

STRENGTHENING THE LOCAL ECONOMY BY INCREASING AGRICULTURAL PRODUCTIVITY

MEMPERKUAT EKONOMI LOKAL DENGAN MENINGKATKAN PRODUKTIVITAS PERTANIAN

Farhan Ahmad^{1,2*}, Ali Sher^{3,4}

¹ Agriculture-Livelihood Officer, UNWPF-FRD, Food for Assets (FFA)-Cash Based Transfers (CBT) Project, District Kurram, KPK, Pakistan

² Department of Agricultural Sciences, Agricultural Faculty, University of Padjadjaran, Jl. Bandung-Sumedang km 21, Jatinangor, Sumedang, West Java, Indonesia

³ Monitoring and Evaluation Officer, Food for Assets (FFA)-Cash Based Transfers (CBT) Project, District Kurram, KPK, Pakistan

⁴ Decent Work Advisor, HELVETAS, Peshawar, KPK, Pakistan

*Correspondence: farhan.syk@gmail.com

Submitted: 19th August 2025; Revised: 23th August 2025; Published: 31st August 2025

ABSTRACT

Vegetable production is vital for rural livelihoods, household income, and food security, particularly in marginalized agrarian regions such as District Kurram, Khyber Pakhtunkhwa, Pakistan. This study assessed vegetable production systems, constraints, and their contribution to local livelihoods and the regional economy. Given the region's agro-ecological diversity, comprising irrigated, rain-fed, and mixed cropping systems with annual rainfall of 500–700 mm, vegetable farming presents untapped potential for income generation. A mixed-methods approach was adopted to analyze production systems, identify limiting factors, and formulate recommendations for productivity enhancement and poverty alleviation. Data collection involved structured surveys, focus group discussions, key informant interviews, and direct field observations. Sampling covered three tehsils – Kurram Upper, Center, and Lower – spanning 15–30 villages and over 200 small-scale vegetable growers. Quantitative data were analyzed using SPSS v26, while qualitative insights were interpreted through manual content analysis. Key constraints included limited access to quality inputs, weak extension services, and poor market connectivity. Nonetheless, interventions such as hybrid seed adoption, improved irrigation, and farmer field schools – primarily through NGO initiatives like FRD and WFP – led to measurable gains in productivity and income diversification. Special emphasis was placed on kitchen gardening, gender inclusion, and value addition to strengthen food security. Overall, vegetable production in Kurram holds significant promise for poverty reduction and empowerment of rural communities, contingent upon supportive policies, institutional backing, and sustainable practices.

Keywords: Agricultural productivity; food security; rural development; sustainable livelihood

ABSTRAK

Produksi sayuran sangat penting bagi mata pencaharian pedesaan, pendapatan rumah tangga, dan ketahanan pangan, terutama di wilayah agraris terpinggirkan seperti Distrik Kurram, Khyber Pakhtunkhwa, Pakistan. Studi ini mengkaji sistem produksi sayuran, kendala, dan kontribusinya terhadap mata pencaharian lokal dan ekonomi regional. Mengingat keragaman agroekologi wilayah tersebut – yang terdiri dari sistem irigasi, tadah hujan, dan sistem tanam campuran dengan curah hujan tahunan 500–700 mm – pertanian sayuran menghadirkan potensi yang belum dimanfaatkan untuk menghasilkan pendapatan. Pendekatan metode campuran diadopsi untuk menganalisis sistem produksi, mengidentifikasi faktor-faktor pembatas, dan merumuskan rekomendasi untuk peningkatan produktivitas dan pengentasan kemiskinan. Pengumpulan data melibatkan survei terstruktur, diskusi kelompok terfokus, wawancara informan kunci, dan observasi lapangan langsung. Pengambilan sampel mencakup tiga tehsil – Kurram

Hulu, Tengah, dan Hilir – yang mencakup 15–30 desa dan lebih dari 200 petani sayuran skala kecil. Data kuantitatif dianalisis menggunakan SPSS v26, sementara wawasan kualitatif diinterpretasikan melalui analisis isi manual. Kendala utama meliputi terbatasnya akses terhadap input berkualitas, layanan penyuluhan yang lemah, dan konektivitas pasar yang buruk. Meskipun demikian, intervensi seperti adopsi benih hibrida, perbaikan irigasi, dan sekolah lapang bagi petani – terutama melalui inisiatif LSM seperti FRD dan WFP – menghasilkan peningkatan produktivitas dan diversifikasi pendapatan yang terukur. Penekanan khusus diberikan pada pengelolaan kebun dapur, inklusi gender, dan nilai tambah untuk memperkuat ketahanan pangan. Secara keseluruhan, produksi sayuran di Kurram memiliki potensi yang signifikan untuk pengentasan kemiskinan dan pemberdayaan masyarakat pedesaan, bergantung pada kebijakan yang mendukung, dukungan kelembagaan, dan praktik berkelanjutan.

Kata kunci: Ketahanan pangan; mata pencaharian berkelanjutan; pembangunan pedesaan; produktivitas pertanian;

INTRODUCTION

The Pakistani economy continues to be dominated by agriculture, contributing to rural development, jobs, and nutrition security. On a larger scale, vegetable farming has a vast potential to increase nutritional effects and local economic development, especially in the underprivileged and underdeveloped areas like Khyber Pakhtunkhwa's District Kurram (Kayani et al., 2016). Kurram, a fertile valley with a temperate climate and resourceful farming population, is located in northwest Pakistan on the Afghan border. Kurram's agricultural potential is largely untapped in terms of vegetable production; however, as a result of a range of institutional, sociopolitical, and technological restrictions (Hussain et al., 2022).

The value of injecting regional economies through agriculture has become widely accepted, particularly in rural areas with few economic

opportunities. Agriculture is the primary source of income for most people, but a lack of facilities, traditional beliefs, and inadequate access to markets hinders advancement (Rasul & Gurung, 2024). Being high-value, short-duration crops, vegetables offer a unique opportunity to increase farm earnings, improve household food security, and create employment off the farm in production, processing, and marketing (Gao & Lyu, 2023). Promoting the production of vegetables can be a strategic step towards boosting the local economy, combating poverty, and working towards the recovery process in this erstwhile war-torn area (Mugizi, 2025).

Despite this, decades of economic development efforts have been reactivated due to peace-building efforts and enhanced connectivity. Particularly in vegetable farming, the shifting conditions present a vital window for market-led development

and agro-innovation (Kashif et al., 2024). Due to its agro-ecological potential, numerous vegetables such as tomatoes, onions, potatoes, chillies, spinach, cauliflower, and carrots can be grown in the district. However, most of this is still untapped owing to poor post-harvest handling, availability of water, poor access to quality seeds, and poor extension services. Among the key issues smallholder farmers face are poor information access and poor access to innovation in agriculture (Kadam et al., 2020).

Lower production, greater susceptibility to pests and diseases, and poorer market competitiveness are the outcomes of traditional vegetable farm methods. In addition, most of the produce is marketed to intermediaries at low prices because of the poor relationships between markets and farmers, leading to lower profitability as well as dissuasion of investment in vegetable production (Xu et al., 2024). Training, demonstration, and capacity building are imperative so farmers can learn about the best crop selection, irrigation, pest management, and organic practices. With rising drought and climatic uncertainty rates in the region, climate-smart agricultural practices are particularly crucial. Domestic vegetable value chain

strengthening is also a crucial component (Nawab et al., 2022).

Expanding access to quality inputs, enhancing cold storage and processing facilities, encouraging farmer cooperatives, and creating market linkages. By facilitating public-private partnerships and innovation-based extension services, government aid, along with community-based and non-governmental organizations, can prove to be instrumental in this regard (Bajwa et al., 2015). Kurram is located in proximity to local and foreign markets, including Afghanistan. Improved production methods and quality standards allow excess vegetables from the district to be exported to KP and other urban centres, providing new sources of income. In addition to making production more economical, area drying, packaging, and value-adding processing facilities could minimize post-harvest losses, which are currently unacceptable because there are no proper storage facilities and transport infrastructure (Kayani et al., 2016).

Increasing the production of vegetables in District Kurram is a comprehensive policy for rural development and is not merely an agricultural intervention. It has the potential to boost the local economy, promote food security,

empower the vulnerable groups, and promote sustainable livelihood sources. All stakeholders, including government, non-governmental, research institutions, and local people, must work together for its achievement. Adopting vegetable cultivation can strongly promote regional stability and economic resurgence since Kurram stands at a crossroads in its development.

METHODS

Study area

District Kurram, located in Pakistan's KP Province, was where this study was undertaken. Kurram is located at longitudes 69°45' and 70°40'E ' E and latitudes 33°40' and 34°20'N ' N.

Mountains and valleys bound the area and have an agro-ecological zone that is varied, supporting irrigated as well as rainfed agriculture. Several vegetable crops can be cultivated there because of the 500–700 mm annual average rainfall and seasonal temperature variations within the region. Agriculture is the primary source of income for most of the rural communities in the region.

Research design

In order to obtain thorough information about vegetable production methods, challenges, and economic effects, the study used a mixed-methods strategy that combined quantitative surveys and qualitative assessments.

Table 1. Data collection methods

Methods	Description	Details
Structured Questionnaire Surveys	Quantitative data collection using a pre-tested questionnaire administered to vegetable farmers.	❖ Demographics ❖ Landholding and cropping patterns ❖ Types of vegetables, yield, inputs ❖ Access to irrigation, markets, and extension ❖ Income from vegetable sales ❖ Production and marketing constraints
Focus Group Discussions (FGDs)	Group discussions with farmers to gather shared experiences, perceptions, and suggestions.	❖ Total 6 FGDs (2 per tehsil) ❖ Participants per FGD: community representatives ❖ Topics: challenges, opportunities
Key Informant Interviews	Semi-structured interviews with stakeholders involved in vegetable farming and marketing.	❖ Key informants ❖ Agricultural officers ❖ Input suppliers ❖ Market traders ❖ NGO representatives
Field Observations	On-site visual assessment during farm visits to observe actual farming practices.	❖ Crop management techniques ❖ Irrigation systems ❖ Agro-input usage ❖ Post-harvest handling

The study aimed to evaluate the existing production systems, identify potential and limitations, and provide tactical solutions to improve vegetable production and regional economic growth.

Sampling procedure

To choose the study participants, a multi-stage sampling procedure was employed: Based on the level of agricultural activity and the number of people farming, three major tehsils—Upper Kurram, Central Kurram, and Lower Kurram—were purposefully chosen. Five to ten villages within each tehsil were chosen at random as deserving. Ten to twenty smallholder vegetable producers were chosen at random from each hamlet. To gain a more comprehensive qualitative picture of the agricultural economy, key informant interviews were also carried out with agriculture extension officers, local market traders, community elders, and members of non-governmental organizations.

Data analysis

Microsoft Excel was used to enter and analyze quantitative data obtained from surveys using the Statistical Package for the Social Sciences (SPSS v26), and Origin Lab was used for visualization. The characteristics of farmers, production

levels, and income distribution were summed up using descriptive statistics, including means, frequencies, and percentages. Manual content analysis was used to transcribe, code, and thematically evaluate qualitative data from FGDs and key informants. The emerging issues were access to resources, institutional support, female involvement, and marketing constraints.

Framework

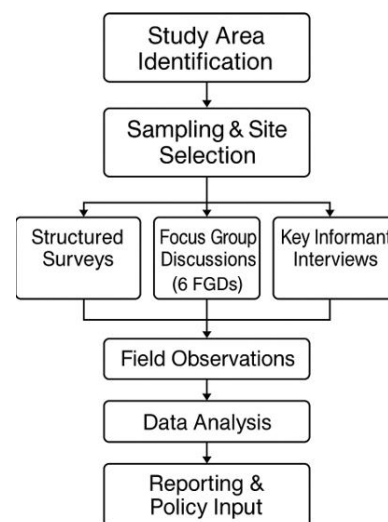


Figure 1. Research framework of data collection and analysis.

Ethical consideration

All participants were informed of the study's objectives and the right to withdraw their participation at any moment before data collection. Every respondent gave their spoken informed consent. The study adhered to the ethical guidelines set by the United Nations-World Food Program.

RESULT AND DISCUSSION

Agriculture plays a pivotal role in developing local economies, most reliably in rural agricultural communities. Food availability is only a small part of its influence—it is a primary source of livelihood, income, and identity. As farm productivity expands, communities can become more food secure, raise household income, and stimulate economic growth in general (Ahmad et al., 2022). For most developing communities, however, agriculture earns income for the farmer and the whole group of processors, movers, and market vendors, all of whom benefit from further productivity. That trickle-down effect illustrates how much agricultural increases are tied to localized economic stability. (Rasul & Gurung, 2024; Upe et al., 2021; Gao & Lyu, 2023).

Training activities

The sustainable livelihood framework enables departments to improve the design and implementation of poverty reduction programs among tribal communities. It enables analysis of opportunities and constraints of the poor in tribes, increases understanding of different perspectives, identifies what choices promise more hope to reduce poverty, and what enabling conditions, policies, and incentives people

experiencing poverty require so that they can increase the number of enhanced livelihood opportunities to tribal farmers. The Kurram District is among the most backward regions of Pakistan. Most of the population lives on agriculture and livestock production and cannot escape below-subsistence livelihoods because of low agricultural and livestock productivity.

The sunflower seeds, weighing 250 g each, were distributed to all the participants to practice in their fields. The sunflower seeds were distributed because they had not been cultivated there previously. The training is on improving agricultural productivity through modern farming practices, an integrated approach to managing pests on their farm, technologies, and adding value to agriculture through developing a value chain and a functional market. The training also aims to achieve the adoption of climate-smart and climate-resilient agriculture, and the adoption of practices for improving crop productivity. Trainees were enrolled in Agriculture (IPM) training with active involvement of the VDC for the respective cycle in project phases.

Essa Khan is a small farmer of Ali Zai village of Pekar PC-Upper Kurram. He used to grow paddy and some vegetables on his farm annually,

seasonally, for family requirements. Soon after the provision of training, Essa Khan planted the sunflower in a 5 Marla plot. He also mentioned that the crop has produced phenomenal performance throughout the village of Ali Zai. Moreover, he added that sunflower pest and disease control is easy because no

attack or infestation occurs, like other crops. "250 grams of sunflower was sown at 5 Marla, which resulted in 17.46 kg of production in the first season". The training was done to help farmers incorporate the latest scientific advancements and technological gear into their routine work.



Figure 2. Productivity of sunflowers following the training sessions and provision

The Lower and Upper Tehsil of District Kurram are predominantly agrarian tehsils with about 70-80% of the population directly or indirectly dependent on agriculture. The potential of the target areas (Upper and Lower Tehsils) is highly uneven because of topography, soil, and climate variations. Its mixed geographical location and mixed soil character are considered best for producing a variety of crops such as vegetables. The upper and lower tehsils'

people were involved earlier in farming maize, rice, wheat, tomato, and soybean. They were only using their own indigenous mode of cultivation, which could not address food insecurity and access to natural resources. Our vegetable productivity is insufficient to keep us economically "community reported". They did not know the benefits of vegetable cultivation and productivity. They were used to grow the local seeds, which were not so

remunerative. Their domestic consumption is only fulfilled through the production for a few days.

Foundation for Rural Development (FRD), in coordination with WFP, through financial support under the "FFA Food Assistance for Asset creation/ Livelihoods Program through Cash-Based Transfers, 2022," enrolled members in vegetable cultivation among vulnerable villages by involving the project Village Development Committee (VDC). Quality seeds were provided to each participant for around one Kanal (20 Marla) of area. The supply of hybrid seeds aims to achieve genetic and physical purity of the crop, achieve the desired plant population, and have the capacity to withstand pathogenic conditions.

The farmers were satisfied with the reasonable price of their vegetables in the market. The production is giving a livelihood promise and a source of income for their family, though generating other nutritious vegetables for their family and buyers at nearby markets. Vegetable cultivation is promising economic prospects for poverty and unemployment alleviation in target villages and is one of the key components of farm diversification strategies.

The production of vegetable cash crops has improved the socio-economic status of the farmers, due to the production of these cash crops (Apple gourd, bitter gourd, and okra). The vegetables and cash crops in agriculture are economically valuable crops. Vegetable crops are one of the largest cash crops in the world's agriculture. It is a fact that vegetable crops are grown on a business basis in almost all countries. The vegetable cash crops are grown intensively around the towns and cities because there is high demand for the vegetable cash crops in urban areas, too. Vegetable farming operations have been found to earn additional income for the household by selling the output at their farm after domestic consumption. They also stated that additional income is often spent on purchasing additional foodstuffs, diversifying the diet even more. Vegetable farming is especially crucial in overcoming the seasonality of food availability and promotes household self-sufficiency. The greatest accomplishment is that the farmers can break the conventional culture to pursue agriculture as a low-level vocation in society. The farmers never hesitate to give their identity as farmers proudly.

Kitchen gardening: a case study

One of the key interventions under the FRD program is seed distribution under VDC and kitchen garden development near sources of water, i.e., water channels, hand-pumps, water ponds, or where the households are releasing wastewater. Seeds distributed in the community were certified hybrid seeds from the well-known Syngenta seed company. The target 5 Marla plot locations for kitchen gardens were selected near their home locations so that females can have easy and secure access to gardens. These kitchen gardens are intended to increase food variety in participating households' diet, reduce reliance on the market for exotic fruits and vegetables, and ultimately enhance their livelihoods.

According to one of the female participants, the kitchen garden has also worked well for her household and her community. She began being part of the project in May 2022. The seeds provided by the FRD field team were good since they all germinated well. Her husband further added that the number of seeds was of a better quality for planting. The intervention has also been successful in reducing reliance on the market. He added that we have sold out 7 kg of apple gourd from our vegetable garden, and so many of our participants are already doing the same. "For the rest of

the vegetables once they reach maturity, we will proceed with the sell-out and family consumption".

The techniques provided by the field team were more effective in seed cultivation and field preparation. They also believed that after harvesting these vegetables, we would proceed with a fresh consignment of vegetables, including onions, carrots, garlic, etc. Under the project, all the participants were motivated to exchange seeds with other houses to diversify food throughout the village. Seed sharing and proper maintenance of the kitchen garden allow the intervention to be long-lasting in the future.

Vegetable production-success story 1

In the remote highlands of Village Pekar, near the Afghan border in Upper Kurram, rural lives have long been constricted by rugged topography, water scarcity, and limited market access. The population suffered long-standing food insecurity for decades, since most households relied on rainfed cereals and subsistence farming. However, something amazing was brought about in 2021, when FRD (Foundation for Rural Development), in association with the World Food Programme (WFP) under the Food Assistance for Assets (FFA) project,

launched an integrated vegetable cultivation program.

The initiative began with rehabilitating an abandoned community irrigation channel and establishing 20 model plots across the village. The raised-bed vegetable production, drip irrigation, composting, and pest control were taught to the local farmers with FFA's assistance. One of the project's

beneficiaries, Haji Rahmatullah, a 45-year-old farmer with six kids, still recalls the transformation. "We did not even harvest enough wheat to consume at home before this project. Now, I cultivate tomatoes, okra, and onions. Last season, I made PKR 85,000 by selling vegetables in the local market, which I never earned as an agriculturalist."



Figure 3. Seed distribution and preparation of the land for cultivation.

The project increased production and added to food diversity and nutrition. Fresh vegetables were a common feature in family meals. The area benefited from improved child health, and most families reduced reliance on imported vegetables from Parachinar and Hangu. Market linkages were an achievement as well. FRD introduced Pewar farmers to Sadda and Thall traders.

A farmers' organization was set up to sell their produce collectively, increasing bargaining power and reducing dependence on intermediaries.

In Pewar, vegetable farming tripled by 2022, benefiting over 50 families through the project. The achievement at Pewar has become an example village for climate-resilient and market-based agriculture in Kurram. This is a positive example of the difference that partnership between communities, development organizations, and government agencies can contribute to changing vulnerable agricultural systems into sources of growth and resilience.

Vegetable production-success story 2

Years of disinvestment, low water availability, and devastated infrastructure had many households reliant on cereal crops with low yields and seasonal labor migration in Shasho and Ali Jan Kali. However, 2022 saw a change, all courtesy of the Foundation for Rural Development (FRD) and the World Food Programme (WFP) under the Food Assistance for Assets (FFA) project.

The FFA project viewed Shasho and Ali Jan Kali as one of the sites with the highest potential for piloting vegetable production at the community level within a broad resilience development plan. Restoration of a communal water storage tank and lining phase one small canals facilitated adequate farmland irrigation. After this, farmers were given starter kits with good-quality vegetable seeds (tomato, spinach, okra, and bitter gourd), basic farm tools, and organic manure. Training was offered on climate-smart farming techniques, including raised-bed cultivation, drip irrigation, and composting. Interestingly, 40% of program participants were women, most of whom established thriving kitchen gardens that helped families attain food and income security.

Community participant added that "We depended on wheat and lentils.

I grew spinach, tomatoes, and okra using seed kits and a training session. I sold vegetables at the neighbourhood market and made over PKR 60,000 in a single season. It assisted me in paying school fees and buying medicine for my mother". In addition to income, the village benefited from improved nutrition, reduced market dependency, and increased coordination among groups. A farmers' committee was also created to organize joint marketing and access wholesale buyers from Sadda and Bannu. FRD also offered basic post-harvest handling techniques, which reduced wastage and improved produce quality.

By mid-2023, over 40 Shasho and Ali Jan Kali families had embarked on vegetable farming, tripling local production from 2021. The previously barren land now flourishes with spots of green vegetables—a symbol of hope and renewal. The Shasho and Ali Jan Kali tale demonstrates the power of equipping the local community with resources, knowledge, and sustainable practices to transform lives and bring lasting change to needy areas like rural Lower Kurram.

Enhancing agricultural productivity implies generating more output from increasingly fewer resources—land, labor, water, or capital.

Data-driven irrigation, stress-tolerant seeds, and precision farming are cutting-edge instruments of this revolution. Technology alone, however, is insufficient. These instruments must be accessible universally, so that small women, smallholders, and other marginalized groups are not left behind. Extension services can bridge this divide. Such services get the farmer in contact with knowledge, markets, and financial products, hence generating livelihoods that are not of a subsistence nature. Well-designed extension services considerably increase the reach of livelihood capitals—human, natural, social, and financial—and empower the society to diversify and become economically advanced. (Dwivedi & Joshi, 2025; Pabón Trujillo et al., 2025; Mugizi, 2025).

Productivity increases are only worthwhile if complemented by adequate infrastructure and market access. Even high-productive farmers might not benefit from their output without appropriate irrigation, storage, and roads. For example, wastage of output after harvest because of insufficient availability of cold storage facilities or inadequate transportation can erode profitability. (Sundari et al., 2023). Investment in infrastructure for the countryside is thus a strategic

imperative. Government and non-government agencies must join forces for better facilities for the producer to warehouse, transport, and market his produce at reasonable costs, converting agrarian surpluses into economic development. (Kayani et al., 2016; Ahmad et al., 2023).

Sustainability is also a unifying theme of discussion about productivity. Unsustainable methods—chemical overuse, multiple irrigations, and monoculture—can destroy ecosystems and pose long-term community risks. Sustainable options like agroforestry, organic, and conservation agriculture are feasible (Khan et al., 2022). These protect the environment and provide a window of opportunity for niche market development and value-added market development, which are best suited for organic and climate-responsible market development. With a balance of productivity and sustainability, communities can diversify the economy while securing the natural base (Zada et al., 2022; Farooqui, 1984).

Social organization amplifies economic effects, too. Family units and cooperatives allow the aggregation of resources, better price negotiation, and information exchange. Transaction costs are minimized, and economies of scale are achieved, which translates to greater

profitability and resilience, through cooperatives. (Ahmad et al., 2021). Cooperative farming has facilitated smallholders' engagement with competitive markets and equitable price access for smallholder output in most of the globe. Strengthened legal compliance, through better enforceable legal norms, and financial incentives for cooperatives must be expanded to scale these effects (Bajwa et al., 2015; Nawab et al., 2022; Hussain et al., 2023). Through the introduction of modern methods of farming, the use of high-yielding varieties of seeds, tunnel farming, and kitchen gardening, the project not only met the short-term target of food security but also opened new, broad avenues of income generation, most significantly so for smallholders and women-headed households. (Qaiser et al., 2013; Sheethal et al., 2023).

Through scaling-up of the intervention to all three Kurram district Tehsils, namely, Upper, Centre, and Lower, the intervention contributed towards greater equality of accessing training and inputs, anchoring participatory learning through the community district-wide. Extension of certified vegetable seeds, along with Farmers Field Schools (FFS), provided a channel of diffusion of know-how of

modern agronomics, post-harvest operations, and market links, diminishing the post-harvest wastage, and lifting the bargaining capacity of the farmer. Evidence of perceptible shift of cropping lines, with enhanced numbers of houses adopting horticultural crops like tomato, okra, and leafy vegetables besides traditional wheat or maize base, is a diversification approach through risk reduction and income maximization. Aside from economic returns, the project generated socio-environmental impacts—improved household nutrition, gender empowerment from home gardening, and improved environment-friendly agriculture practices. Sustainability issues, reliance on external input, and poor access to institutional credit and cold stores are scaling-up constraining factors. The project is a clear example of rural development because, via the project, we can observe that a locally adapted climate-smart agricultural paradigm can be a source of economic resilience for vulnerable communities. Agricultural productivity improvement for the Kurram district not only improved household livelihood but also regional food security and economic stability, proving the leading role of agricultural development in rural empowerment.

CONCLUSION

The diversified agricultural development programs of FRD, in collaboration with WFP, through the Food Assistance for Assets (FFA) program, significantly supplemented the livelihood of the Kurram District tribes. With hybrid seed deliveries, kitchen garden establishment, Integrated Pest Management (IPM) training, and climate-resilient agricultural technologies, the project facilitated the shift of smallholder farmers' livelihood from a subsistence to a more productive market-led livelihood. Diversification of household income through the introduction of vegetable cash crops like the sunflower, apple gourd, okra, and tomatoes diversified income, ensured food availability, and introduced cropping system diversification. Empowerment of the woman farmer, community-level exchange of seed, and complementing localized water sources for sustainable kitchen gardening are a few of the diversifications introduced under the program. Case studies of Essa Khan and Haji Rahmatullah are a testament to the impact of carefully aimed actions for peripheral belts. With enhanced nutrition, increased productivity, and market connectivity, the initiative averted poverty and supplemented

resilience for the Kurram. It transformed agriculture from a source of prestige to a livelihood. With a central theme of sustainable agricultural development, social participation, the program shines with well-structured NGOs' cooperation and localized institutions' collective action, leading to long-term transformation of isolationist agrarian communities, and can be a source of a repeatable model for other underdeveloped tracts.

Authors declaration

Consent to participate

Authors are agreed

Consent to publication

The authors agree to publish this data

Conflict of interest

The authors declare no conflict of interest

Funding

The United Nations World Food Program (UN-WFP) supports the project's operations financially.

Acknowledgement

The Foundation for Rural Development (FRD) is most thankful to its donor, the World Food Program (WFP), for the financial assistance during the implementation of the activity. I am most thankful to (Mr. Asad Ullah, Project Manager FFA-CBT-Kurram, Mr. Iftikhar Khan, Liaison

officer, Mrs. Maria, Senior Program Associate WFP, and Mr. Said Rehman, Senior Program Associate WFP) for the encouragement, regular monitoring, and timely assistance that I got for this report regarding the preparation. I extend my deepest regards to Mr. Azmat Khan, CEO, and Mr. Fahim Khan, Manager Programs FRD, for their courtesy, cooperation, and motivation that enabled me to complete this project. Finally, hats off to the Kurram team, without whom I could not have been supported well in every aspect.

REFERENCES

- Ahmad, F., Khan, I., Nasib, M., & Sher, A. (2022). Community-Based Activity of Nursery Raising for Improving The Livelihood of Small-Scale Farmers in District Kurram. *Jurnal Hexagro*, 6(1), 12–21. <https://doi.org/10.36423/hexagro.v6i1.871>
- Ahmad, F., Sundari, R. S., Ahmad, J., & Arshad, A. (2021). The financial analysis of nitrogen fertilizers and planting systems and its implications on maize agribusiness: Evidence from Peshawar, Pakistan. *Journal of Socioeconomics and Development*, 4(1), 145. <https://doi.org/10.31328/jsed.v4i1.2197>
- Ahmad, Z., Malik, S. M., Mehran, H., K., Ul Haq, N., & Altaf, F. (2023). Community Resilience and Innovation in Livelihood Strategies: Exploring the Drivers of Change in Mountain Agriculture in Lotkuh Valley, Pakistan. *Journal of Asian Development Studies*, 12(4), 158–177. <https://doi.org/10.62345/jads.2023.12.4.11>
- Bajwa, B. E., Aslam, M. N., & Malik, A. H. (2015). Food Security and Socio-Economic Conditions of Women Involved in Kitchen Gardening in Muzaffargarh, Punjab, Pakistan. *Journal of Environmental and Agricultural Sciences*, 4, 1–5.
- Dwivedi, V. J., & Joshi, Y. C. (2025). *Perspectives of Enhancing Sustainable Productivity of Rural*. January.
- Farooqui, M. N. I. (1984). Factors affecting rural fertility in Pakistan. *Demography India*, 13(1–2), 70–91.
- Gao, D., & Lyu, X. (2023). Agricultural total factor productivity, digital economy and agricultural high-quality development. *PLoS ONE*, 18(10 October), 1–15. <https://doi.org/10.1371/journal.pone.0292001>
- Hussain, K., Rahman, F., Ullah, I., Ahmad, Z., & Schickhoff, U. (2022). Assessing the Impacts of Population Growth and Roads on Forest Cover: A Temporal Approach to Reconstruct the Deforestation Process in District Kurram, Pakistan, since 1972. *Land*, 11(6). <https://doi.org/10.3390/land11060810>
- Hussain, S. T., Muhammad, S., Khan, S., Hussain, W., & Pieroni, A. (2023). Ethnobotany for food security and ecological transition: wild food plant gathering and consumption among four cultural groups in Kurram District, NW Pakistan. *Journal of Ethnobiology and Ethnomedicine*, 19(1), 1–15. <https://doi.org/10.1186/s13002-023-00607-2>

- Kadam, D. M., Bihari, B., Kumar, S., & Bishnoi, R. (2020). *Kitchen Garden for Nutritional and Livelihood Security in North Western Himalayan Region* ICAR - Indian Institute of Soil and Water Conservation. September. <https://doi.org/10.13140/RG.2.2.18932.78729>
- Kashif, M., Nazeer, M. A., Mohsin, M., Salahuddin, M., & Sarwar, F. (2024). *Evaluating the Use of Kitchen Gardening in Relation To the Socio - Economic Conditions in Lahore , Pakistan*. July 2025, 45-53.
- Kayani, A. S., Mushtaq, M. S., Muddassir, M., & Abubakar Zia, M. (2016). Impact of Agriculture Loan on Agricultural Farm Productivity: Evidence From District Parachinar, Kurram Agency, Pakistan. *Journal of Global Innovations in Agricultural and Social Sciences*), 4(4), 156-159. <https://doi.org/10.22194/jgiass/4.4.757>
- Khan, M. R., Arif, M., Ahmad, F., Sundari, R. S., Ahmad, J., Adiloğlu, A., Özel, E., Sukmawani, R., Astutiningsih, E. T., Meilani, E. H., Ratnasari, J., Fitriani, Latifah, E., Işık, R., Tarigan, R. T., Tarigan, R. A. N., Asyiah, A. K., Sözübek, B., Öztürk, M., ... Akinoğlu, G. (2022). *Sustainable Agriculture Leads to Zero Hunger*. <https://iksadyayinevi.com/wp-content/uploads/2022/07/SUSTAINABLE-AGRICULTURE-LEADS-TO-ZERO-HUNGER-.pdf%0Ahttps://iksadyayinevi.com/home/sustainable-agriculture-leads-to-zero-hunger/>
- Mugizi, F. M. P. (2025). Extension Advice, Agricultural Productivity, and Food Security in Tanzania. *Food and Energy Security*, 14(1). <https://doi.org/10.1002/fes3.7004>
- Nawab, K., Iqbal, M., Rahman, W. U., & Khan, A. (2022). Role of Agricultural Extension Services in Enhancing Kitchen Role of Agricultural Extension Services in Enhancing. *Journal of Xi'an Shiyu University, Natural Science Edition*, 18(10), 785-804.
- Pabón Trujillo, H., Triana Sánchez, M. R., Eduardo Posada, M., Isabel Peña, T., & Diaz Diaz, L. A. (2025). Cultivating Security: Comparative Analysis of Agricultural Labor Standards in Argentina and Colombia. *Ciencia Latina Revista Científica Multidisciplinar*, 9(1), 7632-7642. https://doi.org/10.37811/cl_rcm.v9i1.16432
- Qaiser, T., Shah, H., Taj, S., & Ali, M. (2013). *Impact Assessment of Kitchen Gardening*. 2(April).
- Rasul, G., & Gurung, P. (2024). Unlocking the potential of sustainable livelihoods in the Chattogram Hill Tracts of Bangladesh. *Nature-Based Solutions*, 5(December 2023), 100108. <https://doi.org/10.1016/j.nbsj.2023.100108>
- Sheethal MP, Shashikantha SK, Neeta PN, & Shwetha Hariba. (2023). Kitchen garden: Perceived role and utilization among Mandya, Southern Karnataka rural households. *Asian Journal of Medical Sciences*, 14(4), 111-114. <https://doi.org/10.3126/ajms.v14i4.50798>
- Sundari, R. S., Hidayati, R., Ahmad, F., & Tarigan, R. T. (2023). Consumer Behavior in Consuming Original Catfish Shredded As Nutritious Processed Fish. *Journal of Hygienic*

Engineering and Design, 41, 339–345.

- Upe, A., To'at, M., Mugambiwa, S. S., Huma, H., & Samad Akenbi, A. (2021). Strengthening Rice Farmers' Social Capital in Increasing Agricultural Productivity. *International Journal of Qualitative Research*, 1(1), 48–54. <https://doi.org/10.47540/ijqr.v1i1.305>
- Xu, H., Wang, P., & Ding, K. (2024). Transforming Agriculture: Empirical Insights into How the Digital Economy Elevates Agricultural Productivity in China. *Sustainability (Switzerland)*, 16(23). <https://doi.org/10.3390/su162310225>
- Zada, M., Zada, S., Ali, M., Zhang, Y., Begum, A., Han, H., Ariza-Montes, A., & Araya-Castillo, L. (2022). Contribution of Small-Scale Agroforestry to Local Economic Development and Livelihood Resilience: Evidence from Khyber Pakhtunkhwa Province (KPK), Pakistan. *Land*, 11(1), 1–21. <https://doi.org/10.3390/land11010071>