The Role of Agricultural Extension Services in Enhancing the Living Conditions of Women Farmers in Erbil Province

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Abstract

Agriculture and women's economics are interlinked in many societies, especially in developing regions. This study focuses on female farmers' satisfaction, income, and program effectiveness in Erbil. Female farmers aged 30–59 reported high satisfaction from tailored AES programs. Younger women (18–29) had the lowest satisfaction due to limited exposure, societal norms, and resource inaccessibility. Women aged 60 and above experienced moderate satisfaction, facing challenges like reduced physical engagement. Income distribution showed disparities, with most farmers earning less than IQD 5,000 monthly. Middle-income beneficiaries were notably absent, indicating unequal access to AES resources. Tailored interventions like microloans are crucial for bridging income gaps. Higher-income earners benefited from AES programs, suggesting training can promote growth. High satisfaction was linked to increased incomes and productivity. Challenges like pest control and infrastructure deficiencies must be addressed to enhance outcomes. Expanding AES coverage, introducing mentorship, skill-building, and feedback can convert "Satisfied" participants into advocates. Age-specific interventions are essential for inclusivity. Younger women need mentorship and leadership training, older farmers need simplified technologies for engagement. Regular feedback can refine AES programs, fostering inclusivity. Addressing cultural stereotypes and facilitating intergenerational knowledge exchange are critical for empowering women farmers. Findings show AES can reduce income disparities, enhance satisfaction, and foster sustainable development. Focus on resource access, market integration, and training can improve economic outcomes for female farmers. Collaborative efforts among policymakers, AES providers, and local communities are vital for equitable financial empowerment and sustainable development.

Keywords: Extension services, women farmers, living conditions, semi-structured interviews

Introduction

Agriculture and women's economics are intricately linked, serving as a cornerstone of many societies. Economic empowerment theories highlight the crucial role of women in agriculture, especially in rural areas. In Iraq, the agricultural sector is primarily composed of small-scale farmers who own less than four Dunam of land, with many facing educational deficiencies or illiteracy [3, 22]. Despite comprising a significant portion of the workforce, women are inadequately represented in the Ministry of Agriculture, with a mere 37 female staff members [4]. Ongoing wars and socio-political challenges

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have intensified gender disparities, further marginalizing the involvement of women in agriculture. Since 2003, various institutions have launched programs in Erbil Province to promote women's empowerment and gender equality, aiming to enhance women's competencies and boost agricultural productivity [7, 24]. Agricultural Extension Services (AES) act as a conduit for disseminating technology among farmers, ensuring the sustainable management of agricultural resources. These services provide technical guidance and capacity-building for farmers engaged in agribusiness, rural youth work, and home economics [9, 15]. AES employs informal educational methods to impart practical knowledge, diverging from traditional classroom-based education by prioritizing hands-on solutions [10]. Women make significant contributions to agriculture in developing regions, yet encounter structural obstacles that impede their access to land, education, and technology [17, 25]. In Iraq, 7.1 million female farmers confront these challenges but remain pivotal in attaining self-sufficiency and alleviating poverty. Research indicates that increases in female income tend to directly benefit household nutrition and the health of children [14, 19]. AES initiatives have positively impacted women farmers, enhancing their productivity, income, and overall quality of life [9, 14]. Approximately 79% of surveyed women reported significant enhancements in agricultural practices and household well-being, underscoring the importance of ongoing training [11]. Agriculture is intricately intertwined with women's economic participation, representing a fundamental pillar in numerous societies. Economic empowerment theories underscore the indispensable role that women fulfill in agriculture, particularly in developing regions. In Kurdistan, agriculture is predominantly carried out by small-scale farmers, the majority of whom manage less than one hectare of land and face considerable educational disadvantages [3, 22]. Despite their substantial contributions to the agricultural workforce, women are underrepresented in leadership and policy-making roles, with only 37 women employed within the Ministry of Agriculture [4]. Gender disparities, exacerbated by conflicts and socio-political instability, further marginalize women's involvement in agriculture. However, recent initiatives aimed at advancing women's empowerment and gender equality in agriculture have emerged in Erbil Province. These programs, initiated since 2003, concentrate on enhancing women's skills and boosting agricultural productivity [7, 24]. Agricultural Extension Services (AES) play a crucial role in bridging the gap between modern agricultural practices and traditional farming communities, particularly among women. AES offers technical assistance, capacity development, and practical education tailored to the challenges faced by farmers, emphasizing sustainable resource management [9, 15]. Nevertheless, structural barriers, such as limited access to land, education, and technology, persist in hindering women's full engagement in agriculture [17, 25]. This study explores the role of AES in addressing these barriers and enhancing the socio-economic conditions of women farmers in Erbil.

Material and Methods

Study Design

This study employed a mixed-methods approach, blending qualitative and quantitative research methodologies. This approach facilitated a thorough exploration of women's encounters with AES while also quantifying

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the socioeconomic repercussions of these services.

Methodology

The methodology utilizes a combination of qualitative and quantitative approaches to investigate women's access to Agricultural Extension Services (AES). Semi-structured interviews and scientific description of peoples and cultures observations were conducted with female farmers, with a focus on comprehending their experiences and obstacles [4, 13]. Participatory techniques, including group interviews, were implemented to address power differentials and promote candid discussions. Women farmers confront challenges such as impoverishment, inadequate access to resources, diminished productivity, and restricted agricultural inputs. Cultural traditions and historical marginalization further constrict their prospects [2, 25]. Scarce educational opportunities and narrowly-focused interventions exacerbate the exclusion and impoverishment of rural women [12, 27.[

Data Collection

Interviews and Observations: Semi-structured interviews and ethnographic observations were conducted with female farmers to gather insights into their challenges and assess the efficacy of AES programs [4, 13]. Surveys: Two surveys were administered: one targeting women who engaged in AES programs and another encompassing a broader array of perspectives from female farmers throughout Erbil .

Participatory Methods: Group interviews were utilized to address power differentials and foster an open dialogue. Translation services were employed during interviews with participants from diverse linguistic backgrounds to ensure inclusivity .

Analytical Framework

Qualitative Analysis: Grounded theory was employed to scrutinize textual data from interviews and observations, enabling an inductive identification of recurring themes. Data triangulation was utilized to enhance the reliability and validity of findings .

Quantitative Analysis: Survey data were scrutinized using statistical tools. Chi-square tests were utilized to assess the correlation between AES participation and socioeconomic outcomes, such as income growth and satisfaction levels.

Results and Discussion

Female farmers involved in Agricultural Extension Services

Figure 1 depicts the satisfaction levels of female farmers engaged in Agricultural Extension Services (AES), segmented by age groups. The graph highlights the varying degrees of satisfaction within these groups, with responses classified as either "Satisfied" or "Very Satisfied." A discernible pattern emerges, indicating a rise in satisfaction levels with advancing age, particularly among individuals aged 30-59, underscoring the efficacy of AES initiatives targeted at these demographics. Women in the youngest age bracket (18-29) exhibited the lowest levels of satisfaction compared to other groups. This diminished satisfaction could be attributed to limited exposure to AES programs or constrained access to leadership roles and decision-making processes. Prevailing cultural norms often favor older individuals in familial and communal settings, potentially contributing to the reduced benefits experienced by this particular group from AES interventions [15]. The age groups of 30-44 and 45-59 reported the highest levels of satisfaction, with a majority falling under the "Very Satisfied" category. These cohorts are typically more actively involved in

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agricultural pursuits and directly benefit from AES schemes. The training imparted likely enhances their productivity, income, and overall household well-being [11]. Furthermore, their extensive exposure to tailored AES programs may account for their heightened satisfaction levels. Women aged 60 and above exhibited moderate levels of satisfaction, with fewer respondents indicating being "Very Satisfied" compared to those in the 30-59 age range. This disparity could reflect reduced physical engagement in farming activities or challenges in adapting to new technologies introduced through AES initiatives. Limited interaction with modern agricultural practices may impede their ability to fully utilize AES resources [9]. The notable satisfaction levels observed in the 30-59 age groups suggest that AES programs are particularly effective for women in their prime working years .

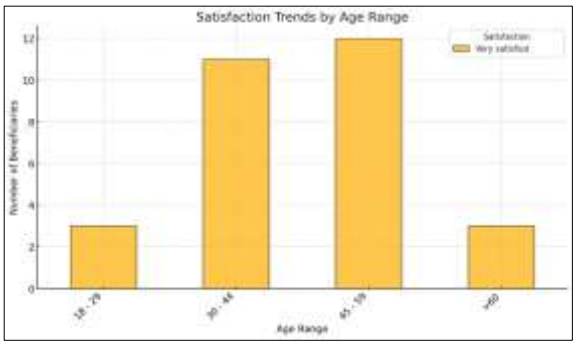

Figure 1. Satisfaction levels of women farmers with Agricultural Extension Services (AES(

The disparities in satisfaction levels across age groups underscore the necessity for bespoke training approaches. Customizing programs to address the specific needs and challenges of diverse age cohorts can ensure enhanced inclusivity and effectiveness. Cultural stereotypes often hinder women's involvement in agricultural decision-making processes, particularly for younger and unmarried women. Challenging these societal norms is imperative to empower women and amplify their satisfaction with AES. AES programs should incorporate leadership training and mentorship opportunities tailored to the 18-29 age group. These initiatives can equip younger women with the requisite skills and confidence to actively engage in and benefit

Tailored training programs emphasizing practical agricultural techniques resonate strongly with these groups, given their active involvement in farming and direct application of acquired knowledge. The lower satisfaction levels among women aged 18-29 underscore the necessity for targeted interventions. Mentorship opportunities, awareness campaigns, and skills development initiatives could help address their unique challenges and augment their satisfaction levels. Programs tailored for women aged 60 and above should prioritize inclusive strategies, such as simplified technologies or peer knowledge-sharing models. These endeavors can ensure sustained engagement and enable them to derive benefits from AES programs despite physical or technological constraints. Both younger and older women may encounter greater obstacles in accessing AES resources. For younger women, societal norms may restrict their decision-making authority and leadership prospects, while older women may face physical limitations

or difficulties in embracing new technologies [2, 25 .[

from agricultural extension services. Developing programs centered on knowledge transfer between older and younger farmers can help bridge generational divides. This approach enables older farmers to share their expertise while addressing their limitations, ensuring their continued contributions to agriculture. Regular feedback from female farmers across different age groups should be sought to continually refine AES programs. Integrating their perspectives can enrich the relevance and impact of these endeavors. Figure 1 underscores the importance of crafting age-specific strategies for Agricultural Extension Services to optimize satisfaction and efficacy. By addressing the distinct challenges faced by various age groups, AES programs can enhance the socio-economic status of women farmers in Erbil, fostering heightened participation and productivity in the agricultural sector.

Monthly income of female farmers

Figure 2 illustrates the monthly income distribution of female farmers in the Baharka District, using a box plot to emphasize variations in income levels. The median income falls near IQD 10,000, with the interquartile range (IQR) spanning from approximately IQD 5,000 to IQD 20,000. Outliers are evident, both at the lower and higher ends of the income scale, reflecting the disparities in economic outcomes within the community. The median monthly income of around IQD 10,000 indicates a central tendency, suggesting that the majority of female farmers earn at or near this level. This median value serves as a benchmark for evaluating the success of Agricultural Extension Services (AES) programs in enhancing women's economic outcomes. The IQR, ranging from IQD 5,000 to IQD 20,000, captures the middle 50% of the income distribution. This relatively wide range suggests significant variation in the financial success of female farmers, potentially influenced by factors such as farm size, access to resources, and market integration .

Outliers at both extremes highlight the income inequality among female farmers in Baharka. Higher-income outliers may represent individuals with greater access to resources or advanced farming techniques, whereas lower-income outliers could reflect challenges such as limited land access, inadequate training, or financial constraints.

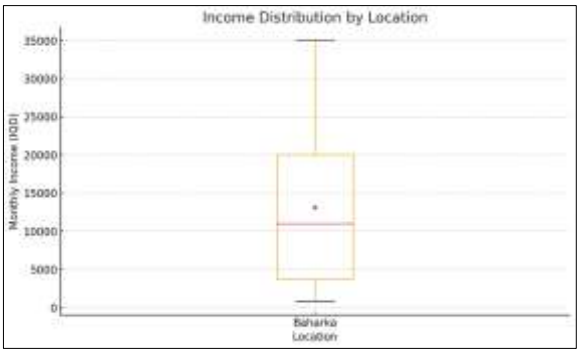

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Figure 2. Income distribution by location

The central clustering of incomes near IQD 10,000 suggests that AES programs are moderately effective in stabilizing income levels among female farmers. However, the presence of income disparities within the IQR indicates that not all farmers benefit equally from these programs. Tailored interventions may be necessary to bridge this gap. Higher-income earners may benefit from better market access and resource utilization, such as advanced farming techniques or participation in cooperatives. In contrast, lower-income earners might face barriers such as limited access to capital, technology, or agricultural extension services. Women closer to urban markets or with supportive community networks may achieve higher incomes, while those in isolated areas might struggle to generate sufficient revenue. Specialized training and financial assistance programs should focus on women in the lower-income bracket to address barriers and enhance their productivity. Initiatives could include access to microloans, improved farming equipment, and tailored capacity-building programs [23]. Programs aimed at improving market access for female farmers could help reduce income disparities. Strategies may include the establishment of cooperatives, better transportation infrastructure, and direct access to urban markets. Regular monitoring of income distribution is essential to evaluate the long-term effectiveness of AES programs [5]. Data-driven adjustments can ensure that interventions remain relevant and inclusive. The income distribution among female farmers reveals a complex economic landscape, with significant disparities requiring targeted interventions. While the median income indicates some success of AES programs, further efforts are needed to address inequalities and ensure sustainable economic growth for all female farmers in the region [6.[

The income distribution among beneficiaries

Figure 3 illustrates the distribution of income among beneficiaries, quantified in IQD, and segmented by the number of beneficiaries in each income bracket. The graph showcases an unequal income distribution, with the majority of beneficiaries situated in the lower income ranges, indicating disparities in financial outcomes within the surveyed demographic. This decline in higher income brackets implies obstacles in amplifying productivity and profitability among women farmers.

An observable gap in the income distribution appears in the IQD 5,000–6,000 range. The absence of middle-income beneficiaries may suggest unequal access to agricultural extension services (AES) or varying degrees of involvement and adoption of contemporary farming techniques. The clustering of incomes at lower levels underscores challenges related to resource accessibility, such as land, capital, and technology. Many women farmers likely depend on traditional farming methodologies, constraining their efficiency and profitability. Subpar income levels may also indicate inadequate integration into competitive markets. Farmers earning under IQD 5,000 may lack ties to larger markets or encounter hurdles in securing equitable pricing for their agricultural yield. Despite AES programs aiming to enhance agricultural productivity, the prevalence of low incomes implies these programs may not fully cater to all beneficiaries' needs. Tailored endeavors are essential to ensure comprehensive progress across all income brackets.

Specific initiatives should target beneficiaries earning IQD 3,000–4,000, emphasizing skill

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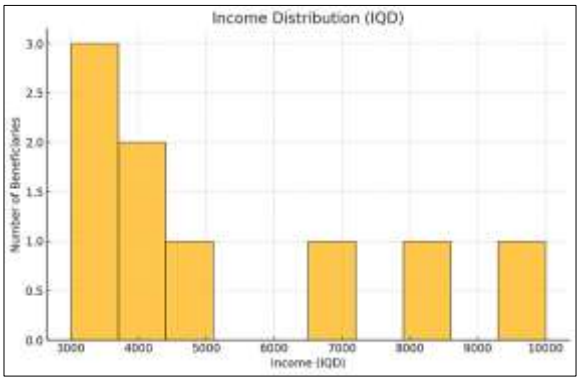
development, credit accessibility, and encouragement for embracing modern farming practices. These interventions could bridge the gap between low and middle-income segments. Implementing cooperative models or facilitating direct entry to urban markets can augment the profitability of agricultural output. Market integration endeavors should prioritize women farmers in the lowest income brackets [18]. Efforts should strive to elevate low-income farmers to the middle-income category by offering customized assistance in value-added production and crop diversification. Financial literacy programs and mentorship opportunities can further aid in stabilizing and augmenting incomes [26]. The income distribution depicted in Figure 3 underscores substantial economic inequalities among women farmers. While a majority grapples within lower-income brackets, targeted interventions in training, resource accessibility, and market integration can pave the way for a shift towards more equitable financial outcomes. Addressing these inequalities will necessitate



collaborative endeavors among AES providers, policymakers, and local communities [6.[

Figure 3. Income distribution by beneficiary count (IQD(

A significant portion of women farmers earn modest incomes, as evidenced by the majority falling within the IQD 3,000–4,000 range. This concentration at the lower spectrum signifies limited financial returns from agricultural endeavors, potentially due to insufficient access to resources, training, or market prospects. As income levels escalate, the number of individuals earning between IQD 7,000–10,000 dwindles.

Income distribution of female farmers by age group.

Figure 4 depicts the income distribution among female farmers across various age brackets. The data is categorized into four age groups: 18–29, 30–44, 45–59, and ≥ 60.

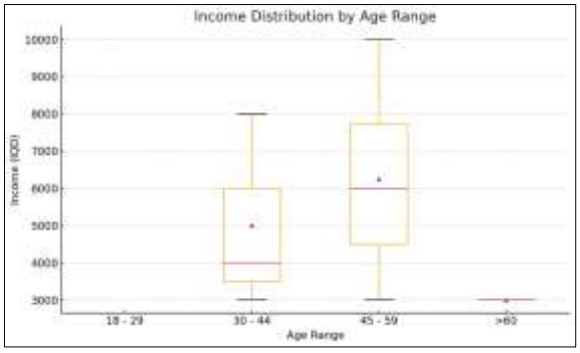


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Figure 4. Income distribution by age range

The illustration showcases notable disparities in income levels, with the middle-aged groups exhibiting wider ranges and higher median incomes compared to the younger and older cohorts. The Age Group 18–29 category displays the lowest income levels, characterized by a narrow range clustered towards the lower end of the spectrum. The limited income opportunities for younger women can be attributed to their relative inexperience, restricted access to leadership positions, and fewer resources compared to their older counterparts. Cultural norms that prioritize senior individuals in agricultural decision-making further exacerbate these challenges [14]. The Age Group 30–44 Women in this age bracket demonstrate a broader spectrum of income levels, with a slightly elevated median income compared to the youngest group. This indicates increased involvement in farming activities and improved access to training initiatives. Nevertheless, the income variability suggests that while some women in this group benefit from Agricultural Extension Services (AES), others may encounter obstacles hindering their income optimization. In Age Group 45–59 segment showcases the widest income range and the highest median income. Women in this group are likely at the peak of their farming experience, resource utilization, and engagement with AES programs. The heightened income levels signify the potential impact of tailored training schemes and enhanced market integration, which are often more accessible to individuals in this age bracket [10]. The Age Group ≥60 Elderly female farmers exhibit the lowest income levels, with a restricted range. The decline in income for this group may be attributed to diminished physical involvement in farming operations and challenges in adopting new technologies or practices introduced through AES programs [9]. The trend of escalating income with age up to 59 years underscores the significance of farming experience and resource accessibility in achieving higher earnings. Middle-aged women appear to derive the most benefits from AES programs, leveraging their expertise to optimize productivity and income. The lower income levels observed among younger and older women underscore specific barriers faced by these groups. Younger farmers often encounter limitations in accessing land, capital, and decision-making opportunities, while older farmers may grapple with physical constraints and reluctance to embrace modern farming techniques [2, 25]. Cultural norms that restrict the involvement of younger women in agricultural leadership and decision-making likely contribute to the income gaps observed in the 18–29 age group. Similarly, the traditional reliance on the knowledge of older women without integrating them into contemporary farming practices may curtail their income potential. Introducing mentorship and leadership training programs tailored towards younger women can help bridge knowledge and resource disparities. These initiatives should strive to enhance their participation in AES programs and offer financial incentives to bolster their development. Developing streamlined training modules and introducing adaptive technologies suitable for older female farmers can enhance their income prospects. Knowledge-sharing models, such as pairing older farmers with younger counterparts, can facilitate reciprocal learning and sustained productivity .

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Continuing to enhance the efficacy of AES programs for women aged 30–59 by providing advanced training on modern farming techniques, value addition, and market accessibility is crucial. Policy reforms should prioritize inclusive access to land, resources, and markets for women across all age groups. Addressing cultural barriers impeding women's involvement in decision-making processes can further narrow income differentials [16]. Figure 4 underscores the pivotal role of age and experience in shaping income outcomes for female farmers in Erbil. While middle-aged farmers derive significant benefits from AES programs, targeted interventions for younger and older groups are imperative to ensure equitable income growth across all age brackets. Implementing these recommendations can amplify the socio-economic impact of AES and foster sustainable development in the agricultural sector. Encourage the adoption of innovative farming methods among high-income farmers to sustain and further grow their earnings. Knowledge-sharing platforms could enable them to mentor lower-income farmers, creating a ripple effect in the community .

The varying income levels of women farmers in Erbil

Figure 5 highlights the diverse income levels among women farmers in Erbil, underscoring the critical role of AES in addressing income disparities. By focusing on resource access, market integration, and targeted training, AES can significantly enhance the livelihoods of women farmers, promoting equitable economic growth and sustainable development in the region

Figure 5 illustrates a histogram depicting the distribution of monthly income (IQD(derived from agricultural product sales among female farmers in Erbil. The income levels are categorized into intervals, with the number of recipients in each interval presented. The data unveils substantial variability in income, emphasizing inequalities in earnings among female farmers .

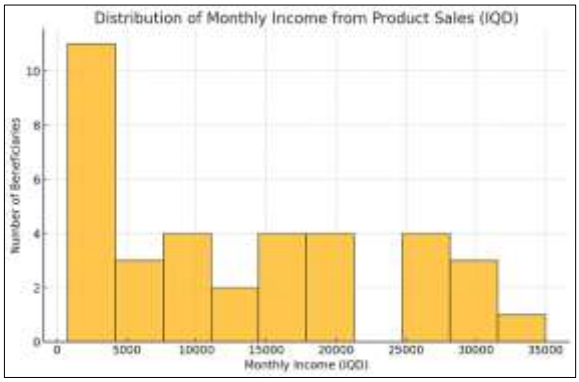

Figure 5. Distribution of monthly income from agricultural product sales among women farmers in Erbil

The majority of female farmers belong to the lowest income bracket, with more than ten recipients earning less than 5,000 IQD monthly .

This concentration underscores challenges such as limited access to productive resources, constrained market opportunities, and small-scale farming practices. Structural obstacles and socio-economic constraints likely contribute to these meager earnings [25]. A smaller yet noteworthy group of recipient's report incomes ranging from 5,000 to 20,000 IQD. These women may benefit from Agricultural Extension Services (AES) training programs or have improved access to resources, enabling them to achieve moderate productivity and sales. The income distribution within this range indicates variances in farming scale, market integration, and crop varieties. A limited number of recipients earn higher incomes surpassing 20,000 IQD per month. These farmers are probably involved in larger-scale or value-added farming activities, utilizing advanced agricultural techniques, modern technologies, or enhanced market access facilitated by AES. The decreased frequency in this category reflects the challenges women encounter in expanding their operations or attaining high-profit margins due to limited resources and market inefficiencies [15]. The significant clustering of female farmers in the lowest income category underscores the necessity for targeted interventions to elevate their economic standing. Limited income may arise from factors such as subsistence farming, dependence on traditional methods, and restricted access to technology or capital. AES programs must prioritize these women to enhance their productivity and earnings. The presence of women in the middle and high-income brackets showcases the potential impact of AES in fostering income growth. Training programs concentrating on modern agricultural practices, value chain development, and financial literacy could broaden these groups, mitigating income disparities. The sparse representation of women in the high-income category indicates substantial barriers to scaling farming activities. These obstacles may encompass limited land ownership, insufficient access to credit, and socio-cultural constraints that impede women's entrepreneurial advancement [2]. Addressing these challenges is crucial to promote equitable growth across all income levels.

Develop tailored training modules focusing on productivity enhancement, market integration, and value addition for female farmers in the low and middle-income categories. Ensure equitable access to land, credit, and modern farming technologies. Financial incentives or microloans targeted at female farmers can empower them to scale their operations [8]. Introduce initiatives to connect female farmers with local and regional markets. Supporting value chain development through cooperative marketing and production could enhance profit margins. Encourage the adoption of innovative farming methods among high-income farmers to sustain and further amplify their earnings. Knowledge-sharing platforms could enable them to mentor lower-income farmers, creating a ripple effect in the community [16]. Figure 5 underscores the diverse income levels among female farmers in Erbil, emphasizing the pivotal role of AES in addressing income disparities. By concentrating on resource access, market integration, and targeted training, AES can significantly enrich the livelihoods of female farmers, fostering equitable economic growth and sustainable development in the region [21 .[

The Correlation between Earnings, location, job satisfaction, and barriers in Erbil Province.

Figure 6 illustrates the correlation between mean monthly earnings and various factors such as geographical location, contentment level, and obstacles encountered by female agriculturalists in Erbil. The outcomes emphasize the influence of Agricultural Extension Services (AES) on efficiency and income in diverse demographic and situational settings. Female farmers in Baharka disclosed higher mean monthly incomes compared to other areas. This discovery suggests that proximity to AES centers, enhanced market accessibility, and local infrastructure might play a pivotal role in amplifying productivity and earnings. Farmers in Baharka could benefit from more frequent engagement with AES initiatives and improved access to contemporary agricultural equipment and resources.

Women who expressed "Very Satisfied" sentiments towards AES programs exhibited significantly greater average incomes than those who were merely "Satisfied." This indicates that the effectiveness of AES programs is positively linked to income growth. Satisfaction may arise from well-tailored instruction, practical agricultural knowledge, and consistent assistance provided by extension services [10, 14].

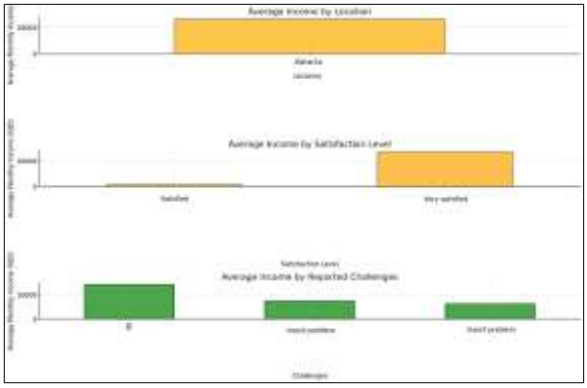

Figure 6. Proportion of women reporting increased productivity through extension programs

The data reveals that insect-related issues were a prevalent challenge among female farmers. Nevertheless, those who reported successful management of these challenges earned relatively higher incomes. This underscores the importance of targeted AES programs addressing specific agricultural hurdles, such as pest control, through education and resource allocation [9]. The higher mean income in Baharka underscores the significance of localized AES interventions. Rural areas with deficient infrastructure and restricted AES availability may encounter difficulties in achieving comparable productivity levels. Expanding AES reach to underserved regions is imperative for impartial development. The substantial income contrast between "Satisfied" and "Very Satisfied" respondents showcases the transformative potential of high-quality AES. Tailored instructional schemes that closely align with farmers' distinct needs can result in enhanced productivity and financial outcomes. Confronting challenges like insect infestations is crucial for ameliorating agricultural yields and income [20]. Farmers who effectively managed such challenges demonstrated elevated earnings, indicating the efficacy of

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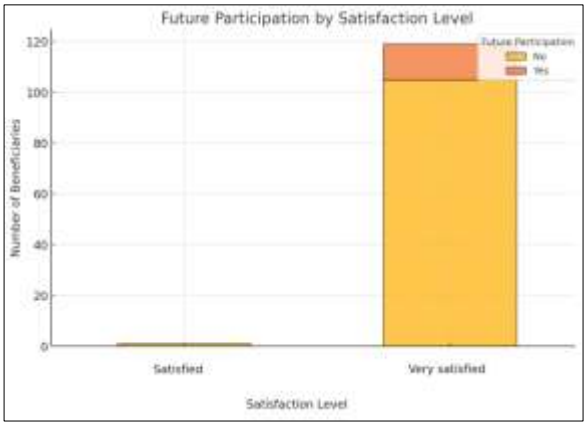
AES interventions when centered on practical issue resolution. Strengthen AES outreach in less developed areas to ensure fair access to training and resources, particularly for women in remote locales. Emphasize the creation of highly personalized training modules catering to the specific needs and challenges of female farmers. Continuous feedback mechanisms can aid in refining these programs for maximal impact [1]. Devise specialized programs to combat common hurdles such as pest infestations. Providing cost-effective solutions like integrated pest management techniques can enhance yields and income levels. Utilize satisfaction surveys as a tool to evaluate the efficacy of AES programs. A strong emphasis on enhancing satisfaction can indirectly lead to heightened productivity and income growth. Figure 6 showcases the profound impact of Agricultural Extension Services on female farmers' productivity and income. Elevated satisfaction levels, localized interventions, and resolutions to practical challenges like pest control are fundamental drivers of success.



Broadening AES coverage and tailoring programs to the specific needs of farmers can further enrich the economic empowerment of women in Erbil's agricultural sector.

The impact of high satisfaction on future participation in AES programs among women farmers.

Figure 7 underscores the pivotal role of high satisfaction in driving future participation in AES programs among women farmers. While the "Very Satisfied" group exhibits a strong commitment to continued engagement, targeted efforts are required to convert "Satisfied" participants into long-term advocates for AES programs. By addressing gaps in program delivery and ensuring consistent follow-up, AES can sustain and expand its impact in enhancing the lives of women farmers in Erbil. Figure 7 depicts the correlation between satisfaction levels ("Satisfied" and "Very Satisfied") and the inclination of female agriculturalists to engage in forthcoming Agricultural Extension Services (AES) initiatives. The data reveals a robust connection between contentment and future involvement, with individuals classified as "Very Satisfied" displaying a significantly higher propensity to continue participating. More than 95% of female farmers classified as "Very Satisfied" indicated their eagerness to partake in future AES programs. This underscores the pivotal role of program efficacy and perceived benefits in ensuring

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sustained commitment and trust from beneficiaries [15 .[

Figure 7. Future participation willingness by satisfaction level

Conversely, a minute portion of women categorized as "Satisfied" expressed interest in future participation, indicating a potential disparity between meeting fundamental expectations and delivering transformative impacts necessary to convert moderate satisfaction into enthusiastic future engagement [9]. The marked disparity in future participation rates between the two satisfaction tiers highlights the significance of attaining high satisfaction through tailored and impactful AES programs. Initiatives addressing specific agricultural challenges like access to modern tools, pest management, and market opportunities are likely to elevate satisfaction levels and maintain participation [10]. The high willingness among "Very Satisfied" farmers suggests that AES programs have effectively cultivated trust and delivered tangible value to this cohort. Ongoing support and follow-up initiatives are imperative to upholding this trust and sustaining engagement. Conversely, the lack of enthusiasm for future participation among "Satisfied" farmers implies that their program experience may not have yielded substantial or notable benefits. Efforts should concentrate on enhancing program efficacy for moderately content individuals by addressing their unmet needs. Emphasize the enhancement of training quality and relevance to ensure farmers attain tangible productivity and income benefits. This approach can aid in converting "Satisfied" participants into "Very Satisfied" individuals more inclined to maintain involvement with AES programs. Implement post-training support mechanisms such as regular check-ins, problem-solving aid, and mentorship programs to reinforce learning and ensure sustained engagement. Regular feedback surveys should be conducted to comprehend the specific needs and obstacles faced by female farmers. This insight can facilitate the design of programs more attuned to their expectations, fostering heightened satisfaction. Showcasing success stories of "Very Satisfied" farmers can cultivate trust and encourage participation from less engaged groups .

Figure 7 underscores the crucial role of heightened satisfaction in propelling future participation in AES programs among female agriculturalists. While the "Very Satisfied" segment demonstrates a strong dedication to prolonged engagement, targeted endeavors are necessary to convert "Satisfied" participants into enduring advocates for AES programs. By addressing deficiencies in program delivery and ensuring consistent follow-up, AES can sustain and broaden its impact in enhancing the livelihoods of female farmers in Erbil

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Conclusion

.1

Agriculture and women's economic empowerment are deeply interconnected, particularly in developing regions like Erbil.

.2 Female farmers aged 30–59 demonstrated high satisfaction with tailored Agricultural Extension Services (AES) programs, which significantly influenced income and productivity.

.3 Younger women (18–29) expressed the lowest satisfaction due to barriers such as societal norms, limited exposure, and resource inaccessibility.

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.4 Older women (60+) reported moderate satisfaction, hindered by reduced physical engagement and infrastructure challenges.

.5 Income disparities among female farmers were evident, with most earning less than IQD 5,000 monthly and middle-income beneficiaries absent.

.6 Higher-income earners leveraged AES programs to achieve growth, emphasizing the potential of training to drive economic empowerment.

.7 High satisfaction levels were directly linked to increased income and productivity, indicating the effectiveness of AES programs.

.8 Challenges such as pest control issues and inadequate infrastructure negatively impacted overall outcomes.

.9 AES programs have the potential to reduce income disparities, improve satisfaction, and support sustainable development for women farmers.

Recommendations

-1 Mitigate structural barriers to land ownership and financial accessibility through policies sensitive to gender disparities.

-2 Formulate tailored training programs addressing the distinctive challenges and prospects faced by women .

-3 Ensure cost-effective access to contemporary agricultural equipment and technologies.

-4 Strengthen collaborations among governmental bodies, NGOs, and local communities to bolster support for female farmers.

-5 Enacting these recommendations has the potential to foster enhanced gender parity and sustainable progress within Erbil's agricultural domain

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