

Relationship between Livelihood Assets and Strategies of Small-Scale Farmers: Evidences from Rain-Fed Areas of the Punjab, Pakistan

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Abstract—Present research was designed to access the relationship, between livelihood capitals and strategies of small-scale farmers in rain-fed areas of Pakistan. Results highlighted that households possessed limited human, financial, physical, social and natural assets. Chi-square statistics showed a highly significant relationship ($P < 0.05$) between livelihood assets and diversification strategies. It was found that social asset was highly influenced and depends upon income level of households as a majority (67.0%) of the poor people with a low income level had a low level of financial capital. The preference or choice of livelihood strategies by different income groups was measured through a chi-square test of independence ($\chi^2 = 122.770$) which shows that the majority (79.3%) of low income households used farming as their only major livelihood strategy. Due to which they were considered as more prone to poverty as the high majority (98.0%) of households were facing the problem of poverty and hunger (98.0%) at the household level. The results of multiple regression analysis showed that the problem of poverty & hunger (PPH) can easily be estimated from livelihood assets of respondents.

Index Terms—livelihood assets, strategies, small-scale farmers, climate change

I. INTRODUCTION

Small-scale agricultural producers occupy a dominant position in agricultural production around the world. But a majority of them are suffering from poverty, food insecurity [1]. Research studies indicate that in developing countries, agriculture is dominated by small land holders with low agricultural production and food shortage [2]. Regarding consequences of small agricultural land holdings particularly in developing countries [3] reported that small land holders are more vulnerable to shortages of food. Pakistan is the 6th most populous country of the world and where more than 60.0% of the population is living in rural areas. Out of this massive population in rural localities, a majority is facing the problems of poverty while adopting agriculture as a major source of their livelihoods.

Small land holders and rural poverty is very common in Pakistan also [4]. In rain-fed areas farming is mainly

dependent upon rainfall as the source of irrigation. The Potohar region of the Punjab also falls into the category of the rainfed area of Pakistan. Agricultural land in this region is fragmented in nature and here farming is associated with many constraints which underpin the low agricultural productivity [5]. In spite of abundant literature on livelihoods in Pakistan, it is not yet clear which livelihood strategy is best for the sustainability and healthy life of a household. It is very necessary to see the relationship between livelihood strategies and assets. For this purpose, the present study was designed.

II. METHODOLOGY

A. Research Area

The present study was conducted in the Pothwar region of the Punjab province of Pakistan because a majority of the rainfed areas of Pakistan are located in this region [6].

B. Sampling Procedure

Two districts (Attock and Chackwal) were purposefully selected from the Pothwar region. The list of farmers having up to 5 acres of agricultural land in both the selected districts was prepared. From each list, 100 households were randomly selected and interviewed. The total sample size for the present study was 200 respondents.

C. Statistical Analysis

The data were analyzed by using SPSS. The nature of data collected in the present research was quantitative. Both descriptive and inferential statistics were used for data analysis and its description. The following equation regarding regression analysis was formulated:

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + e$$
$$PPH = B_0 + B_1EFP_1 + B_2RAS_2 + B_3FSS_3 + B_4ED_4 + B_5CD_5 + e$$

III. RESULTS AND DISCUSSION

A. Livelihood Assets

The situation of livelihood assets (human, financial, natural, physical and social) in the research area is presented below:

Human Assets: It includes human health, educational status, knowledge & skill level and capacity to work. The data regarding human assets possessed by respondents in the research area is presented in Table I:

TABLE I. HUMAN ASSETS POSSESSED BY HOUSEHOLDS

Educational status	Frequency	Percentage
Literate (Having education up to 10 years of schooling ¹ or above)	36	18.0
Illiterate (No schooling or schooling less than 10 years)	164	82.0
Capacity to produce enough food for household consumption		
Yes	05	2.5
No	195	97.5
Age		
Minimum	30 Years	
Maximum	65 Years	
Mean	41 Years	
Household size	Frequency	Percentage
Small (up to 3 members)	21	10.5
Medium (4-5 Members)	60	30.0
Large (More than 5 members)	119	59.5

The data presented in Table I show that illiteracy is very common as a large majority (82.0%) of the respondents did not receive formal education. Regarding capacity to produce enough food out of their own resources, a large majority (97.5%) of the households said that they had no capacity to produce enough food. Only 2.5% of the respondents had enough capacity to produce food for household consumption. The mean age of respondents was 41 years. The size of household as reported by majority (over half) of the respondents (59.5%) was large (more than 5 household members).

Financial assets: The exact picture of financial assets possessed by the respondents in the research area is given in Table II:

TABLE II. FINANCIAL ASSETS OF HOUSEHOLDS

Income sources	f	%
Farming	89	44.5
Non-farming	83	41.5
Both farming & non-farming	28	14.0
Income level		
Low income (Monthly income up to Rs. 15,000)	92	46.0
Medium (Monthly income Rs. 15,001-20,000)	78	39.0
High (Monthly income more than Rs. 20,000)	30	15.0
Access to financial support structures		
Yes	11	5.5
No	189	94.5

The data presented in Table II shows that the majority of households (44.5%) earned their income from farming. Approximately 41.5% of the respondents indicated they received their income from non-farm sources while 14.0% of the respondents indicated they received income for livelihoods from both farm and non-farm income sources. On the basis of monthly income, households were divided into three groups as; low income group (Having monthly income up to 15,000 PKR), medium income group (Having monthly income from 15,001-

20,000 PKR) and high income group (Having monthly income more than 20,000 PKR). Findings reveal that majority of the respondents (46.0%) belong to the low income group. Only 15.0% of the households had monthly income >20,000PKR and belong to the high income group. Regarding access to financial support structures by the households, data shows that large number of households (94.5%) had no access to financial support structures in the form of micro-credit and other informal support structures.

Social Assets: According to [7], it is form of social networks, norms, coordination, social trust and cooperation between individuals within a society. The data in this regard is given in Table III:

TABLE III. SOCIAL ASSETS POSSESSED BY HOUSEHOLDS

Membership of NGO	Frequency	Percentage
Yes	2	1.0
No	198	99.0
Access to Agri. Extension & Advisory Services		
Yes	2	3.5
No	198	96.5
Participation level in social activities		
Low	100	50.0
Medium	76	38.0
High	24	12.0

The data given in Table III indicate that only 1.0% of households reported the membership of NGO and very high majority of the respondents (96.5%) had no access to agricultural extension and rural advisory services at their door steps. Intensity of social assets was assessed with the participation level of households in social and community development related activities in the research area. About 50.0% of households reported low level of participation and only 12.0% had high level of participation in the form of social assets.

Physical Assets: It comprises of infrastructure, goods, land holding and activities required for maintaining livelihoods [8]. The data regarding status of physical assets of households is presented in Table IV:

TABLE IV. PHYSICAL ASSETS OF HOUSEHOLDS

Agricultural diversification	Frequency	Percentage
Yes	28	14.0
No	172	86.0
Crop diversification		
Single crop	164	82.0
Multiple crops	36	18.0
Type of house		
Kacha (with mud)	16	8.0
Packa (cemented)	184	92.0
Land holding status		
Landowner	95	47.5
Tenant	18	9.0
Landless	87	43.5

The data presented in Table IV shows that majority of the respondents (86.0%) didn't adopt agricultural diversification techniques. In crop diversification high majority (82.0%) of households reported that they used to grow single crop on their land. Majority (92.0%) of households used to live in cemented houses. Regarding land holding status of households, the results shows that

¹ Yardstick to measure national literacy rate as set by Government of Pakistan

majority (47.5%) of households cultivate their own land. However, some percentage (9.0%) of households was tenants.

Natural Assets: Natural assets are refers to as stock of natural resources. The data regarding natural assets is given in Table V:

TABLE V. NATURAL ASSETS POSSESSED BY HOUSEHOLDS

Exposure to climate change	Frequency	Percentage
Yes	200	100.0
No	0	0.0
Size of land holding		
Minimum	01 Acres	
Maximum	4.5 Acres	
Mean	1.8 Acres	

The data presented in Table V indicate that all the households (100.0%) reported the exposure of climate change. Minimum size of landholding of households who used to do farming was one (01) acre and maximum is 4.5 acres. The average size of land holding as reported by respondents was 1.8 acres, which indicate the presence of small land holders in the research area.

B. Association between Agricultural Diversification Strategies and Household Income

For finding the relationship between agricultural diversification strategies and income level of households, chi-square test was used as given in Table VI.

TABLE VI. RELATIONSHIP BETWEEN AGRICULTURAL DIVERSIFICATION AND INCOME LEVEL OF HOUSEHOLDS

Income level	Agricultural diversification		Total
	Yes	No	
Low	0 (0.0%)	92 (51.7)	92 (46.0)
Medium	9 (41.0)	69 (38.8)	78 (39.0)
High	13(59.0)	17 (9.5)	30 (15.0)
Total	22 (11.0%)	178 (89.0%)	200

$\chi^2_{cal} = 43.430 ***$ Highly Significant $df = 2$
Likelihood Ratio = 41.762 Linear-by-Linear Association = 38.845

The data presented in Table VI shows that majority (89.0%) of the households didn't adopt agricultural diversification strategies. Out of these households, slightly more than half (51.7%) had low income level. Out of 11.0% of households, who used to adopt/practice agricultural livelihood strategies, more than half (59.0%) had high income level.

C. Association between Social Capital and Income

The relationship between income level of households and their social capital was assessed through chi-square test as given in Table VII:

TABLE VII. ASSOCIATION BETWEEN INCOME & SOCIAL CAPITAL LEVELS

Income level	Level of Social Capital			Total
	Low	Medium	High	
Low	67 (67.0)	18 (23.7)	7 (29.2)	92 (46.0)
Medium	24 (24.0)	42 (55.3)	12 (50.0)	78 (39.0)
High	09 (9.0)	16 (21.0)	05 (20.8)	30 (15.0)
Total	100 (50.0)	76 (38.0)	24 (12.0)	200

$\chi^2_{cal} = 35.762 ***$ Highly Significant $df = 4$
Likelihood Ratio = 36.988 Linear-by-Linear Association = 21.421

The data presented in Table VII shows that majority of the low income people (67.0%) possess low level of social capital.

D. Selection of Livelihood Strategies by Different Income Groups

In order to find out which livelihood strategy was being adopted by different income groups, chi-square test was used. And the results in this regard are given in Table VIII:

TABLE VIII. ASSOCIATION BETWEEN LIVELIHOOD STRATEGIES INCOME GROUPS

Livelihood Strategies	Income Group			Total
	Low	Medium	High	
Farm	73 (79.3)	09 (11.5)	07 (23.3)	89 (44.5)
Non-Farm	14 (15.2)	61 (78.2)	08 (26.7)	83 (41.5)
Both	05 (5.5)	08 (10.3)	15 (50.0)	28 (14.0)
Total	92 (46.0)	78 (39.0)	30 (15.0)	200

$\chi^2_{cal} = 122.770 ***$ Highly Significant $df = 4$
Likelihood Ratio = 166.989 Linear-by-Linear Association = 64.134

The data given in Table VIII shows that majority (79.3%) of people having low income adopt farming as livelihood strategy. The data also indicate that out of the total 14.0% of households who adopt both farming and non-farming activities as livelihood strategies, majority (50.0%) belong to high income.

E. Regression Model Description

Multiple regression was used in order to find out the relationship between Problem of Poverty & Hunger (PPH) as dependent variable and five independent variables as Capacity to Produce Enough Food (EFP), Access to Rural Advisory Services (RAS), Access to Financial Support Structures (FSS), Education (ED), and Crop Diversification (CD). Summary of multiple regression analysis is given in Table IX:

TABLE IX. SUMMARY OF REGRESSION ANALYSIS

Summary					
R	R ²	Adjusted R ²	Standard Error		
.623 ^a	.388	.372	.11119		
a. Predictors/Independent Variables: (Constant), Produce Enough Food, Access to rural Advisory Services, Access to Financial Support Structures, Education and Crop Diversification					
ANOVA ^a					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1.522	5	0.04	24.614	.000 ^b
Residual	2.398	194	.012		
Total	3.920	199			
a. Dependent Variable: Problem of Poverty & Hunger (PPH)					
b. Predictors/Independent Variables: (Constant), Produce Enough Food, Access to rural Advisory Services, Access to Financial Support Structures, Education and Crop Diversification					
Coefficients ^a					
Model	UC		SC	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.036	0.143		14.279	0.000
Produce Enough Food	-.291	.052	-.325	-5.610	0.000

Access to Rural Advisory Services	-.198	.044	-.259	-4.489	0.000
Education	.080	.021	.221	3.868	0.000
Access to Financial Support Structures	-.112	.035	-.183	-3.181	0.002
Crop Diversification	.060	.021	.164	2.913	0.004
a. Dependent Variable: Problem of Poverty & Hunger (PPH)					

The results of multiple regression model as presented in Table IX shows that problem of poverty and hunger faced by respondents can easily be estimated/predicted from independent variables as ability to produce enough food, access to rural advisory services & financial support structures, education and crop diversification strategies. This showed that it is very much easy to predict the problems of poverty & hunger of households from their different livelihood capitals (human, social, financial and physical). Value of R (0.623) as correlational coefficient, also indicate that problem of poverty and hunger of respondents had highly positive correlation independent variables (ability to produce enough food, access to rural advisory services & financial support structures, education and crop diversification strategies). In addition, ANOVA also showed that all the independent variables were significantly (0.000) estimating the problem of poverty and hunger faced by households in the research area.

IV. DISCUSSION

A. Livelihood Assets' Entitlement

Livelihood assets are very much important and play significant role in finding out the livelihood strategies. Among all assets, human asset is the major one as it influences the capability of individuals to have access to other assets [9]. Education is the major human asset plays key role in the capacity building of individuals. Low educational status of majority of respondents was recorded in the research area. The results indicate that large majority (97.5%) of the respondents didn't have enough capacity to produce food for household consumption. This is mainly due to the small agricultural land holdings in the research area as reported by [10]. It was found that involvement of elder age group in agricultural activities is more than young age group. This may be due to limited opportunities for youth in agriculture.

Large size households are more prone towards poverty than households having small size due to the less number of food/financial dependents compared to large sized households where number of food/financial dependents is comparatively high. In the research area, in majority of the households, number of household members was more than five, which was higher than developed countries. The results also indicate that majority of the households (59.2%) who were facing the problem of poverty and

hunger in the research area had large household size (>5 members). The relationship between household size and vulnerability towards poverty was also discussed by [11].

Value of chi-square (35.762) shows highly significant relationship ($P < 0.05$) between social capital level of households and their income level. Highly significant difference was found in financial capital of households with low, medium and high level of social capital. Cross tabulation shows that 67.0% of the poor households (having low income level) had low level of social capital. This indicate that income play a significant role in social capital of rural households. Households with high income level were more inclined towards participation in social activities and had high level of social capital compared to households with income. Low level of social capital is due to the fact that high majority (98.0%) of the households were facing the problems related to poverty, food insecurity and food shortage. The relationship between social capital and financial capital (income level) of rural households was also described by [12]. Low level of social capital was found in the research area as an overwhelming majority of households reported that they didn't have membership of any formal or non-formal NGO and had no access to agricultural extension and advisory services. Lack of access to agricultural extension and rural advisory services by the public sector is one of the major reasons behind widespread rural poverty due to low agricultural production and farm yield.

Limited access to financial support structures as an overwhelming majority (94.5%) of the households in the research area had no access to any form of financial support structures, which serve as Social Safety Nets (SSNs) for rural poor. Due to poor accessibility towards financial support structures by the households in this study, large majority (98.0%) were facing the problem of poverty and hunger. This has been proved by different economists and social scientists that financial support structures serve as significant and important strategy in reducing poverty [13]. In the research area, it was found that a large majority of the households didn't adopt agricultural as well as crop diversification techniques. Large majority (82.0%) of the households used to grow single crops due to small land holdings.

Due to small size of agricultural land holding, majority of the farmers were practicing subsistence farming which is mainly responsible for existence of poverty, food insecurity and food shortage at household level. In this research all (100.0%) the respondents reported that climate change (increase in daily temperature and changes in rainfall pattern) badly influenced their livelihoods as whole of the agriculture in rain fed areas is depend on rainfall.

B. Livelihood Strategies

Households used diverse nature of farming and non-farming strategies to secure their livelihoods. However, farming was the major income generation activity for livelihoods of majority (44.5%) of the respondents. In connection with these findings [14] reported that in rural areas, majority of the people used to do farming as their

major livelihood strategy. Crop and livestock production was the major farming related economic activity and job in public/private enterprises, labour and business were the main income generating activities in non-farm income sources.

The results of chi-square statistics (Table VIII) showed that diversified income sources or livelihood strategies significantly influence the income level of households. Diversified income sources in the form of livelihood lead to poverty reduction. This is one of the best strategies to mitigate the risks and shocks. In rural areas of Pakistan, reliance on farm economy is very much high compared to non-farm economy. Research studies shows that use of diversified income sources as livelihood strategies enable rural households to have better income than dependency on single income source (farming), thereby enhancing food security status [15].

About half of the households belong to low income group, which indicate that income based poverty exist in the study region. Low income status of households was due to a number of factors. Out of these factors small agricultural land holdings, low educational status of head of households and low tendency of households towards agricultural diversification strategies were the factors. The results of chi-square statistics shows highly significant relationship between income level of households and agricultural diversification strategies being employed by the households. Due to low income level of households, a large majority (98.0%) of them were facing the problem of poverty and hunger at household level. This showed that income-based poverty exists in the study area. Different factors like education, enough food production, access to rural advisory or agric. Extension services, access to financial support structures in the form of social safety nets (SSNs) and diversification of livelihood strategies strongly influences the problem of poverty and hunger being faced by households.

V. CONCLUSIONS & RECOMMENDATIONS

It was concluded majority of the households had limited human, financial, physical, social and natural capitals. In the scenario of climate change, households adopted diverse nature of farm and non-farm related strategies to secure their livelihoods. Findings of chi-square statistics showed highly significant association ($P < 0.05$) between agricultural diversification strategies being adopted by households in the situation of changing climate and income level of households. It was found that social capital was highly influenced and depends upon income level of households as majority (67.0%) of the poor people with low income level had low level of financial capital. The preference or choice of livelihood strategies by different income groups was measured through chi-square test of independence ($\chi^2 = 122.770$) which shows that majority (79.3%) of low income households used to adopt only farming as their major livelihood strategy. Due to which they were considered as more prone to poverty as high majority (98.0%) of

households were facing the problem of poverty and hunger (98.0%) at household level. The results of multiple regression analysis showed that problem of poverty & hunger (PPH) can easily be estimated from different livelihood assets as independent variables. Following policy recommendations are hereby formulated:

- State management should revise the poverty reduction policies and strategies emphasizing adoption of livelihood diversification strategies
- Youth policy must be redefined with special focus on agriculture
- Government should device policies for rural livelihood strategies keeping in view the status of livelihood assets possessed by the households

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