academicJournals

Vol. 8(43), pp. 5354-5367, 7 November, 2013
DOI: 10.5897/AJAR2013.7055
ISSN 1991-637X ©2013 Academic Journals
http://www.academicjournals.org/AJAR

African Journal of Agricultural Research

Full Length Research Paper

Agricultural income, land size and food insecurity in Pakistan

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Accepted 15 October, 2013

Hundred rural-based households (50 landowners and Sharecroppers each) were interviewed regarding income-consumption in relation with land-size, household-size and debt through ANCOVA model. The Marginal Propensity to Consume (MPC) was greater than one (MPC>1) while, intercept found negative (C<0) describes the serious gap in income and expenditures leading to negative savings produces the debt on respondent. We also found that, the income from agricultural is not capable to compensate the food expenditure. The debt and food insecurity are positivity linked and at least and on average, 4-acre land required meeting 8000 PKR/per-month equivalent to minimum wage for Landowner and 8-acre for Sharecroppers.

Key words: Agricultural income, land size, food insecurity, debt, food expenditures, marginal propensity to consume (MPC)

INTRODUCTION

The Keynesian income-consumption model is the leading instrument to analysis the economic situation and according to Keynesian-Model, "… that man (woman) are disposed, as a rule and on average, to increase their consumption as their income increase, but not as much as the increase in their income[1] …."

In least developing rural societies, the income found relatively low cause the peoples to compromise on fundamental necessities of life (Baranyi and Viviane, 2006; Bernstein, 2002). South-Asians societies are divided into rural in majority and urban in minority with highly skewed distribution affecting the dynamics of income-consumption. The urban societies are month-based due to salary structure while crop specific in rural dictates the different pattern of expenditures (Burney and Khan, 1991; Peters, 2006; Otsuka and Place, 2001; Held and Zink, 1982).

The changing patterns of contemporary world has transformed the preference of food expenditures in urban life has dual impacts, that is, food insecurity and compromise on non-food facilities whereas, in rural societies the staple-food is still manageable while health, education and transportation has negative impact (Hopper, 2011; Putnam and Jane, 1997; Burney and Khan, 1991; Silva, 2007). The net-farm-income is subject to the tax on farming, gross income from crop, income from livestock, rate of production, pattern of cultivation and land size (Dunn and Williams, 2000; Zenger and Schurle, 1981; Pope and Prescott, 1980; Held and Zink, 1982).

Economies of scale are linked with consumption patterns determine the level of consumption because it has diverse relationship among different level of income with food-commodity (Burney and Khan, 1991) whereas, price and demand of food-commodities determines the food consumption (Campbell et al., 2010).

Han and Wahl (1998), Gale and Huang (2007), Yu and Abler (2009) and Nguyen (2010) concluded that the

[1] John Maynard Keynes (1936), The General Theory of Employment, Interest

household's food expenditures are subject to the preference to quality and quantity of food and Hopper (2011), McDowell et al. (1997) and Muhammad et al. (2011) explained that, the degree of income has strong link with food expenditures to human welfare.

Consumption patterns can be influenced by education, household income and household size the low income would cause to pay more on food and agricultural income due to labour intensive in nature have unpleasant effects (Delgado et al., 1998; Bertail and Caillavet, 2008; Carletto et al., 2007) and rural welfare is not possible by only agricultural earning needs the sharing of service-income (Dessus et al., 2008); therefore Ravaillon (1990) and Khan and Khan (1989) found that poverty is directly linked with income and food-consumption in India.

An increase in agricultural income would enhance the ability to take sufficient calorie intake would reduce the hunger and poverty (Bouis and Hadad, 1990; Tozanli, 1995; Mmakola et al., 1997; Begum et al., 2010)

Agricultural reforms including redistribution of land could lead the rise in income of common farmer for overall economic sustainability (Peters, 2006; Peters and Kambewa, 2007; Takane, 2005). Deaton and Christina (1994) contrary to Silva (2007) concluded that trade liberalization could enhance the income of framer by rise in exports of agricultural product. The emission of carbon and greenhouse gases has negative effects on agricultural production decreasing the income of farmer and damaging the natural environment is directly linked with farmer (Cline, 2007; Nordhaus, 2007; Alig et al., 2010; McCarl and Schneider, 2001; Verchot et al., 2007; Pagiola, 2008).

Bussolo et al. (2009) concluded that around 45% of the world population based on agricultural income and 32% of it is the part of global poverty and PRB (2009), Govt of Pakistan (2010-11) SPDC (2010), UNDP (2010) and OCHA (2010) reported that, out of 180 million peoples of Pakistan, sixty percent earn below two USD per-day and rural income is more deprived especially, flood 2010 and war on terror has negative effect on economy significantly damaging the rural societies.

This research is designed to find out the micro-level evidence of income and consumption of rural based household to explore their patterns of expenditures, what the relationship of land size with agricultural income is and how food expenditures are attached with agricultural-income.

METHODOLOGY

It is primary data research conducted by questionnaire which covers the income and its sources, expenditures and its preferences, cultivated land size, household size and debt figures. The sample-size consist of 100 respondents categorized into two types: Landowner that holds the land for cultivation is the legal proprietor of same land and serve the whole production; and Sharecropper that temporarily holds the land for cultivation generally on fifty percent sharing with landlord from the production is responsible to perform complete labour-work and contributes in major inputs of production normally fifty percent. Hence, fifty of each type landowner and Sharecropper was interviewed to construct the reliable analysis in rural union councils of District (Nawabshah-Sindh-Pakistan Feb-2013). A single respondent is one household projecting the dynamics of one family chosen by random selection method identified by concern local community.

Econometric modeling through Ordinary Least Square (OLS) leading to ANCOVA has been used to test the argument of study by generating several new-indicators (Appendix Table 1).

EMPIRICAL MODELING

The Keynesian Income-Consumption model is the leading instrument explains the consumption patterns hence (Appendix Table 1):

$$\text{Consumption} = f(\text{income}) \quad (1)$$

Due to primary data research sample has its own characteristic, according to wisdom of fieldwork the "gap" i.e. "income minus expenditure" is another explanatory variable explaining consumption. Because frequent respondents are consuming more or equivalent to their income would directly hit the Marginal Propensity to Consume (MPC) and *gap* is the indicator capturing the same effects (Appendix Table 1)

$$\text{Consumption} = f(\text{income}, \text{gap}) \quad (2)$$

$$TE = f(TI, G) \quad (3)$$

Appling dummy variables with "ANCOVA" model (Appendix Table 1)

$$TE = f(TI * D1, \; TI * D6, \; G * D2, \; G * D3) \quad (4)$$

$$TE = C + \sum_{k=i}^{n} (\beta 1 * TIi * D1i) + \sum_{k=i}^{n} (\beta 2 * TIi * D6i) + \sum_{k=i}^{n} (\beta 3 * Gi * D2i) + \sum_{k=i}^{n} (\beta 4 * Gi * D3i) + u \quad (5)$$

The Agricultural Income (AI) is the function of Land Size (LS) because in general the cultivated land size determine the income in addition to cost of production including quality of inputs, quality of land and methodology of cultivation are equally significant. We are considering only land size due to narrow scope of research.

$$\text{Agricultural Income} = f(\text{Cultivated land size}) \quad (6)$$

$$AI = f(LS * D1, \; LS * D6) \quad (7)$$

$$AI = C + \sum_{k=1}^{n} (\beta 1 * LSi * D1i) + \sum_{k=1}^{n} (\beta 2 * LSi * D6i) + u \quad (8)$$

The food expenditures are the major head of total expenditures and, in rural area with small Agricultural Income (AI) it remains difficult to finance therefore, Food Ratio (FR) is the variable to test against Agricultural Income Ratio (AIR), Household Size (HZ), Land Size (LS) and Ability of One Acre (AOA).

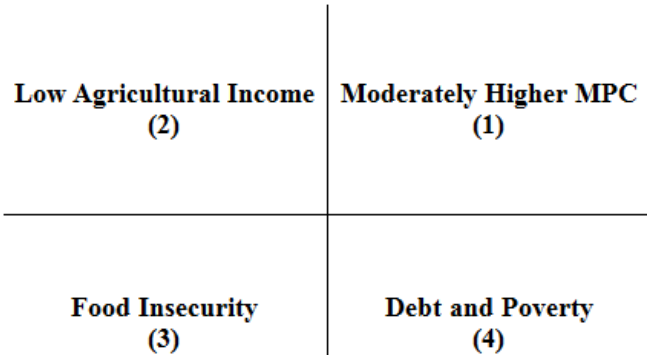

Figure 1. Cycle of Vulnerability.

$$\text{Food Ratio} = f(\text{Agricultural Income Ratio, Householdsize, land Size, Ablity of One Acre}) \quad (9)$$

$$FR = f(AIR * D1, HZ * D1, LS * D1, AOA * D1, AIR * D6, HZ * D6, LS * D6, AOA * D6,) \quad (10)$$

$$\mathbf{FR} = C + \sum_{k=1}^{n} (\beta 1 * AIRi * D1i) + \sum_{k=1}^{n} (\beta 2 * HZi * D1i) + \sum_{k=1}^{n} (\beta 3 * LSi * D1i) + \sum_{k=1}^{n} (\beta 4 * AOAi * D1i) + \sum_{k=1}^{n} (\beta 5 * AIRi * D6i) + \sum_{k=1}^{n} (\beta 6 * HZi * D6i) + \sum_{k=1}^{n} (\beta 7 * LSi * D6i) + \sum_{k=1}^{n} (\beta 8 * AOAi * D6i) + u \quad (11)$$

Frequent respondents found in debt because of purchasing of agricultural inputs on “debt” hence their agricultural income with respect to debt would have negative relationship is systematically reduces the food arrangement or increasing Food Ratio (FR):

$$\text{Debt to agricultural income ratio (DAR)} = f(\text{food ratio}) \quad (12)$$

$$DAR = f(FR * D4 * D1, \; FR * D4 * D6) \quad (13)$$

$$DAR = C + \sum_{k=i}^{n} (\beta 1 * FRi * D4i * D1i) + \sum_{k=i}^{n} (\beta 2 * FRi * D4i * D6i) + u \quad (14)$$

The Equations (5), (8), (11), and (14) is Model 1, 2, 3, and 4 respectively for analysis.

RESULTS AND DISCUSSION

Model-1 (Appendix Table 2) at 5% significant presents the following stated equation:

TE (estimated) = - 25.3 + 0.99978 TI (landowners) + 1.001421 TI (Sharecroppers) – 1.00967 G (deficit respondents) – 0.9857 G (surplus respondents) (15)

The R-squared 0.999741 is moderately significant it is approximate and overall equal to one showing very small error term is somehow different to general Keynesian Income Consumption model; because, Marginal Propensity to Consume (MPC) travels from 0 to 1 in majority of case.

In case of landowner, MPC showing almost cent percent rate of consumption of their income whereas, sharecroppers are slightly greater than one means income is less to expenditures and debt is instrument to manage the deficit. Hence, positive relationship has been noticed in income and expenditures and change of one unit in income would approximate cause one positive unit change in consumption of landowner on average and greater than one in case of sharecropper. The negative intercept describes the propensity of “debt” and in conventional income consumption model, it explains the fixed expenditures with relatively low MPC to unit and the MPCs in model-1 are moderately high leads the negative intercept term caused the respondent to take loan to finance their expenditures. The higher MPC also reflects the low-income and changing patterns of socioeconomic and inflationary pressure in rural society, it runs on crop-specific-transaction generally biannual, that-is-why respondent consumes on debt and reimburse it by crop earning after six months and year by year this exercise make them habitual of debt-taker and this transaction has dual impacts; it pushes the respondents in vulnerable situation as time passes secondly, the consumption on debt cause to consume more relatively on higher prices with burden of interest-rate. The same case is with “cost-of-production” the respondent purchases the inputs to cultivate the land on debt in addition to their daily home consumption, this “dual-debt” occurrence with interest burden reduces the ability of agricultural earning cause to increase the consumption rate due to low income. Hence, the intercept term is negative 25 PKR/per-month showing debt in combined ANCOVA model has reducing impact technically whereas, according to field-observation, it travels from 400 to 2000 PKR/per-month on average even endorsed by separate regression individually (Figures 1 and 2).

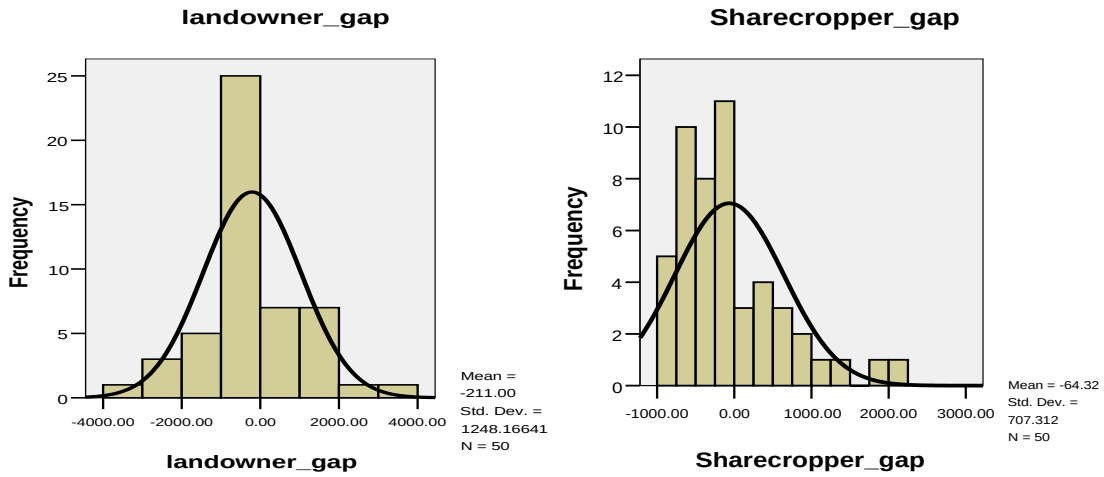

Figure 2. The gap of income.

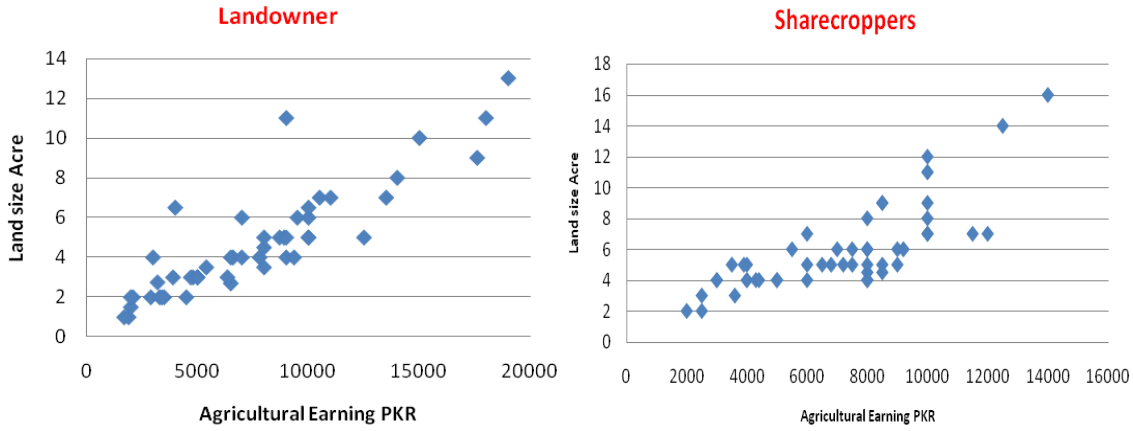

Figure 3. Relationship of land size and income.

The *gap* has negative relationship with total expenditures according to function partially and on average, if one unit gap (deficit) has increased, it would have couple of possibilities, either the income of the respondent is decreased or the expenditures have increased, in this situation the respondent would attempt to reduce the expenditures because income would notrise due to many reasons. Hence, if one unit gap has changed it would negativity hit the total expenditures in general and partially by 1.0096 for those respondents has deficits in their income that is why Sharecropper would respond to this by 1.001421 MPC showing ”critical-vulnerability”

In Model-2, the R-square is 0.7113 showing the agricultural income majorly explained by the land size and rest of the portion (0.2887=1-0.7113) is subject to the cost and quality of input and cultivation methodology[2] (Appendix Table 2).A positive-relationship[3] have occurred in cultivated land size and agricultural income and in case of sharecropper partially and on average, if one unit, that is, “acre” has increased this could cause to at least enhance the income by 890 PKR/per-month while 1305 PKR/per-month for landowners (Figure 3).

The intercept term has good economic logic as the random number nature of land size with cross sectional data explains that, at least and on average, 1632 PKR/per-month is the earning by both respondents from land or 1632 PKR/per-month is the minimum income from agricultural for different land holding or this would lead to further explanation that, in general and on average, either landowner or sharecroppers could earn at-least[4] 1208 to 2056 PKR/per-month by agricultural production at different level of land size.

[2] It is gap in model-2, due to limited scope with individual capacity, collection of data for concern indicators were difficult;

[3] $AI(Estimated) = 1632.93 + 1305.005\ LS\ (landowners) + 890\ LS\ (Sharecropper)$

[4] u± Stdev

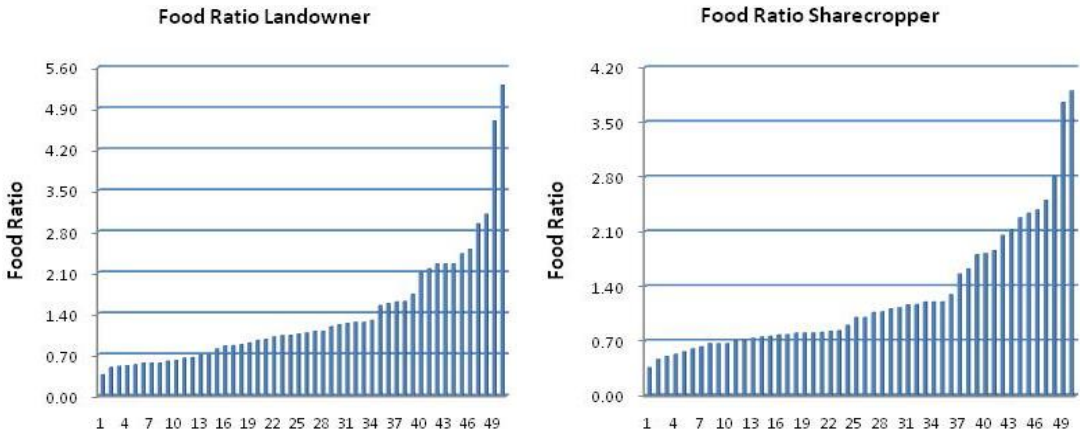

Figure 4. Food Ratio (FR) at benchmark of 70%.

In Model-3, the R square is 0.7451 before describing the results there is the need to explain some important characteristics of FR[5] and AIR (Appendix Table 2):

a) If FR is equal to one **(FR=1)**, this means household investing its whole agricultural income to food expenditures.
b) If FR is greater than one (**FR>1),** this means agricultural income is less than food expenditures.
c) If FR is less than one **(FR<1)**, this means agricultural income is greater than food expenditures.

FR defines the strength of agricultural income because only in case of point-c the household would be able to finance food and nonfood expenditures. If we consider an easy benchmark that, in any rural-based-household with relatively low-income the 70% of it spent on food and 30% on nonfood expenditures. Means, if FR falls within or equal to 70% or 0.7 this would inform that the same household can manage its both heads (food and nonfood) on average from agricultural-income[6], while increase in FR would cause the food insecurity explained in point (a) and (b). The 14 out of 50 landowners and 11 out of 50 sharecroppers found at benchmark while rest are food insecure with respect to their agricultural income (Figure 4) and (Appendix Chart 7).

The AIR[7] travels from zero to one, if it is one (AIR=1) it means that respondent only has agricultural income, in case of less than one (AIR<1) respondent has diverse income generally from services and livestock (Appendix Table 3 and Chart 7).

FR (Estimated) = 3.4628 - 1.808182 AIR (Landowner + 0.01134 HZ (Landowner) - 0.12164 LS (Landowner)- 0.066909 AOA (Landowner) - 1.59317 AIR (Sharecroppers) + 0.004734 HZ (Sharecroppers) - 0.092461 LS (Sharecroppers) - 0.052222 AOA (Sharecroppers) + u (16)

An increase in FR would cause the household toward food insecurity and household size (HZ) in general has positive relation endorsed in estimated model falls in critical region with small coefficient is not consistent variable to explain FR. Similarly, Land Size (LS) and Ability of One Acre (AOA) are significant with negative relationship supporting the general argument of model is inconsistent source to explain FR due to small coefficients.

Whereby, the AIR has strong economic meanings has negative relationship with FR and if one unit of AIR has increased in Landowners partially and on average, the FR would reduce by 1.8081 units and 1.5931 in case of sharecroppers.

The AIR is the reflective indicator of income-diversification by respondent in model leads the couple of explanation first, if AIR is one means AI=TI (no diversification) which is maximum value and under this condition FR would reduce by their respective coefficients and result would be 1.65 and 1.867 for landowners and Sharecroppers respectively partially and on average indicating “critical dependency on low agricultural-income” is almost incapable to finance the food expenditures by both respondents. Secondly, the estimated FR is 1.32 showing on average 132% of agricultural income is spending on food expenditures by both of respondents again explaining “critical-vulnerability” and crunch of agricultural-income.

However, the intercept term is 3.4628 showing the tentative upper edge of FR partially on average, it further describes that, in common within sample the FR would be around 3.5 or partially and on average, manageability of food expenditures needs 3.5 times of agricultural income. Moreover, within sample by maximum and on average, the 3.5 times of agricultural income is ideally sufficient to finance at least food expenditures.

[5] Food Ratio= (Food Expenditures)/(Agricultural-Income)
[6] Although, in urban societies on average the Food-Exp. travels from 40 to 55 percent and further it is subject to degree of income whereas, rural societies could have at 50 to 80 percent in general;
[7] Agricultural Income Ratio= (Agricultural Income)/(Total Income)

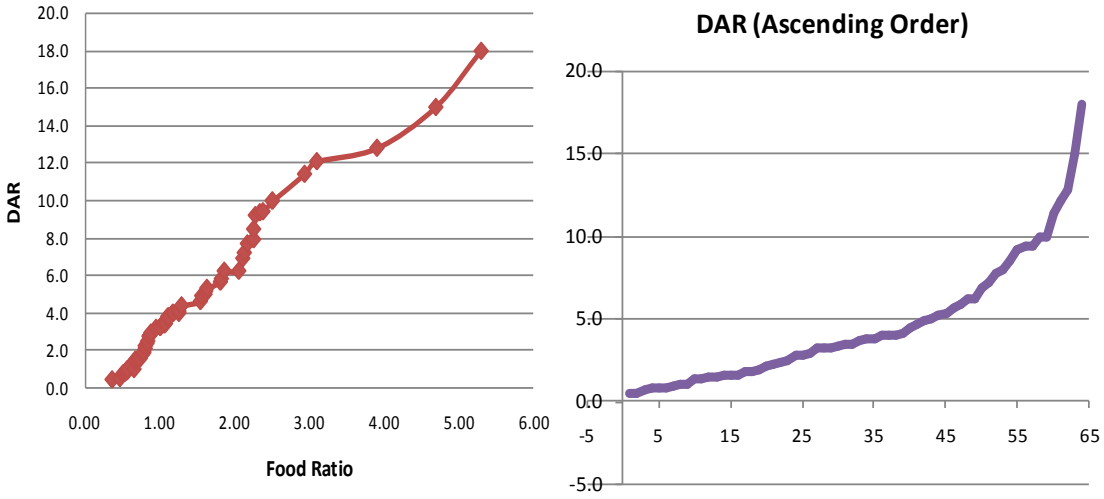

Figure 5. The relationship of food ratio and debt.

Model-4 has 0.59 R-square and reporting[8] the dynamics of Debt to Agricultural Income Ratio (DAR[9]) has positive relationship with Food Ratio (FR) both would increase or decrease simultaneously (Figures 4 and 5) whereas, partially and on average, if one unit of FR is increased/decreased it would rise/fall the 2.95 units of DAR for Landowners and 3.38 for sharecroppers (Appendix Table 2).

The situation is critical because FR caused to rise by AIR and this transaction leads the enhancement in DAR or just one unit increase in FR (leading to food insecurity) produces the debt which approximately equal to "three-month" agricultural income of landowner and around three and half for Sharecroppers endorsing that the agricultural income is not sufficient to compensate even food expenditures.

The intercept term also explaining the basic economic sense although it falls in critical region so we cannot accept it describes that partially and on average one third of the agricultural income of respondents is on debt (Appendix Table 3).

DESCRIPTIVE ANALYSIS

The Food Per Capita (FPC) depends on income and household size (Appendix Chart-1) we found that due to low income from agricultural respondents are unable to spend on food expenditures even few of the respondents have large family size hence, the rest of agricultural income is the prominent instrument to finance the food expenditures. The Food Expenditures to Non-Food Expenditures (FENF) describes (Appendix Chart 2) the important socioeconomic details and food expenditures are principal component of both respondents in their total expenditure. It is 1.5 to 5 times greater than to Non-Food Expenditure presenting serious "compromises" on Non-Food items that is Housing, Education, Health, Transportation and Social Relations.

The Per month Per Acre Income (PPI) defines the income from one acre (Appendix Chart-3) as PPI is subject to quality and quantity of cost of production including land size and according to sample data, it is 2500 PKR/per-month and 2000 PKR/per-month for landowners and sharecroppers respectively at maximum edge on average. The Ability of One Acre (AOA) to finance the food expenditure (Appendix Chart-4) has disappointing picture, the income of one acre could not finance the food expenditures of one whole month 30 days. The AOA in many case is just 2 to 10 days for both respondents because landowners spends more money on food while income from PPI is low cause AOA of landowners smaller to sharecroppers due to large household size promote the decreasing trends. The land Size to Household Size (LSHZ) explaining the ability of total land size to finance the total expenditures of household (Appendix Chart-5) majority of respondents has less land and greater family size. Ideally, it would be identical is almost impossible due to many reasons and the average of LSHZ is 0.69 and 0.82 for landowner and Sharecropper respectively.

There is the need to examine the agricultural income by land size in respect of LSHZ; hence, we multiply LSHZ to Agricultural Income (LAI) to obtain the real income (Appendix Chart-6) majority of respondents in both types lost their income by significant portion, while few of them getting relative and proportional benefit are landowner. The author would argue that in this case the sharecropper's income would not reflect the real rise because it is on half profit term and sharecroppers could have the large land because of labour earning so it is valid for landowners only or divided by four for sharecropper.

8 $AR\,(Estimated) = 0.3394 + 2.953\,FR\,(debt\ holdhing\ landonwers) + 3.38\,FR(debt\ holding\ Sharcropprs)$

9 The amount of debt divided by monthly agricultural income;

Diversification of income sources could help the respondents to solve their economic problems and Agricultural Income to Non-Agricultural Income (AINAI) describes that (Appendix Chart-7) the one-fifth i.e. 20% of both respondents has only agricultural income is comparatively small and rest has other income sources mainly services and livestock. While, 40% of both respondents, their agricultural income is less to nonagricultural income are from category has small land size or due to any reason land income is less. However, rest of respondents majorly earning from agricultural and less to other sources. We found that, due to inadequate earnings from land respondents are switching to services sector to combat their financial crunch.

Federal Government of Pakistan fixed 8000-PRK/per-month for minimum wage - the agricultural sector is one of the major factor of GDP and around 70% of country population is attached with rural economy. Whereas and on contrary, it is still informal contributor and minimum wage is not implementable on agricultural sector and we would like to compare informal agricultural earning with formal benchmark. The Agricultural Income to Minimum Wage (AIMW) of respondents (Appendix Chart 8) has interesting trends around one-third of the both respondents are earning greater than minimum wage, while 15% equal and rest, that is, 50% below to minimum wage. The land earning chiefly depends on its size and a rough calculation by reported data, at least four acre cultivated land required to earn equal to minimum wage monthly for landowners and eight acre for sharecroppers. Further analysis of Minimum Wage to per month per Acre Income (MWPAI) reports that, within sample at least 3.2 times per month per acre income is “shorter” to minimum wage for landowners and 4 times for Sharecroppers (Appendix Chart 9)

CONCLUSION

The consumption rate relative to income is moderately high chiefly due to low-income, especially in Sharecroppers, and Landowners are earning relatively more, the MPC for both groups showing higher consumption rate crossing the critical point of 100% consumption pulling respondents into “Vicious Cycle of Debt” leading to “Vicious Cycle of Poverty” (Figure 1).

The land size is positively attached with agricultural income and the costs of input and cultivation methodology determine the agricultural income. The Food Expenditures is the leading head among regular expenses and agricultural income is almost insufficient to manage the food expense promoting food insecurity. Hence, services and livestock income is the way to manage the food expenditures because debt and food insecurity found positively linked. The food per capita and per month per acre income found very low damaging the ability to manage food expenditures by one acre is almost impossible and at least 4-acre land required meeting 8000 PKR/per-month equivalent to minimum wage on average for Landowner and 8-acre for Sharecroppers.

ACKNOWLEDGMENT

The author would pay note of thanks to his beloved father **Mr. Bashir Ahmed** (Retired Farmer) for collecting the data from field and working hard within enumeration process. He also extends his thanks to **Shakira Parveen** (Sociologist), **Sumaira Hafeez** (Gender Specialist), **Nayyar Ahmed Siddiqui** (Labour Economist), **Iskhaq Soomro** (Sindhi Intellectual and Writer), **Ahmed Raza** (Fiscal-Economist), **Mariyum Binty Bilal Ahmed** (Student) and special thanks to **Dr. Mirza Barjees Baig** (Rural Development & Extension Specialist-KSU) for incredible support.

REFERENCES

Alig RJ, Latta G, Adams DM, McCarl BA (2010). “Mitigating greenhouse gases: The importance of land base interactions between forests, agriculture, and residential development in the face of changes in bioenergy and carbon prices. Forest Poli. Econ. 12(1):67-75.

Baranyi S, Viviane W (2006). ‘Transforming Land- Related Conflict: Policy Practice and Possibilities’, Policy Brief, Ottawa: The North-South Institute.

Begum S, Khan MM Farooq M, Begum N, Shah IU (2010). Socioeconomic factors affecting food consumption pattern in rural area of district Nowshera, Pakistan. Sarhad. J. Agric. 26(4):649-653

Bernstein H (2002). Land Reform: Taking a Long(er) View’. J. Agrarian Change 2(4):433–63.

Bertail P, Caillavet F (2008). Fruit and Vegetable Consumption Patterns: A Segmentation Approach. Am. J. Agric. Econ. 90 (3):827–842.

Bouis HE, Hadad LJ (1990). Agricultural Commercialization, Nutrition and the Rural Poor: A study of Philippine Farm Households. Lynne Rienner Publishers, Boulder Colorado, U.S.A.

Burney NA, Khan AH (1991). Household consumption patterns in Pakistan: an urban-rural comparison using micro data. Pak. Develop. Rev. 30(2):145-171.

Bussolo M, De Hoyos R, Medvedev D (2009). Global Poverty and Distributional Impact of Agricultural Distortions”. Working paper -97, World Bank, Washington-DC.

Delgado CI, Hopkins J, Kelly VA (1998). Agricultural growth linkage in sub-Saharan Africa”. Research report number 107. International Food Policy Research Institute, Washington D.C., USA. pp. 53-54.

Campbell AA, Pee S, Sun K, Kraemer K., Thorne-Lyman A, Moench-Pfanner R, Sari M, Akhter N, Bloem MW, Semba RD (2010). Household Rice Expenditure and Maternal and Child Nutritional Status in Bangladesh. J. Nutr. 140:189–194.

Carletto G, Covarrubias K, Davis, B, Krausova M, Stamoulis K, Winters P, Zezza A (2007). Rural Income Generating Activities in Developing Countries: Re-Assessing the Evidence J. Agric. Develop. Econ. 4:1.

Cline WR (2007). Global Warming and Agriculture: Impact Estimates by Country”, Center for Global Development and Peterson Institute for International Economics, Washington, DC.

Deaton A, Christina P (1994). Intertemporal Choice and Inequality. J. Polit. Econ. 102:437-467.

Dessus S, Herrera S, De Hoyos R (2008). “The Impact of Food Inflation on Urban Poverty and Its Monetary Cost: Some Back-of-the-Envelope Calculations”, *World Bank Policy Research Working Paper*, P. 4666, Washington, DC.

Dunn JW, Williams JR (2000). Farm Characteristics that Influence net farm income variability and Loss”, paper presented in Western Agricultural Economics Association, Annual Meeting, Vancouver British Colombia.

Gale F, Huang K (2007). Demand for Food Quantity and Quality in China". *Economic research report no. 32* .United States. Dept. of Agriculture. Economic Research Service Govt. of Paksitan: Economic Survey of Pakistan 2010-11. Ministry of Finance, Econ. Advisor's Wing, Finance Div. Islamabad, Pakistan.

Han T, Wahl TI (1998). China's Rural Household Demand for Fruit and Vegetables". J. Agric. Appl. Econ. 30(1):141-50.

Held LJ, Zink RA (1982). Farm Enterprise Choice: Risk Return Tradeoffs for Cash-Crop versus Crop-livestock System". North Central J. Agric. Econ. 4:11-19.

Hopper WC (2011). Income and Food Consumption. Can. J. Econ. Polit. Sci. 9:487-506.

McCarl BA, Schneider UA (2001). The cost of greenhouse gas mitigation in U.S. agriculture and forestry. Science 294(5551):2481-2482.

McDowell DR, Allen-Smith JE, McLean-Meyinsse PE (1997). Food expenditures and socioeconomic characteristics: Focus on income class. Am. J. Agric. Econ. 79(5):1444.

Mmakola DJ, Kirsten JK, Groenewald JA (1997). Food consumption pattern in two communities". Agrekon 36(2):206-215.

Muhammad A, Seale JL, Jr, Meade, B, Regmi A (2011). International Evidence on Food Consumption Patterns. Technical Bulletin (TB-1929), P. 59.

Nguyen MC (2010), Three essays in development economics: The case of Vietnam". Ph.D. dissertation. The American University, AAT 3406837.

Nordhaus W (2007). The Challenge of Global Warming: Economic Models and Environmental Policy," Yale University, New Haven, CT. OCHA (2010), Annual Report- 2010, Pakistan Office.

Otsuka K, Place F (2001), Land tenure and natural resource management. A comparative study of agrarian communities in Asia and Africa , International Food Policy Research Institute: Washington, D.C.

Peters PE, Kambewa D (2007). Whose Security? Deepening Social Conflict over 'Customary' Land in the Shadow of Land Tenure Reform in Malawi. J. Modern. Afr. Stud. 45(3):447-472.

Peters PE (2006). Rural Income and Poverty in a Time of Radical Change in Malawi. J. Develop. Stud. 42(2):322-345.

Pagiola S (2008). Payments for environmental services in Costa Rica, Ecol. Econ. 65(4):712-724.

Pope RD, Prescott R (1980). Diversification in Relation to farm size and other Socioeconomics Characteristics. Am. J. Agric. Econ. 62:554-59

PRB (2009). World population data sheet". Population Reference Bureau. Washington DC 2009 USA.

Putnam JJ, Jane EA (1997). Food Consumption, Prices, and Expenditures, 1970-95, Statistical Bulletin No. 939, Economic Research Service, U.S. Department of Agriculture,

Ravaillon M (1990). Rural welfare changes of food prices under induced wage responses: theory and evidence from Bangladesh". Oxford Econ. Pap. 42:574-85.

Silva JA (2007). Trade and Income Inequality in a Less Developed Country: The Case of Mozambique. Econ. Geogr. 83(2):111-136.

SPDC (2010). Social Impact of the Security Crisis. Tenth Annual Review of Social Development of Pakistan.

Takane T (ed.) (2005). Agricultural and Rural Development in Malawi: Macro and Micro Perspectives. Africa Research Series No. 11. Chiba: Institute of Developing Economies.

Tozanli S (1995). Social transformation and factors hampering evolution of food consumption models in Turkey". Medit. Turkey 6(1):4-11.

UNDP (2010), "Early Recovery Need Assessment", Pakistan Office.

Verchot LV, Van Noordwijk M, Kandji S, Tomich T, Ong C, Albrecht A, Mackensen J, Bantilan C, Anupama KV, Palm C (2007). Climate Change: Linking adaptation and mitigation through agroforestry. Mitigation Adaptation Strateg. Global Change 12:901-918.

Yu X, Abler D (2009), The Demand for Food Quality in Rural China. Am. J. Agric. Econ. 91(1):57-69.

Zenger S, Schurle BW (1981). The Impact of Diversification on Risk at the farm level" Abstract. Am. J. Agric. Econ. 63:1043.

APPENDIX

Table 1. Variable list.

D1	=	*Dummy Variable, by value 1 for Landowner respondents*
D6	=	*Dummy Variable, by value 1 for Sharecropper respondents*
D2	=	*Dummy Variable, by value 1 the respondents their income is less than expenditures and the gap is negative means same respondents are getting deficit on monthly basis (Exp>Income) or deficit respondent*
D3	=	*Dummy variable, by value 1 the respondent their income is greater than expenditures and the gap is positive means same respondent are not getting deficit on monthly basis (Exp<Income) or surplus respondent*
D4	=	*Dummy variable, by value 1 respondent who holds the loan/debt*
D5	=	*Dummy variable, by value 1, respondent who hasn't loan/debt*
TE	=	*Total Expenditures monthly (it contain all Exp. Food, Housing, Health, Transpiration, Education, Utilities, etc ..)*
TI	=	*Total Income monthly (it contains all income i.e. Agriculture , Services, Business , livestock etc …)*
G	=	*Gap, Income minus Expenditures monthly (TI-TE)*
FPC	=	*Food per capita, amount of food expenditures divided by total family members*
EA	=	*Earning Ability, number of earning person divided by total number of family members*
FR	=	*Food Ratio, the food expenditures divided by agricultural income*
AIR	=	*Agricultural Income Ratio, the Agricultural Income Divided by total income*
OIR	=	*Other Income Ratio, rest of Agricultural Income divided by total income*
PPI	=	*Per-month Per-acre Income, Agricultural Income divided by cultivated land size*
AOA	=	*Ability of One Acre, means by income of one acre how many days the same households could runs its food expenditures; income of one acre divided by per day food expenditures*
HZ	=	*Household size/ total number of family members*
LS	=	*Cultivated land size in acre*
DT	=	*Debt on Household, generally due to production inputs*
AI	=	*Agricultural Income from total cultivated land size (Monthly)*
DAR	=	*Debt to Agricultural Income Ratio, the Debt divided by Agricultural Income*
IFS	=	*Income From Services*
LSHZ	=	*Land Size to Household Size, Land Size divided by total number of family members*
LAI	=	*LAHZ to Agricultural Income, the LSHZ multiply by Agricultural Income*
DPA	=	*Debt on Per Acre, amount of debt divided by land size*
DP	=	*DPA to PPI, DPA divided by PPI*
FENF	=	*Food Expenditures Divided by Non Food Expenditures*
AINAI	=	*Agricultural Income divided by Non-Agricultural Income*
AIMW	=	*Agricultural Income divided by Government Declared Minimum Wage*
MWPAI	=	*Government Minimum Wage divided by per month per Acre Income*

Table 2. Estimated models.

Explanatory variable		Model -1 (TE)	Model -2 (AI)	Model -3 (FR)	Model -4 (DAR)
C	Coefficient	-25.309	1632.938	3.4628	0.3394
	Std. Dev	25.295	427.817	0.286722	0.33007
	T-Statistics	-1.000554	3.816905	12.07744	1.028167
*TI*D1*	Coefficient	0.999778			
	Std. Dev	0.001756			
	T-Statistics	569.4058			
*TI*D6*	Coefficient	1.001421			
	Std. Dev	0.002143			
	T-Statistics	467.4017			

	Coefficient	-1.00967			
*G*D2*	Std. Dev	0.01891			
	T-Statistics	-53.39319			
	Coefficient	-0.985729			
*G*D3*	Std. Dev	0.019133			
	T-Statistics	-51.51949			
	Coefficient		1305.055		
*LS*D1*	Std. Dev		86.6634		
	T-Statistics		15.05889		
	Coefficient		890.219		
*LS*D6*	Std. Dev		71.6737		
	T-Statistics		12.42044		
	Coefficient			-1.808182	
*AIR*D1*	Std. Dev			0.36764	
	T-Statistics			-4.918356	
	Coefficient			0.01134	
*HZ*D1*	Std. Dev			0.020807	
	T-Statistics			0.545342	
	Coefficient			-0.121648	
*LS*D1*	Std. Dev			0.038451	
	T-Statistics			-3.163682	
	Coefficient			-0.066909	
*AOA*D1*	Std. Dev			0.021527	
	T-Statistics			-3.108201	
	Coefficient			-1.59317	
*AIR*D6*	Std. Dev			0.41274	
	T-Statistics			-3.859989	
	Coefficient			0.004734	
*HZ*D6*	Std. Dev			0.020186	
	T-Statistics			0.234523	
	Coefficient			-0.092461	
*LS*D6*	Std. Dev			0.035808	
	T-Statistics			-2.58212	
	Coefficient			-0.052222	
*AOA*D6*	Std. Dev			0.015442	
	T-Statistics			-3.381846	
	Coefficient				2.953098
*FR*D4*D1*	Std. Dev				0.312767
	T-Statistics				9.441838
	Coefficient				3.380221
*FR*D4*D6*	Std. Dev				0.3529
	T-Statistics				9.578412
R^2		**0.999741**	**0.711373**	**0.745115**	**0.5903**
Adjusted R^2		0.99973	0.705422	0.722708	0.5818
Durbin-Watson statistics		2.0382	1.981011	1.988261	2.16911
F-Statistics		91785.57	119.5371	33.25305	69.879
N		100	100	100	100
T-Statistics at 5%					

Table 3. Descriptive statistical trends.

Descriptive statistics of landowners									Descriptive statistics of sharecroppers								
Variable	**N**	**Min**	**Max**	**Sum**	**Mean**	**Std. Dev**	**Skewness**	**Kurtosis**	**Variable**	**N**	**Min**	**Max**	**Sum**	**Mean**	**Std. Dev**	**Skewness**	**Kurtosis**
TI	50	5200	38300	673000	13460	7300	1.87	3.94	**TI**	50	6000	28000	571530	11431	4655	1.76	3.02
TE	50	5750	38950	682550	13651	7188	1.82	3.98	**TE**	50	6040	28200	574746	11495	4792	1.76	2.86
G	50	-3750	3550	-10550	-211	1248	0.11	1.59	**G**	50	-1000	2220	-3216	-64	707	1.32	1.83
FPC	50	636	1800	50840	1017	264	0.91	0.75	**FPC**	50	571	1500	46245	925	191	1.28	2.10
EA	50	0.10	0.50	11.48	0.23	0.08	0.85	1.13	**EA**	50	0.11	0.33	9.93	0.20	0.06	0.57	-0.57
FR	50	0.36	5.29	68.93	1.38	1.01	2.12	5.37	**FR**	50	0.36	3.90	63.01	1.26	0.80	1.64	2.59
AIR	50	0.08	1.00	30.52	0.61	0.29	0.01	-1.28	**AIR**	50	0.14	1.00	33.54	0.67	0.27	-0.20	-1.29
OIR	50	0.00	0.92	19.49	0.39	0.29	-0.01	-1.28	**OIR**	50	0.00	0.86	16.47	0.33	0.27	0.20	-1.30
PPI	50	615	2500	82971	1659	404	-0.36	0.60	**PPI**	50	700.0	2000.0	61578.0	1231.6	351.4	0.48	-0.65
AOA	50	2.00	27.00	380.00	7.60	4.19	2.24	8.34	**AOA**	50	3.00	28.00	588.00	11.76	6.47	1.00	0.26
HZ	50	2.00	17.00	404.00	8.08	3.51	0.41	-0.34	**HZ**	50	3.00	21.00	427.00	8.54	4.16	1.26	1.20
LS	50	1.00	13.00	232.45	4.65	2.70	1.21	1.35	**LS**	50	2.00	16.00	302.00	6.04	2.86	1.59	2.89
DT	50	0.00	50000	697800	13956	14796	0.63	-0.81	**DT**	50	0.00	83000	935100	18702	19361	1.20	1.43
AI	50	1700	19000	377600	7552	4311	0.85	0.43	**AI**	50	2000	14000	357900	7158	2861	0.08	-0.58
DAR	50	0.00	12.80	142.10	2.84	3.77	1.33	0.63	**DAR**	50	0.00	18.00	155.30	3.11	3.79	2.02	5.15
IFS	50	0.00	22000	215100	4302	5057	1.69	3.32	**IFS**	50	0.00	20000	123600	2472	3950	2.34	6.96
LSHZ	50	0.08	2.67	34.54	0.69	0.52	1.68	3.27	**LSHZ**	50	0.22	2.20	41.20	0.82	0.45	1.21	1.30
LAI	50	131	37333	327453	6549	8081	2.21	5.01	**LAI**	50	444	22000	322319	6446	4859	1.04	0.96
DPA	50	0.00	23000	216613	4332	5744	1.54	1.89	**DPA**	50	0.00	16600	188946	3779	4365	1.42	1.49
DP	50	0.00	13.00	142.00	2.84	3.74	1.32	0.65	**DP**	50	0.00	18	155	3.10	3.75	2.07	5.46
FENF	50	0.60	5.10	85.30	1.71	0.85	1.70	4.58	**FENF**	50	0.50	5.60	115	2.30	1.14	0.88	0.78
AINAI	50	0.00	16.67	93.54	1.87	3.29	2.98	9.49	**AINAI**	50	0.00	14.29	114.79	2.30	3.43	2.05	3.41
AIMW	50	0.21	2.38	47.27	0.95	0.54	0.85	0.43	**AIMW**	50	0.25	1.75	44.77	0.90	0.36	0.07	-0.57
MWPAI	50	3.20	13.00	261.10	5.22	1.84	2.46	7.16	**MWPAI**	50	4.00	11.40	351.60	7.03	1.99	0.37	-0.85

Charts of descriptive analysis (ascending-method)

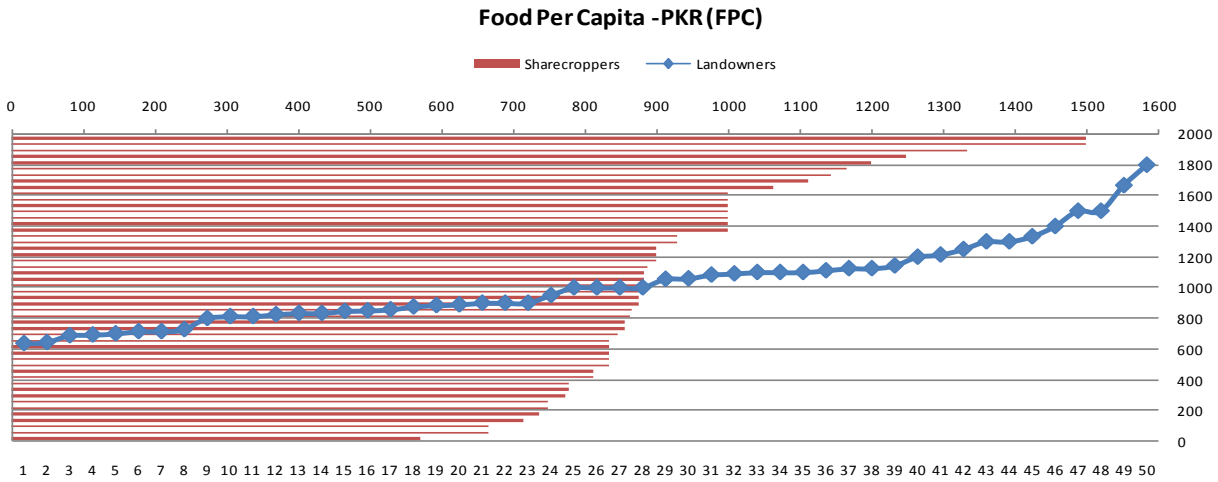

Chart 1. Food per capita (FPC).

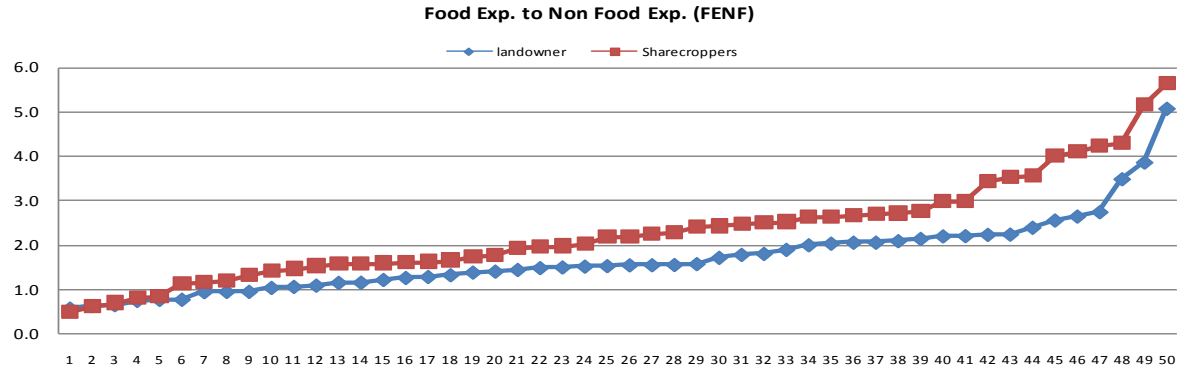

Chart 2. Food expenditures to non-food expenditures ratio (FENF).

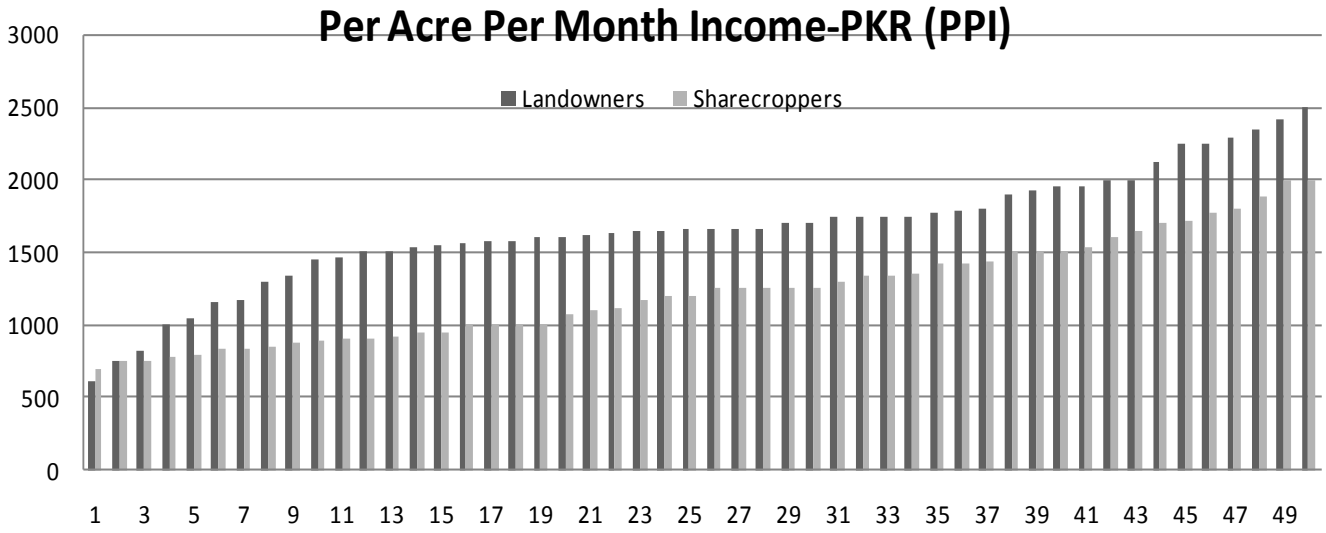

Chart 3. Per Acre per month Income (PPI).

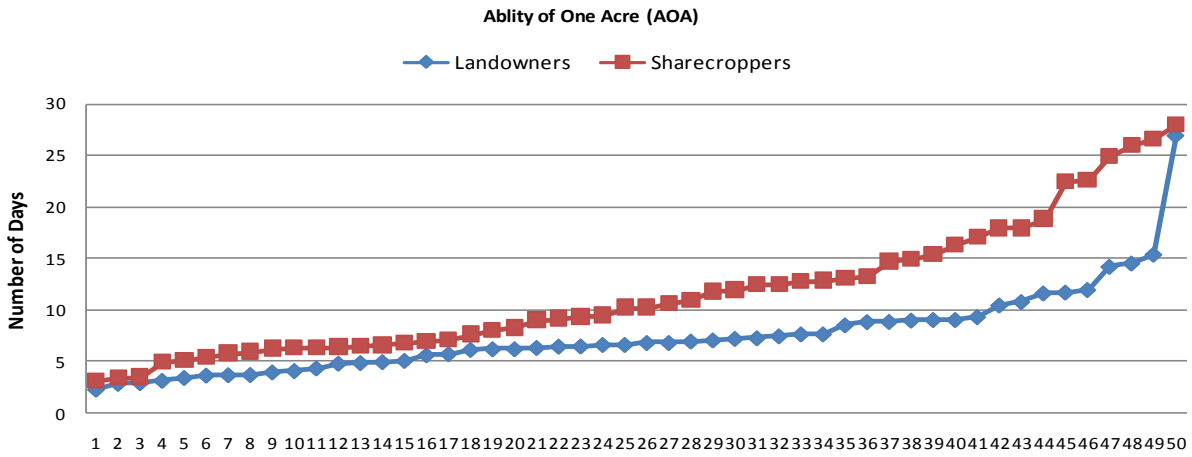

Chart 4. Ability of one acre (AOA).

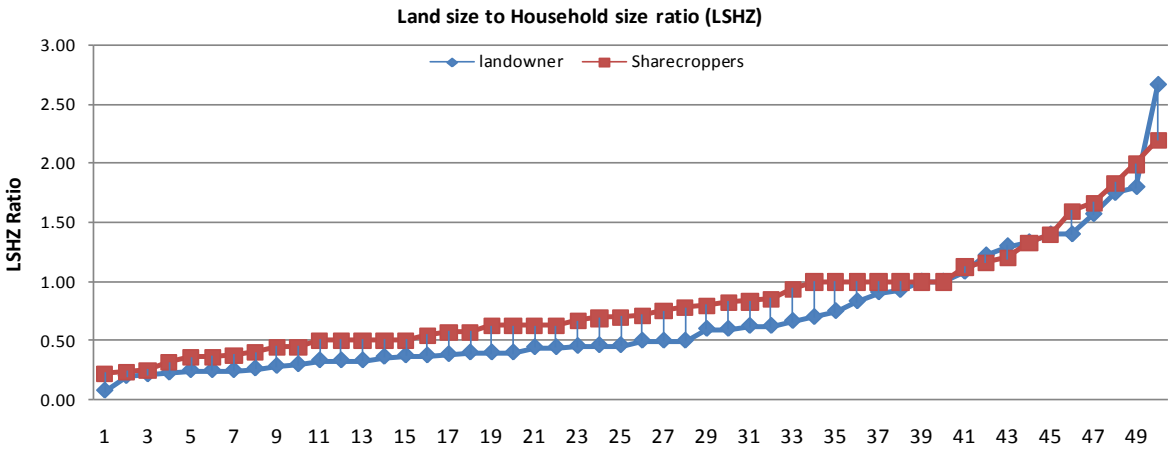

Chart 5. Land size to household size ratio (LSHZ).

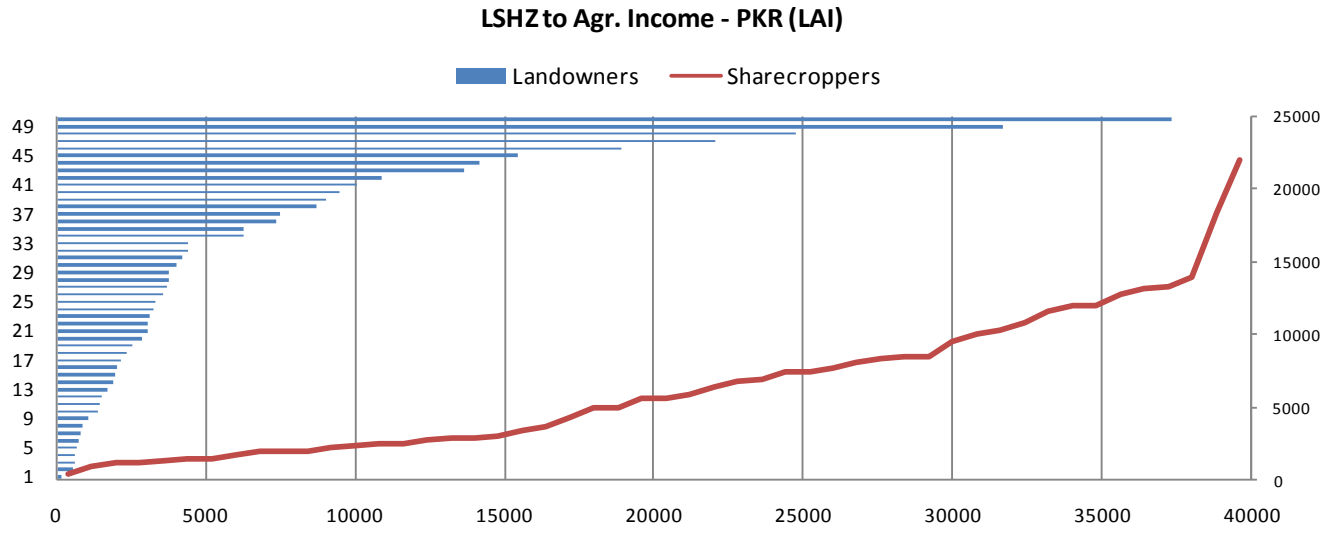

Chart 6, LSHZ to Agri. Income (LAI).

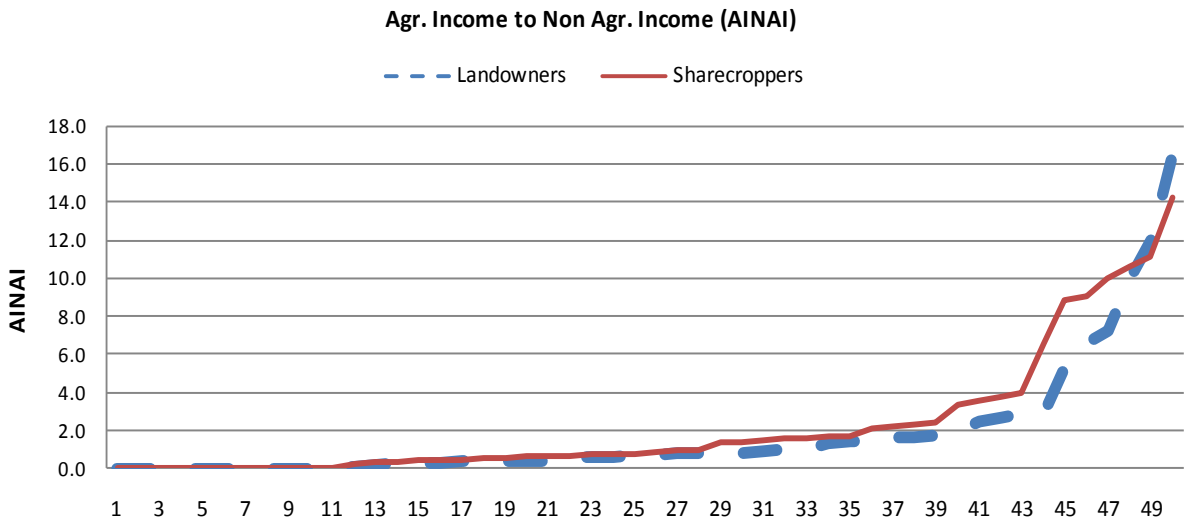

Chart 7. Agricultural Income to Non-Agricultural Income (AINAI).

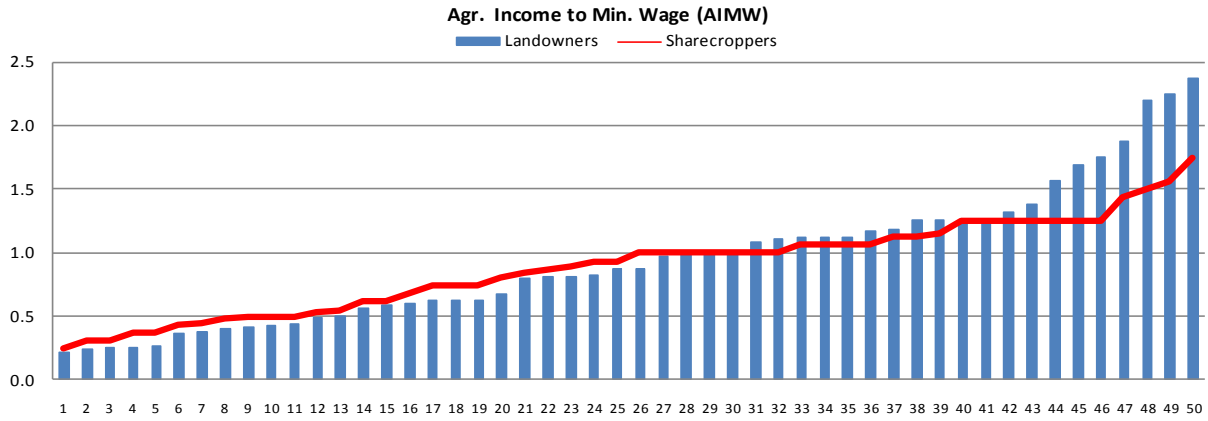

Chart 8. Agricultural Income to Minimum Wage (AIMW).

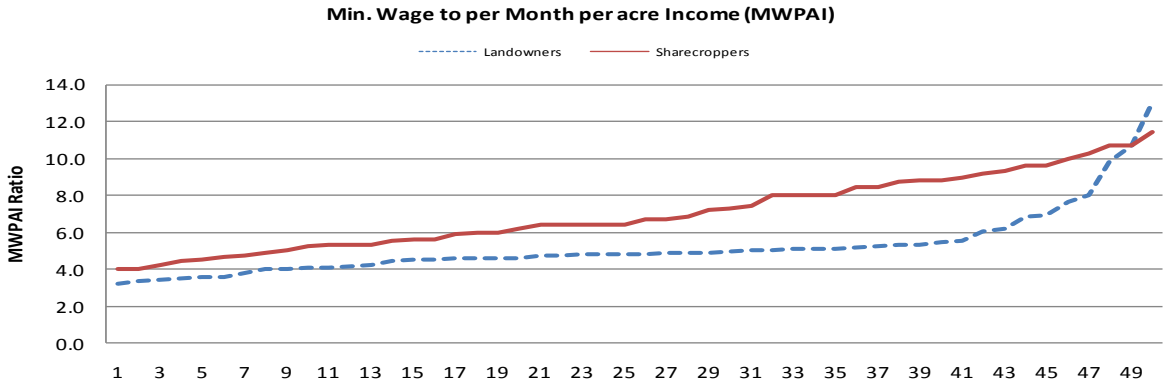

Chart 9. Minimum wage to per month per acre income (MWPAI).