

Greening futures: Empowering women through climate-resilient culinary herb gardening

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ABSTRACT

Climate change is one of the environmental challenges which has been affecting food crops, disrupting flowering and fruiting and contributing to overall food insecurity in Pakistan. Globally, herbs gardening is world's most ancient food production which is practiced by women. This study measures the awareness level of culinary skills by involving women in cultivation of culinary herbs gardening in district Faisalabad, Pakistan. A mixed method technique was used to conduct this research. A quantitative research was carried out with 38 respondents through random sampling technique and qualitative research was conducted through hands-on training workshop of women growers were investigated and asked about cultivation of popular culinary herbs. Practical sessions were organized in a community Garden (Jinnah Garden Faisalabad) Pakistan. Most significant outcome of this research was creating some strong linkages between women growers and stakeholders for climate mitigation strategies in horticulture farming. Mostly respondents serving vegetables once daily to their family meals. They believed that vegetables/herbs are rich source of vitamins, minerals and carbohydrates. The respondents know that vegetable helps to detoxify the body. Vegetables/herbs are high in nutritional values and low-calories. They told that they had sufficient space in their homes for kitchen gardening.



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Introduction

Climate change is one of the environmental challenges which has been affecting food crops, disrupting flowering and fruiting and causing low yield of crops, thus contributing to overall food insecurity in Pakistan. In the current scenario, it is essential to cultivate a notion which can help to reduce the drastic effects of extreme environmental challenges. The extreme changes in environment have adversely affected the production of culinary herbs which contribute to nutrition and flavor of traditional cuisines, making their use an economic burden for the families. These herbs are vital for environmental protection as they absorb excess carbon from the atmosphere. Adequate vegetable consumption is crucial for a healthy balance diet (Hartwell et al., 2024) that protects against serious non communicable diseases (Hartley et al., 2013) and minimize environmental effect (Reynolds et al., 2014). A societal top priority is to certify food and nutritional security however reducing environmental impacts of food production system (Remize & Garcia, 2024).

Kitchen or home gardening is the earliest and most extensive food production system found throughout the world (Kashif et al., 2024). Kitchen gardening practices are health and nutrition, enhanced income, self-employment, food security within the household and community social life (Rehman et al., 2013). Kitchen gardening is a multifaceted approach that addresses both environmental and nutritional challenges and that's why from nutritional standpoint, kitchen gardening ensures food security by providing a direct source of fresh, healthy produce (Mohapatra et al., 2024).

Around 11% of the total area of Pakistan is under vegetable crops (GOP, 2020) and the consumption of vegetables is very low, highly seasonal and oil consumption (FAO, 2015). In Punjab province, the project of kitchen gardening is initiated by the provincial government with the goal to deliver immediate relief to the citizens by growing fresh vegetables by their own at homes (Mohsin et al., 2017). Fruits and vegetable production give households direct access to important nutrition that might not be within their budget to purchase (Sithole et al., 2023). Here in our country, consumption of vegetables is very low, highly seasonal, and oil consumption (FAO, 2015). Our food system is facing several severe challenges like climate change and population growth are just a few of the issues putting immense pressure on the agricultural food system (Satz.I, 2024).

According to an estimate Pakistan will become world 4th largest nation in 2050 which is an alarming situation for it to meet the food requirement (Bajwa et al., 2015). Pakistan lies in a climate change hotspot (ranked 7th in the global climate change vulnerability rating) where agriculture uses more than 90% of freshwater resources (Habib, 2021) and 60–70% of the annual rainfall occurs during the monsoon period from July to September (Akbar et al., 2024).

Major food items such as vegetables and fruits are considered vital for the rapidly increasing populations of developing countries like Pakistan, India and Bangladesh (Mohsin et al., 2017). For poor households, vegetables and fruits are often the only sources of micronutrients in the family diet (Arya et al., 2018). Kitchen gardening activities focused on household women and try to increase women income which might be enhance caring practices, empowerment or household resources (Sharanbir et al., 2012). Therefore, women empowerment focused on poverty reduction and primprove vital socio-economic returns by less mortality rate, less welfare or health reimbursement (Berend and Dick, 2012).

The Food and Agriculture Organization (FAO) and Department of Agriculture and Cooperatives of the Government of Balochistan piloted an “Integrated Kitchen Gardens” program in Balochistan

province in 2015. The aim was to provide chance to low-income rural women to engage in economic activities and eventually improve food security and nutrition for their families (Wood et al., 2018). A research based project on Greening Future: “Climate Resilient Culinary Herbs Gardening” Women skill Development Training Program was held in GC University Faisalabad and University of Agriculture Faisalabad Pakistan. we explored the significance of culinary herbs in promoting sustainability, nutrition and community empowerment.

According to study, women maintain herbs garden primarily, which gives women more authority, guarantees that the money from the garden is better used for food, and improves family welfare. Each of these advantages makes a significant contribution to reducing poverty (David, 2011). Understanding of sustainable gardening practice, promoting environmental responsibility, food & nutritional security and self-sufficiency of young Women by providing training in variety of culinary herbs gardening skills, addressing critical environmental challenges, increasing their access to healthy diets and integration into local communities.

Given the aforementioned information, a purposeful study was carried out to gauge the degree of knowledge regarding climate-resilient herb gardening among women who practice horticultural cultivation, encourage the women into growing fruits and vegetables at home to satisfy it limited or full kitchen requires, and investigate the economic effect on household vegetable production.

Material and Methods

A research study about the assessment of climate resilient herbs gardening among females from Ayub Agricultural Research Institute, Jhang road residential area in Faisalabad (Pakistan) was selected as universe of this study through purposive sampling technique (Khalid et al., 2013). A sample size of 38 respondents was selected by using random sampling technique in such a way that every unit available for sampling had an equal possibility of being done. A questionnaire schedule was selected as a tool of data collection for the present research. For better outcomes and in depth research, a five day’s training program was also conducted in STC hall at GCUF Faisalabad, and University of Agriculture Faisalabad Pakistan. The climate change challenges faced by women growers were discussed which are severely effecting the kitchen herbs/vegetables gardening practices. The presenters and resource persons were invited for knowledge sharing and practical implication on climate-resilient herbs gardening. All women were demonstrated about new techniques of climate-resilient herbs gardening in public Garden (Jinnah Garden) in Faisalabad City, Pakistan.

SPSS was used to examine the findings. The data was interpreted using a descriptive method, including mean and frequencies percentages. The researcher completed the tabulation process following analysis. Following table completion, the data were analyzed, discussed, and logical conclusions were reached. Chi-square is predicated on several assumptions. The data is first a random sampling of the population, next it is based on nominal/ordinal data, and finally, there are no empty cells in the frequency or predicted frequencies lower than 5. The content analysis method was used to examine the qualitative data.

Results and Discussion

Table 1 indicates that 39.5% of respondents possess a BA or B.Sc. level, 28.9% hold an FA or F.Sc. level, 18.4% hold an MA or M.Sc. level, and 13.2% have a matriculation in kitchen gardening at different household. It indicates that graduates make up a significant proportion among sample being studied.

Table 1: Socio-economic indicators showing distribution of respondents

S. No	Parameters	Education				Marital Status			Total
		Matric	FA/F.Sc	B.A/B.Sc	M.A/ M. Sc	Married	Un Married	Total	
1	Frequency	5	11	15	7	36	2	38	
	%	13.2	18.4	39.5	18.4	94.7	5.3	100	

These results are in line with the findings of Ramphill and Gill (1990) that well educated respondents used to help in valuable findings of the projects. Furthermore, it is obvious (from Table 1) indicates that 94.7% respondents were married and 5.3% respondents were un-married of kitchen gardening at various household levels. These results are in accordance with the findings of Kamphuisi et al. (2006), Khalid et al. (2011) and Fatima (2011) that married persons are well aware of the nutritional and dietary value of the vegetables.

Table 2, 94.7% of respondents have been growing vegetables at the home level, whereas 5.3% have not been engaging in kitchen gardening. This demonstrates their propensity for kitchen gardening. These results are consistent with those of Andrew et al. (2012) and Anonymous (2011), who found that kitchen gardening at the household level is highly advantageous for women. Similarly, Table 2 shows that 87% of respondents have considered saving money with kitchen gardening at different household levels, whereas 13% have not considered doing so. These findings are consistent with those of Anonymous (2011a) and Liu (2003), who found that kitchen gardening tended to ease the financial strain on a family's household budget.

Similarly, 92.1% of respondents considered that eating vegetables produced their kitchens was good throughout their health, while 7.9% disagreed. This was the case for gardening in the kitchen at various household. According to David (2011) and Khalid et al. (2011), homegrown vegetables are superior to market-purchased ones as they don't contain chemical fertilizers or insecticides.

It is obvious (from Table 2) that 63.2% respondents felt that kitchen gardening is the best exercise for health 36.8% respondents did not feel that kitchen gardening is best exercise for health of kitchen gardening at various household levels. Similarly, 94.7% respondents believe that vegetables are important part of our diet however, 5.3% respondents did not believe that of kitchen gardening at various household levels. 63.2% respondents believe that chemicals remove after washing vegetables and 36.8% respondents did not believe that all chemicals remove after washing vegetables of kitchen gardening at various household levels.

Table 2: *Distribution of respondents with reference to Herbs gardening practiced by women*

S. No		Kitchen gardening is the best exercise for physical & Mental health			Ensure growing vegetables at household level			Believe that money saved by household kitchen gardening practices			Believe that household vegetables are better for health maintenance		
		Yes	No	Total	Yes	No	Total	Yes	No	Total	Yes	No	Total
2	Frequency	24	14	38	36	2	38	33	5	38	33	5	38
	%	63	37	100	94.7	5.3	100	87	13	100	87	13	100
3		Believe that vegetables are important part of our diet			According to believe that all chemicals remove after washing vegetables			Agree that kitchen gardening provides fresh vegetables			vegetables are rich source of Vitamins, minerals & Carbohydrates		
	Frequency	36	2	38	14	24	38	100	0	100	38	0	38
	%	94.7	5.3	100	36.8	63.2	100	100	0	100	100	0	100
4		Is sufficient space for kitchen gardening at household level			Have you any kitchen gardening tools			Aware about the use of gardening tools			Other members in your family take interest in household kitchen gardening		
	Frequency	13	25	38	27	11	38	27	11	38	36	2	38
	%	34.2	65.8	100	71.1	28.9	100	71.1	28.9	100	94.7	5.3	100
5		Knows that a vegetable helps to detoxify the body			Vegetables contain photochemical which have different health benefits			Vegetables are high in nutritional values and low-calories			Vegetables have compound like photochemical which can reduce the risk of cancer		
	Frequency	25	13	38	26	12	38	32	6	38	27	11	38
	%	65.8	34.2	100	68.4	31.6	100	84.2	15.8	100	71.1	28.9	100
6		Vegetables increase antioxidant activity in human body			How we can finish the food shortage in Pakistan?			Serving of vegetables per day for human body					
		Yes	No	Not aware	Total	Growing vegetables at large scale level	Save vegetables	Not aware	Total	1 serving	2 serving	3-5 serving	Total
	Frequency	21	3	14	38	18	1	19	38	19	9	10	38
	%	55.3	7.9	36.8	100	47.4	2.6	50	100	50	23.7	26.3	100

More than half 57.9% respondents are not aware according to what happened if they eat vegetable those purchase from market, 28.9% respondents have psychological effect, 10.5% respondents have skin problem and 2.6% respondents have vomiting from eating vegetables those purchased from market of kitchen gardening at various household levels. 100.0% respondents agree that kitchen gardening provides fresh vegetables of kitchen gardening at various household levels and fresh vegetables provides substantial quantity of minerals and vitamins to the consumers (Williams et al., 2013; Liu, 2003). Moreover, 50.0% respondents are serving one time vegetables per day for human body, 26.3% respondents are serving 3-5 times and 23.7% respondents are serving 2 times for human body per day of kitchen gardening at various household levels. More than half 65.8% respondents did not have sufficient space for kitchen gardening at household level and 34.2% respondents have sufficient space for the purpose of kitchen gardening at various household levels. These results shows that most of the respondents can manage their space for kitchen gardening.

Almost 71.1% respondents have kitchen gardening tools and 28.9% respondents did not have kitchen gardening tools of kitchen gardening at various household levels. It means most of the respondents were having gardening tools of their own. more than half 71.1% respondents are aware to use the kitchen gardening tools and 28.9% respondents did not aware to use these tools of kitchen gardening at various household levels. It means most of the women were aware of the use of the tools. Mostly, 94.7% respondents felt that their family members take interest in household kitchen gardening and 5.3% respondents felt that their family members are not interested of kitchen gardening at various household levels. It means most of the family members used to take interest in house- hold gardening. Most of the 65.8% respondents know that vegetable helps to detoxify the body and 34.2% respondents did not know that of kitchen gardening at various household levels. Likewise, 55.3% respondents think that vegetables increase antioxidant activity in human body, 36.8% respondents are not aware and 7.9% respondents think that vegetables did not increase antioxidant activity in human body of kitchen gardening at various household levels. More then half, 68.4% respondents have an idea that vegetables contain photochemical which have different health benefits and 31.6% respondents did not have any idea of kitchen gardening at various household levels.

Majority of the respondents 84.2% says vegetables are high in nutritional values and low-calories and 15.8% respondents did not believe that of kitchen gardening at various household levels. It means women were aware of the nutritional value of vegetables. Majority, 71.1% respondents have some information that vegetable shave compound like photochemical which can reduce the risk of cancer and 28.9% respondent have no information of kitchen gardening at various household levels. 50.0% respondents are not aware to finish the food shortage in Pakistan, 47.4% respondents felt that growing vegetable at large scale level can finish the food shortage and 2.6% respondents felt that this can be done by saving vegetables of kitchen gardening at various household levels. Similarly, Anonymous (2011a) and Anonymous (2011) found with gardening, food deficit can be minimized in Pakistan. Hands-on training was provided to trainees for cultivation of popular culinary herbs (e.g., basil, spring onion, spinach, beet root green, mint, parsley, broccoli, and lettuce). They also learnt about Understanding the culinary uses and health benefits of different herbs. Practical sessions were organized in a community Garden (Jinnah Garden Faisalabad). Regular personalized guidance provided to women growers trainees on their individual needs and goals. A post- training national conference was organized on International environmental day at GC University Faisalabad to connect individuals to community and experts of the horticulture, environment and professional food experts, tourism and hotel management entrepreneurs from assorted backgrounds to promote sustainable agricultural practices in climate-

Resilient Herbs Gardening practices. we also formulate a training hand book which covered all aspects of informal cultivation of culinary herbs gardening along with therapeutic benefit.

The climate- resilient culinary herbs gardening project for the women growers offered multifaceted benefits and serves several compelling purposes reported by women trainees. The women growers contracted that cultivation of herbs supports biodiversity, improve soil health, and can contribute to sustain our local ecosystems. The drastic climate changes not only reducing the soil fertility but also effecting and changing the pattern of cultivation and production. The small steps to greening our lands will enhance environmental sustainability as well as provide the life skill development, individual health and nutrition, economic savings, community engagement, and educational opportunities, entrepreneurship openings and promoting a sustainable living, mental well-being and joyful life.

Conclusion

The respondents have awareness about the importance of vegetables component as food and its daily intake is insistent in diet but growing of herbs/vegetables were challenging due to climate change. Its also helpful for economically low income population of our country as it is a source of income by selling those vegetables producing in kitchen gardening and also improve the health of family as these are organic and fresh. So, kitchen gardening should be promoting not just for the sake of family's health point of view but also good for our country' overall wellbeing. For kitchen gardening, culinary practices are important but along with also technical support important especially when new gardening techniques are being promoted like growing new or even increase number of varieties or year-round vegetable production. By growing these herbs, the environmental challenges will have sustainable solutions in terms of biodiversity, air quality improvement, soil conservation and reduction of carbon associated with pollution. By implementation of culinary herbs gardening for use in kitchens, their therapeutic impact will be integrated with health and wellness. By providing them scientific knowledge through digital tools, their technical skills will be enhanced for life skill development. By enabling women to grow their own kitchen garden herbs, they will be empowered with self-sufficiency along with culinary skills proficiency. By providing them with training and mentorship, the women will be equipped with entrepreneurial skills to start small herb related businesses such as selling fresh herbs or homemade organic herb-based products. By the interaction of the women with the trainers, they will become more socially aware, thriving a sense of satisfaction that they are contributing towards environmental protection as well as their own nutrition and home economical management. By growing different herbs, the women will be able to explore the cultural significance of the herbs in various cuisines, promoting appreciation of diverse culinary traditions. By participating in training workshop for culinary herbs gardening, the women will get skill certification which can enhance their resume and open doors for future opportunities. By carrying out the project in a public park, sustainability is insured as it inspires and motivates the passerby to grow these herbs too and take steps towards a better environment.

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