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Exploring the implications of agricultural extension services to combat food insecurity in district Tharparkar Sindh, Pakistan

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Abstract

Pakistan is a developing country with diversified ecological zones. However due to low percentage of forests and high percentage of emission, climate change is causing natural disasters like floods and droughts. Predominantly, drought has been a frequent spectacle in the districts of Tharparkar and Umerkot. Keeping in view the severity of food insecurity in drought hit regions, the present study was carried out in the Department of Agricultural Extension and Rural Development, University of Sargodha during 2017. The study aimed to find out the role of public and private agricultural extension services in provision of secure food in the selected study area. Additionally, it tried to identify the implications of agricultural extension to combat food insecurity as perceived by respondents. Results showed that respondents get extension services from private NGOs with the mean value of 2.83 which lies between sometimes to usually on Likert type scale. Public extension services and self-help groups are playing less active role than NGOs with the mean values of 1.85 and 2.01 respectively. Respondents highly recommended that Kisan Cards (4.47), drought resistant verities (4.33) and maintenance of RO plants (4.17) can help combat food insecurity. Hence, it is recommended that area specific strategies should be adopted to ensure food security under climate changing scenarios.

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Introduction

Pakistan is a developing country with diversified ecological zones. However, its population is increasing day by day, and shrinking all available resources at high speed. According to latest research reports Pakistan must manage its water resources by 2025 otherwise due to climatic changes in the region Pakistan would face severe water crises in near future. (Tagar *et al.,* 2008). Agricultural extension is the bridge between research and farmers. Extension transfers agricultural innovations to the farming masses with the objective of enhanced adaptations for economic improvement of households. Therefore, extensions possess noteworthy importance in bringing improvement of rural households. In this way, extension does have potential in combating poverty, unemployment and food insecurity through increased production. Role of extension in rural uplift and agricultural boom is well documented (Abdullah *et al.,* 2014).

Extension sector could render critical part in sharing chunk of information about major challenges and need of food sufficiency through educational programs (Hersman, 2004). However, role of extension is under criticism because partial success in objective. Allahyari (2008) agreed with the potential role of extension in food production but in the same time paved the criticism that traditional extension approaches are not successful in achieving the set targets. This sluggish success could be observed from wider adoption gap of innovations. Extension service started experiencing some challenges in the last decade due to socio-economic changes and agriculture sector reforms are taking place. Given the increase in food price, high demand for agricultural products, weather changes and constrained resources become critical to food security and poverty reduction in Africa (World Bank, 2010).

Agricultural extension followed diversified approaches for better services. With the passage of time, modern approaches like use of information communication technologies were adopted by sector. This advancement presented an opportunity of fostering information sharing among stakeholders (Lwoga, 2010). Trainings about other extension programs also exhibited significant outcomes. For instance, Training and Visit approach improved yields in Kenya, Burkino Faso and India. In Pakistan, T&V showed best partial effects. Farmer Field Schools (FFS) recorded significant increase in knowledge regarding use of pesticides (Tripp *et al.,* 2005; Van den Berg & Jiggins, 2007).

Various researchers also noted significant influence of extension on poverty alleviation and food security achievement (Dercon *et al.,* 2009). It can be said that agricultural extension does hold significant potential in combating food insecurity. One of the main constraints to development that many farmers face is isolation, and a feeling that there is little they can do to change their lives. Some farmers will have spent all their lives struggling in difficult circumstances to provide for their families with little support or encouragement. It is important for extension to work closely with farmers, helping them to take the initiative and generally encouraging them to become involved in extension activities. Equally important is to convince farmers that they can do things for themselves, that they can make decisions and that they have the ability to break out of their poverty. Present investigations were carried out to analyze food security situation in Tharparkar District and suggest guidelines for policy makers.

Material and methods

Research Design

Cross sectional research design was chosen to answer the research questions in tackling scarcity of food in drought hit areas of District Tharparkar, Sindh, Pakistan. Present study was carried out during July to December 2017. This design assisted the researcher in exploring the implications of agricultural extension services in drought hit areas of District Tharparkar.

Population and Sample Size

The study was conducted in district Tharparkar. District Tharparkar is the most food insecure district of Sindh province. It has four talukas or tehsils namely Mithi, Diplo, Chachro and Nanger Parkar. Out of these four tehsils one tehsil (Mithi) was selected purposively, based on severity of food

insecurity and drought conditions in the area. Tehsil Mithi was constituted of 12 union councils. All union councils were surveyed in the present study. Further from each union council, two (02) villages were selected purposively. The target population (most affected dwellers) was unknown therefore following formula was used as suggested by Kasely and Kumar (1989) to compute the accurate sample size for unknown population.

$$n = Z^2 V^2 / d^2$$

Where,

Z= Normal variant or confidence level 95% = 1.96

n= Sample size

V= 51% assumed variation in the sample size of selected households those were highly affected from food insecurity in tehsil Mithi.

d= assumed marginal error (5%)

$$n = \frac{(1.96)^2 (0.51)^2}{(0.05)^2} = 399.68$$

All 400 households' heads (respondents) were equally allocated to 24 purposively selected villages from 12 UC of tehsil Mithi. Hence 16.66 say 17 household heads was the final workable sample of respondents at village level selected conveniently.

Research Instruments

The study employed two types of data collection instruments. Interviewer-administered structured questionnaire and key informant interview guide, Questionnaire was used for data collection from households while interview guide was used to collect data from extension field staff in the study area.

Pre-testing of Research Instruments

Thirty respondents were randomly selected from tehsil Mithi to pre- test reliability of questionnaire. Different locations and varying time slots were chosen for pre- testing to make sure plausibility and authenticity of responses. Revisions were made in light of respondents' observations and remarks concerning quality of research instrument to enhance its validity and reliability.

Reliability

The reliability coefficient of instruments was calculated using Cronbach's Alpha formula using Statistical package for social sciences (SPSS). Alpha (α) ranges from 0 to 1. A value of ≥0.70 reflects good reliability. Reliability coefficient for all factors measured on Likert type scale for the present study was computed and found satisfactory which was above 80% (Mugenda and Mugenda, 2003).

Validity

The content and face validity was ascertained by seeking the suggestions of experts. Relevant variables matching scope of study were included in questionnaire development. Questionnaire was reviewed and adapted the instructions of experts.

Data Collection Procedures

For qualitative data collection household heads were assumed as the sample of the study to answer the questions on food insecurity and how they tackle the situations as the administrator of their families. Quantitative data was collected from random respondents of the study area for interview sessions conducted by using structured questionnaires administered by the researcher.

Data Analysis

Quantitative data was analyzed using the computer software program Statistical Package for Social Sciences (SPSS). Distinct categories, patterns and themes were also identified to elaborate the data in a qualitative manner. The tools of descriptive statistics such as percentages, frequencies, and means were used to describe the data statistically.

Results and discussion

Existing Role of Agricultural Extension Services for Food Security

Number of factors such as Public extension services, non-governmental organizations (NGOs), Self-help groups, Provision of wheat from warehouses, availability of drinking water, cash payments (BISP), vocational trainings programs/ Awareness movements regarding food security, provision of crops seeds and fertilizer, provision of kisan card for purchase of crops seeds, fertilizer and sprays, planting of fast growing grain crops, planting of suitable shrubs and trees for fodder, protection of

livestock for regular supply of meat and milk, establishment of model agriculture/livestock farms and drought resistant varieties of food crops were taken into account to examine the role of public and private agricultural extension services. It describes the role of various extension service offered by governmental and non- governmental associations working in Tharparkar. Data depicted that in the study area various NGOs (private) were providing various extension services i.e. creating awareness about coping strategies for drought conditions and water saving methods etc.

Table 1. Existing Role of Agricultural Extension Services for Food Security.

Organizations	N	Mean	Rank
Public Extension services	400	1.85	3
NGOs (Private extension services)	400	2.83	1
Self-help groups	400	2.01	2

*1=Never, 2=Sometimes, 3=Usually, 4=Constantly, 5=Always

Results from descriptive statistical analysis show that respondents get extension services from private NGOs with the mean value of 2.83 which lies between sometimes to usually on Likert type scale. Public extension services and self-help groups are playing less active role than NGOs with the mean values of 1.85 and 2.01 respectively showing never to sometime on Liker type scale

Public Extension service delivery in the study area

Results regarding services provided to the rural people of district Tharparkar show that Govt. of Sindh (provincial) has installed Reverse Osmosis (RO) plants in rural areas. The results from table 2 showed that higher mean value (1.94) for drinking water availability was observed followed by cash payment while (1.67) was provided by Benazir income support program and training programs launched by different local and international organizations to create awareness related to food security. Value of (1.17) was linked to further provision of wheat from warehouses, (mean-1.33) by different local and international organizations while provision of crop seed and fertilizer was ranked at 5 with the mean value of 1.65.

Table 2. Provision of Different Types of Services by Public extension services in the Study Area.

Services	N	Mean	Rank
Provision of wheat from warehouses	400	1.33	6
Drinking water availability	400	1.94	1
Cash payments (BISP)	400	1.67	2
Trainings programs/ Awareness movements regarding Food security	400	1.17	9
Provision of crops seeds and fertilizer	400	1.65	3
Provision of kisan card for purchase of crops seeds, fertilizer and sprays	400	1.02	11
Planting of fast growing grain crops	400	1.15	10
Planting of suitable shrubs and trees for fodder	400	1.62	4
Protection of livestock for regular supply of meat and milk	400	1.22	7
Establishment of model agriculture/livestock farms	400	1.19	8
Drought resistant varieties of food crops	400	1.56	5

Scale: *1=Never, 2=Sometimes, 3=Occasionally, 4=Usually, 5=Always

The result further shows that sometimes (on likert type scale) public extension services at the most helping respondents in availability of drinking water with the mean score of (1.94). On the other hand, according to the respondents public extension services never help in providing Kisan card for purchase of crop seed, fertilizers and sprays with the mean value (1.02).

Satisfaction level regarding awareness / provision of information about food security provided by different sources

Results from table 3 are related to satisfaction level regarding awareness/provision of information about food security provided by different sources. The data in table showed that among various sources, NGOs were ranked at 1st ranked with the mean value of 4.01 as respondents perceived satisfaction level in the study area. Further, self- help groups (Mean-3.85) information/awareness from group of volunteers (electronic media) (mean-3.72), initiatives at neighborhood level showed that (mean-3.58), information provided from elders, govt. extension department (mean-2.48) and information from educational institutes (mean-2.37) respectively.

Table 3. Satisfaction Level Regarding Awareness / Provision of Information about Food Security Provided By Different Sources.

Source of information	N	Mean	Rank
Public extension services	400	2.48	6
Non-government organizations (NGOs)	400	4.01	1
Self- help groups	400	3.85	2
Initiatives at Neighborhood level	400	3.58	4
Information provided from elders	400	3.26	5
Information / awareness from group of volunteers (Electronic Media)	400	3.72	3
Information from educational Institutes	400	2.37	7

*1= Very unsatisfied, 2= unsatisfied, 3 = No Opinion, 4 = Satisfied, 5 = Very satisfied

The results depicted that the respondents were satisfied with the information provided by NGOs mean value (4.01), self-help groups (3.85), volunteer groups (3.72). However, the respondents were quite unsatisfied from the public extension services (2.48) and information from the educational institutes (2.37). Further respondents said that different local and international NGOs and extension field staff were the major source of trainings. Both public and private sector were organizing farmer's trainings in the regard of food security. The extension staff is responsible to educate the farmers in learning to incorporate modern day discoveries in their cultivation practices. If the integration of up- to- dated technologies emerges as a reality in the agriculture sector, the diffusion of new trends will attract other farmers to apply experimental techniques to produce for maximum yield. The practical demonstration of extension education principles assists extension employees to analyze farmers' needs, constraints, priorities and opportunities.

As far as the exploration of the implications of agriculture extension services is concerned, number of factors such as construction of ponds for water storage, protection of livestock reuse of saved food, discourage population migration, establishment of model farm Planting suitable shrubs and trees, improved health services, improved veterinary services, Kesan Card, coordination with social safety network, drought resistant varieties for food crops, maintenance of RO plant, vocational training programs were evaluated during survey. Conditions of food insecurity persist during the transient periods after harvesting due to recurrent joblessness and shortage of food reserves which forces families to look for different remedial strategies. The results revealed water and food availability were the major threat in the study area due to which respondents suggested that construction of ponds for water storage and food storage (4.99) skills were the important implications for securing the food in the study area.

Table 4. Implications for Agricultural Extension to Combat Food Insecurity.

Implication	N	Mean	Rank
Construction of ponds for water storage	400	4.90	1
Protection of livestock for constant food supply	400	3.50	10
Reuse of saved food and other products	400	4.50	4
discourage population migration	400	2.25	13
Establishment of model farm with the help of local people	400	4.87	2
Planting suitable shrubs and trees for fodder (Cactus,Jetropha etc)	400	3.99	8
Linking respondents to improved health services	400	4.67	3
Linking respondents to improved veterinary services	400	3.33	11
Kesan Card may be introduced to supply for agricultural Purpose	400	4.47	5
Coordination with social safety network for sustainable development	400	3.00	12
Drought resistant varieties for food crops	400	4.33	6
Maintenance of RO plants	400	4.17	7
Vocational training program may launch regarding food security	400	3.98	9

*1= Fairly recommended, 2= Recommended, 3=Moderately Recommended, 4= Highly recommended, 5= Strongly recommended

Data from the above table showed that among various implications perceived by respondents in the study area to combat food insecurity; construction of ponds for water storage establishment of model agricultural and livestock farms (4.87), linkage of respondents to improve health services (4.67), reuse of saved foods and products (4.50) were highly to strongly recommended on liker type scale. Respondents highly recommended that Kisan Cards (4.47), drought resistant verities (4.33), maintenance of RO plants (4.17) to combat food insecurity. Moreover, the respondents moderately recommended the following factors to combat food insecurity: protection of livestock for constant food supply (3.50), planting

shrubs and trees (3.99), linkage of respondents to improve veterinary services (3.33), coordination with social safety network (3.00) and vocational training programs. Similarly, different studies also pointed out the importance of awareness and knowledge level of farmers through learning and training (Tripp *et al.,* 2005).

Multiple regression model was used to manipulate the factors such as "provision of information" "drought tolerant crop varieties" "water resources" and "fertile agriculture land" to assess their contribution in provision of secure food in the study area (provision of secure food considered as dependent variable in the analysis). The role of respondents' awareness, information, and cultivation of drought tolerant crops, available amount of water for irrigation and home usage, and cultivable land responsible for provision of sustainable and secure food in the area was measured for maintaining food security level up to some extent. A complete regression model was applied to test the effects of independent (predictor) variables such as provision of information/awareness through training to respondents on how to keep secure food, cultivation of drought tolerant crops, water availability for irrigation and for home usage, and cultivable land for food crops on a single dependent (provision of secure food in the study area) variable. Regression assesses the divergence about the means, and all inconsistent values must be interval scaled. Computationally, there are two available options of conducting regression analysis by using either a raw data matrix (respondents by variables) or a correlation matrix. This type of analysis estimates the extent to which independent variables affect a dependent variable.

Following regression equation was used to evaluate the role of independent factors on dependent factor.

$y= \alpha+\beta_1 x_1+\beta_2 x_{2+} \beta_3 x_{3+} \beta_4 x_4+€_j$

Where y= Factors responsible for the provision of secure food in the study area

α= Constant/slope in the regression model

β_1= regression coefficient for x_1=Satisfaction of respondents for provision of information/training available to keep the food secure

β_2= regression coefficient for x_2= Drought tolerant crop varieties in the area for provision of secure food

β_3= regression coefficient for x_3=Available water for irrigation and for home usage

β_4= regression coefficient for x_4=Cultivable land that could be used for provision of secure food crops

$€_j$ = associated error (residual) of the observations and causes observable change occurred in the dependent variable of "factors responsible for the provision of secure food in the study area" when controlling other factors. The results from the analyses can be observed in the following tables.

Table 5. Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	0.901	0.813	0.811	2.509

Predictors: (Constant), Info, Crops, water, Land

Value of R Square is 0.813 which means 81.3% variation was explained by the dependent variable such as "factors responsible for the provision of secure food in the study area" It further shows MR model fitted well for analyzing the factors of "provision of information" "drought tolerant crop varieties" "water resources" and "fertile agricultural land.

Table 6. ANOVA.

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	10783.076	4	2695.769	428.130	0.000
	Residual	2487.164	395	6.297		
	Total	13270.240	399			

a. Dependent Variable: factors responsible for the provision of secure food in the study area

b. Predictors: (Constant), Info, Crops, water, Land

The alpha level 0.05 was used. The model was statistically significant $F\ (4,395) = 428.130\ p < .05$ and pointed out 81.3% of the variance in the dependent variable of "factors responsible for the provision of secure food in the study area".

To showcase the outcomes of regression analysis, unstandardized coefficients, standard error, standard coefficients, and t-value were employed. Standard coefficients illustrated the net effect in "factors responsible for the provision of secure food in the study area" (dependent variable), which was related to one

unit change in independent variables, for instance, agricultural land, water, crops and information sources, etc. in terms of standard deviations.

Table 7. Regression Coefficients.

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	3.584	1.454		2.465	0.014
Land	3.322	0.083	0.919	40.134	0.000
Water	0.082	0.030	0.062	2.742	0.006
Crops	-0.261	0.065	-0.088	-4.028	0.000
Information	-0.260	0.028	-0.205	-9.209	0.000

a. Dependent Variable: factors responsible for the provision of secure food in the study area

The values of standardized beta coefficients demonstrate individual predictive significance of the independent variables and point out the average range of variation in the dependent variable which is associated with the same amount of change in any particular independent variable with one standard deviation and when the rest of independent variables remain constant. In this study, the independent variable of land has a standardized beta value of 0.919; this means that when other independent variables of water, crops, and information remain constant, the dependent variable of "factors responsible for the provision of secure food in the study area" also goes through the changes by the same amount of 0.919 standard deviation.

The results from the above table further emphasize that there is a dire need to work on the factors such that developing drought tolerant crops and provision of timely information to respondents for availability of secure food in the study. Results also indicated that independent variables like cultivable land, availability of water for irrigation and for home usage, cultivation of drought tolerant crops, provision of information, training and awareness to respondents regarding secure food, provision of health services to newborn babies and pregnant women in the study area are the strategies which can ensure food security in the study district.

Conclusion

It is concluded from the study that respondents generally get extension services from non-governmental organizations followed by public extension services and self-help groups. This show that private sector was more active in the provision of extension services in the study area as compared to other public sector sources. Results regarding provision of services to the rural people of district Tharparkar show that Govt. of Sindh (provincial) has installed Reverse Osmosis (RO) plants in rural areas, ensured cash payments provided by Benazir income support program and training programs launched by different local and international organizations to create awareness related to food security. . Moreover, the provision of wheat from warehouses by different local and international organizations and provision of crop seed and fertilizer are the additional services provided to respondents but on limited scale. Food insecurity prevails during the transitory post-harvest periods due to seasonal unemployment and lack of food stock which forces households to adopt different coping strategies.

Data shows that various implications perceived by respondents in the study area to combat food insecurity include construction of ponds for water storage ranked at first number, protection of livestock for constant food supply, reuse of saved food and other products, discouraging population migration, establishment of model farm with the help of local respondents, planting suitable shrubs and trees for fodder, linking respondents to improved health and veterinary services. Introduction of Kesan cards to supply for agricultural purpose, coordination with social safety network for sustainable development, drought resistant varieties for food crops, maintenance of RO plants, and vocational training programs may be launched regarding food security.

Recommendations

1. Public sector extension services need to launch model farms, model water storage facilities, model health services and model self-help groups of the respondents.
2. The need of the time is that public and private extension organizations must work cooperatively in the study area to overcome the sufferings of the respondents.
3. Public sector departments and banks should provide loans to the respondents in the study area to boost up agricultural activities in the study area.

4. Kisan card should be introduced to small scale farmers for agricultural productivity.
5. Health-care card system needs to be initiated in district Tharparkar immediately to give some kind of relief to the respondents in the study area.

Reference

Abdullah M, Xia LC, Li J, Ghazanfar S, Mehmood Y, Ishaq MN, Saud S. 2014. Effectiveness Comparison Between the Farmers Field School and the Training & Visit Approaches of Agricultural Extension in Two Districts of Pakistan. American-Eurasian J. Agric. Environmental Sci **14(1),** 33-39.

Allahyari T, Saraji GN, Adi J, Hosseini M, Iravani M, Younesian M, Kass SJ. 2008. Cognitive failures, driving errors and driving accidents. Int. J. Occupational Safety and Ergonomics **14(2),** 149-158.

Dercon, S., D. O. Gilligan, J. Hoddinott and T. Woldehanna. 2009. The impact of agricultural extension and roads on poverty and consumption growth in fifteen Ethiopian villages. American J. Agric. Economics, 91(4): 1007-1021.

FAO. 2002. Food and Agricultural Organization. Assessment of the World Food Security.

Hersman JWC McNabb, Schumacher RAL, Todor Adams G, Anciant E, Anghinolfi M, Bagdasaryan. 2004. Hyperon photoproduction in the nucleon resonance region. Physical Review **69(4),** 042201.

Kumar S, West DC, Ponting JM, Gattamaneni HR. 1989.. Sera of children with renal tumours contain low-molecular-mass hyaluronic acid. Int. J. Cancer **44(3),** 445-448.

Lwoga ET. 2010. Bridging the agricultural knowledge and information divide: The case of selected telecenters and rural radio in Tanzania. The Electronic J. Information Systems in Developing Countries **43(1),** 1-14.

Mugenda A. 2003. Research methods Quantitative and qualitative approaches by Mugenda. Nairobi, Kenya.

Slim I, Pirlet A, Kwiatkowski K, Michot F, Millat BL. 2011. Emergency preoperative stenting versus surgery for acute left-sided malignant colonic obstruction: a multicenter randomized controlled trial. Surgical Endoscopy **25(6),** 1814-1821.

Tagar HK, Bullo A, Shah SR, Shah SMM. 2008. Sustainable Development Goals: End poverty, Food Security and Healthy Lives through Human Resources and Managing Agriculture Productivity (A case of Pakistan).

Tewodaj M, Cohen MJ, Birner R, Mamusha L, Randriamamonjy J, Fanaye T, Zelekawork P. 2009. Agricultural extension in Ethiopia through a gender and governance lens. Ethiopia Strategy Support Program 2 (ESSP2) Discussion Paper No. ESSP2, 7.

Tripp R, Wijeratne M, Piyadasa VH. 2005. What should we expect from farmer field schools? A Sri Lanka case study. World Development **33(10),** 1705-1720.

Van den Berg H, Jiggins J. 2007. Investing in farmers—the impacts of farmer field schools in relation to integrated pest management. World Development **35(4),** 663-686.

World Bank. 2006. Agriculture Investment Sourcebook. Washington, DC, World Bank.

World Bank. 2010. Agriculture Investment Sourcebook. Washington, DC, World Bank.