



Kitchen gardening: A strategy for improving nutritional status of rural households in Sindh province of Pakistan

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Abstract

Malnutrition is a gigantic problem for underdeveloped and developing nations including Pakistan (specifically, Sindh Province). This research aimed to evaluate the impact of kitchen gardening practice on improving household (HH) nutrition status in the Sindh Province of Pakistan. The objectives of the study were to identify the barriers in the adoption of kitchen gardening practice and evaluate community perceptions regarding kitchen gardening and nutrition and its impact on the nutritional status of women and children. To achieve the objectives, kitchen gardens were established in different geographically located HHs with the help of LANSAs funded project and qualitative data were collected through face-to-face interview methods through survey from nine male and nine female heads of the HHs for one winter and one summer vegetables growing season. The HHs participating in the research project are categorized as the poorest of the poor with monthly incomes ranging between 17 and 86 USD. The study found that the development of model kitchen gardening plots and training of community researchers facilitated the participants to overcome challenges previously encountered. There was a marked improvement in technical knowledge retention and replication in regard to designing and management of kitchen gardening plots; increased awareness concerning nutrition best practices and diverse food consumption; food and seed preservation practices; and soil composition and fertility management. The study findings conclude that kitchen gardening can significantly improve the availability of nutritious food at HH levels for vulnerable HHs and can have a substantial impact on the health of women and children. However, it was recommended that further detailed research into evaluating the positive impact on the nutritional status of the rural HH through practices of kitchen gardening by the diverse management of agriculture and livestock.

Keywords: Kitchen Gardens; Malnutrition; Food Security; Women Empowerment; Flood Prone; Drought Prone; Peri-urban Environment

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1. Introduction

Hunger and malnutrition are still the significant challenges faced by communities worldwide even though, extensive research and advancement have taken place in the fields of agricultural productivity and nutrition. Pakistan is among the top three countries that together account for half of the malnourished children and women in the world (Food and Agriculture Organization of the United Nations, 2015). The National Nutrition Survey (NNS) (2011) found that in Pakistan, acute malnutrition rates stand at 15%; while 58.1% of households (HHs) in Pakistan are food insecure, of which 9.8% are food insecure with severe hunger. The NNS further reveals that only 3% of the country's children can receive a diet that meets the minimum standards of dietary diversity. Whereas in the case of women, micronutrient deficiency is widespread with 51% of pregnant women diagnosed with anemia, while 46% suffer from Vitamin A deficiency, 47.6% from zinc deficiency, and 68.9% from Vitamin D (Bhutta et al., 2011).

According to the findings of Tontisirin and Bhattacharjee (2001), South Asia has the highest rates of malnutrition as compared to the rest of the world, while the findings of FAO (2015) revealed that Pakistan has some of the worst rates of malnutrition in South Asian context. According to Fan et al. (2011), globally 1 billion people face chronic hunger while approximately 2 billion endure periods of food insecurity coupled with one-third of the world's population suffering from single or multiple micronutrient deficiencies. Usually, children <5 years of age and women (especially pregnant and lactating women) unduly carry the burden of undernutrition in the low-income and developing countries (Girard et al., 2012), hence increasing their risk of compromised cognitive functions, reduced immunity, infectious diseases, and pregnancy complications among others health-related challenges (Girard et al., 2012 and Martorell, 2010). Furthermore, numerous research studies concluded that nutrient deficiency during pregnancy potentially leads to long-term consequences in the form of underdevelopment in children, intergenerational cycle of malnutrition, and higher morbidity and mortality rates. Studies caution that such an intergenerational cycle of malnutrition result in prolonged negative impacts on individual and overall communal productivity and economic development (Martorell, 2010 and Victora et al., 2008).

Production of food on small plots adjacent to HHs is one of the oldest forms of cultivation in human civilization. Home gardening is practiced worldwide in a variety of ways including kitchen, backyard, homestead, compound, tabletop, rooftop, roadside, and so on to yield diverse products including herb, fruits, and vegetables (Arimond et al., 2011; Galhena, 2012, and Galhena et al., 2013). Mitchell and Hanstad (2004), defined home gardens as "a small-scale, supplementary food production system by and for HH members that mimic the natural, multilayered ecosystem". Globally, food-based nutrition interventions specifically, homestead or kitchen gardening are widely touted as a sustainable approach with high potential for addressing malnutrition among women and children in the developing countries (Allen and Gillespie, 2001; Galhena et al., 2013; and Jones et al., 2005). The main reason for this assumption is that home-based gardening practices can improve availability and accessibility of nutritious food at the HH level thus fulfilling key criteria for food security (Abbasi et al., 2014; Asaduzzaman et al., 2011; Allen and Gillespie, 2001; Galhena, 2012, and FAO, 2010). Numerous case studies from around the globe including Africa and Asia (India, Bangladesh, Sri Lanka, and Pakistan) endorse homestead gardening in comparison to other interventions to counter malnutrition and micronutrient deficiencies (hidden hunger) in women and children due to its potential of easy access to nutrient-rich foods. Thus exhibiting that kitchen gardening can play key

role in the fight against hidden hunger, malnutrition, and poverty in these developing countries (Chayal et al., 2013; Galhena, 2012; Galhena et al., 2013; Jones et al., 2005; and Mohsin et al., 2017).

Keatinge et al. (2012) in their review of over 30 home-based food production interventions found that although they significantly increased food production and did not necessarily improve the nutritional status of the HH. Therefore, researchers emphasize that impact of kitchen/homestead gardening on women and children's health needs to be studied in detail, as these researches do not address all aspects of the intervention (Gibbs et al., 2013; Mohsin et al., 2017, and Schreinemachers et al., 2015). Galhena (2012) in his review of studies in regard to homestead gardening concluded that although kitchen gardening presents a versatile pathway to address food insecurity in low-income and at-risk HHs; however, varying degrees and combinations of socioeconomic, cultural, and environmental conditions greatly impact the potential of this intervention. Therefore, further studies are essential to assess factors that reduce or enhance the potential of kitchen gardening in different contextual situations (Galhena, 2012, and Ruel and Alderman, 2013).

Sindh Province of Pakistan suffers from chronic malnutrition is critically high among under 5 years of age children, that is, the prevalence of stunting is 49.8% and wasting is 43.7%, making them increasingly vulnerable to disease and at high risk of impaired intellectual and physical development (Government of Sindh, 2017; and Khan et al., 2016). The causal factors behind these high rates of malnutrition among women and children include chronic poverty, food insecurity, poor health, and sanitation conditions, water availability, and gender inequality to name a few (Arshad and Shafqat, 2012; Bain et al., 2013, and Girard et al., 2012). In light of this situation, large-scale humanitarian and development responses continue across the country with many organizations linking relief, early recovery, and development initiatives with nutritional outcomes. According to Leveraging Agriculture for Nutrition in South Asia (LANSA, 2018) research studies, nutrition-sensitive programs usually have low coverage, poor quality or intensity of service and underlying factors and processes create a non-enabling environment for nutrition. In the case of Pakistan, with a rapidly increasing population, the government is treating food security and nutrition as a key challenge; moreover, the Government of Pakistan has approved a detailed National Food Security Policy to address food and nutrition security problems. In this regard, the Government of Punjab promoted kitchen gardening in the province by subsidizing kitchen garden packages. However, it was noted that this intervention had a limited impact on the nutrition status of HHs and further studies are required to understand behaviors and practices that create enabling environment for nutrition-sensitive agriculture interventions (Mohsin et al., 2017). Similarly, the Government of Sindh in its fight against stunting and malnutrition has introduced a comprehensive and integrated plan called "Accelerated Action Plan for Reduction in Stunting and Malnutrition in Sindh (AAP)" (Government of Sindh, 2017) that is still in its initial phases and the results are yet to be derived. However, the diverse socioeconomic, geographic, and cultural conditions of Sindh require that to achieve maximum benefit from homestead/kitchen garden on health and economics of HHs, a comprehensive examination is carried out regarding connectors and barriers in adoption of kitchen gardening across diverse contextual situations. In this regard, a detailed research study funded by LANSA was undertaken by Action Against Hunger – Pakistan Mission with the objectives to evaluate challenges faced by HHs in the uptake of kitchen gardening practice and the nutritional status of the HH.

The objectives of this research are as follows:

- To evaluate rural/peri-urban HHs' perceptions regarding kitchen gardening and nutrition
- To identify barriers in adoption of kitchen gardening practice by rural and peri-urban HHs
- To study the impact of kitchen gardening on the nutritional status of women and children.

2. Materials and methods

2.1. Geographic location

The study was conducted in three different geographic regions of Sindh – Pakistan, that is, District Dadu (Union Council Sawro), District Badin (Union Council Tarai), and Hyderabad City (outskirts area of Union Council Hoosri). Dadu District is located in the west of Sindh Province with District Kamber Shahdadkot in the north, District Jamshoro in the south, District Larkana and Shaheed Benazirabad on the east end, while in the west is Kirther Mountain Range and Balochistan (Al Hasan Systems [PVT], 2015). Dadu District specifically targeted intervention area of UC Sawro falls in the arid climatic zone, with the unavailability of surface and very deep groundwater tables. The communities in this area are completely dependent on rain-fed agriculture and livestock for income generation (Qureshi and Akhtar, 2004). On the other hand, District Badin is a flood-prone district lying between the Thar Desert and coastal stretches of the Arabian Sea. It is bounded in the north by Hyderabad, in the east by Tharparker and Mirpurkhas Districts, on the west side by Thatta District, and in the south is the Arabian Sea. In contrast to Dadu, Badin District (UC Tarai) has more than adequate availability of surface and groundwater along. The area is vulnerable to flash floods and seasonal/monsoon floods due to the proximity to drainage network (Left Bank Outfall Drain) that transports waste and saline water from the irrigation network into the Arabian Sea (Government of Sindh, 2008). In relation to the other two districts, District Hyderabad comprises the second largest city (Hyderabad) in the province after Karachi. Hyderabad is surrounded by Districts Mitiari, Tando Allah Yar, Tando Muhammad Khan, and Badin. The district has a moderate climate and plain lands irrigated from Indus River System (IMMAP, 2014). The intervention peri-urban area Hoosri falls in the outer perimeters of Hyderabad city where numerous families settle after temporary or permanent migration from rural areas, due to livelihood losses from droughts and land degradation. Figure 1 shows the geographical location of the study area.

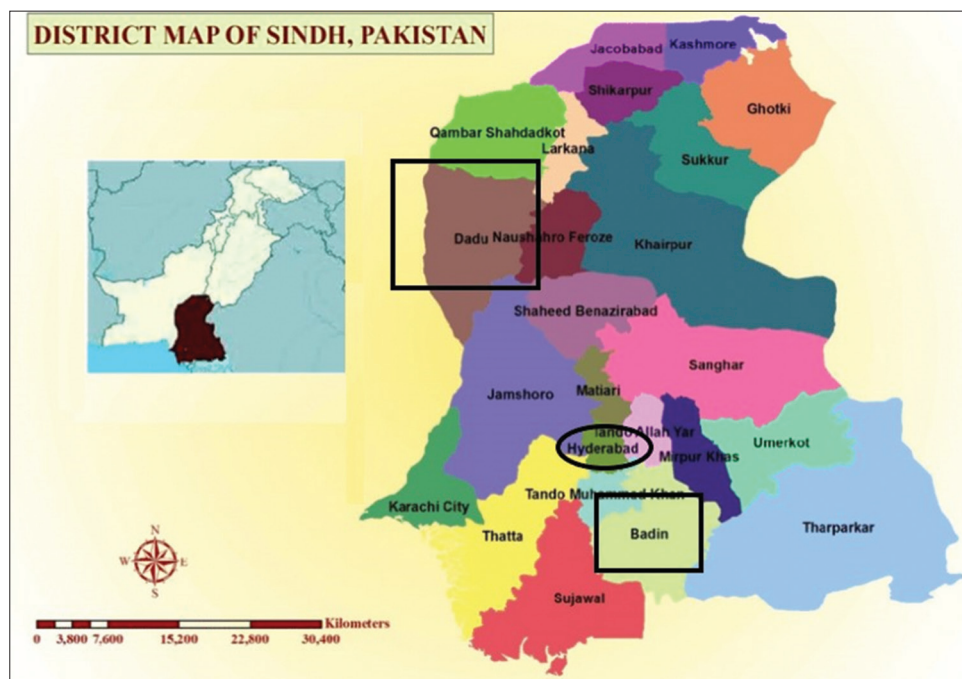


Figure 1. Geographical location of the study.

2.2. Sampling procedure and sample size

Purposive sampling techniques were employed to select representative HHs from each of the target areas falling under all of the selection criteria, namely, HHs' are permanent residents of the target area, having pregnant or lactating women, having children between ages of 6–59 months, having an average income below 500 PKR/day (4.5 USD), willing to allow their women to be involved in the research for instance which included spending few hours everyday work in the kitchen garden, be part of training and awareness session and allowed to be interviewed by the research team for data collection purposes. Resting on the aforementioned criteria a total of 9 HHs (male and female) were selected for a longitudinal cohort study. Initially, broad-based community meetings were held in each target area to discuss selection criteria and key features of the research project. Furthermore, these meetings facilitated in bringing community consensus on HHs selected for research purposes and avoiding potential conflict within the community. Selected HH members were briefed on the dynamics of the research project. Participating HHs were enrolled in the research project after both heads of each HH and participating community researchers (all women) signed the written consent form. The research was carried out between November 2016 and September 2017 with the main activity of harvesting indigenous vegetable crops in kitchen gardening carried out from February 2016 until July 2017.

The study method enabled women to undertake kitchen gardening activities at the HH level. The objective behind the focus on women was to add a gender perspective to the results including increasing awareness and capacities of women regarding malnutrition, effects of micronutrient deficiencies on their own and children's health, the importance of practicing dietary diversity, and potential for economic empowerment. In beginning, HHs' perceptions regarding nutritious diet and kitchen gardening were recorded. Throughout the research awareness-raising sessions were conducted with the selected HHs (for both men and women) regarding causes and impacts of undernutrition, pathways to improve HH dietary diversity with a focus on kitchen garden, and HH level poultry/small ruminant raising. Moreover, community researchers were directly involved in capacity-building sessions regarding techniques and approaches for undertaking kitchen gardening effectively. In addition, community researchers were provided with a starter kitchen gardening tool and seed kit, as shown in Table 1.

The research was designed as a mixed method approach and carried out qualitative data analysis. The data were collected through a periodic face-to-face survey called the "knowledge, attitude, and practice (KAP)" survey. Data were collected from participating HHs (both head of HH and participating female community researcher) at beginning of the project, every month after the distribution of kitchen gardening package (seeds and tool kit), and at the end of the study. The aim of monthly data collection was to gather timely information and updates on utilization of provided inputs into kitchen gardens, progress, challenges faced, and productivity of kitchen garden. Furthermore, data were also collected through employing a participatory rural appraisal approach including focus group discussions and in-depth interviews. The data sets were analyzed through thematic and content analysis techniques along with SPSS software.

3. Results and discussion

3.1. Food sources

The data analysis showed that all the participating HHs in this research were facing a number of challenges and barriers in practicing kitchen gardening. The HHs participating in the research project are categorized

as the poorest of the poor with monthly incomes ranging between 17 and 86 USD. The majority of the HHs depend on food credits and charity to meet their minimum food requirement every month (Figure 2). At the beginning of the research project, 60% of the participants were practicing some form of traditional home-based food production, however, they faced numerous challenges that resulted in low productivity and minimal health and economic benefits to HHs. However, at the close of the research project, the analysis of study findings show that the source of secondary staple food for participating HHs change significantly (as

Table 1. Kitchen gardening seed and toolkit distributed to community researchers.

Tools	Seeds
Spade	Coriander
Axe	Spinach
Hoe	Peas
Sickle	Carrots
Shoulder sprayer	Bottle gourd
Hand sprayer	Apple gourd
Water can with rose sprayer	Radish
Bucket	Cauliflower
Rope	Okra
Rope nets	Ridged gourd
Cutter	Bitter gourd
Wheel barrow	Turnip
	Eggplant

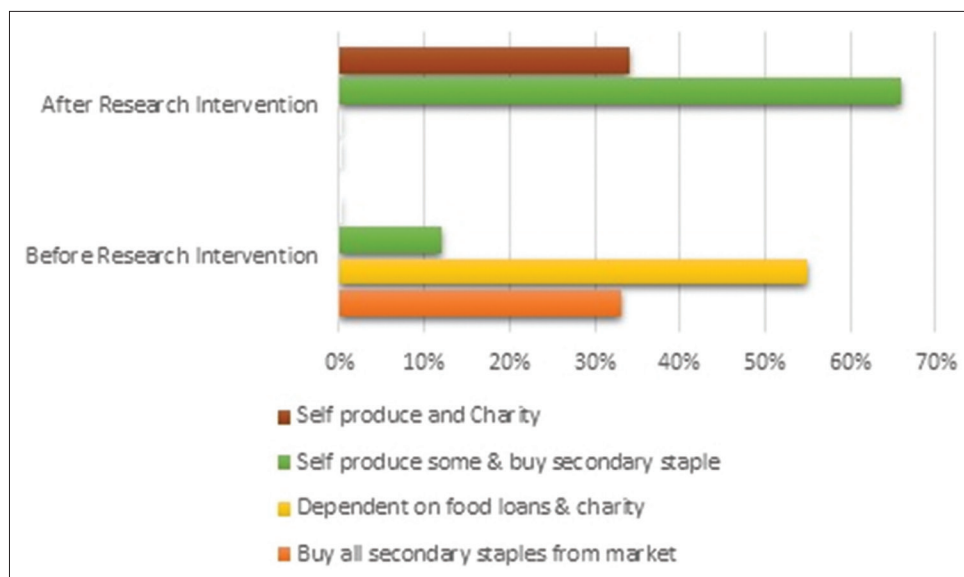


Figure 2. Households' secondary staple sources of food before and after kitchen gardening intervention.

depicted in a statement from a community researchers below) and there was a marked increase in home produced secondary staple food (vegetables) as compared to the previous practice of dependence on food loans and charity (Figure 2).

CR-HYD01: *“The availability of fresh vegetables free of cost within the house caused reduction in our stress connected to food insecurity as we were not worried to arrange money to purchase vegetables daily.”*

CR-HYD02 shared that *“Before this project, I only knew how to grow spinach, chili, and okra but productivity was low and now I know about more vegetables like growing ridge gourd, bottle gourd, bitter gourd, and apple gourd. I can read so now I also know what micronutrients each vegetable contains why they are important for my family’s health.”*

3.2. HH perception

Based on the qualitative analysis through perception mapping, the study found that although previously HHs were aware that kitchen gardening benefits that it can provide home produced food and reduce expenditures on food. However, they did not perceive the kitchen garden as a solution to improve their family’s health and nutritional status. Furthermore, due to numerous challenges faced by rural and peri-urban HHs in form of limited technical knowledge, limited access to agricultural inputs, and harsh environmental conditions; the majority perceived kitchen gardening as a physical and economic burden with limited returns. Nevertheless, after extensive awareness programs regarding the nutritional significance of diverse diets, technical training on designing and management of kitchen gardens, and support with agriculture inputs; participating HHs observed increased yields, reduction in expenditures, and need to take loans for food, in addition to experience improved health. The community perceptions significantly transformed and they now believe in the health and economic benefits of kitchen gardening practice (Figure 3).

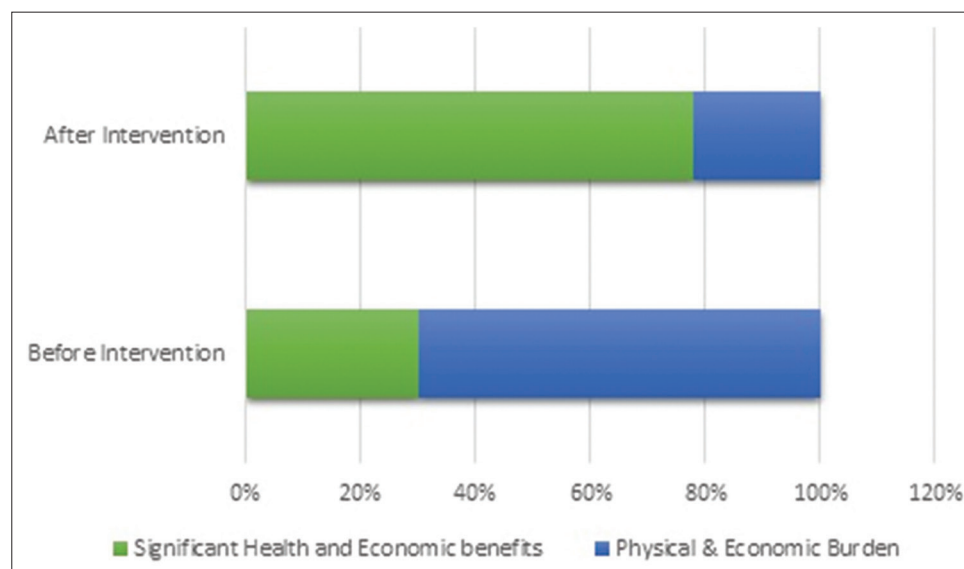


Figure 3. Change in perceptions of households regarding kitchen gardening practice.

3.3. Challenges

The key challenges faced by the HHs included lack of resources to buy agricultural inputs for instance, quality seeds, tools, and fertilizer; limited technical knowledge including sowing times, land preparation, pest, and diseases knowledge; limited knowledge regarding food/vegetable preservation; lacking awareness and knowledge regarding nutrition-rich foods; and health impacts of micronutrient deficiency in regular diet. Furthermore, participants in Dadu and Hyderabad districts also faced low soil fertility issues due to soil composition and water availability challenges. A review of numerous food-based intervention studies revealed that communities worldwide encounter similar challenges (lack of knowledge, inputs, water scarcity, limited land, poor environmental conditions, and damage from pests and livestock) during homestead farming practices. Therefore, researchers emphasize that the benefits, productivity, and sustainability of home gardening in developing countries can be ensured when these constraints are properly addressed (Chauhan, 2012; Galhena, 2012; and Sethy et al., 2010).

In this regard, as part of a complete package to facilitate kitchen gardening practice, kitchen gardening tools and seed kits were provided to participating HHs. They were also engaged in awareness sessions regarding the importance of a nutritious diet and best practices to improve diet diversity. Furthermore, the researchers were enabled through practical training on kitchen gardening techniques to improve home-based food production and preservation of food for lean periods, along with proper storage of seeds for next growing cycle. As part of the technical training, community researchers were also trained to prepare organic compost from organic waste available at HH levels (plant and animal waste) and use it to improve the texture and micronutrient content of kitchen gardening plots. In the Dadu study area, community researchers were advised to add organic compost to sandy soil to improve the water retention capacity of the soil. Similarly, in the Hyderabad research area, community researchers were advised to add sand and river silt to local soil (10:40:50 ratio) to improve soil water retention capacity and fertility.

In the research study, those HHs that prepared their lands well before the sowing period experienced comparatively better production than the rest of the HHs involved in kitchen gardening. Furthermore, as the research shows that planting legumes improve soil micronutrient content including nitrogen, phosphorous, and carbon as these plants are natural nitrogen fixers (Mugendi et al., 2011), community researchers were encouraged to plant legumes for instance cowpeas and *Sesbania Bispinosa* to improve soil fertility. In addition to providing edible produce, these plants also provide shade for other plants in the kitchen gardening plot, fodder for small ruminants, and wood for fuel. In addition, other key guiding principles promoted included putting up a protective boundary around kitchen gardens to protect against wild animals and livestock; providing shading through dried shrubs against heat intensive conditions; putting in a proper drainage system; and practicing smart irrigation techniques including localized water and water spraying to improve sustainability and productivity of kitchen gardens.

The study found that after the development of model kitchen gardening plots and training of community researchers, the participants were better equipped to overcome challenges previously encountered. There was a marked improvement in technical knowledge retention and replication in regard to designing and management of kitchen gardening plot; increased awareness in relation to nutrition best practices and diverse food consumption; food and seed preservation practices; and soil composition and fertility management through locally prepared organic fertilizer (Figure 4).

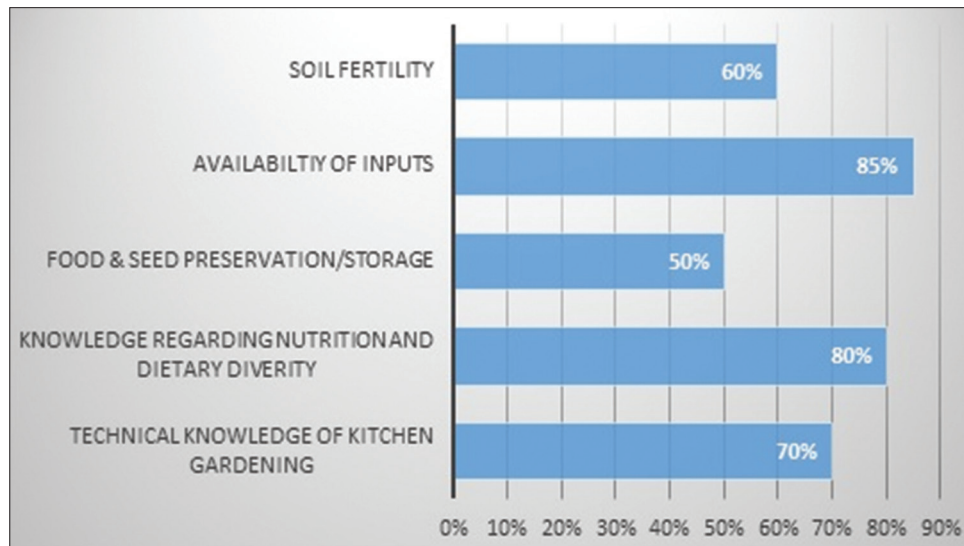


Figure 4. Percentage improvement in initial constraint to practice kitchen gardening.

3.4. Nutritional impact

The previous research studies have shown that kitchen gardening groups with knowledge regarding nutrition benefits of dietary diversity and consumption of micronutrient-rich food are significantly more likely to consume home produced nutrient-rich vegetables and are more food secure (Asaduzzaman et al., 2011; and Jones et al., 2005). In this research, analysis of qualitative data collected through interviews and focus group discussions, it was found that home-based food production led to not only a change in the diet patterns of the community researchers' HHs but also enhanced nutritional status of the HHs. During the interviews with participant HHs, it was found that previously, due to lack of ability to buy vegetables, HHs had a monotonous diet and limited meal frequency. They usually eat wheat or maize "roti" (bread) with "lassi" (a yogurt-based drink) or raw onions. This caused children to get tired with the same diet and loss of appetite occurs. However, after regular home-based food production, different vegetable curry (salan) was available at lunch and dinner times resulting in reignition of interest in food for children. Thus, concurring with findings of the study carried out by Keenan et al. (2015) that meal variety increases food intake. Community researchers reported that fresh vegetables from their kitchen gardens helped in increasing the frequency of food intake from twice per day to 3 or 4 times per day, thus having a positive impact on the health of women and children of the family. These results correspond with findings in Bangladesh that women's home-based food production is effective in increasing the food supply and consumption of a diverse range of vegetables in poor HHs (Schreinemachers et al., 2015).

In regard to dietary diversity, the participating HHs were assessed individually and as a whole, regarding diversity of food intake against 12 food groups as depicted in table.

The study established that there was a 10–20% increase in dietary diversity of the participating HHs after kitchen gardening intervention (Figure 5). The reason for the limited increase in dietary diversity was that community researchers were only provided with a variety of vegetable seeds for growing which they harvested and consumed (thus increasing in dietary diversity scores). However, the HHs participating in

S. No.	Minimum Dietary Diversity Food Groups
1	Cereals: Corn/maize, rice, wheat, sorghum, millet or any other grains or foods made from these (e.g., bread, noodles, porridge, or other grain products)
2	Vegetables: Tomato, onion, eggplant, pumpkin, kale, spinach, okra, etc.
3	Roots and tubers: Potatoes, yams, cassava, carrots, or other foods made from roots
4	Fruits: Mangoes, dates, apricot, apple, berries, guava, etc.
5	Eggs
6	Milk products: Cheese, milk, butter, yogurt, etc.
7	Meat: Chicken, beef, mutton, duck, etc.
8	Fish: Fresh or dried
9	BEANS: Any from made from beans or lentils
10	Oils and fats: Oil, fats, or butter added to food or used for cooking
11	Sweets: Sugar, honey, sweetened soda, or sugary foods such as chocolates, candies, cookies, and cakes
12	Spices, condiments, and beverages: Spices (black pepper, salt), condiments, coffee, tea, and alcoholic beverages

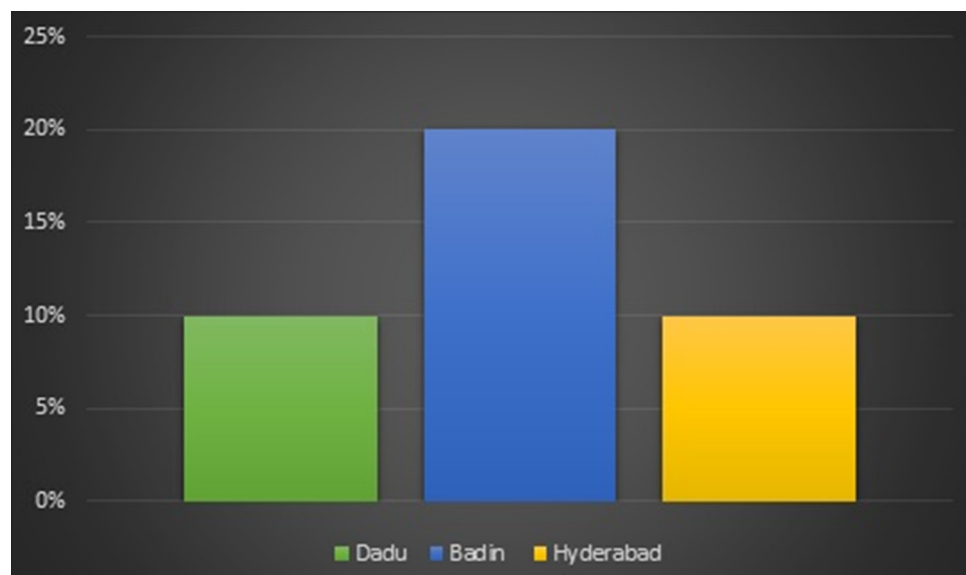


Figure 5. Increase in dietary diversity score for participating households.

research belonged to poor and vulnerable HHs with a monotonous diet focused on carbohydrates and limited access to proteins in form of meat, chicken, or eggs along with fruits, lentils/beans, and roots/tubers. After the establishment of kitchen gardens, their dietary diversified to include micronutrient-rich food.

Numerous studies conclude that kitchen gardening can potentially increase food security and raise awareness to tackle malnutrition simultaneously in rural HHs as it promotes the inclusion of sufficient quantities of proteins and carbohydrates along with essential micronutrients rich home produce for an appropriately balanced diet (Keatinge et al., 2012, and Keatinge et al., 2011). The kitchen gardens in this

research project produced micronutrient-rich vegetables such as bottle gourd (Vitamin A), ridge gourd (Vitamins B and A, manganese, and potassium), okra (Vitamins C, A, and K), spinach (Vitamins C and E), bitter melon (Vitamins C, B9, and B2), and apple gourd (iron and Vitamins B1, B2). Cumulatively, the majority of community researchers utilized 92% of the product from their kitchen garden while the rest of the produce was gifted to neighbors, relatives, and community members. Only 22% of the community researchers sold a small percentage (14%) of their produce to local markets while consuming the rest at the HH level. These results concur with findings of similar researches conducted in India, Sri Lanka, and Bangladesh that HHs practicing kitchen gardening consume 90% of the produce themselves while the rest is either shared with neighbors and relatives or sold in the market (Shaheb et al., 2016, and Chayal et al., 2013).

During the research project, two community researchers were pregnant. Both of the community researchers reported that their pregnancies were much smoother than their previous experiences and that their babies were born healthy; each weighing 4.5 and 4 kilos, respectively. According to medical practitioners, in Pakistan, the standard for healthy birth weight is 2.5–4 Kilos (Najmi, 2000). One of the mothers (CR-HYD01) reported, *“My health was much better in this pregnancy than my last one. We spent 18,000 PKR (155 USD) on my last pregnancy due to my weak health and complications related to it. However, this year we only spend 6000 PKR (52 USD) as both my baby and I were healthy due to a balanced diet.”* Nonetheless, a limitation of this study was that no blood profiling of the participants was carried out before and after the study to quantify the positive health and nutritional impacts. A similar study has been conducted in Pakistan regarding the comparison of impacts from nutrition specific only with both nutrition-specific and sensitive interventions on nutritional status of women and children where the study employs blood profiling among other methods for evaluation (Fenn et al., 2015). However, the results of the said study are yet to be published.

4. Conclusion and recommendations

The findings of the study conclude that kitchen gardening can play a key role in rural and peri-urban settings to provide essential micronutrients in daily diets to vulnerable HHs through the consumption of vegetables. This can be done by facilitating the HHs through trainings, awareness session, agricultural input support, encouragement, and motivation to overcome constraints; they face while practicing traditional home-based food production practices. Furthermore, the crop diversity and supporting interventions positively affect the nutritional status of HHs, especially women, rather than the size of kitchen gardening plots. Therefore, further research is needed to assess support interventions that can increase dietary diversity scores and increase income generation opportunities, for instance, combining small ruminant and poultry raising with kitchen gardening to diversify home-based food production and its impact on dietary diversity and nutrition status in rural HHs. Furthermore, it is also recommended that in future researches to increase the accuracy of data, blood profiling of participating HHs is conducted before and after the intervention to precisely measure a change in nutritional status. In addition, this kind of analysis will also be able to provide a relative change of nutritional status between different age groups and gender. The study recommends that the provincial government through the agriculture extension department, design, and implement a kitchen gardening supports program for poor and vulnerable HHs in rural Sindh to assist them in overcoming challenges to adopt kitchen gardening practice at a wider scale, similar to one being implemented by Punjab Government with very positive results.

5. Acknowledgments

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