RESEARCH ARTICLE

Household Crop Incomes Among Small Farmers: A Study of Three Villages in West Bengal

Biplab Sarkar*

Abstract: This article examines incomes from crop production in West Bengal. Specifically, it analyses the levels and determinants of household crop incomes across regions and socio-economic classes. It is based on an examination of household survey data collected by the Foundation for Agrarian Studies (FAS) in three villages located in different agro-ecological regions of West Bengal. The article discusses how farm business incomes vary across the study villages. We found that there was not much difference in farm business incomes between an advanced village and a relatively backward village in the survey year. This was due mainly to a crash in potato prices in the advanced village. The analysis of potato cultivation across socio-economic classes covers various aspects of potato cultivation, such as the selection of varieties, contract farming arrangements, different components of cost, and marketing channels. In Panahar, where the major commercial crop was potato, diversification to potato cultivation had a negative impact on incomes, as potato prices crashed in the survey year.

Keywords: household crop income, small farmer, PARI, negative incomes, farm business incomes, potato price, West Bengal, village study, crop diversification, risk.

Introduction

Farmers in India have contributed greatly to the country's transformation from a state of food insecurity to one of surplus cereal production (NCF 2004a, 2004b, 2006a, 2006b, 2006c). Between 1950-51 and 2015-16, the production of foodgrain in the country increased from 51 million tonnes to 252 million tonnes, while oilseed production increased from 5 million tonnes to 25 million tonnes (GoI 2016). Similar growth was also achieved in the production of sugarcane, cotton, fruit, vegetables, and other crops.

* Assistant Professor (Economics), Centre for Development Studies, PES University, biplabisi@gmail.com

Despite tremendous gains in agricultural development after Independence, the problems of indebtedness, crop failure, non-remunerative prices for crops, poor returns over costs of cultivation, and negative crop incomes persist in the farming system (Reddy and Mishra 2009; Ramachandran 2011; Rawal and Swaminathan 2011a; Dev 2012; Gaurav and Mishra 2014). The National Commission on Farmers 2004–6 appointed by the Ministry of Agriculture, Government of India, was one of the earliest official bodies to recognise the crisis in farm incomes and livelihoods. The first objective of the National Policy for Farmers formulated by the Commission was to improve the economic viability of farming by ensuring a minimum net income (NCF 2006a, 2006b, 2006c). The National Policy for Farmers (GoI 2007) also recognised the need to focus on the economic well-being of farm households.

> There is a need to focus more on the economic well-being of the farmers, rather than just on production. Socio-economic well-being must be a prime consideration of agricultural policy, besides production and growth. The aim of the Policy is, therefore, to stimulate attitudes and actions which should result in assessing agricultural progress in terms of improvement in the income of farm families, not only to meet their consumption requirements but also to enhance their capacity to invest in farm-related activities (GoI 2007, p. 2).

Official data (NSSO 2005) indicate that in 2002–3, 95 per cent of farm households cultivating less than four hectares of land were unable to earn enough to meet their consumption needs (Bhalla 2006). This means that small and marginal farmers could undertake little to no investment to improve agriculture. This is especially significant for West Bengal, a State where marginal and small farmers cultivate 84 per cent of agricultural land (NSSO 2015).

This article uses data from three villages in West Bengal surveyed at different points of time as part of the Project on Agrarian Relations in India (PARI). The villages are Amarsinghi in Malda district, Kalmandasguri in Koch Bihar district, and Panahar in Bankura district.[1]

The article addresses the following questions: what are the levels of income from crop production in the study villages? How does crop income vary across households, and across the villages? What are the factors affecting levels of household crop income in the villages?

Village Surveys: An Introduction

Panahar in Bankura district, Amarsinghi in Malda district, and Kalmandasguri in Koch Bihar district are located in three distinct agro-ecological regions in West Bengal

[1] A total of 25 villages across 11 States have been surveyed under PARI between 2005 and 2016 (see www.fas.org.in).

(Appendix Table 1). A census-type survey of all resident households in the villages was conducted in 2010. Only those households that operated some land (hereafter called farm households) have been considered in this article. By this definition, farm households constituted 71 per cent of all households in Amarsinghi, 79 per cent of all households in Kalmandasguri, and 75 per cent of all households in Panahar. All farm households in Amarsinghi and Kalmandasguri came under the definition of "small farmers," that is, the extent of their operational holdings was less than two hectares. In Panahar, 95 per cent of farm households (all but eight farm households) were small farmer households. Some basic characteristics of the study villages are given in Table 1.

These villages provide interesting case studies of production systems that have specific features, yet share general characteristics of agricultural production in West Bengal.

Panahar village in Bankura district is well-connected by all-weather roads to urban centres and regulated markets. The village had stable access to irrigation throughout the reference year. The average crop yield in the village was significantly higher than the State and all-India average. In contrast, Kalmandasguri in Koch Bihar district is connected by a mud and gravel road to the nearest urban centre. Agriculture here was mostly unirrigated with low agricultural yields. Amarsinghi in

Table 1 *Characteristics of the study villages, West Bengal, 2009–10*

Characteristics of the village	Panahar (Bankura district)	Amarsinghi (Malda district)	Kalmandasguri (Koch Bihar district)
Number of households	248	128	147
Total population	1,083	579	701
Share of irrigated land in gross cropped area (in per cent)	90	89	40
Sources of irrigation (area under the source as a proportion of gross cropped area)	Tubewells (86) Canals (3) Ponds (1)	Tubewells (82) RLI (6) Ponds (1)	Tubewells (35) Ponds (5)
Major crops in kharif season (June-July to November)	*aman* and *aus* rice	*aman* rice	*aman* rice
Major crops in rabi season (November to February-March)	potato, mustard/ rapeseed, wheat, and vegetables	mustard/ rapeseed, potato	potato, mustard/ rapeseed, and vegetables
Major crops in summer season (February-March to May-June)	*boro* rice, sesame	*boro* rice, jute	jute
Cropping intensity	2.05	1.94	1.84

Notes: RLI = River Lift Irrigation.
Cropping intensity is the ratio of gross cropped area to net sown area.
Source: PARI survey data 2010.

Malda district is very close to the Samsi regulated market and motor vans were the main means of transport between the village and the market. Rice yields in Amarsinghi were substantially higher than the State and all-India averages. But the average yields of major non-foodgrain crops (jute and mustard/rapeseed) in the village were lower than average yields in the district and the State.

The three villages also share some common features that characterise rural West Bengal. They are all dependent primarily on rice cultivation.[2] Secondly, there is a significant presence of smallholder agriculture in all three villages.[3]

Estimates of Household Crop Income

Calculating household crop income can be a complex process, given that a substantial part of the produce is not marketed and a large part of the inputs used in production is not purchased from markets. In fact, for some products and inputs, no markets or only very basic markets exist. In general, households cannot directly report crop income over a specified reference period; instead, income has to be derived from a detailed accounting of crop output and input costs (Bakshi 2010).

This article calculates household crop incomes from detailed data on crop inputs and outputs. I calculate the gross value of output (GVO) and two cost measures: paid-out cost (or Cost A2) and "catch-all cost" (or Cost C2). The gross value of output less paid-out cost is designated farm business income and gross value of output less catch-all cost is designated net income.

The values of the main crop product and the by-product together constitute the gross value of output. The main product is that part or item of the produce for which crop production is undertaken. The by-product refers to straw, plant bushes, or other plant residue. The gross value of output is the total value of produce, including output consumed and sold. Each crop produced by a household during the reference year is valued separately and aggregated to estimate the gross value of output.

The cost items considered in the Cost A2 and Cost C2 calculations are listed in Appendix Table 2. The calculation methodology for each of the items comprising Cost A2 is available in a manual by the Foundation for Agrarian Studies, *Calculation of Household Incomes: A Note on Methodology* (FAS 2015). For the calculation of Cost C2, I have followed the Cost of Cultivation of Principal Crops

[2] Village data show that the share of area under paddy in the total gross cropped area ranged from 49 per cent in Kalmandasguri to 65 per cent in Panahar and Amarsinghi. According to the Bureau of Applied Economics and Statistics, Government of West Bengal, paddy covered 58 per cent of the gross cropped area of West Bengal in 2011–12 (Government of West Bengal 2013).

[3] The village data show that all the agricultural land in Amarsinghi and Kalmandasguri were owned by marginal and small farmers. In Panahar, marginal and small farmers owned 60 per cent of the total agricultural land in the village.

(CCPC) methodology to impute the rental value of owned land, interest on fixed capital assets, and wages for family labour use.

The rent of owned land is imputed based on the prevailing average rate of rent in the tenancy market in the village. The average rent so calculated for each crop is then imputed as rent on owned land. Interest on fixed capital is calculated from data on means of agricultural production owned by the households. Following the CCPC scheme methodology, we calculate interest at the rate of 10 per cent per annum on the present value of fixed productive assets, which includes all machinery owned and used by the household for cultivation. Cost of family labour is imputed depending on the prevailing daily wage rate in the village.

Socio-Economic Classification of Households

This section describes briefly the PARI classification of farm households into socio-economic classes in the study villages. Three criteria are used to identify socio-economic classes: ownership of the means of production, the nature of labour deployment on land, and the level and composition of incomes.

The following descriptive classification is from Ramachandran (2015).

Landlords/Capitalist Farmers

The first category comprising landlords/capitalist farmers refers to households that own the most and the best land in the village. These households do not labour in any major manual operations.[4] Of the three study villages, only Panahar had a landlord/capitalist farmer class, with seven households included in this category (Appendix Table 3). Four of these households were Goala families, who initially had small holdings, but had purchased land over time. The other three households had inherited their landholdings and were the descendants of a Muslim Jotedar family. These three families owned the most and the best land in the village. No member of these seven families worked on the fields. Some employed full-time farm servants, but most relied on daily hired labour to cultivate their fields.

Peasantry

Members of peasant households worked on all or some of the major manual operations on the land. Peasant households constituted 78 per cent of all cultivator households in Panahar, 61 per cent of all cultivator households in Amarsinghi, and 59 per cent of all cultivator households in Kalmandasguri.

[4] Extracted from a presentation on socio-economic classes in the study villages in West Bengal, and delivered by V. K. Ramachandran in Durgapur, West Bengal, September 11, 2015.

The peasantry was further classified into "upper" and "lower" on the basis of a labour ratio criterion. The labour ratio is defined as the ratio between the sum of the number of days of family labour and the number of days of labouring out of members of the household in agricultural and non-agricultural work (in the numerator), and the number of days of labour hired in by the household (in the denominator). Peasant households with a labour ratio above zero but less than one were classified as "peasant (upper)," while those with a coefficient greater than one were classified as "peasant (lower)."

Among the peasantry, means of production were mostly owned by the upper peasants. Lower peasants hardly had any productive assets other than small plots of land (Appendix Table 3).

Manual Workers

Income for manual worker households was mostly from work as hired labour on others' land and for tasks outside crop production. Manual worker households may operate some land to cultivate cereals for household consumption. The proportion of manual worker households to total households in the village was 25 per cent in Panahar, 38 per cent in Amarsinghi, and 37 per cent in Kalmandasguri. Around 31 per cent of manual worker households in Panahar, 51 per cent in Amarsinghi, and 66 per cent in Kalmandasguri were cultivators. In Panahar, the land cultivated by manual worker households accounted for only one per cent of total gross cropped area. The corresponding figures in Amarsinghi and Kalmandasguri were eight per cent and 11 per cent respectively. In Panahar, manual worker households were mainly tenant cultivators. In Amarsinghi and Kalmandasguri, they cultivated small plots of owned land.

Others

Households that were primarily engaged in and dependent on non-agricultural business, salaried employment, artisan work, and pensions and remittances, were identified and classified separately as "Others." These households operated some land, but the members earned a major portion of their income from sources other than farming and wage labour. In Panahar, 12 households were classified in this category; they operated five per cent of the gross cropped area in the village. In Amarsinghi and Kalmandasguri, there were 12 such households, operating four per cent and 10 per cent of the gross cropped area respectively.

Household Crop Income: Levels and Disparities

Our major findings follow.

First, there was a marked variation in farm business income across the study villages in 2009–10. Farm business incomes of a majority of farm households in Panahar, a village

Table 2 *Descriptive statistics of annual farm business income per household, study villages, West Bengal, 2009–10* in Rupees per household

Village name	Number of farm households	Farm business income (Rupees per household)				
		Median	Mean	Minimum	Maximum	Coefficient of variation
Panahar	184	1,780	11,606	−41,184	489,169	4.46
Amarsinghi	91	10,460	14,538	−1,666	119,961	1.15
Kalmandasguri	116	7,996	11,374	−24,750	131,149	1.53

Note: The differences in mean annual farm business income per household across study villages are not statistically significant (Results of one-way ANOVA:F(2,388) = 0.227 and p value = 0.797).
Source: PARI survey data 2010.

in an agriculturally advanced region (Old Alluvial Zone) were lower than those in Kalmandasguri, a village located in a relatively backward region (Terai Teesta Zone). Table 2 shows that median annual farm business income for farm households in relatively well-irrigated Amarsinghi, located in the New Alluvial region of West Bengal, was Rs 10,460. The median farm business income was Rs 1,780 in Panahar and Rs 7,996 in Kalmandasguri.

Incomes are based on a single year's observation. Even though the survey year was a good agricultural year in terms of rainfall and yield, there was a problem with potato prices (discussed later).

Mean farm business incomes were higher than median incomes, as averages were influenced by the high incomes of a few households. The mean farm business income per household over the reference year was Rs 14,538 in Amarsinghi, Rs 11,374 in Kalmandasguri, and Rs 11,606 in Panahar. It is significant that, on average, Panahar had more operated land, higher irrigation, crop yield, and higher crop intensity, yet in 2009–10 the mean annual farm business income was similar to that of Kalmandasguri, a relatively backward village, where only around 40 per cent of the gross cropped area was irrigated and crop yields were substantially lower.

In a study of 600 households in two districts of West Bengal in 1999–2000, Bhaumik (2007) observed that the mean annual farm business income was Rs 21,170 per household in an agriculturally advanced district (Hooghly) as compared to Rs 6,080 per household in a relatively backward district (Koch Bihar).[5] The data from the study villages in 2010 did not show any statistically significant difference in mean annual farm business income between advanced and backward regions in the State.

In a survey conducted in 2003–4, Rakshit (2014) found that the annual income from crop production per holding in an agriculturally advanced region was higher than in

[5] The consumer price incomes at 2009–10 prices (with State CPI-AL) are Rs 38,106 in Hooghly and Rs 10,994 in Koch Bihar.

a backward region. He calculated two variables to project economic surpluses or deficits of cultivator households in Bardhaman (an advanced region) and Purulia (a backward region) districts of West Bengal. The variables were farm labour income (FLI) and farm labour surplus/deficit (FLS). FLI is the value of agricultural production less total material input cost and wages in kind and cash. FLS is FLI less imputed value of family labour. However, the cost of rent paid for leased-in land, maintenance expenses of owned animal and machinery, depreciation of implements and machinery, interest on working capital, and land revenue were not accounted for in the crop income estimation. Therefore, a comparison with the calculations made in this article must be made with caution. Rakshit calculates an annual FLI per holding of Rs 17,060 in the advanced region and Rs 11,451 in the backward region (or Rs 27,807 and Rs 18,665 respectively at 2009–10 prices). The corresponding figures for annual FLS were Rs 17,225 and Rs 14,094 at 2009–10 prices.

A study conducted by Bakshi (2010) in three villages of West Bengal in 2005–6 found that mean annual farm business income per household was Rs 10,401 in Bidyanidhi village, located in the agriculturally advanced Bardhaman district. The corresponding figures for Amarsinghi (Malda) and Dalkati (West Medinipur) villages were Rs 3,725 and Rs 1,610 respectively.[6]

Secondly, low, and even negative farm business incomes for a majority of the households in Panahar was on account of the huge loss incurred in potato cultivation as a result of a crash in potato prices in the survey year.[7] The average farm harvest price in the district in 2010 was the lowest price, in real and nominal terms, in relation to the past five years. I re-calculated farm business income for a hypothetical situation. What would incomes be if farm households received prices for a normal year? New estimates of farm business income that were arrived at by calculating average farm harvest prices of potato for the previous three years are shown in Table 3.[8]

The estimated mean annual farm business income per household, based on triennial average farm harvest prices, was Rs 35,103 in Panahar, followed by Kalmandasguri (Rs 18,288), and Amarsinghi (Rs 14,538). Panahar now emerges as the village with a significantly higher average farm business income than Amarsinghi and Kalmandasguri.

Thirdly, income from crop production is generally low, but there are pronounced variations across farm households within a village. Take for example, Panahar, where the mean annual income from crop production was only Rs 11,606 per household but varied from minus (–) Rs 41,184 to Rs 489,169 per household (Table 2).

[6] This is equivalent to Rs 15,289, Rs 5,476, and Rs 2,367 respectively at 2009–10 prices.

[7] Actual farm harvest price received (FHPs) was below paid-out cost (Cost A2) for 80 per cent of farmers in Panahar in 2010. Farmers incurred paid-out cost of Rs 286 per quintal, but received only Rs 181 per quintal for their production.

[8] I use district-level farm harvest prices for 2006–7, 2007–8, and 2008–9, at 2009–10 prices.

Table 3 *Descriptive statistics of annual farm business income per household after potato price adjustment, study villages, West Bengal, 2009–10* in Rupees per household

Village name	Farm business income (in Rupees per household)			
	Mean	Minimum	Maximum	Coefficient of variation
Panahar	35,103	−11,165	694,384	2.37
Amarsinghi	14,538	−1,666	119,961	1.15
Kalmandasguri	18,288	−5,254	210,452	1.56

Note: There was a statistically significant difference in mean annual farm business income between study villages as determined by one-way ANOVA ($F(2,388)=4.716$, p value = 0.009). A Tukey post-hoc test revealed that the mean annual farm business income was statistically significantly higher for Panahar compared to Amarsinghi and Kalmandasguri. There was no statistically significant difference in mean annual farm business income between Amarsinghi and Kalmandasguri.
Source: PARI survey data 2010.

At the same time, it must also be noted that incomes from sources other than crop cultivation supplemented crop production incomes. Table 4 shows the average household incomes from different sources in the study villages. Average income from crop production was only around 18 per cent of total household incomes in Panahar (Bankura district) and Kalmandasguri (Koch Bihar district) in 2009–10. By contrast, in Amarsinghi in Malda district, around 30 per cent of average household incomes came from crop cultivation. Other sources of income played an important role to supplement the income of farm households. However, the extent of contribution of other economic activities varied across villages and classes of cultivators. For example, income from animal resources was 4 per cent of average household income in Panahar and around 13 per cent in Kalmandasguri in 2009–10.

Finally, farming for a majority of households is non-remunerative when the cost of family labour, rental value of own land, and interest on other productive assets are imputed (Cost C2) to estimate the income from crop production. Table 5 shows that

Table 4 *Average household incomes from crop production, animal husbandry, and other activities, study villages, West Bengal, 2009–10* in Rupees per household

Village name	Average farm business income	Average income from animal husbandry	Average income from other sources*	Average household income
Panahar	11,606	2,260	48,872	62,738
Amarsinghi	14,538	3,844	29,727	48,109
Kalmandasguri	11,374	7,681	42,453	61,508

Note: *Other income sources include rental income from agricultural land and machinery, wage earnings from farm and non-farm employment, salary, business, money lending, pensions, and remittances.
Source: PARI survey data 2010.

Table 5 *Descriptive statistics of annual net income (NI) over Cost C2 from crop production per household, study villages, West Bengal, 2009–10* in Rupees per household

Village name	Net income over Cost C2 from crop production (Rupees per household)				
	Median	Mean	Minimum	Maximum	Standard Deviation
Panahar	−1,379	−997	−90,922	309,004	36,088
Amarsinghi	2,520	5,267	−11,113	84,351	11,842
Kalmandasguri	−1	−151	−45,692	79,591	12,665

Note: Differences in mean annual farm business income per household across study villages are not statistically significant (Results of one-way ANOVA F (2,388) = 1.809 and p value = 0.165).
Source: PARI survey data 2010.

median annual net incomes (NI) in Panahar and Kalmandasguri were negative in 2009–10. In Amarsinghi it was positive, but low.

Dey's (2013) calculation of farm labour surplus (FLS) for sample households in Birbhum, Bardhaman, Hooghly, and Murshidabad districts includes the imputed cost of family labour. He estimated an average income of minus (–) Rs 29,525 per holding in 2010–11. He imputed the value of family labour with the cost of material inputs and the wage bill for hired labour, and subtracted it from the value of agricultural production to arrive at farm labour surplus (FLS).

The proportion of farm households that incurred a loss in crop production over Cost C2 was 65 per cent in Panahar, 50 per cent in Kalmandasguri, and 28 per cent in Amarsinghi. Accounting only for paid-out cost (Cost A2), a substantial proportion of farm households still incurred losses (Figure 1).[9]

The Lorenz curve of income from crop production shows that a cumulative 84 per cent of farm households in Panahar received zero income over Cost A2. This proportion was 42 per cent in Kalmandasguri and 11 per cent in Amarsinghi (Figure 2).

Several factors can lead to losses from crop production. Negative incomes could be on account of low crop yields due to weather shocks, pests and diseases, high input prices, low output prices, or other factors. In the study villages, the primary cause for losses in crop production was low agricultural output prices in general and a crash in potato prices in the survey year in particular. However, some households also incurred losses specifically because of low crop yields, particularly with regard to mustard cultivation in Panahar and jute cultivation in Kalmandasguri.

Crop insurance is a possible solution to protect farmers from losses. In reality, crop insurance schemes in India have limited coverage, especially among small farmers (Das and Swaminathan 2017).

[9] Bakshi (2017) argues that loss making farmers do not give up farming because of the lack of alternative sources of employment.

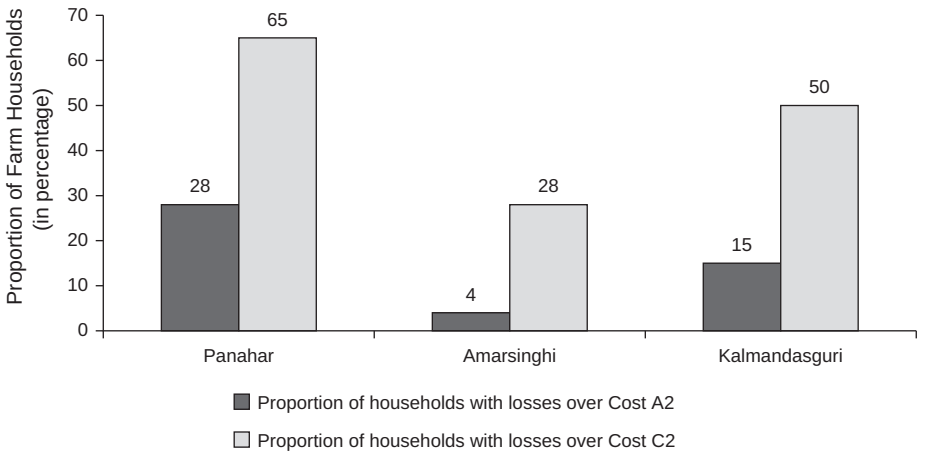

Figure 1 *Proportion of farm households with negative incomes from crop production, by study villages, West Bengal, 2009–10* in per cent
Source: PARI survey data 2010.

Variations in Household Crop Income Across Socio-Economic Classes

All households with operational holdings are grouped into five categories. The categories are: landlords/capitalist farmers, peasant (upper), peasant (lower), hired manual workers, and other households.

Table 6 presents data on average farm business income per household across different socio-economic classes. In Panahar (Bankura district), average farm business income per household was highest for landlord/capitalist farmers (Rs 167,478) and declined sharply for poorer socio-economic classes. The income of peasant (lower) households from crop production was only around one per cent of

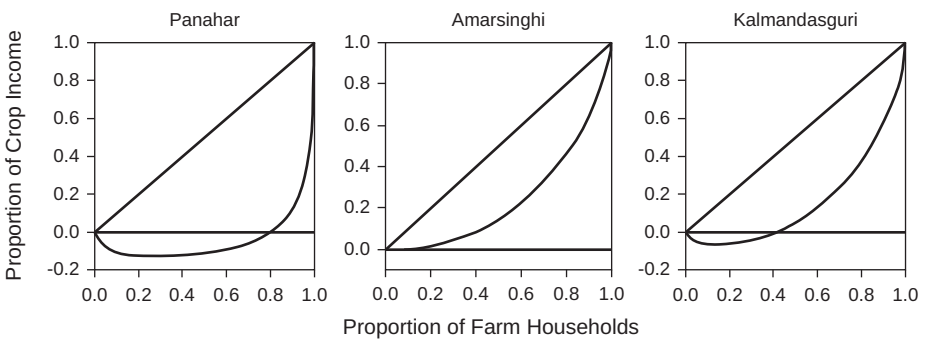

Figure 2 *Lorenz curves of farm business income per household, by study villages, West Bengal, 2009–10*
Source: PARI survey data 2010.

Table 6 *Mean annual farm business income (FBI) by socio-economic class, study villages, West Bengal, 2009–10* in Rupees per household

Socio-economic class	Panahar		Amarsinghi		Kalmandasguri	
	Number	FBI	Number	FBI	Number	FBI
Landlord/Big Capitalist Farmers	7	167,478				
Peasant (upper)	52	14,555	19	30,370	30	21,506
Peasant (lower)	93	1,886	36	16,058	38	12,687
Manual Workers	20	1,895	24	4,477	36	3,283
Other Households	12	−572	12	5,035	12	6,157
All Farm Households	184	11,606	91	14,538	116	11,374

Source: PARI survey data 2010.

the income earned by landlord/big capitalist farmers. Amarsinghi (Malda district) and Kalmandasguri (Koch Bihar district) villages had no landlords and big capitalist farmers, but variations in average farm business income across classes were substantial. In Amarsinghi, it was Rs 30,370 for the peasant (upper) category, Rs 16,058 for the peasant (lower) category, and Rs 4,477 for hired manual worker households. In Kalmandasguri, it was Rs 21,506 for the peasant (upper) category, Rs 12,687 for the peasant (lower) category, and Rs 3,283 for hired manual worker households.

The level of farm business income depends on the extent of operated land and the return per hectare. Average operated land is directly related to the class status of households (with the exception of the "other" household category). For instance, in Panahar, the average size of household operational holding was highest for landlord/big capitalist farmers among all categories of farm households (9.24 acres), followed by peasant "upper" (1.89 acres), peasant "lower" (0.39 acres), and hired manual workers (0.15 acre). The average size of household operational holding among other households was 1.02 acres.

The relationship between socio-economic class and the return per hectare is a complex one. Table 7 shows the relationship between socio-economic class and farm business income per hectare. In Panahar, the average farm business income per hectare declines as one moves from the landlord/capitalist farmer class (Rs 33,780) to upper peasant (Rs 14,938) and lower peasant households (Rs 12,910). However, the per hectare farm business income for hired manual workers was higher (Rs 25,205) than for peasant classes. Hired manual workers in Panahar operated only one per cent (a negligible share) of the gross cropped area in the village.

There was a positive relationship between socio-economic class and farm business income per hectare in Panahar. There was no such relationship in Amarsinghi and Kalmandasguri.

Table 7 *Mean annual farm business income (FBI) by socio-economic class, study villages, West Bengal, 2009–10* in Rupees per hectare

Socio-economic class	Annual farm business income (in Rupees per hectare)		
	Panahar	Amarsinghi	Kalmandasguri
Landlord/Capitalist Farmers	33,780	—	—
Peasant (upper)	14,938	35,500	26,768
Peasant (lower)	12,910	46,665	41,472
Manual Workers	25,205	43,566	37,753
Other Households	−8,163	48,840	23,419
All Farm Households	14,239	43,803	34,648

Note: There was a statistically significant difference in mean annual farm business income between socio-economic classes in Panahar as determined by one-way ANOVA (F(4,179)=3.751, p value = 0.006). A Tukey post-hoc test revealed that the mean annual farm business income was statistically significantly higher for landlord/capitalist farmers compared to all other classes. There was no statistically significant difference in mean annual farm business income between socio-economic classes in Amarsinghi and Kalmandasguri as determined by one-way ANOVA (Amarsinghi F(3,87)=0.463, p value = 0.709 and Kalmandasguri F(3,112)=1.344, p value = 0.264).
Source: PARI survey data 2010.

It may be argued that the relationship between socio-economic class and profitability will be different if we measure returns from crop production over Cost C2. Estimates of average income from crop production over Cost C2, presented in Table 8, show that the direction of the relationship between class and net return remains unchanged. In Panahar, landlord/capitalist farmers had the highest level of net income from crop production over Cost C2. However, no such relationship was evident in Amarsinghi and Kalmandasguri.

Table 8 *Mean annual net income (NI) over Cost C2 from crop production by socio-economic class, study villages, West Bengal, 2009–10* in Rupees per hectare

Socio-economic class	Annual net income (NI) from crop production (Rupees per hectare)		
	Panahar	Amarsinghi	Kalmandasguri
Landlord/Capitalist Farmers	9,655	—	—
Peasant (upper)	−16,912	12,156	−1,764
Peasant (lower)	−21,024	15,872	4,294
Manual Workers	−887	10,355	−541
Other Households	−31,526	22,505	−6,928
All Farm Households	−17,191	14,516	66

Note: There was a statistically significant difference in mean annual farm business income between socio-economic classes in Panahar as determined by one-way ANOVA (F(4,179)=2.648, p value = 0.035). A Tukey post-hoc test revealed that the mean annual farm business income was statistically significantly higher for landlord/capitalist farmers compared to all other classes. There was no statistically significant difference in mean annual farm business income between socio-economic classes in Amarsinghi and Kalmandasguri as determined by one-way ANOVA (Amarsinghi F(3,87)=0.373, p value = 0.773 and Kalmandasguri F(3,112)=0.385, p value = 0.764).
Source: PARI survey data 2010.

Potato Cultivation in Panahar

In Panahar, 23 per cent of the gross cropped area was under potato cultivation in 2009–10. The varieties of potato cultivated in Panahar included *Jyoti*, *Pokhraj*, and *Atlantic*. The first two were cultivated for sale in the open market and the third was cultivated under contract farming. The *Atlantic* variety was mainly cultivated by landlord/capitalist farmers, and occupied a fourth of the area they cultivated with potato. Two middle peasant households cultivated *Atlantic* on two per cent of the total area under potato cultivated by this socio-economic class. The *Jyoti* and *Pokhraj* varieties were cultivated by all categories of farmers and accounted for 61 and 32 per cent respectively of the total area under potato cultivation.

Potato is planted in Panahar between October and December and harvested between January and March. A perishable commodity, it cannot be stored for more than a month without cold storage. In 2009–10, 72 per cent of potato produced (*Jyoti* and *Pokhraj*) was immediately sold upon harvest, while the rest was kept in cold storage.

Cold storage facilities around Panahar were privately owned. In 2010, the cost of storage was Rs 54 per bag (50 kg of potato) for a period up to 10 months. The cold storage would issue a receipt for the potatoes, termed potato bonds. These bonds could be traded in the market as well as exchanged for potatoes at a day's notice at any time during the 10 months. If the potato was not retrieved in this period, it would be kept by the cold storage facility.

A majority of the farmers in Panahar sold potatoes to village traders. The traders resold a significant portion of the produce in neighbouring wholesale markets ("mandis" in Kotulpur) to large traders, for whom they worked as commission agents. The large traders in turn sold potato to retailers in the retail markets, or in the neighbouring States of Odisha, Bihar, Assam, and Andhra Pradesh.

Marketing channels of potato cultivators are depicted in Figure 3. Two-thirds of the marketed potato in Panahar was sold to village traders and another five per cent was sold directly to large traders in Kotulpur. A negligible quantity (less than one per cent of total production) was sold to a cooperative society.

The following are some major observations regarding potato marketing.

First, potato cultivators in Panahar, on average, received prices lower than the paid-out cost in 2009–10. As a result, a majority of the potato cultivators (80 per cent) made losses. A price of around Rs 300 per quintal was required for an average cultivator to break even. However, almost the entire output was sold to private traders at less than Rs 300 per quintal. The West Bengal State Co-operative Marketing Federation Limited (BENFED) purchased potatoes at Rs 350 per quintal, but acquired only one per cent of the total production in the village.

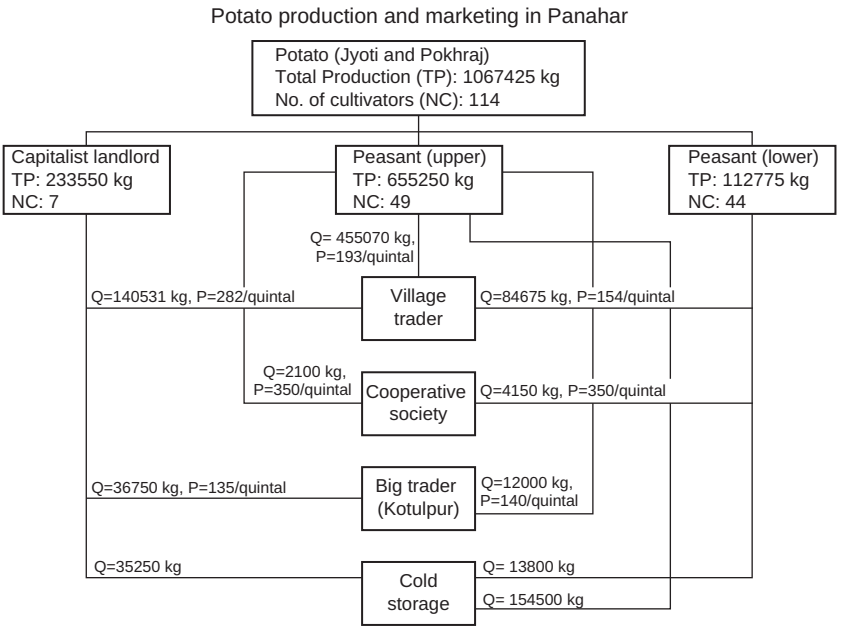

Figure 3 *Potato production and marketing channels in Panahar, Bankura district, West Bengal, 2009–10*
Note: Q = Quantity and P = Price.
Source: PARI survey data 2010.

Secondly, in the absence of government support, the price of potato was influenced by negotiations between farmers and village traders. The relative bargaining power of the farmer was dependent on economic status, volume of marketed output, and dependence on traders for inputs and credit. Most village traders or input dealers have a network of farmers to whom they provide required inputs such as seed, fertilizers, or cash on credit, and from whom they buy potato on a regular basis. Payments are often delayed, which is why farmers prefer selling to traders with a good record of trade credit repayment. It has been observed that capitalist landlords received better prices than peasants from the village trader (Figure 3).

Thirdly, there is a difference between the price offered by traders to farmers in the village and the prevailing price in the nearest market at Kotulpur. Potato prices were collected from a big trader in Kotulpur market from February to December 2010 (Figure 4). Prices were relatively low (below Rs 300 per quintal) for three to four months (February–May) following the harvest. This gradually rose to Rs 400 between May and August, and increased sharply in the period September–December to Rs 500 to Rs 700 per quintal. More than two-thirds of the produce was sold in the early months after the harvest. However, it was sold at a village price lower than the prevailing market price in Kotulpur. Farmers mainly rely on village traders. The daily price uncertainty and cost of transporting produce to the market were

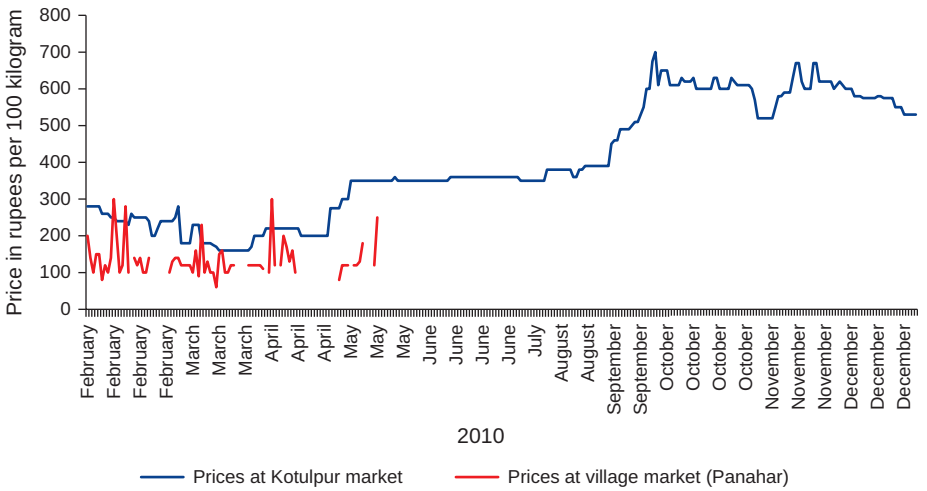

Figure 4 *Jyoti potato prices in the village market and at Kotulpur market, Bankura district, West Bengal, February to December 2010* in Rupees per quintal
Note: 2010 potato prices at Kotulpur market were collected during a follow up visit in 2013.
Source: PARI survey data 2010.

deterrents against sale in Kotulpur. Also, a number of farmers bought inputs from local agents and in turn sold the output to them.

Given the seasonal price movement, the rational action for farmers would be to put the crop in cold storage and sell the produce several months after harvest. However, in the absence of sufficient cold storage space, some farmers were compelled to sell their output just after the harvest.[10]

Contract Farming

Though the *Atlantic* variety of potato was not widely cultivated in Panahar, it comprised 25 per cent of potato cultivation by landlord/capitalist farmers. This variety was grown under contract farming in agreement with Frito Lays, a subsidiary of PepsiCo Company Private Limited. The company approached potential farmers through commission agents. As per the rules of the agreement between the farmer and the commission agent, the farmer was entitled to a kit (including seed and guidelines document), credit (in kind), price insurance, and frequent inspection. Insecticides and pesticides were also provided by the company, though the farmers had to bear the cost. Contract farmers supplied land, labour, and residual inputs. Field agents of the company made frequent visits to monitor technical aspects of cultivation, such as farming practices, and to check for disease and pests. The output price was fixed before sowing. In 2009–10, the rate was Rs 490 per quintal, much higher than the break-even price of Rs 300. An "incentive price"

[10] On shortages of cold storage space in West Bengal, see Dahiya and Sharma (1994), GoI (2010).

in addition to the base price was on offer for quality produce and a good relationship with the company.

Contract farming of the *Atlantic* variety with an assured price was profitable and the returns were higher than the production of *Jyoti* and *Pokhraj*, as both varieties registered a steep decline in prices that year.

A study by Pandit *et al.* (2009) observed that contract farming of potato in four southern districts of West Bengal resulted in good returns in 2008 in comparison to those obtained by non-contract farmers. Tripathy *et al.* (2005) also note the greater profitability of potato in Haryana due to contract farming. Similarly, Singh (2002) mentions that contract farming had led to higher farm incomes in Punjab.

These studies argue that contract farming offers greater economic viability. The scope of operation of contract farming and its suitability for small and marginal farmers, however, need further study. In Panahar, contracts were mainly undertaken with landlord/capitalist farmers.While the reasons for absence of contract farming among small and marginal farmers need more study, my present hypothesis is that company agents do not find it worthwhile to engage with those cultivating tiny plots.

Conclusions

This article explored levels of and variations in annual farm business income (gross value of output minus Cost A2) of households across socio-economic classes in three villages located in different agro-ecological zones of West Bengal. The analysis is based on household-level data from village census surveys conducted by the Foundation for Agrarian Studies in 2010.

It shows that annual farm business incomes varied substantially across villages located in different agro-ecological regions. The median annual farm business income for farm households in Amarsinghi village, located in the New Alluvial region of West Bengal, was Rs 10,460. It was Rs 7,996 in non-irrigated Kalmandasguri village, located in the Teesta Terai region. In Panahar, an irrigated village in the Old Alluvial region of West Bengal, median annual farm business income was only Rs 1,780. The unexpected lower income in Panahar was mainly because of huge losses incurred in potato cultivation because of a crash in output prices in the survey year.

Secondly, a substantial proportion of households incurred negative crop incomes, or losses from crop production. The proportion of farm households that incurred a loss in crop production over Cost A2 was 28 per cent in Panahar and 15 per cent in Kalmandasguri. In the case of Panahar, this loss was mainly on account of losses incurred in potato farming, whereas in Kalmandasguri, low yields for mustard and jute cultivation were important factors.

Thirdly, the variation in annual farm business incomes across households within villages was substantial. In Panahar, farm business incomes per household were highest for landlord/capitalist farmers and declined steeply as we moved down the socio-economic class hierarchy. The crop income of poor peasant households was only one per cent of the crop income of landlord/capitalist farmers. In Amarsinghi and Kalmandasguri, there were no landlords and capitalist farmers, but variations in average farm business income across classes remained.

In Panahar, where the major commercial crop was potato, diversification to potato cultivation had a negative impact on incomes, as potato prices crashed in the survey year. Diversification to commercial crops, it is argued, can be a necessary and sufficient condition to augment farmers' income. Commercial crop cultivation without adequate institutional support to mitigate high risks of cultivation, however, can lead to huge losses.

Acknowledgements: I am grateful to Madhura Swaminathan, V. K. Ramachandran, two anonymous referees, and the editorial team of the journal. I also thank Deepak Kumar for comments on earlier versions of the article.

References

Bakshi, Aparajita (2010), "Rural Household Income," PhD thesis submitted to the Department of Economics, University of Calcutta, Kolkata.

Bakshi, Aparajita, with Modak, Tapas Singh (2017), "Incomes of Small Farmer Households," in Madhura Swaminathan, and Sandipan Baksi (eds.), *How Do Small Farmers Fare? Evidence from Village Studies in India*, Tulika Books, New Delhi.

Bhalla, G. S. (2006), *Condition of Indian Peasantry*, National Book Trust, New Delhi.

Bhaumik, Sankar Kumar (2007), "Diversification of Employment and Earnings by Rural Households in West Bengal," *Indian Journal of Agricultural Economics*, vol. 62, no. 4.

Central Statistical Organisation (CSO) (2008), *Manual on Cost of Cultivation Surveys*, Ministry of Statistics and Programme Implementation, Government of India, New Delhi.

Dahiya, Prem Singh, and Sharma, Hoshyar Chand (1994), "Potato Marketing in India: Status, Issues, and Outlook," Working Paper Series, Social Science Department, International Potato Centre, Lima.

Das, Arindam, and Swaminathan, Madhura (2017), "Cropping Pattern, Crop Productivity, and Incomes from Crop Production," in Madhura Swaminathan, and Sandipan Baksi (eds.), *How Do Small Farmers Fare? Evidence from Village Studies in India*, Tulika Books, New Delhi.

Dey, Rajiv (2013), "Problem of Farm Viability, Poverty and Agrarian Crisis: The Case of West Bengal," in Suman K. Chandra, Suresh V. Babu, and Pradip Kumar Nath (eds.), *Agrarian Crisis in India: The Way Out*, Academic Foundation in Association with the National Institute of Rural Development (NIRD), Hyderabad.

Dev, S. Mahendra (2012), "Small Farmers in India: Challenges and Opportunities," Working Paper 14, Indira Gandhi Institute of Development Research, Mumbai, June.

Foundation for Agrarian Studies (FAS) (2015), *Calculation of Household Incomes: A Note on Methodology*, Foundation for Agrarian Studies, available at http://fas.org.in/wp-content/themes/zakat/pdf/Survey-method-tool/Calculation%20of%20Household%20Incomes%20-%20A%20Note%20on%20Methodology.pdf, viewed on October 24, 2016.

Gaurav, S., and Mishra, S. (2014), "Farm Size and Returns to Cultivation in India: Revisiting an Old Debate," *Oxford Development Studies*, vol. 43, no. 2, pp. 165–93.

Government of India (GoI) (2007), *National Policy for Farmers 2007*, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, New Delhi.

Government of India (GoI) (2010), *West Bengal Development Report*, Planning Commission, Government of India, New Delhi.

Government of India (GoI) (2016), *Agricultural Statistics at a Glance 2014*, Directorate of Economics and Statistics, Department of Agriculture and Cooperation, Ministry of Agriculture, New Delhi.

National Commission on Farmers (NCF) (2004a), *Serving Farmers and Saving Farming (First Report)*, National Commission on Farmers, Ministry of Agriculture, Government of India.

National Commission on Farmers (NCF) (2004b), *Serving Farmers and Saving Farming: From Crisis to Confidence (Second Report)*, National Commission on Farmers, Ministry of Agriculture, Government of India.

National Commission on Farmers (NCF) (2006a), *Serving Farmers and Saving Farming: 2006, Year of Agricultural Renewal (Third Report)*, National Commission on Farmers, Ministry of Agriculture, Government of India.

National Commission on Farmers (NCF) (2006b), *Serving Farmers and Saving Farming: Jai Kisan: A Draft National Policy for Farmers (Fourth Report)*, National Commission on Farmers, Ministry of Agriculture, Government of India.

National Commission on Farmers (NCF) (2006c), *Serving Farmers and Saving Farming: Towards Faster and More Inclusive Growth of Farmers (Fifth and Final Report)*, National Commission on Farmers, Ministry of Agriculture, Government of India.

National Sample Survey Organisation (NSSO) (2005), *Income, Expenditure and Productive Assets of Farmer Households, Situation Assessment Survey of Farmers*, National Sample Survey 59th Round, Report no. 497 (59/33/5), Ministry of Statistics and Programme Implementation, Government of India.

National Sample Survey Organisation (NSSO) (2015), *Household Ownership and Operational Holdings in India*, National Sample Survey 70th Round, Report no. 571, Ministry of Statistics and Programme Implementation, Government of India.

Pandit, Arun, Pandey, N. K., Rana, Rajesh K., and Lal, Barsati (2009), "An Empirical Study of Gains from Potato Contract Farming," *Indian Journal of Agricultural Economics*, vol. 64, no. 3.

Rakshit, Santanu (2014), "Output, Surpluses, and 'Stressed Commerce': A Study on Farm Viability and Agrarian Transition in West Bengal, in India, in the New Millennium," *The Journal of Peasant Studies*, vol. 41, no. 3.

Ramachandran, V. K. (2011), "The State of Agrarian Relations in India Today," *The Marxist*, vol. 27, nos. 1–2.

Ramachandran, V. K. (2015), "Socio-economic Classes in the Study Villages," presented at the Symposium on Results from Village Surveys, organised by the Foundation for Agrarian Studies, Durgapur, September 11–13.

Rawal, Vikas, and Swaminathan, Madhura (2011a), *Returns from Crop Cultivation and Scale of Production*, paper presented in a workshop on "Policy Options and Investment Priorities for Acceleration Agricultural Productivity and Development in India," organised by Indira Gandhi Institute of Development Research and Institute for Human Development on November 10–11 at India International Centre, New Delhi.

Reddy, D. Narasimha, and Mishra, Srijit (2009), *Agrarian Crisis in India*, Oxford University Press, New Delhi.

Singh, Sukhpal (2002), "Contracting out Solution: Political Economy of Contract Farming in the Indian Punjab," *World Development*, vol. 30, no. 9.

Tripathy, R. S., Singh, Ram, and Singh, Sube (2005), "Contract Farming in Potato Production: An Alternative for Managing Risk and Uncertainty," *Agricultural Economics Research Review*, vol. 18, pp. 47–60.

Appendix Table 1 *Location of study villages*

Village	Agro-climatic region	District	Block	Gram Panchayat
Panahar	Old Vindhyan Alluvial region	Bankura	Kotulpur	Deshra-Koalpara
Amarsinghi	New Alluvial Plains region	Malda	Ratua I	Samsi
Kalmandasguri	Terai Teesta region	Koch Bihar	Cooch Behar II	Bararangras

Source: PARI survey data 2010.

Appendix Table 2 *Items included in the cost of cultivation calculation*

Items included in the cost of cultivation calculation	
Paid-out cost (or Cost A2)	Catch-all cost (or Cost C2)
Seed (farm saved and purchased)	All items in Cost A2
Manure (home-produced and purchased)	Imputed value of rent for owned land
Chemical fertilizer	Interest on fixed capital (excluding land)
Plant protection	Imputed value of family labour
Irrigation	
Hired labour	
Animal labour (own and hired)	
Machine (owned and hired)	
Rent paid for leased-in land	
Marketing expenses	
Land revenue	
Crop insurance	
Interest on working capital	
Depreciation on own machinery	

Sources: FAS (2015) and CSO (2008).

Appendix Table 3 *Socio-economic class wise composition of households, means of production, and income, study villages, West Bengal, 2009–10* in number, per cent, acres, and Rupees

Socio-economic class	Number of cultivator households	Share of total cultivator households (in per cent)	Proportion in gross cropped area (in per cent)	Average operational holding (in acres)	Proportion of irrigated area in GCA (in per cent)	Average value of means of production per household (in Rupees)	Income per household (in Rupees)
Panahar village							
Landlord/Capitalist Farmer	7	4	31	9.24	91	76,410	494,931
Peasant (upper)	52	28	49	1.89	89	12,667	73,303
Peasant (lower)	93	50	14	0.39	74	569	28,899
Manual Worker	21	11	1	0.15	77	42	39,203
Other Households	12	6	5	1.02	88	3,240	71,493
All Farm Households	185	100	100	1.17	87	6,206	63,075
Amarsinghi village							
Peasant (upper)	19	21	46	1.97	78	3,603	79,028
Peasant (lower)	36	40	42	0.92	89	480	37,732
Manual Worker	24	26	8	0.26	81	20	29,699
Other Households	12	13	4	0.27	63	0	42,168
All Farm Households	91	100	100	0.87	82	2,056	48,109
Kalmandasguri village							
Peasant (upper)	30	26	50	1.89	51	3,453	77,551
Peasant (lower)	38	33	29	0.84	21	280	47,501
Manual Worker	36	31	11	0.34	27	488	42,785
Other Households	12	10	10	0.97	48	7,921	121,932
All Farm Households	116	100	100	0.96	39	2,676	61,509

Source: PARI survey data 2010.