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The Enigma Of Low Production In Agricultural Sector: The Solution Through Trajectory Of Women's Empowerment

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Abstract

Among many others, the enigma of low production per acre is also a persistent common phenomenon of developing economies. The present study is a guide towards solving this problem by assessing the impact of women's empowerment on agricultural production. The convenient sample of 160 women farmers aged between 21-55 year was recruited from district Khanewal, Pakistan. The Composite Women's Empowerment Index (CWEI: Batool & Batool, 2018) was used to measure the empowerment variable. The outcomes of the stepwise regression model showed a positive significant impact of women's empowerment, in particular, and use of technology, agricultural information, farm ownership, paid job, and agricultural training on agricultural production, produced by sample women farmers, in general. The recommendations to the government are also discussed.

Keywords: Women empowerment, agricultural production, use of technology

Introduction

Agriculture is considered to be the backbone of Pakistani economy. Five major crops viz., cotton, rice, wheat, sugarcane, and maize are grown here, which cover the maximum cultivated area of Pakistan. Total cultivated area in Pakistan is about 21.5 million hectares, wherein 3.1 million hectares (14.5%) consists of cotton belt, the largest part of cash crop after wheat (Government of Pakistan, 2015).

Although problem of low agricultural productivity (output to input ratio) is common phenomenon in developing economies, Pakistan records lower productivity as compared to many developing countries in Asia. Among various underlying factors that constrain low farm productivity enumerated as lack of latest technologies, inadequate credit facilities, inadequate agricultural research, and lack of seed production capacity, illiteracy, poverty, lack of access to

improved inputs and services, inadequate large land holdings, fragmented /small land holdings, lack of awareness, plant disease, improper use of fertilizers, traditional methods of cultivation, lesser use of water, lack of canal and groundwater, climate impact, soil erosion, depletion of soil fertility, and waterlogging (Aslam, 2016).

The phenomenon of feminization of agriculture, which is very common now a days, refers toward the ever-expanding share of women in agriculture, puts a question mark on the undergoing situation in Pakistan, where social and economic status of women can make a big difference to alter the fate of Pakistan's agricultural and in return economic development. Agriculture being labor intensive sector should be thankful for the viable percentage (42)of women farmers, who directly or indirectly, participate in agricultural labor force.

It has been advocated that high percentage of women found to be attached with agriculture sector can to help in eradicating rural poverty. It is pathetic to note that women who actively participate in agriculture labor force, are not empowered enough, and miss control over their own earned agricultural incomes, purchase/sale of inputs and outputs, and in decision making (Chaudhary et al., 2019). The disempowerment of women engaged in agriculture causes one additional constraint, of low farm productivity, in the country. Along with many other factors to address the issue of low farm productivity, if women are empowered in agriculture sector of Pakistan, many allied issues can be settled automatically.

Farm productivity is the ratio of outputs to inputs, used in agriculture sector. In other words more agricultural outputs means the farm is more productive (Datt & Ravallion, 1998). The increase in farm productivity can lead a country towards poverty eradication, work efficiency, food security, and cost reduction. An addition in farm productivity is a way to decrease cost of production of the crops followed by added revenue that can be helpful to combat the issue of poverty in any country.

Increasing production or producing more outputs at low level of inputs remain primary objective everywhere around the globe, where population is increasing with geometric progression. There is a strong case for continued improvements in agricultural productivity in United States and rest of the world. For developing countries, where majority of population directly depends on agricultural sector for its livelihood, raising the productivity level provides a pathway out of poverty. Increased farm productivity is also associated with rapid economic growth, by releasing extra resources for other productive uses, by providing food to non-farm growing population (Reddy, 2003).

According to United States' Economic Research Service (ERS), for agricultural productivity in United States and world-wide, the term of "Total Factor Productivity" or TFP is used, which indicates the ratio of outputs to inputs, which can be attained by using all productive factors. The factor productivity can be increased with use of modern technology, such as, improved seed varieties, better irrigation system, proper use of fertilizers according to land needs, conservation of tillage, and laser leveling. According to ERS report (2012), the United States' TFP increased to double from 1948 to 2011, which shows that farmers were able to produce crops twice

with given resources, which indicates toward both, the efficient use of resources and increase in production. Change in this efficiency level enabled United States' farmers to be vigorous competitors in global market and increase trade balance (Mugeral et al., 2011).

Women's labor force participation, like in every sphere, is low in agriculture sector. Discussing this issue, Heyzer (1995) added that generally, women 's participation in labor force increased from 36 percent in 1975 to 41 percent in 1995. Globally, women still have only 35 percent of total wage employment and add only one-fourth of the share of national income. Women 's wages are generally only three-quarters of men 's wages in the non-agricultural sector in 58 underdeveloped countries.

Globally, farming is labor-intensive because of its geophysical settings, catering women in the labor force to bear the load of various farm tasks. According to Vaidya et al.(1990), about 50 to 80 percent of agricultural labor force comprises of women. Dey (1985) manifested that in Asia alone, share of women in households' incomes from agriculture wage labor ranges from 10 to 60 percent. Agriculture sector, despite being backbone of Pakistani economy, recorded a share of 19.5% in gross domestic in 2019 and absorbed 42.5% of labor force. According to 6th census 2017, the country's population growth rate is 2.4 percent per annum. In order to cater the needs of increasing population, government of Pakistan has taken initiatives to accelerate the productivity in this sector. The year 2017-18 recorded a remarkable growth rate of 3.8% in agriculture sector against the target of 3.5%. (Economic Survey of Pakistan, 2017-18).

According to report issued by Pakistan Business Council (2019), crops yield of Pakistan remained very low per hector for a long time and now it has sunk to lowest point as compared to whole world. Pakistan produces 3.2 tons of wheat from one acre, which is very low and only 40 percent of the 7.9 tons produced in France, which shows best productivity in the world. Similarly, China produced 4.7 tons per hectare, while Pakistan produced only 2.6 tons of cotton per hectare (Punjab Agricultural Research Board, Lahore and University of Agricultural Faisalabad combined report 2018).

Agriculture sector of Pakistan provides inputs to industrial sector e.g., like cotton. Low productivity is a major barrier for Pakistan to become a part of international food market along with dearth of cold storage and warehouses. About fifty percent agricultural produce is destroyed due to the absence of facilities like, water, new hybrid varieties of seeds, and marketing. Both the low productivity and low wage in agriculture sector, forces farmers to quit rural areas for migration to cities.

The Pakistan Economic Survey (2017-18) reports that cotton production was 11.895 bales and recorded growth of 11.7% over the production of 10.76 million bales during the same period (2017-18). The share of cotton in GDP was one percent and contributed 5.6 percent in agriculture value addition. The area of cotton crop cultivated in year 2017-18 was 2701 thousand hectares as compared to area of 2490 hectare in the last year. Production increased during last year was due

to better economic returns and availability of subsidized inputs. In many areas of rural development, Pakistan lags behind its Asian neighbors with scarcer natural resources, hence has become an important subject of inquiry (Pakistan Agriculture Research Council, 2004).

Although women's participation can be observed in labor force, they are not empowered in decision making process and use of their own earned agricultural incomes (Chowdhury et al., 2009). Farm productivity in agricultural sector is found to be positively related with women's empowerment; Women's overall empowerment includes four dimensions, namely, economic, familial, social, and psychological (Batool & Batool, 2017). Women's empowerment in case of decision making regarding the purchase of resources and output positively, affect the level of farm productivity (Alkire et al., 2013).

To attain sustainable development goals in Pakistan, it is essential to empower women in social, economic, political and health spheres (United Nations Population Fund, 1994). Women's empowerment can be increased through freedom of movement, awareness of their own rights, education, increasing literacy level, training and use of modern technology, like use of mobile phones (Batool& Batool, 2018). According to Millennium declaration 2000, no country can deny the importance of gender equality and assurance of rights of women equal to men. Access of women to decision making will give them opportunities equal to men and their greater participation in decision making process must be assured by government and international organizations (World Conference on Human Rights, Vienna, 1993).

It has been observed, where women are empowered, a viable increase in agricultural production is recorded, for instance a study by Diiro et al. (2018) showed that women's empowerment caused maize production in western Kenya to rise. It was also indicated that women's empowerment helped to reduce the insecurity of food and poverty in agricultural sector in western Kenya and sub-Sahara, Africa

As we turn to Pakistan, we find a sharp contrast about women's involvement in agricultural activities on one hand and non-involvement in agriculture-related decision making on the other hand. For example, women are extensively involved in the whole food system starting from the selection of seeds, sowings, drying, storing and feeding the family from agricultural products. They contribute 60% to70% in cropping labor, livestock as well as harvesting system, but they are not involved in decision making about selection of suitable crops and adoption of innovative and good management practices in Pakistan (Mehar, 2009).

Generally, the family structure in Pakistan is such that most of family heads are males, due to which females are lesser empowered as compared to that of males. Women do not take active part in decision making process in households as well as agricultural maters in sowing, seeding, cultivating and harvesting. They are not empowered in purchasing and selling of agricultural commodities, hence productivity in agricultural sector remains low (Afzal et al., 2009). This statement refers toward the corrective measure to increase agricultural productivity based on the notion of women's empowerment. It is well documented that the achievement of the goal of

women's empowerment in agriculture sector might lead the country to increase farm productivity; as it has been observed and empirically proved that women who are more empowered add more in agricultural production as compared to those who are lesser empowered (Ishaq & Memon, 2016; Diiro et al., 2018).

Pakistan, where women formulate half of the population and economy is based on agriculture and allied activities, is labelled as a country where farmers are destined to in poverty. About 62% people's employment is related to agriculture sector here. As regards women, they play a vital role in agricultural sector but they face many obstacles and economic constraints (Sadaf et al., 2006). According to Economic Survey of Pakistan (2008), about 61% of the rural population related to agriculture sector is dependent on women. In rural areas, women perform dual role; housewives as well as wage earners. Women are not empowered socially, economically, and in decision making activities in agricultural sector (Pakistan Agriculture Research Council: Pakistan Agricultural Research Council, 2004). Whereas, majority of rural women involve in production, processing, cultivation, preparation and marketing but they lack authority to decide about crop type, cultivation and to use agricultural income (Yisehak, 2008).

One of the factors of women farmers being lesser empowered is that they receive very limited services from extension programs. Among the major reasons of lack of extension services for women include local cultural values, limiting women to attend extension meetings, and their heavy involvement in household tasks (Othman Martin, 2000). A vast majority of women in developed and developing countries attach the role of women as productive, care and nurturing of children. Generally, decisions regarding the activities requiring technical proficiency and money related matters are taken by male members. Since knowledge and economic independence are the restrictions on women empowerment, therefore increasing their technical knowledge and skills are counted as of supreme importance to empower them (Santra & Kundu, 2001).

The lack of women's empowerment is not only fatal for their own selves but also keep the development mechanism slow in the country. So, unless the actual and prospective contribution of women in agricultural production process is acknowledged, efforts to improve the wellbeing of farm households and food security will remain in turmoil. Though in diverse areas of rural development, Pakistan lags behind its Asian neighbors with scarcer natural resources (Pakistan Agriculture Research Council: PARC, 2004) , in line with the international efforts, the Pakistani government has also taken initiative to raise the status of women (Haider et al., 2017). Unfortunately, despite different initiatives taken by government of Pakistan in different eras, there is need to do a lot to improve the level of women's empowerment in household, industrial, and agricultural sectors (Batool, 2018).

The present study is an effort to highlight the impact of women's empowerment on agricultural production. Having a look into this background of low production in agriculture sector in Pakistan and lower women's empowerment level we come to the conclusion that in Pakistan's per acre farm production is low due to lack of women's effective contribution. As empowering

women has been on the agenda of sustainable development goals for development policy and research and enquiry in Pakistan so finding the link between agricultural production and women's empowerment can provide a viable insight to the government, for the policy formation. Keeping in view the significance of the matter, the current study was planned to measure the impact of women's empowerment on agriculture production of district Khanewal, the rice and cotton area, of southern Punjab Pakistan to reach some policy recommendations in the light of the results attained.

Literature Review

Fabiyi et al. (2007) studied the role of women in agricultural development and their constraints in Biliri local government area, Nigeria. Simple random sampling technique was used to select six villages from the LGA and 60 women farmers. The result showed that there is positive relationship of agriculture productivity (dependent variable) with education level, employment status, and women's empowerment in household decision making and autonomy in movement (social empowerment). Satyavathi et al. (2010) showed that there is positive relationship of women's empowerment with agricultural growth, farm technology, better irrigation and use of chemical fertilizers.

Alkire et al. (2013), using random sampling technique, collected data from 350 household (625 individuals) in Guatemala and Uganda while, 450 households (800 individuals) in Bangladesh to observe the impact of women's empowerment in decision about agricultural product, control over use of income, leadership, and time allocation on maize productivity. The result showed that the women empowerment in all domains of agriculture increased the agricultural production.

Ishaq and Memon (2016) studied the role of women in agricultural sector of three towns of Lahore, Pakistan by collecting data from rural women (n=207). The results of both descriptive and inferential statistics showed that women's empowerment has positive effect on agricultural productivity and development. Abebe et al. (2016) analyzed the impact of women's empowerment on agricultural productivity. Data were taken from kutaye district of Ormina, Ethopia. The t-test showed that women were less empowered than men and there was positive relationship between women's empowerment and agricultural productivity. Logeswari and Thiruchenduran (2016) analyzed the impact of women empowerment (in agricultural decision making) on agricultural development. It was proved from the results that level of agricultural development decreased with lesser empowered women.

Ahmad and Khan (2016) measured the women's disempowerment in agriculture in Pakistan. Data were collected from 2090 households, in rural areas of Pakistan, in three rounds from the year 2012 to 2014 by international food policy research institute. The result showed that agricultural productivity increased with increasing level of women's empowerment Diiro et al. (2018) estimated the impact of women's empowerment on agricultural productivity for maize production in Kenya, collecting data from international center of insect physiology and biology

(2015-16). The results of the two stage least squares method showed that women's empowerment contributed not only to reduce the gender gap in agricultural productivity but also increased productivity from Farms managed by women.

Mulema et al. (2019) interviewed 230 women farmers and 16 focus group men and women farmers from four woredas (districts) of Ethiopia. The outcomes of the binary and multivariate Probit model showed that several empowerment indicators significantly ($p \leq 0.001$) influenced women's participation in different stages of agricultural research, specifically about, input, production decisions, autonomy in plot management, membership of farmers groups, and ability to speak in public which enhanced women's participation in different stages.

According to the report issued by Pakistan business council 2019, crops yield of Pakistan remained very low per hector for a long time and now it has sunk to lowest point as compared to rest of the world. Pakistan produces 3.2 tons of wheat from one hector, which is very low and only 40 percent of the 7.9 tons produced in France, which shows best productivity in the world produce. Similarly, China produced 4.7 tons per hectare while Pakistan produced only 2.6 tons of cotton per hectare which is only 53 percent as compared to Chinese level of productivity (Punjab Agricultural Research Board, 2018). As it is evident that the low farm productivity/production compared to the rest of the world is a serious issue in Pakistan, which requires to be resolved. On the other hand, women share half of the population of Pakistan, the need to enhance their role in agriculture sector and consequently in economic development has been reiterated from time to time. To examine how effective they can prove to contribute in agricultural production, if they are empowered, can go long way to recommend policy implications. As a big chunk of literature regarding Pakistan did not incorporate the impact of women's empowerment on farm productivity/production, this study will be unique addition in the literature.

Data and Methodology

Sample

Sample of this was recruited from Khanewal district of south Punjab, Pakistan: four tehsils namely, Kabir Wala, Mian chanu, Jahanian, and Khanewal. Khanewal is agricultural district, where mainly rice, wheat, and cotton crops are grown (Khanewal official website). As cotton is major cash crop, so we decided to measure the role of women empowerment in cotton production. Disproportionate, convenient sample was selected from four tehsils of district Khanewal. The target participants of the study were women connected with agricultural sector.

This study used mixed sampling technique to collect the data. At the first stage, province Punjab was purposively selected out of four provinces of Pakistan. Similarly, district Khanewal was selected purposively to represent the southern Punjab, relatively backward area in terms of awareness and economy. The sample was taken from farmer women aged between 21 to 55 years, following the literatures (e.g., Fabiyi et al, 2007; Ishaq & Memon, 2016; Diiro et al., 2018). The women respondents under the age of 21were not included because of the empowerment under this

age cannot be determined. And women of age of 55 usually cannot work due to health issues. Women below the age of 21 and above 55 years, living in urban areas as well as not connected with agricultural sector, were not included in the survey.

Measures.

In the present study, all the measures were used in Urdu, being national language. In order to measure the dependent variable we took per acre agricultural production (in mound) and categorized it in low production (15-30 mound/acre), moderate production (31-45 maund/acre), and high level of production (46 mounds and above/acre). It is pertinent to mention here that though literature used agricultural productivity, instead we used agricultural production as the explained variable. The productivity is simply the ratio of output and input, as most of the farmer sample women did not find any record of the input cost used, so we had to confine only the production per acre rather than productivity.

Education, paid job, family system, farms ownership, agricultural information, use of technology, and agricultural training (being part of extension services) along with the main focused variable, women's empowerment were used as independent variables.

Composite Women's Empowerment Index (CWEI: Batool & Batool, 2018) was utilized, which is an aggregate of four sub-dimensions namely, Familial, Economic, Psychological, and Socio-Cultural. The Cronbach's alpha of CWEI was .76. A 5-point Likert scale (1=Not at all, to 5= to great extent) was used for all four sub-scales. Women's economic empowerment index (control over economic resources) consisted of 5 items viz., to what extent do you hold control over domestic economic matters? The Cronbach's alpha for the measure was .79. The Women's familial empowerment index carried 5 items of decision making within family, The Cronbach's alpha for this index was .77. Women's Socio-Cultural empowerment index consisted of 5 items e.g., "to what extent do you hold control over social mobility?" Cronbach's alpha for the measure was .72. The short version (15-items) of psychological empowerment scale (Batool, & Batool, 2017) was used. Cronbach's alpha for the measure was .79.

In order to measure the variable use of technology, two options were used following satyawathi (2017): yes=1 in case women farmer used technology and 0 otherwise. For the variable use of information (UOI) two options were used following Sadaf et al. (2006): yes=1 in case women farmer used information (agricultural information through TV, newspaper, relatives and family members) and 0= otherwise. For the variable farm ownership, two options were used by following Fabiyi,et al.(2007) : yes=1 in case if women farmer had farm ownership and 0 otherwise

For the variable paid Job, two options were used by following Fabiyi et al (2007): yes=1 in case women farmers were doing part time paid job and 0 otherwise. The variable training used two options following Lemlem (2016) yes=1 in case if women farmers got training and 0 otherwise. For the variable being part of extension programs two options were used following Muriithi et al. (2018): yes=1 in case if farmer women being the part of extension program and 0 otherwise.

Procedure

The data for the present study were collected through survey method with the help of a questionnaire containing closed ended questions from, four Tehsils of district Khanewal, Punjab, Pakistan, namely Khanewal, Kabir Wala, Mian chanun, and Jahanian. After taking their consent, the questionnaires were distributed among two hundred respondents in all four tehsils of Khanewal;

Several among the participants failed to participate in the study because women of backward rural area were not willing to provide their personal information without the permission of husband or male head of families. Many questionnaires were not returned because of unwillingness of the participants, The survey for the present study was conducted during the month of June and July, 2019. Out of 200 questionnaires, 175 were returned and 160 were found complete in all respect to formulate the final sample of respondents' women working in agriculture sector.

Research Question.

What is the impact of Women's Empowerment on Agricultural Production in Pakistan?

Hypotheses.

H1: There is a significant positive impact of Women's Empowerment on Agricultural Production;

H2: Use of Agricultural Information, Farm Ownership, Agricultural Training, Paid Job, and Use of Technology positively and significantly affect agricultural production.

Frequencies and Percentages of the Demographic Variables (N =160)

Table 1 Age Groups of Sample Women (N= 160)

Age Groups	Frequencies	Percentage
21-37 years	106	66.25%
38-55 years	54	33.75%

Table 1 indicates that majority of the sample women, 66.25%, were aged from 21 to 37 years and the rest (33.75) belonged to the age group of 38 to 55 year.

Marital status; Hundred percent married women were taken in research process. (Because items in women's empowerment indices were related to married women)

Table 2 Education Groups of Sample (N=160)

Education Status	Frequencies	Percentage
Illiterate	32	20%
Primary	48	30%
Middle	32	20%

Matric	23	15%
Intermediate	15	9%
Bachelor/Master	10	6%

Table 2 highlights the education background of the sample women which enumerates 20 % sample women as illiterate followed by 30%, 20%, 15%, 9%, and 6% as primary, middle, matric, intermediate, bachelor/ masters, respectively.

Table 3 Job Status of Sample Women (N=160)

Job Status	Frequencies	Percentage
In paid job	40	25%
Not in paid job	120	75%

Table 3 manifests the paid job status of the sample women. It indicates that 25% of the sample women are engaged in paid job apart from managing their agricultural land, and those who are dedicated farmer and not engaged in paid job are indicated as 75%.

Table 4 Training Status of Sample Women (N=160)

Training Status	Frequencies	Percentage
Trained	99	61.88%
Untrained	61	38.12%

Table 4 highlights that living in the same locality, 61.88% sample women got the opportunity to get training about agriculture, whereas 38.12% of the sample did not avail any opportunity to get such training.

The data collected showed that overall, out of sample of 160 women 50% (80) lied in the group of low farm production (15-30 mounds/acre), 33.75% (54) of sample belonged to the moderate production group ((31-45 mounds/acre), and only 16.25% (26) stood in the high production group (46-and above mounds/acre)

Results and Discussion

To study the effect of women's empowerment on agricultural production (explained variable) we ran ordinary least squares regression (stepwise regression) by using composite women empowerment (CWEI) as an explanatory variable along with other variables. Before running the stepwise regression all assumptions of ordinary least squares were tested and found satisfactorily.

Table 5

Stepwise Regression Estimates of the Impact of Women's Empowerment (Composite Women's Empowerment Index: CWEI) on Agricultural Production (N= 160)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.817	.242		-3.382	.001
UOT	.301	.093	.197	3.249	.001
AGRI-INFO	.319	.106	.212	3.024	.003
FOWN	.325	.092	.201	3.516	.001
WE	.008	.002	.195	3.310	.001
PJOB	.237	.094	.139	2.531	.012
AGRI-TRAIN	.247	.099	.162	2.480	.014

Note: UOT= Use of technology, AGRI-INFO= Agricultural information, FOWN=Farm ownership, WE=women's Empowerment, PJOB=Paid job, AGRI-TRAIN= Agricultural training and AGRIP=Agricultural production

After running the stepwise multiple regressions following (6^{th}) fitted regression model was attained and retained:

AGRIP = 0.197 UOT + 0.212 AGRI-INFO + 0.201 FOWN + 0.195 WE +0.139+PJOB + 0.162 AGRI-TRAIN

R^2= 0.497 for model one, R^2= 0.608 for model two, R^2= 0.683 for model three, R^2= 0.713 for model four, R^2= 0.726 for model five, R^2= 0.736 for model six (most of Ps<.01), and all t-values are significant. So, we may conclude that the predictor variables have significant contribution to the values of the outcome variable (agricultural Production). F-statistics for model 'one' to model 'six' = 156.267, 121.929, 112.007, 96.05, 81.441, 71.163 (with Ps< .001, .01, and .05) respectively. The Variance accounted for UOT in model 1, and is equal to 49.7%, in model two 11.2% is accounted for by AGRI-INFO, in model three, FOWN adds 7.5% variance, in model four, WE(women's empowerment) add 3.0% more variance in model five, additional 1.3% is accounted for by PJOB, and finally in model six, TRAIN adds only1.0% variance. Six factors significantly accounted for 73.6% of variance in Farm Production.

Overall, six models of stepwise regression were attained, whereas, Table 5 depicts only 6^{th} and final model, which shows the best possible suitable set of determinants of farm production. Sixth model presented in Table 5 indicates the value of R^2= .73.6%, which means approximately 74% of the variance in agricultural Production is explained by these explanatory variables. The F-value is found significant, which shows that the methodical variation is significantly larger. Thus, the study revealed the set of the most important factors that can forecast agricultural Production.

The coefficient value of variable UOT (use of technology), shown in Table 5 as positive (0.197) and significant (p<.05) which means an increase of one unit in UOT in agricultural sector brings 0.197 units increase in agricultural Production. Technology is found to be the most important determinant in predicting the agricultural production. Our result is supported by satyawathi, (2017) that use of technology in Asia boosts the agricultural production. Our result is also in line with outcomes of Bharadwaj and Brahmand (2017) that technology used in case of green housing and hybrid seeds increases farm production as compared to traditional way of cultivation. Use of modern technology (green housing, laser leveling etc.) boosts agricultural production .

The Table shows that coefficient of variable AGRI-INFO is positive (0.212) and significant (p< .05), which indicates the women who got agricultural information (through TV, radio, newspaper etc.) add more in agricultural production by 0.21 units with one unit change of information. The results are supported by Sadaf et al. (2006) that availability of information sources like, print media, electronic sources positively affect the agricultural production. The sample of Sadaf et al. (2006) suggested that agricultural information increase the agricultural production by 36%.

The coefficient value of FOWN (farm ownership) is found positive (0.201) and significant (p<.05) as given in the Table, it means farm ownership increases the production by 0.201 units. Our result is in line with the outcomes derived by Alkire et al. (2013) and Fabiyi et al. (2007) that farm ownership creates security and confidence among the farmers, thereby increases the level of output per acre produced by them. Rented farms used for cultivating purpose give lesser yield as compared to the respondents who owned agricultural farms.

The coefficient of WE in the Table is found to be positive (0.195) and significant (p<.05). which means one unit increase in women's empowerment leads to 0.195 units increase in farm production. Our results are supported by Logeswari and Thiruchenduran (2016) that agricultural productivity is observed lower, where women are found disempowered whereas Ahmad and Khan (2016) and Ishaq and Memon (2016) that women's empowerment invigorate women to produce more with more zeal and zest to show their worth.

The Table indicates that the value of regression coefficient for PJOB is positive (0.139) and significant at (p<.05), which means that when a woman moves from not in paid job status to in paid job status, it will increase the production by 0.139 units. Our results are in line with Fabiyi et al. (2007) that employment of women can increase their productivity in agriculture sector.

The regression coefficient of Training in agriculture sector is 0.162 and significant(p< .05), which means as respondents get training, one unit increase in training increases the agricultural production by 0.162 units. The results are consistent with Abebe et al. (2016) revealed that training frequency increased the yield of agrarian farms in Kutaye district of Ormina, Ethopia. In African countries most respondents getting trained produced more as compared to those respondents who were not properly trained.

Conclusion

The outcomes of the stepwise regression showed that women's empowerment had positive impact on agricultural production of the sample women farmers in particular, and in general, the use of technology, agricultural information, farm ownership, paid job, and training had positive impact on farm production in Khanewal district, Punjab, Pakistan.

Policy Recommendation and Limitations of the study

As women's empowerment came out to determine farm production so women should be encouraged and empowered to fulfill the needs in farming process and efforts should be made to empower women who are already working in agriculture sector. The government should take steps to promote awareness among women and provide adequate facilities to them to increase agricultural production. The government should plan to train, and educate, and provide agricultural information to farmer women to make them competitive.

The latest technology should be introduced in rural areas. Where women farmers cannot afford to purchase expensive machineries, the government should subsidize them in agricultural tools such as laser leveling, dip water system, and harvester and other modern equipment. The NGOs should also play their role to apprise rural farmer women of the updated techniques and tools that can help them to become more effective human resource of the economy.

Some of the limitations of the study reduce the generalizability of the results: The sample was selected from four tehsils district Khanewal of province Punjab, Pakistan, we cannot generalize the results to the women in other three provinces of Pakistan. The data should be collected from the whole country in future. A convenient sampling technique was used to recruit the sample due to the reason that we did not have consistent measurements on women in Pakistan about the age standard we used, and there was a lack of sampling framework for working/non-working, and illiterate/educated women. The study was based on self-reported questionnaire which cannot be free of biasness, so qualitative studies are suggested to discover the true perception of women on the factors they consider to be important in defining their empowerment. The women in underdeveloped world should be active mediators of economic development. This calls for crucial construction of strategies to empower them. The future studies should collect data at least two points in time as recommended by Malhotra et al. (2002).

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