dramatically in Round 4. Note that workers are deriving employment almost entire from working for others; business operators derive a smaller share of total working hours in operator on own-account.

Table 10: Duration of weekly employment, hours

	Round 1	Round 2	Round 3	Round 4	Average
All employed:					
Hours employed	46.5	43.3	46.0	46.8	45.7
Share of visibly underemployed (%)	13.4	17.2	19.6	16.4	16.7
Workers:					
Hours employed	45.7	42.1	45.9	45.4	44.8
Work hours (no business)	44.6	41.5	44.3	44.4	43.7
Share of visibly underemployed (%)	12.6	17.3	18.1	16.7	16.2
Business operators:					
Hours employed	54.2	49.9	46.7	54.2	51.2
Hours in self-employment	51.6	44.0	42.8	49.7	47.0
Share of visibly underemployed (%)	21.3	16.8	25.5	15.1	19.7

Source: Survey data.

Hours employed varies widely across individuals, with visible underemployment varying from 13 to 17 percent across the rounds. Even though average hours employed is at more than fulltime rate, there remain many employed persons working undertime. The rate of visible underemployment though averages 17 percent, similar to the rate obtained nationwide by LFS for 2018 for agricultural workers (about 17 percent). Visible underemployment rises from the first round up to the last round, over a range of about 6.2 percentage points. Surprisingly, visible underemployment is lower among workers compared to business operators, for which the rate of visible underemployment averages 20 percent (ranging from 16.8 to as much as 25.5 percent).

Also varying widely within the year is basic daily pay, for both workers and especially for business operators. Compensation of workers and business operators converted to daily pay is shown in Table 11.

Table 11: Daily compensation of employed persons (Php)

	Round 1	Round 2	Round 3	Round 4	Average
Total daily compensation of employed	478.2	195.1	325.1	213.2	302.9
Workers					
Average basic daily pay	479.8	236.6	276.1	291.5	321.0
Total daily pay (all worker occupations)	481.4	238.7	274.4	292.2	321.7
Total daily compensation (all employment)	488.9	234.0	287.9	285.3	324.0
Business operators					
Basic daily pay equivalent	267.8	-72.7	425.4	46.7	166.8
Total daily pay equivalent (all businesses)	312.3	-65.1	434.0	17.6	174.7
Total daily compensation (all employment)	370.8	-19.1	471.9	44.6	217.0

Source: Survey data.

In the table, "basic daily pay" refers to pay from the primary occupation, whether for workers or for business operators; for the latter the daily pay is based on net income (earned within the reference period) and converted to daily equivalent. Daily "compensation" sums over both daily pay from wage work and from daily equivalent income from business operation. Lastly, a strong precaution must be made in estimating income of business, given the limited reference period. For instance, farming in a particular month may be generating net income (owing to application of labor and inputs) but the compensating income stream may come in a future month (upon harvest).

Basic daily pay for workers declines from Round 1 to Round 2, then recovers somewhat in Rounds 3 and 4. Inclusion of other worker occupations in daily pay raises it only slightly; when both work and business operation are included, the increase is only minimal. Meanwhile, basic daily pay varies enormously for business operators; from an average of Php 270 per day in Round 1, down to the negative territory in Round 2. The highest basic daily pay is achieved in Round 3; basic daily pay in Round 4 is positive but negligible. Given this, operators seem to be diversifying to other businesses, and more importantly to other work employment, thereby offsetting their losses from the primary business. Total daily pay (across all businesses) is about 5 percent higher than basic daily pay; total daily compensation is higher still by 30 percent.

In the following discussion we focus mostly on agricultural employment, the dominant sector of employment for workers in the sample.

Agricultural workers who stay in the sector work under time on average, as do agricultural business operators. Table 12 summarizes the employment hours of persons employed in agriculture. In the table, "basic working hours" refers to hours of employment per week in the primary occupation or primary business. The basic working hours are only 35 hours for workers, falling to 32 hours for agricultural business operators. Across survey rounds, basic working hours varies only slightly for agricultural workers; variations in working hours are much larger across rounds for agricultural business operators.

Table 12: Duration of employment per week, persons employed in agriculture, hours

	Round 1	Round 2	Round 3	Round 4	Average
All persons employed in agriculture:					
Working hours, no.	43.2	39.3	40.7	42.0	41.3
Share of visibly underemployed (%)	13.4	19.5	22.9	28.2	21.0
Workers in agriculture:					
Basic working hours	35.0	33.3	34.0	37.9	35.0
Working hours, all work occupations	41.5	39.0	39.4	41.3	40.3
Hours employed	43.2	39.3	41.5	42.4	41.6
Share of visibly underemployed (%)	13.4	19.3	21.6	27.6	20.5
Agricultural business operators					
Basic hours employed	NA	33.4	28.1	32.9	31.5
Hours in self-employment	NA	34.8	29.3	34.5	32.9
Hours employed	NA	40.0	35.2	38.2	37.8
Share of visibly underemployed (%)	NA	1.2	4.3	3.2	2.9

Source: Survey data.

Diversified occupations/businesses allow agricultural workers to increase hours employed to full-time equivalent. Though basic hours worked/employed per week in agriculture is below forty hours, total working/employed hours rises to more than forty hours when other occupations/businesses are considered. Note however this is not the case for agricultural business operators, where total hours employed (all occupations and business) reach 38 hours on average.

Within agriculture, there are wide variations in weekly hours employed across persons and across quarters. The share of visible underemployment averages 21 percent among agricultural workers, but only 2.9 percent among agricultural business operators. Within a year, visible underemployment among agricultural workers starts out only at 13.4 percent in the first round, but rises toward the last round, peaking at 28 percent.

Agricultural workers are paid lower than average, both in terms of the basic and overall pay; within the year the quarter-to-quarter variation is similar to that of the average worker. Daily compensation of persons employed in agriculture is summarized in Table 13. Compared with overall compensation (Table 11), compensation of agricultural workers is lower (by 15 percent); this is true whether for basic pay (primary occupation only), or overall compensation (though agricultural workers are able to earn slightly more than their agricultural daily pay due to other employment). Basic daily pay falls from Round 1 to Round 3 and 4, which is similar to the sub-annual movement in basic daily pay for the average worker.

Table 13: Daily compensation of persons employed in agriculture (Php)

	Round 1	Round 2	Round 3	Round 4	Average
Total daily compensation	526.1	172.1	315.0	214.6	307.0
Agricultural workers					
Basic daily pay	517.5	197.1	232.4	247.5	298.6

	Round 1	Round 2	Round 3	Round 4	Average
Total daily pay	517.8	200.5	231.8	248.0	299.5
Total daily compensation	526.1	203.6	237.4	239.0	301.5
Agricultural business operators					
Basic daily pay equivalent	NA	-458.5	766.3	72.8	126.9
Total daily pay equivalent	NA	-444.0	757.5	-48.9	88.2
Total daily compensation	NA	-398.4	803.2	-25.0	126.6

Source: Survey data.

Daily pay equivalent of agricultural business operators varies very widely over the year. Average basic daily pay of agricultural business operators is much lower than that of agricultural workers. There is a large variation in basic daily pay of agricultural business operators. Total daily compensation of the person employed in agriculture follows the same trend as that of basic daily pay of the agricultural worker, except for the last Round, where the former drops – simply due to the drop in daily pay equivalent for the agricultural business operator. The round-to-round variations are so large, and sample sizes are so small, that averages provide little if any meaningful information in the case of business operators; daily basic pay and compensation information specifically for agricultural business operators is therefore omitted in the following.

Cohort analysis for agricultural workers

The changes from quarter to quarter of employment profile of persons employed in agriculture is very large and requires more detailed analysis. In the following we examine the profile of *cohorts* of agricultural workers, i.e. characterizing the changes observed for a fixed group of agricultural workers.

The first grouping consists of **agricultural workers in the first round** (Table 14). Note that the first round has the largest number of agricultural workers. Of the original 476 persons, only 70 percent remain (paid) agricultural workers by Round 2, falling further to 54 percent by Round 3, rising slightly to 56 percent in Round 4, for an average of 70 percent over the rounds.

A large share of first round agricultural workers move out of agricultural work and mostly into not working, or nonagricultural work. Where did the agricultural workers in the first round go? Some physically relocated, beginning with 4 percent in Round 2, rising to 8.4 percent (of the original 476) by Round 4. A small percentage have remained in agricultural work but unpaid (an average of 0.8 percent across rounds). A much larger percentage have stopped being employed altogether; this begins from 11 percent in Round 2, rising to 16 percent by Rounds 3 and 4.

Some first round agricultural workers have changed their primary occupation. The business option is pursued by 5.4 percent of these workers; more of these go to nonagricultural businesses than agricultural businesses. Meanwhile 8 percent of these workers moves into nonagricultural work. Taken together the alternative primary occupations account for 13.6 percent in Round 2, 22.3 percent in Round 3, and 16 percent in Round 4.

Table 14: Cohort profile, agricultural workers in first quarter (N=476)

	Round 1	Round 2	Round 3	Round 4	Average
Share of agricultural workers (%)	100.0	65.8	52.8	52.2	67.7
Share who moved elsewhere (%)	0.0	4.1	6.3	8.7	4.8
Share of unpaid agricultural worker (%)		5.8	2.2	6.9	5.0
Not employed (%)	0.0	10.6	16.5	16.2	10.8
Shares by primary occupation (%):					
Nonagricultural worker (%)	0.0	8.2	12.6	9.3	7.5
Agricultural business (%)	0.0	1.9	4.5	3.5	2.5
Nonagricultural business (%)	0.0	3.5	5.2	3.2	3.0
Indicators for agricultural workers:					
Basic daily pay (Php)	517.5	199.6	243.8	257.1	304.5
Basic working hours per week	35.0	25.2	25.6	25.6	27.9
Daily compensation (Php)	526.1	192.0	288.1	212.4	304.7

Source: Survey data.

The basic daily pay for agricultural workers within this cohort follows the pattern for agricultural workers overall, namely, a decline in Round 2, then recovering somewhat in Round 3 and Round 4. Basic daily pay in agriculture is slightly higher within this cohort than the average agricultural worker. However, working hours in the primary occupation are lower than for the average agricultural worker.

In Table 15 we consider another grouping, namely workers whose primary occupation has been agricultural work *in any round* or "anytime agricultural worker". The number of such workers is obviously much larger (N = 606).

Anytime agricultural workers exhibit movements similar to those of first-round agricultural workers, though basic daily pay is slightly higher. The round with the largest share of anytime agricultural workers is the first; this declines in the second round, and further in the third round, while recovering somewhat in the fourth round. A few anytime agricultural workers migrate (3.8 percent on average), or moved to unpaid agricultural work (0.6 percent on average), or were not interviewed (1.7 percent on average). A bigger explanation is a shift to unemployed status (29.4 percent on average); the largest shift to unemployed status occurs in Rounds 3 (45 percent) and 4 (37 percent).

A smaller percentage of anytime agricultural workers move into other primary occupations (averaging 17 percent). The share of other primary occupations is highest for the third round (26 percent). Of these, business accounts for 11.6 percent, almost evenly split between agricultural and nonagricultural business; and the remaining 16.5 percent as nonagricultural work occupations. Basic daily pay follows the trend from round to round for first-round agricultural workers. The average though is lower than for first-round agricultural workers, although basic working hours is higher.

Table 15: Cohort profile, agricultural workers in any round (N = 649)

	Round 1	Round 2	Round 3	Round 4	Average
Share of agricultural workers (%)	76.2	65.7	46.7	52.0	60.1
Share who moved elsewhere (%)	0.0	3.1	5.0	6.9	3.8
Share who were not interviewed (%)	1.7	1.5	0.8	1.7	1.4
Share of unpaid agricultural worker (%)	13.4	19.6	27.2	31.5	22.9
Not employed (%)	18.0	17.6	44.9	37.1	29.4
Shares by primary occupation (%):					
Nonagricultural worker	8.7	9.1	16.5	10.1	11.1
Agricultural business	0.0	1.7	4.6	3.6	2.5
Nonagricultural business	1.7	4.0	5.0	2.8	3.3
Indicators for agricultural workers:					
Basic daily pay (Php)	517.5	197.4	232.4	247.5	298.7
Basic working hours per week	35.0	33.4	34.0	37.9	35.1
Daily compensation (Php)	526.1	202.5	237.4	239.0	301.2

Source: Survey data.

The last cohort to be examined is the group of persons who have remained engaged in agricultural work as their primary work occupation (Table 16); this group is referred to as "consistent agricultural workers". This group is strikingly small (N = 198).

Consistent agricultural workers are not solely working in agriculture; nonetheless they are able to earn a higher basic daily pay and work more hours than anytime or first-round workers. A large proportion of these are engaged in other occupations (average of 29 percent, highest at 42.4 percent in the first round). A much smaller percentage are engaged in a business (2.8 percent on average). Basic working hours per week is only 35 hours; however, working hours per week (all occupations and businesses) are exceed full-time equivalent (average of 42 hours, lowest at 37 hours in Round 2). Lastly, average daily compensation on average is higher for consistent agricultural workers, compared with the compensation of anytime agricultural workers or even first-time agricultural workers.

Table 16: Cohort profile, agricultural workers in all quarters (N = 198)

	Round 1	Round 2	Round 3	Round 4	Average
Share who are multi-occupation (%)	42.0	29.3	27.3	16.7	28.8
Share with business (%)	1.3	1.3	8.0	0.7	2.8
Basic daily pay (Php)	604.3	184.8	215.1	231.5	308.9
Basic working hours per week	34.0	31.9	36.6	35.8	34.6
Hours employed per week	44.7	37.3	44.6	40.8	41.9
Daily compensation (Php)	609.6	186.4	230.8	228.7	313.9

Source: Survey data.

Analysis of demographic characteristics for persons employed in agriculture

We continue our assessment of persons employed in agriculture, this time in terms of demographic characteristics, namely sex (Table 17), educational attainment (Table 18), and educational attainment (Table 19).

Agricultural workers are mostly male. Female agricultural workers earn far less than male agricultural workers. Females account for only 29 percent of persons employed in agriculture (Table 17); most of these are agricultural workers (93 percent on average), though they begin moving to agricultural business starting from Round 2 (highest percentage of 12 percent in Round 3). Hours employed are much lower than for the average agricultural worker at 33 hours. Daily pay for agricultural work averages Php 200, lowest in Round 2 and highest in Round 1.

Table 17: Profile of persons employed in agriculture, by sex

	Round 1	Round 2	Round 3	Round 4	Average
Working age females employed in agriculture:					
Share in total agriculturally employed (%)	27.3	29.6	29.0	31.4	29.3
Share of agricultural workers (%)	100.0	94.4	88.2	90.8	93.3
Share of agricultural business operators (%)	0.0	5.6	11.8	9.2	6.7
Basic working hours	26.4	29.2	23.9	33.0	28.1
Hours employed per week	32.6	33.0	31.8	34.7	33.0
Basic daily pay (Php)	238.5	180.9	185.8	196.1	200.3
Average daily compensation (Php)	275.8	148.4	356.4	155.4	234.0
Working age males employed in agriculture:					
Share in total agricultural workers (%)	72.7	70.4	71.0	68.6	70.7
Share of agricultural workers (%)	100.0	94.9	85.5	90.8	92.8
Share of agricultural business operators (%)	0.0	5.1	14.5	9.2	7.2
Basic working hours	38.2	35.0	38.2	40.1	37.9
Hours employed per week	47.3	42.2	44.1	45.3	44.7
Basic daily pay (Php)	518.6	202.1	241.7	258.2	305.1
Average daily compensation (Php)	527.0	180.7	290.5	230.6	307.2

Sources: Survey data.

Meanwhile for male workers, likewise most are mainly engaged in agricultural work; the shares are roughly similar to those of female agriculturally employed persons. Weekly hours employed is however much higher on average than for female workers. Basic daily pay of males in agriculture is much higher than that of females (by 52 percent); likewise, the overall average daily compensation is much higher than for females (by 31 percent).

Most agricultural workers are of prime working age; earning prospects are highest for this age range (though working hours are highest for the youth age group). Table 18 disaggregates agricultural workers by age bracket. Most agricultural workers can be found in the 25 – 54 age bracket, covering the prime working age (66 percent); only 21.3 percent of agricultural workers belong to a higher age bracket. Likewise, basic daily pay is highest for this age group; followed by older and elderly persons; and then youth in agricultural work.

Basic working hours per week also varies by age group; the highest is for youth, followed by prime working age; older and elderly agricultural workers work far below full-time equivalent per week.

Table 18: Profile of agricultural workers, by age bracket, in years

	Round 1	Round 2	Round 3	Round 4	Average
Shares in total agricultural workers (%)	100.0	100.0	100.0	100.0	100.0
15-24	13.9	13.3	12.7	12.1	13.0
25-54	64.1	64.9	65.7	68.3	65.7
55-64	15.6	15.8	16.6	15.2	15.8
65 and above	6.5	6.0	4.9	4.4	5.5
Basic daily pay (business omitted, in Php)					
15-24	459.7	199.7	238.6	247.3	286.3
25-54	510.9	196.7	238.1	262.5	302.0
55-64	586.7	181.9	219.9	193.3	295.4
65 and above	539.6	235.7	183.3	204.0	290.6
Basic working hours per week					
15-24	36.4	36.5	37.7	43.7	38.6
25-54	36.8	33.3	35.8	38.0	36.0
55-64	30.2	33.5	27.6	32.9	31.1
65 and above	24.7	26.1	21.6	36.6	27.3

Source: Survey data.

Most agricultural workers have low levels of schooling. There some tendency for higher schooling to lead to more basic working hours, but little tendency to increase basic daily pay. Majority of agricultural workers (51 percent) have low educational status (Table 19), i.e. did not finish primary school. The next largest share are secondary school undergraduates (19 percent). Note that the share of lower educated workers among agricultural workers tends to rise from Round 1 to Round 2, rising moderately to Round 4.

Average daily basic pay is highest for secondary school graduates, and lowest for workers with no schooling; however primary school undergraduates earn more than primary school graduates; and tertiary school undergraduates and graduates earn less than secondary school graduates. There is therefore little correlation between amount of schooling and basic daily pay. Lastly, secondary school graduates also have the most working hours, while those without schooling have the least; while working hours do not monotonically increase with schooling, a positive relationship is discernible.

Table 19: Profile of agricultural workers, by educational level

	Round 1	Round 2	Round 3	Round 4	Average
Shares in agricultural workers (%)					
No schooling	1.9	2.3	2.5	1.9	2.1
Primary school, undergraduate	47.2	51.4	51.9	53.7	51.0
Primary school graduate	11.0	9.8	10.6	9.5	10.2

	Round 1	Round 2	Round 3	Round 4	Average
Secondary school, undergraduate	21.2	18.3	18.7	18.7	19.2
Secondary school, graduate	15.2	16.0	13.8	14.0	14.7
Tertiary school, undergraduate	2.6	2.3	2.1	1.6	2.1
Tertiary school graduate or higher	0.9	0.0	0.4	0.6	0.5
Average daily basic pay (Php)					
No schooling	500.7	188.1	251.6	161.3	275.4
Primary school, undergraduate	558.5	188.3	228.6	234.6	302.5
Primary school graduate	461.2	187.1	206.4	242.1	274.2
Secondary school, undergraduate	490.9	212.6	224.1	276.5	301.0
Secondary school, graduate	524.2	217.6	254.8	270.3	316.7
Tertiary school, undergraduate	265.2	179.5	305.8	272.8	255.8
Tertiary school graduate or higher	325.5	0.0	571.0	261.5	289.5
Basic working hours per week					
No schooling	31.6	27.2	30.7	20.3	27.5
Primary school, undergraduate	35.0	33.3	34.4	38.0	35.2
Primary school graduate	36.0	32.4	30.6	33.5	33.1
Secondary school, undergraduate	35.8	36.8	33.6	41.4	36.9
Secondary school, graduate	33.3	30.6	34.8	39.2	34.5
Tertiary school, undergraduate	32.3	35.1	40.7	30.6	34.7
Tertiary school graduate or higher	46.5	0.0	56.0	36.5	34.8

Source: Survey data.

Variability of basic daily pay across survey rounds declines as schooling level increases. Variability across survey rounds can be measured by the range or the coefficient of variation. In both measures, variability of basic daily pay tends to decline when schooling level increases from no primary schooling to tertiary school undergraduate. The impact of schooling on variability of weekly working hours also tends to decline but the negative impact is much weaker than for basic daily pay.

Analysis of barangay characteristics for persons employed in agriculture

Next we consider barangay characteristics and agricultural workers, first in terms of distance from the nearest municipal hall (Table 20); and access to infrastructure (Table 21).

The farther a barangay from the nearest municipal hall, the lower the average daily basic pay and weekly working hours. Agricultural workers are approximately equally distributed in the 0-5 km, 6-10 km, 11-20 km, and >21 km zones. The >20 km zone has the lowest basic daily pay (Php 260); the >11 km zones have the lowest weekly working hours (32 hours). One qualifications though is that daily basic pay is lower in the 0-5 km zone than in the 11-20 km zone. This is consistent with studies reviewed in Briones (2017b), which showed that rural areas nearest to urban centers tend to have higher concentrations of high returns nonfarm employment; and agricultural activities in the peri-urban zone tend to specialize in perishable food products for urban consumers.

The farther a barangay from the nearest municipal hall, the greater the variability of daily basic pay. The range of daily basic pay begins from 231 pesos in the 0-5 km zone, then reaches 460 pesos in the 11-20 km zone, before dropping to 299 pesos in the >20 km zone. Meanwhile the range of working hours begins from 5 hours in the 0-5 km zone, then rises to

6 hours in the farther zone, although in the 11-20 km zone the range of working hours dips back to 5 hours.

Table 20: Profile of agricultural workers, by distance from nearest City/Municipal Hall (barangay level)

	Round 1	Round 2	Round 3	Round 4	Average
Shares in agricultural workers (%)	100.0	100.0	100.0	100.0	100.0
0-5 km	27.5	26.6	21.6	22.9	24.6
6-10 km	23.4	23.8	23.3	24.4	23.7
11-20 km	24.2	26.1	27.9	26.0	26.1
21 km and above	24.9	23.6	27.2	26.7	25.6
Average daily basic pay, in Php/day					
0-5 km	456.2	225.1	275.3	276.7	308.3
6-10 km	510.6	207.5	274.3	270.2	315.6
11-20 km	647.7	187.6	203.9	232.9	318.0
21 km and above	464.7	165.7	191.7	216.0	259.5
Basic working hours per week					
0-5 km	36.9	37.0	37.0	41.7	38.2
6-10 km	41.5	35.3	40.8	39.5	39.3
11-20 km	31.0	30.6	29.6	34.6	31.5
21 km and above	30.5	30.2	30.4	36.3	31.8

Source: Survey data.

The better the state of rural infrastructure of a barangay, the higher the daily basic pay and weekly working hours of agricultural workers. Proxy indicators for rural infrastructure is share of population with easy access to potable water and to a secondary school. Note that potable water systems are a basic public facility; its absence suggests remoteness of the deprived area both from nearby water sources, and easy access of construction equipment. Majority of agricultural workers are found in barangays with good to complete access to potable water (63 percent). On the other hand, it is barangays with poor to moderate accessibility of secondary school (54 percent). Note that as accessibility of potable water and to a secondary school improve, basic daily pay tends to increase. However, a similar pattern is not found for basic weekly working hours.

As the spread of farm machinery in a barangay increases, the basic daily pay tends to be higher; there is also a weak tendency for weekly working hours to increase. Farm machinery is a different kind of "infrastructure", mainly because investment in farm machinery is typically a private decision (unlike a potable water system or a secondary school, which in rural areas are usually publicly provided.) A slight majority (51 percent) are in the lowest category of access to farm machinery. There is no discernible pattern relating averaging basic working hours and degree of access to farm machinery. However, a clear pattern can be discerned between basic daily pay of agricultural workers to access to farm machinery, which a positive relationship. Note however that the causation is not straightforward. The share of population with easy access may be higher where agricultural wage is higher, simply because more agricultural operators have decided to invest in machinery, to save on high labor cost.

Table 21: Share of persons agricultural workers, by category of access to infrastructure (barangay level)

	Potable water	Secondary school	Farm machinery
Share in agricultural workers, average (%)			
Share of population with easy access:			
0 – 49.99 %	29	36	51
50 - 59.99 %	8	18	17
60 – 89.99 %	39	15	4
90 – 100 %	24	31	27
Total	*100*	*100*	*100*
Daily basic pay, average (Php)			
Share of population with easy access (%)			
0 – 49.99	239	266	267
50 - 59.99	261	286	330
60 – 89.99	335	335	323
90 – 100	319	328	334
Basic working hours per week			
Share of population with easy access (%)			
0 – 49.99	31	32	33
50 - 59.99	41	36	38
60 – 89.99	34	34	24
90 – 100	41	39	39

Source: Survey data.

Econometric modeling of agricultural work and hours of employment

All the previous tabulations only control for one factor at a time; econometric modeling allows for simultaneous analysis of explanatory variables. We propose to model status as agricultural worker as a result of individual choice, depending on prospective returns and availability of work across the various sectors (with the default possibility of not working at all). These prospective returns in turn depend on both individual and barangay characteristics (controlling for seasonality).

Regarding individual characteristics: the model hypothesizes that younger individuals with better schooling have greater access to better job opportunities outside agriculture. Males are also able to access better jobs within agriculture (see Briones, 2019). Hence, the likelihood of being an agricultural worker is positively correlated with being male; having levels of human capital (i.e. lower educational attainment); and being older.

For barangay characteristics, we hypothesize the likelihood of being a worker outside agriculture will tend to be greater, the closer the barangay is to the urban center, and the better the quality of rural infrastructure with better rural infrastructure. Therefore, being an agricultural worker will be positively correlated with distance from the urban center, but negatively correlated with quality of rural infrastructure.

Testing the aforementioned hypothesis involves running a probit regression for individuals of working at least 15 years, to predict becoming an agricultural worker. This is represented by

a dummy variable set to 1 for an individual whose primary occupation is an agricultural worker (0 otherwise). Explanatory variables are as follows (expected signs in parenthesis):

- Sex (+): dummy variable for sex of individual (Male = 1)
- Age (+): Age of individual, in years
- Education (-): years of schooling (up to highest educational attainment)
- Distance (+): distance in km from the nearest urban center
- Infrastructure index (+): categorical variable for share of population with easy access to potable water (0 to 49.99 percent = 0; 50 – 59.99 percent = 1; 60 – 89.99 percent = 2; 90 – 100 percent = 3)
- S1, S2, S3: season dummies

Results are shown in Table 22 covering coefficient value, standard error, z-value, $\Pr(z > z_{critical})$, and the 95 percent confidence interval. All the coefficients (including the constant term) are statistically significant (i.e. in no case is zero present in a confidence interval). Coefficients with the largest absolute effect (aside from the season) are sex of individual, education, and the infrastructure index.

Table 22: Results of probit regression, status as agricultural worker

	Coefficient	Standard error	z-value	P > z	95 percent confidence interval	
Sex	0.6363	0.0409	15.57	0.000	0.5562	0.7164
Age	0.0109	0.0013	8.65	0.000	0.0085	0.0134
Education	-0.0883	0.0066	-13.37	0.000	-0.1013	-0.0754
Distance	0.0238	0.0026	9.11	0.000	0.0187	0.0289
Potable water	0.0570	0.0205	2.78	0.005	0.0169	0.0972
S1	0.3076	0.0553	5.56	0.000	0.1991	0.4161
S2	0.1915	0.0562	3.41	0.001	0.0814	0.3016
S3	-0.1211	0.0582	-2.08	0.037	-0.2352	-0.0070
Constant	-1.2749	0.1217	-10.47	0.000	-1.5135	-1.0364

Source: Authors' calculation using survey data.

Coefficients are of expected sign, except for the infrastructure index; it turns out that the better the state of rural infrastructure, the more likely an individual will opt or find agricultural work as primary occupation. To summarize: *Controlling for seasonality, individuals of working age are more likely to become an agricultural worker if they are male, older, less educated, and are in a barangay with better rural infrastructure and more remote from the urban center.*

Regression analysis may also be used to explain hours of work. The model is based on the hypothesis that, once an individual has selected as agricultural worker, hours of work will still be limited by employers, conditional of worker's sex, human capital, and age; that is they will tend to favor males, the better educated, and the younger (i.e. with better physical performance on average). As for community variables: while there is no obvious link between infrastructure quality and hours of agricultural work offered, it does appear plausible

that areas closer to the urban center will tend to have restricted opportunities for agricultural work in the first place, and therefore a smaller quantity of working hours overall on offer. Hence the model predicting basic working hours for agricultural workers has the following variables (and expected sign):

- Sex (+)
- Age (-)
- Education (+)
- Distance (+)
- S1, S2, S3: season dummies

Lastly, it is understood that directly running a regression (say by the method of least squares) to predict basic working hours will suffer from selection bias. To account for this the Heckman selection model is used; in its two-step form, it entails a probit regression (as in Table 22) with an additional term (known as the inverse-Mills' ratio); and a second stage least squares regression incorporating the computed inverse-Mills' ratio as instrument.

Results are shown in Table 23. The worker characteristics variables are statistically significant except for Sex of worker (zero lies within the 95 percent confidence interval). The negative sign for the mean estimate is also surprising (the 95 percent confidence interval goes from -29.1 to 3.4). Age and Education are both statistically significant and of expected sign; every additional year of schooling raises working time by 2.75 hours per week. Meanwhile distance has a statistically significant coefficient but of unexpected sign: working hours *increases* the closer to the urban center.

Table 23: Results of Heckman selection model estimation

	Coefficient	Standard error	z-value	P > z	95 percent confidence interval	
Sex	-12.8509	8.2950	-1.55	0.121	-29.1089	3.4070
Age	-0.5207	0.1496	-3.48	0.000	-0.8139	-0.2276
Education	2.7470	1.1311	2.43	0.015	0.5300	4.9640
Distance	-0.9140	0.2599	-3.52	0.000	-1.4235	-0.4045
S1	-13.1136	4.5863	-2.86	0.004	-22.1025	-4.1246
S2	-10.8839	3.5658	-3.05	0.002	-17.8728	-3.8950
S3	0.2858	3.2549	0.09	0.930	-6.0937	6.6653
Constant	117.3839	28.2429	4.16	0.000	62.0289	172.7389

Source: Authors' calculation using survey data.

it is possible that market proximity effect is negating the availability of alternative work nearer the urban center. To summarize: *Weekly working hours for agricultural workers is greater for younger workers, those better educated, and in barangays nearer the urban center.*

5. Conclusion

Summary

This study aims to address a gap in existing data and literature regarding the socio-economic profile of agricultural workers within rural households. It implemented a survey collecting data on the full range of labor and economic activities of rural households with agricultural workers, including patterns of employment and seasonality; other relevant worker and household characteristics; and the community-level context. Findings from data can be summarized as follows:

Household members of working age are almost evenly split between males and females; however, employed persons are disproportionately male. Only few employed persons are in members of an organization, and fewer still in an IP group.

Most employed persons are earning paid work for others (rather than working on own-account). There are large changes in employment status within a year. Moreover, while most workers and business operators are engaged in a single occupation at a time, a significant share are able to find a secondary occupation or business. By sector of employment, it is clearly that agriculture accounts for the dominant share, whether as workers or business operators; the second most important occupation is services.

While number of workers and business operators vary widely by quarter, average hours employed tend to remain above full-time equivalent and be fairly stable across survey rounds. However, hours employed varies widely across individuals, with visible underemployment varying from 13 to 17 percent across the quarters. Also varying widely within the year is basic daily pay, for both workers and especially for business operators.

Focusing on agricultural workers: agricultural workers who stay in the sector work under time on average, as do agricultural business operators. Nonetheless, diversified occupations/businesses allow agricultural workers to increase hours employed to full-time equivalent.

Within agriculture, there are wide variations in weekly hours employed across persons and across quarters. Agricultural workers are paid lower than average, both in terms of the basic and overall pay; within the year the quarter-to-quarter variation is similar to that of the average worker.

Cohort analysis of agricultural workers finds a large share of first round agricultural workers move out of agricultural work and mostly into not working, or nonagricultural work. Anytime agricultural workers exhibit movements similar to those of first-round agricultural workers, though basic daily pay is slightly higher. Lastly, consistent agricultural workers are not solely working in agriculture; nonetheless they are able to earn a higher basic daily pay and work more hours than anytime or first-round.

Based on individual characteristics, we find that agricultural workers are mostly male. Female agricultural workers earn far less than male agricultural workers. Most agricultural workers are of prime working age; earning prospects are highest for this age range (though working hours are highest for the youth age group).

Most agricultural workers have low levels of schooling. There some tendency for higher schooling to lead to more basic working hours, but little tendency to increase basic daily pay. Moreover, variability of basic daily pay across survey rounds declines as schooling level increases.

Based on barangay characteristics, we find that the farther a barangay from the nearest municipal hall, the lower the average daily basic pay and weekly working hours; and the greater the variability of basic daily pay. Meanwhile, higher basic daily pay and weekly working hours is associated with an improved state of rural infrastructure for the barangay. Lastly, the wider the spread of farm machinery in a barangay, the higher the basic daily pay.

The preceding summary examines variations over one characteristic at a time. Statistical analysis is needed to control for multiple factors that vary in the data. Tighter statistical analysis finds the following:

- Controlling for seasonality, individuals of working age are more likely to become an agricultural worker if they are male, older, less educated, and are in a barangay with better rural infrastructure and more remote from the urban center.
- Weekly working hours for agricultural workers is greater for younger workers, those better educated, and in barangays nearer the urban center

Implications

The following implications for research and policy are drawn with the *caveat* that our sample is representative of at most the large agricultural provinces of the country; no claim is made about the degree to which our findings represent the country as a whole. Nonetheless if indeed the findings generalize, then the following implications may be drawn.

First, **discussions of structural change should be nuanced in terms of its analysis of sectoral employment trends**. The link from declining employment in agriculture being picked up in statistical surveys, and permanent migration out of agriculture, still needs to be substantiated (rather than assumed). This is in view of the churn in status and sector of employment among the individuals of working age in our survey. The fragility of sectoral identification also permits a fresh perspective on issues such as: the decline in the number of agricultural workers; links to household income and poverty.

Second, **the volatility of employment is itself a policy concern; growth does apparently contribute to labor absorption from agriculture, but many jobs continue to be transient in nature**. While it is true that technological change is leading to growth of flexible labor arrangements, and even the "gig economy", it is more plausible to interpret the transience of sample jobs due to the high reliance on low quality employment in subsistence farming, together with petty trade, transport, and related services. The response lies not in restrictions against intermittent work, but ensuring the growth of establishments offering formal employment.

Third, **aggressive expansion of quality schooling remains very much a policy imperative for rural Philippines**. This may be inferred from our finding that the quality of jobs – whether in terms of stability of working hours or size of daily pay - definitely rises with human capital.

Fourth, aside from investments in human capital, **investments in rural infrastructure are still critical to sustained rural transformation and inclusive growth**. Better connectivity promotes transition to nonfarm work; even farm production to serve urban markets is boosted by farm-nonfarm linkages through transportation, storage, and communication.

Fifth, **design of programs** targeting agricultural workers should bear in mind the **implications of gender, the possibility of crowding-out, as well as the need for program flexibility**. With respect to gender: the study has found that women are especially

disadvantaged in terms of basic daily pay. The policies discussed in Briones (2019) may be reiterated in this regard.

As for crowding-out: it was only after careful study were we able to surface the fact that average hours of work among those employed is at full-time equivalent, and that jobs are highly variable; no wonder the "crowding-out" by publicly-funded livelihood programs is seldom raised. It is not clear however whether government-funded livelihood programs are well targeted to the visibly underemployed, or are merely displacing existing work among the fully-employed.

Lastly, program flexibility is needed given the wide variety of characteristics and behavior of agricultural workers among rural households. For instance, the Department of Labor and Employment (DOLE) identifies rural workers as a sub-sector among "workers with special concerns". One program targeting such workers is the Kabuhayan Program (DOLE, n.d.). Despite its gender focus (Women and Youth), and other advantageous features, it suffers from program rigidities: for one, it disqualifies 4Ps beneficiaries (a severe restriction given the expansion of the transfer scheme); it also courses benefits through organized groups, limiting its reach towards the unorganized workers.

This leads to the sixth implication: the low penetration of peoples' organizations (POs) among average rural workers urgently needs to be addressed. Not only does this limit the coverage of government programs; more importantly, the lack of formal rural organizations constrains prospects for stable employment at formal sector wage levels for non-migrant agricultural workers. The recent SAGIP-SAKA Act (Republic Act 11321) addresses this in part, though its organizational component must be fast-tracked.

Directions for further research

Previously the limitation of the study in terms of statistical validity has been mentioned; obviously a direction for further research will be to allocate sufficient resources to re-run the survey with survey design to address statistical validity. However, even short of such a nationwide panel, smaller scale studies will still useful, examining various themes that were only broached in this study. For instance, confirmation of structural change will require data on spells of employment disaggregated by sector, complemented by tracer studies of agricultural workers (moving out of the barangay) and/or origin studies of services workers in expanding barangays. The role of individual and community characteristics also deserve further primary data collection and deeper analysis – for instance, what is the link between low labor participation of female workers, and home work/household production? Does the spread of machinery displace farm workers, or does scarcity of farm workers drive the demand for machinery?

Lastly, the inferences made above from study findings to program design and public investment themselves require careful study and validation. The issue of crowding-out, for instance, is seldom raised except in rigorous impact evaluation. The proper modality of organizing agricultural workers and operators into farmer and fishery enterprises is unclear – there is no presumption that government itself will undertake the activity, or whether services of other entities (perhaps nongovernmental organizations) will need to be procured, and under what conditions. Clearly the research agenda of agricultural employment and rural household welfare remains rich and awaiting further exploration.

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