INITIATIVE ON
Asian Mega-Deltas

Nutrition- and Gender-Sensitive Agri-food Systems in the Mekong Delta, Cambodia: A case study of three interventions

International Institute of Rural Reconstruction (IIRR)
The Alliance of Bioversity International and CIAT

Proper citation:
Sophea Chuon, Diana Jean A. Umali, Thy Or, Julian Gonsalves, Deborah Nabuuma, Huong Pham, Thanh Duong, and Tuyen Huynh. Nutrition- and Gender-Sensitive Agri-food Systems in the Mekong Delta, Cambodia: A case study of three interventions. 2023. International Institute of Rural Reconstruction and The Alliance of Bioversity International and CIAT.

Photo credit: WorldFish

Acknowledgements

This study would not have been produced with the assistance of many organizations.

The authors wish to acknowledge The Alliance of Bioversity International and CIAT and WorldFish for providing financial support to undertake this study. The authors are grateful to Dr. Deborah Nabuuma, Scientist I with the Alliance of Bioversity International and CIAT, for the excellent and invaluable support, infinite patience, valuable feedback, helpful guidance, and tremendous time throughout the entire study.

The authors also wish to acknowledge Dr. Julian Gonsalves, Senior Adviser of International Institute of Rural Reconstruction (IIRR) based in Philippines and Mr. Or Thy, Country Director of IIRR based in Cambodia, for the helpful guidance and reviewing the study.

In addition, the authors acknowledge WorldFish Cambodia, Helen Keller International, and Heifer International Cambodia for excellent collaboration and invaluable support rendered by sharing related information and experiences in the project implementation of these case studies. Particularly Mrs. Phichong Ou (WorldFish Cambodia), Dr. Sareth Nhem, Mr. Rithy Chum, and Mr. Vatola Sok (Heifer International), and Mr. Mr. Kroeun Hou and Mr. Sokha Sours (Helen Keller International) who provided thoughtful feedback and documents to improve the case studies and shared lessons learnt for further interventions to enhance the nutrition-sensitive agri-food systems in the Mekong Delta of Cambodia.

Table of Contents

Acknowledgements iii
Table of Contents 1
Executive summary 2
Introduction 4
Case study 1: Community Fish Refuge in Cambodia 8
Case study 2: Promoting Food Security, Nutrition, and Livelihood of Poor Farming Families in the Face of Inflation Crisis and Food System Changes 14
Case study 3: Poultry Project of National Pride in Cambodia (PPNP) 21
Synthesis 28
Conclusion and recommendations 29
References 33

Executive summary

Nutrition and food systems transformation have been prioritised as essential opportunities to support continuing social and economic development for the nation and the well-being of the Cambodian population. Apart from policies, the government has demonstrated commitment to the transformation of food systems. While achieving rapid development, structural changes have happened to the agricultural sector, posing challenges to promoting food and nutrition security. In the Mekong Delta, food insecurity among local people remains high. To address these challenges to produce a healthy population, the enhancement of nutrition-sensitive agri-food systems is critical in this context. The interventions and projects have been undertaken with support from the government, development partners and civil society organisations.

This case study assessed three nutrition- and gender-sensitive agri-food systems interventions in the Mekong Delta to understand how the interventions support equitable and sustainable consumption and production of nutritious foods; and identify opportunities and gaps to increase equitable and sustainable consumption and production and consumption of nutritious foods in the Mekong Delta region of Cambodia.

In this study, three projects in the Mekong Delta were studied: (i) the project implemented by WorldFish Cambodia, (ii) Helen Keller International's project, and (iii) the project of Heifer International Cambodia. Each project had different characteristics targeting nutrition-sensitive agri-food systems. The project, implemented by WorldFish Cambodia, has both specific nutrition and nutrition-sensitive activities to cope with malnutrition among children under five and food production. Helen Keller International's project aims to promote food and nutrition security among vulnerable people through access to diverse nutrient rich foods at a committed price. Heifer International Cambodia is working to increase farmers' income by enhancing backyard chicken production and value chains.

The case studies find that nutrition- and gender-sensitive agri-food system interventions focused largely on the capacity building of farmers to improve productivity. Capacity building uses various approaches to increase production and reduce the use of chemical fertilisers and pesticides in agriculture. While also providing input distribution, such as seeds, compost fertilisers, and financial contribution. Producer groups were created and put under the management of ACs. Contract farming received attention from the project while focusing on the capacity building of ACs to be the agri-enterprise on the ground. All projects also deal with crossing issues in the Mekong Delta region including women inclusion and empowerment, youth inclusion, natural resource management and climate change.

Based on the study, some of the gaps identified were related to clear monitoring and evaluation of food and nutrition security indicators beyond production and income, as well as more comprehensive nutrition and behaviour change activities. It is important that interventions in the Mekong are connected and complementary to each other and ensure that farmers and consumers benefit from those interventions directly or indirectly in terms of food availability, access, and consumption of diverse and quality foods. The recommendations to enhance nutrition-sensitive agri-food systems were related to: (i)

strengthening food production, (ii) enhancing supply chains to incentivise farmers or producers, (iii) improving food consumption practices, (iv) promoting and strengthening monitoring and evaluation of food and nutrition security and nutrition outcomes, and (v) enhancing multisectoral collaboration to enhance nutrition outcomes.

Introduction

Development in Cambodia has made significant progress over the last ten years. The Kingdom graduated from low to middle-income status in 2015. The government continues making conscious efforts to build a more robust economic foundation, promote a healthy workforce, and enhance the investment climate in the country. As of 2018, the GDP per capita rose significantly to US$1,561, projected to rise to $1,754 in 2022 (NIS, 2023). The poverty rate has declined considerably from 36.7% in 2014 to 16.6% in 2022 (Alkire, Kanagaratnam, & Suppa, 2023). The government set an ambitious goal to become an upper-middle-income country by 2030 and a high-income nation by 2050. In the process of healthy workforce enhancement, the government has reformed its institutions and has been working closely with development partners, civil society organisations, and other societal actors. The collaboration has yielded policies and regulations that promote food and nutrition security nationwide. As of 12 December 2023, 386 projects have been implemented with the support of development partners (CDC, 2023).

Nutrition and food systems transformation have been prioritised as essential opportunities to support continuing social and economic development for the nation and the well-being of the Cambodian population. Apart from policies, the government has demonstrated commitment to the transformation of food systems through leadership in the National Food Systems Dialogues in 2021 and the development of Cambodia's Roadmap for Food Systems for Sustainable Development 2030. Moreover, the government put them in the Seventh Legislature of the RGC's Pentagonal Strategy-Phase 1 for Growth, Employment, Equity, Efficiency, and Sustainability, emphasising human capital development as the first Pentagon and includes priorities around promoting a healthy diet for all and strengthening food systems so that they are robust, intelligent, resilient, and inclusive. Cambodia actively participated in the UN Food Systems Summit +2 Stocktaking Moment in Rome in 2023. Currently, the government is developing a strategic plan for food security and nutrition for 2024 - 2028.

In the face of this rapid development, the country, especially the Mekong Delta is extremely vulnerable to sea-level rise, other agricultural production challenges such as soil infertility, pest and diseases and inadequate access to inputs and infrastructure. This is further aggravated by structural changes in the agricultural sector (Chuon, 2021), posing challenges in ensuring food and nutrition security. The rural population that is either making a living from or engaging in agriculture, has declined dramatically from 80% in 2008 (NIS & MoP, 2009) to 61% in 2019 (NIS & MoP, 2020). Households with agricultural land decreased from 75% in 2013 (NIS & MoP, 2015) to 57% in 2020 (NIS, MoP, & MoAFF, 2020). On average, the number of parcels per holding was estimated at 1.8 in 2020 and 2.5 in 2013 (NIS et al., 2020). As of 2020, only 14% of households in the household agricultural holdings have only home lots, and 86% have both parcels and home lots (NIS et al., 2020). Interestingly, 61% of households produce agricultural products mainly for home consumption and 39% for sale. For crop production, 47% of farming households had less than one hectare in 2013; however, this figure increased to 51% in 2020 (NIS et al., 2020). The proportion of employed labour in the sector declined from 71.3% in 2008 to 53.4% in 2019 (NIS & MoP, 2020). According to (NIS et al., 2020), only 13% of holdings reported that income from agriculture was higher than the previous year, while 31%

reported a decline in income or similar income compared to the previous year (NIS et al., 2020). These changes could further encourage more rural people to migrate for work in other sectors, either within the country or abroad for higher incomes.

Food insecurity among local people remains a challenge for stakeholders, particularly the government. Due to economic vulnerability, 25% of Cambodian households were vulnerable to food insecurity in 2019/2020. Since 2017, 23% of its population did not have the economic capacity to respond to their essential needs in the same period. Approximately 3% of households could not meet food needs (NIS & WFP, 2022). Also, food consumption in female-headed households in 2019/2020 was even worse than in households that are IDPoor[1]. Forty-eight per cent of household expenditures were spent on food and non-alcoholic beverages (NIS & MoP, 2022). In 2019/2020, 29% of those in the rural areas were marginally food secure, while 1% faced moderate food insecurity (NIS & WFP, 2022).

In addition to this, with increasing incomes, food consumption practices are also shifting significantly, contributing to all forms of malnutrition, and increasing the risk of non-communicable diseases (NCDs). Compared to previous years, the consumption of fats and sugars increased considerably in 2019/2020 (NIS & WFP, 2022). Approximately 80% of calories consumed in Cambodia come from rice and sugar, with inadequate consumption of nutrient-dense foods (World Food Programme, UNICEF, Development, & (CARD), 2023). In 2019/2020, consumption of vegetables mainly green leafy vegetables and foods rich in vitamin A and heme-iron decreased, especially in urban areas (NIS & WFP, 2022). Currently, Cambodian people are confronting four major NCDs, including cardiovascular disease, cancer, chronic respiratory disease, and diabetes (MoH, 2018). As of 2021, 7.3% of the population ages 20-79 have diabetes (World Bank, 2023). In 2014, NCDs caused 52% of deaths nationwide, and this is projected to increase (MoH, 2018).

More significantly, micronutrient deficiencies impact women as they have higher needs during childbearing. A lack of sufficient nutrients in women leads to lower birth weights and higher child mortality (NIS & WFP, 2022). Good nutrition is the bedrock of child survival, growth, and development. In 2019/2020, almost one in five households did not regularly consume food rich in heme-iron (including fish, meat, and poultry), and more than one in four households did not regularly eat foods rich in vitamin A (such as orange fruits and vegetables), which poses a risk for the normal functioning of the immune system, body growth and development, as well as reproduction. Regarding the nutritional status of women, 4% of women aged 20–49 and 14% of young women aged 15–19 years are stunted. In addition, 7% of women aged 20–49 and 29% aged 15–19 years are underweight. Women's dietary practices showed that 57% consumed food from at least five of the 10 recommended food groups (minimum dietary diversity) the previous day, 63% consumed sweet beverages, and 33% consumed unhealthy foods. Around 22% of children under five years of age are stunted, 10% are wasted, 16% are underweight, and 4% are overweight (NIS, MoH, & The DHS Program, 2023).

[1] The Identification of Poor Households Programme (IDPoor) is a community-driven proxy implemented by Commune/Sangkat Working Groups on demand to identify households living beyond the poverty line and households having problems sustaining their livelihood due to special circumstances. (https://idpoor.gov.kh/en/about/)

A recent study found that food insecurity among local people remains high in the Mekong Delta (WorldFish, 2023). Prey Veng and Svay Rieng have 10%-20% of the population that cannot afford a nutritious food basket (World Food Programme et al., 2023). Landlessness among locals remains a challenge while addressing other related matters. In the Mekong plain, 59% of household agricultural holdings have only a home lot (higher than national figure, 14%), and 30% have both home lots and parcels (lower than national figure, 86%). The average number of parcels in the region per holding is estimated at 2.2. Approximately 90% of households grow crops, followed by livestock, poultry and/or insect raising (72%) and aquaculture and capture fish activities (14%) (NIS & MoP, 2020). However, only 39% of the agricultural households in the zone could produce agricultural products mainly for sale. Only 11% earned a higher income than last year (NIS & MoP, 2020).

Moreover, food consumption behaviours have changed significantly. Around 20% of the current dietary consumption is unhealthy food (9% alcohol, 6% energy drinks, and 4% spices and oil) (WorldFish, 2023). The same study also found that 35% of the food budget was spent on foods prepared outside the home, alcohol, and energy drinks, mainly accessed from the markets within the village and mobile vendors.

To address these challenges to produce a healthy population, the enhancement of nutrition-sensitive agri-food systems is critical, especially in the Mekong Delta context. Several interventions and projects have been undertaken with support from the government, development partners and civil society organisations. However, understanding these interventions in with a nutrition-and gender-sensitive agri-food systems lens remains limited, especially those in the Mekong Delta.

Objective

This case study assessed three nutrition- and gender-sensitive agri-food systems interventions in the Mekong Delta to:

1. Identify interventions supporting equitable and sustainable consumption and production of nutritious foods in deltas in the face of rapid change.
2. Understand how the interventions support equitable and sustainable production and consumption of nutritious foods
3. Identify opportunities and gaps to increase equitable and sustainable production and consumption of nutritious foods in the Mekong Delta region of Cambodia.

Methodology

Projects for the case study were identified from a previously conducted scoping study of nutrition- and gender-sensitive agri-food systems interventions in the Mekong Delta in 2023. The scoping study included projects that may have recently ended (102 years), nearing completion or in the middle of implementation. The projects were required to clearly include at least 1 of the agricultural components such as food production, processing, or supply, and at least 1 of the food environment components such as food availability, accessibility, affordability, consumption, and nutrition status.

The scoping study included 12 projects (published separately), from which three projects were selected to further understand the nutrition- and gender-sensitive approaches. To

ensure representation, the selection sought projects conducted by the following: (i) research and development organisations (CGIAR, other research organisations); (ii) non-governmental organisations (NGOs); and (iii) government.

The interventions in the Mekong Delta were assessed to understand the key components of nutrition- and gender-sensitive agri-systems. The interviews with respective organisations were conducted, and some information relied on secondary data such as reports produced by that organisation and related documents. The interviews looked at the following aspects of the projects:

- Scope of the interventions: objectives; target beneficiaries; location; timeframe; partners and their roles; and multi-sectoral approaches
- Areas of the food system (themes and subthemes) and corresponding activities[2]: sustainable food production and supply chains; equal and equitable access to healthy diets; and transparent, democratic, and accountable governance
- Nutrition-sensitive agri-food system-related actions: food groups, availability, accessibility, utilisation, and consumption of diverse and nutrient dense foods
- Gender-sensitive actions: gender, youth, and social inclusion
- Monitoring and evaluation of indicators related to food production, nutrition, and gender
- Progress or impact of the project on food production, access, consumption, and nutrition outcomes
- Best practices for designing and implementing interventions with impact on nutrition and gender and policy recommendations
- Opportunities and gaps to increase a) the availability, access, and consumption of nutritious foods, b) impact of the interventions on food and nutrition security of people in the Mekong delta and c) impact on gender and social inclusion and benefits (.

In addition to this analysis, after the case study was drafted and shared with each organisation for feedback and comments. In this regard, the country director of each organisation provided further comments to improve the case study. Furthermore, a consultation workshop with stakeholders was organized to present the findings of the case studies and obtain feedback. All feedback was used the insights of the study. The following descriptions illustrate each case study guided by nutrition-sensitive agri-food systems principles and critical dimensions of food systems.

[2] CFS Voluntary Guidelines on Food Systems and Nutrition (2021)

Case study 1: Community Fish Refuge in Cambodia

Background and scope

The fishing industry in Cambodia plays an essential role in the country's economy, accounting for 8-12% and 25-30% of the total national and agricultural GDP (Un, Chheng, Tress, Baran, & Simpson, 2014). The industry engages an estimated 4.5 million individuals in fishing and related activities (Un et al., 2014). Consequently, around 60-70% of the country's total animal protein consumption is provided by fish and other aquatic creatures, crucial to food security and nutrition. Out of the total fish production in 2013, 550,000 metric tons were caught in freshwater environments, with rice field fisheries and small-scale family fisheries contributing roughly 20% (Brooks & Sieu, 2016). In addition, rice field fisheries in Cambodia serve as a source of income. They are vital to securing food and nutrition security, especially at the household level in rural areas of the country. In the Tonle Sap region, rice field fisheries supply 62% of the fish families consume (Shieh, Eam, Kim, et al., 2021).

The establishment and management of Community Fish Refuge (CFR) represents a valuable method for boosting fish productivity and biodiversity in this essential fisheries system and as a permanent aquatic habitat integrated into the rice field landscape (Figure 1). By carefully managing the refuge through habitat enhancements and safeguarding it from fishing activities, it has the potential to increase fish populations in rice field fishing zones, ultimately enhancing local households' access to fish resources (Shieh, Eam, Sok, et al., 2021)

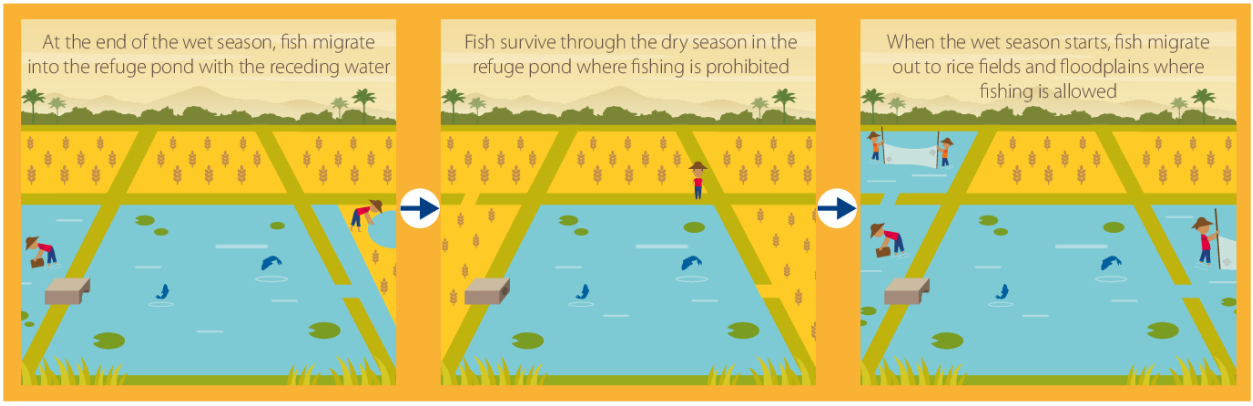

Figure 1: World Fish' representation of how rice field fisheries work (Kim et al., 2019)

Recognising the importance of CFRs, WorldFish, a CGIAR research for development international organisation, has worked with the Fisheries Administration (FiA) (since 2012 to pilot and scale out strategies and best practices in CFR areas designed by FiA, World Vegetable Center, and the Feed the Future Cambodia NOURISH project (Save the Children), that included five (5) local NGOs and three (3) universities. CFRs in the Mekong Delta are managed by the Department of Fisheries Administration.

The Feed the Future Cambodia Rice Field Fisheries II project was conducted to implement CFR activities on nutrition and gender. This project focused on replicating and scaling out best practices on CFR management, including efficient water use integration of homestead food production and promoting consumption of nutrient-rich small fish from CFRs.

The CFR project of WorldFish was conducted in four (4) provinces around Tonle Sap — Kampong Thom, Siem Reap, Battambang and Pursat. This project generally aimed to improve the food and nutrition security of poor and vulnerable rural households in the country by improving the productivity and availability of rice field fisheries. Specifically, it aimed to establish the impacts of incorporating nutrition and gender activities into CFR management on households and communities, improve the consumption of aquatic foods, grains and vegetables for human consumption and improve the productivity of rice field fisheries in the area (Shieh, Eam, Kim, et al., 2021)

The project was implemented from 2016 to 2021, with a total budget of 7 million USD, including 1 million USD for health and nutrition from the USAID. The project targeted approximately 200,000+ beneficiaries composed of smallholder fish farmers, poor households with pregnant women, children under five years old and youth (including schoolchildren) (Shieh, Eam, Kim, et al., 2021).

Main commodities and activities

The project focused on three (3) main food commodities—vegetables, grains, and aquatic foods (natural and wild brood fish). It included capacity-building activities such as training on food processing, home vegetable production, CFR development and management and awareness raising, particularly on proper food handling and production for improved consumption and nutrition of children in the first 1000 days

The project activities included nutrition-specific topics covering exclusive breastfeeding, infant and young child feeding practices, and nutrition-sensitive activities focusing on nutrition, water, sanitation, and hygiene (WASH), targeting women/caregivers and youth. There were also mentoring activities on homestead food production to improve household consumption of vegetables.

In addition, quantitative and qualitative surveys and site visits were conducted to document the experiences of the communities before, during and after the implementation of CFR management interventions in the four provinces around Tonle Sap.

Nutrition-sensitive agri-food system actions

Nutrition-sensitive agriculture is a strategy of integrating nutrition into agricultural activities by prioritising the production and consumption of nutritionally rich and diverse foods to overcome all forms of malnutrition—wasting, stunting, overweight and obesity, and micronutrient deficiencies. In this project, the production, consumption and processing of nutrient-dense and diverse vegetables, grains and aquatic foods were highlighted and used as a strategy to fight all forms of malnutrition at the community- and household-level affecting women and children under five. To attain the objectives, activities were conducted targeting women/caregivers and youth.

Mentoring activities on homestead food production and nutrition education activities were conducted to improve household production and consumption of vegetables. Training of women/caregivers was conducted to improve knowledge, attitude, and practices related to the consumption of fish and its nutritional benefits at the household level. The project also provided beneficiaries with financial resources such as, start-up kits for small fish processing, grinder and plastic jars, and training on CFR management

best practices. As well as integrated nutrition education and homestead gardening to increase households' access to available aquatic food rich in vitamins and minerals.

Other nutrition-sensitive activities around water, sanitation and hygiene, or WASH, were also implemented to improve health, hygiene and nutrition knowledge and practices among household members in the target communities.

Gender and youth inclusion

Women are pivotal in small-scale fisheries, yet their contributions are often undervalued and overlooked. Despite the significant involvement of women in various fisheries-related activities, encompassing both pre-and post-harvest tasks, the field of fisheries management remains predominantly male-dominated.

This persistent gender disparity prevails, even though many women aspire to hold leadership and decision-making positions within management committees. These positions are critical for enhancing livelihoods, building capacity, and ensuring the sustainable management of fisheries resources for future generations. To address this issue, the project undertook steps to engage and empower women (Figure 2). They actively involved women in household visioning processes and integrated them into CFR committees. As part of this effort, targeted women were equipped with knowledge and skills in various areas, including the consumption and processing of small fish, gardening, and WASH practices (Shieh J, Eam D, Kim M. et al, 2021). A total of 2,640 women were trained on Rice Field Fisheries Enhancement and Food Nutrition topics.

Aside from women, more than 5,000 youth (including schoolchildren) were also engaged in awareness-raising activities focusing on consuming nutrient-rich and diverse foods, including fish from CFR and vegetables from homestead gardening. This activity provided the youth with information and background on healthy and diverse dietary practices to support the knowledge and skills imparted to their households through the caregivers.

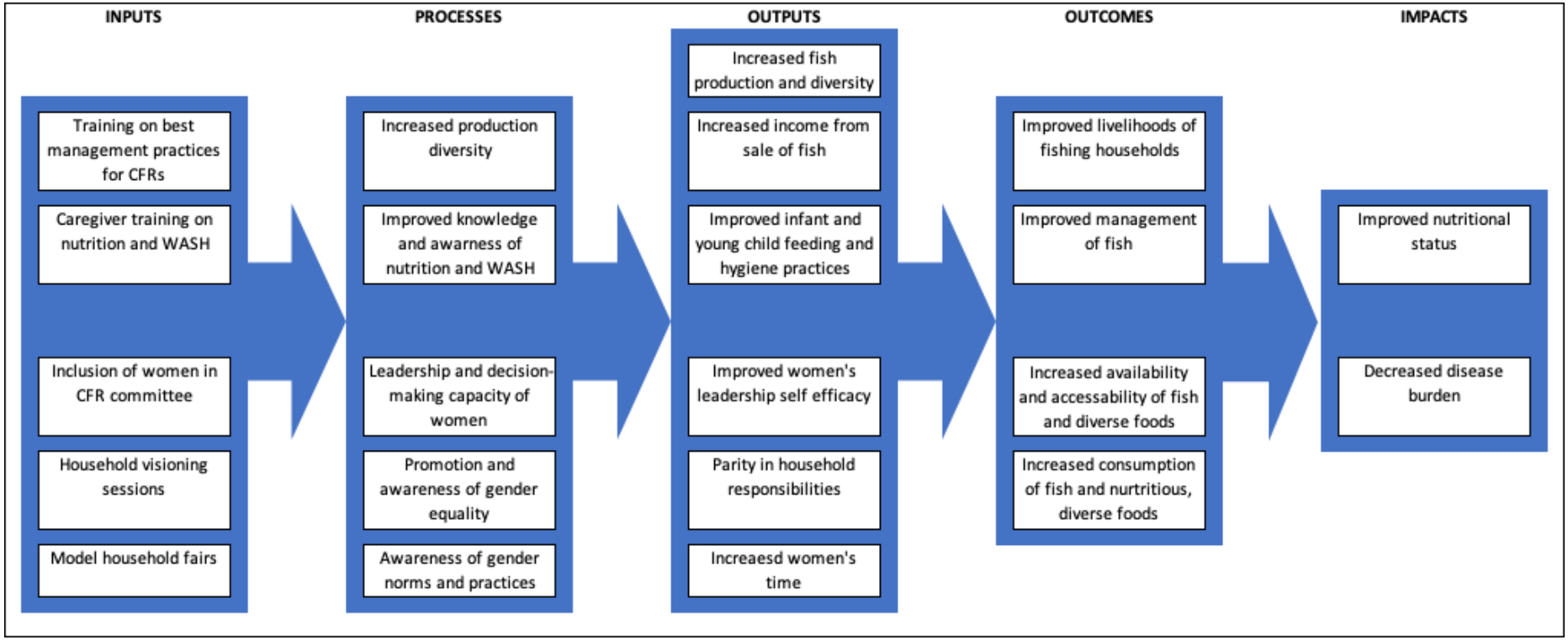

Figure 2: WorldFish's Theory of Change for nutrition and gender activities in rice field fisheries

Monitoring and evaluation

To monitor and evaluate the project, assessment activities were undertaken at different stages, including baseline, midline, and endline activities to determine the impact on food production, access, availability, and consumption at the community and household levels. These assessments encompassed a range of methods, such as surveys, in-person and virtual interviews, focus group discussions, and CFR capacity assessments (self-reported).

These activities were essential for gauging the progress and impact of the CFR initiative on food production— assessed by examining the increase in fish catchment within the ponds, as recorded by the CFR committee and observed through surveys conducted by field officers. Moreover, the assessments were aimed to ascertain the project's impact on food access and availability. The project's influence on food consumption and nutritional outcomes was assessed, focusing on the practices of caregivers in nearby households and the beneficiaries. This evaluation delved into the consumption of small fish and other produce (Shieh, Eam, Kim, et al., 2021).

Quantitative and qualitative activities were conducted to assess the impact of the CFR as a nutrition-sensitive agri-food systems intervention. Quantitative tools such as dietary diversity tool, 7-day recall of the household's fishing activities, and Knowledge, Attitude and Practice (KAP) survey (covering topics on (1) the global food insecurity experience scale, (2) nutrition among adults and children, (3) sources of food, preparation, cooking and storage, (4) water source, and (5) defecation practices) were translated to Khmer and used for the project.

Project progress and best practices

The project generated evidence highlighting the substantial impact of establishing CFRs on the knowledge, attitudes, and practices of women, men, and other household members concerning household food production and consumption of nutrient dense foods, food safety, and related activities that contribute to the achievement of the project's nutritional outcomes.

Notable improvements were observed among the respondents after receiving comprehensive training on homestead garden and CFR management, WASH practices, and other community-awareness activities. Beneficiaries and other implementers reported an increased availability and access to fish in rice fields for consumption and income. The project also improved households' access to small indigenous fish species, a good source of nutrients, including protein and micronutrients. This was because they were able to catch fish near their households. More than 90% of the participants showed enhanced awareness and knowledge regarding food safety, with the majority learning essential practices such as covering food, avoiding contact with animals near food, and storing cooked dishes in a hygienic environment.

Furthermore, the results highlighted the promising potential of CFRs. These community-based resources demonstrated their ability to sustain and enhance fish production in rice fields, with potential positive impacts on the livelihoods of landless individuals with limited resources.

The implementation of the WorldFish CFR project yielded several notable best practices, demonstrating its positive impact on the community:

1. **Value Addition:** The project went beyond simply establishing CFRs. It also provided materials and trainings on processing small fish, encouraging the consumption of nutrient-rich small fish powder by children under five in the community. Furthermore, some households/families leveraged these new skills as a source of income through selling dry powder to their neighbours, contributing to the alleviation of micronutrient deficiencies in children across the country.
2. **Nutrition Education:** Community Awareness Raising initiatives conducted as part of the project have significantly influenced community members' knowledge and skills in terms of proper nutrition. This extended to the production and consumption of nutrient-dense and diverse foods sourced from rice fields and home gardens. Through Social and Behaviour Change Communication activities, a total of 213,138 people (51.5% women) improved their consumption of small indigenous fish at home (WorldFish, 2021). Additionally, the project improved the community's understanding of the importance of effective CFR management, fostering a higher level of compliance with the new regulations set by the CFR committee.
3. **Gender and Nutrition:** The project recognised the pivotal role of women in its successful implementation. The inclusion of women in capacity-building activities and in CFR management empowered them to participate more actively in decision-making processes and committee activities. This not only enhanced women's knowledge and skills but also led to improved attitudes and practices related to small fish consumption at the household level, which would later result in the improved nutritional status of members of the household.

The project demonstrated the potential of fish conservation in improving food security and nutrition at both community and household levels by increasing the accessibility and availability of aquatic foods. When scaled up, this approach could significantly enhance the country's food security and nutritional situation, with a reduced reliance on imported food items with lower nutrient content.

Project challenges

With the CFR as a nutrition-sensitive agricultural intervention, several challenges impeded the project's ability to have a more significant nutrition impact. These were identified as climate-related, knowledge-based and linked to migration.

First, an extended period of drought in the CFR areas from 2019 to 2020 led to the drying up of some ponds, causing a decline in fish productivity. Consequently, the consumption of nutrient-rich small fish by project beneficiaries decreased. However, the project seized this opportunity to introduce innovative strategies, including deepening the ponds to ensure water availability even in the absence of rainfall and planting trees to enhance the fish habitat, ultimately resulting in increased fish survival rates.

Second, knowledge gaps among some beneficiaries regarding CFR management and homestead production posed a challenge. Some households were uncertain about the project's objectives and activities, which affected their willingness to participate. To address this, community awareness-raising activities, such as household visioning sessions related to homestead food production, were initiated.

Furthermore, the issue of migration emerged as a challenge, particularly concerning activities that required the involvement of both husbands and wives as beneficiaries. Migration, often involving men relocating to cities or neighbouring provinces, affected the effective dissemination of crucial knowledge and skills related to food production and consumption, essential for improving food security and nutrition within households. It is worth noting that the migration of men to work in cities is also associated with the different drivers of the food environment and barriers to food security and nutrition.

Acknowledging these challenges, the project developed activities to support the effective implementation of established CFRs. Nevertheless, it's essential to recognise that these challenges likely continue to impact the effectiveness of nutrition- and gender-sensitive agricultural interventions and need to further exploration.

Case study 2: Promoting Food Security, Nutrition, and Livelihood of Poor Farming Families in the Face of Inflation Crisis and Food System Changes

Background and scope

In the context of the inflation crisis and food system changes, smallholder farmers and impoverished farming families face challenges and difficulties in securing their livelihood and food. Hellen Keller International (HKI) started a pilot project titled "Improving household food security and livelihood among the Cambodian rural poor by strengthened food production systems" in three provinces across the country, including Kampong Thom, Takeo, and Kampot, from November 2022 to December 2024. Among these provinces, Takeo is the only province in the Mekong Delta of Cambodia, the focus of the case study.

The project set out a broad objective to help smallholder farmers access diverse and nutritious foods, promote nutrition security, and strengthen local livelihood in the selected communes. Specifically, it aims to enhance food security and nutrition at the community level, where members of agricultural cooperatives can work together and sell their commodities at lower prices among the members before selling to the market. The project also seeks to promote the diversification of vegetable home gardens of target beneficiaries through vegetable seed distribution, training, and regular technical assistance.

The project targets 100 agriculture cooperatives (ACs) and over 4,000 producers in the three provinces. In Takeo, the project works with 1,603 smallholder farmers from 40 ACs from 28 communes of Tram Kak, Samraong, Treang, and Koh Andaet districts. HKI worked with the Provincial Department of Agriculture, Forestry and Fisheries (PDAFF) to select the ACs that were registered and recognised by the PDAFF.

The project is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) and the Germany Development Agency Deutsche Gesellschafts für International Zusammenarbeit (GIZ) under the Multisectoral Food and Nutrition Security (MUSEFO) project. To translate the objectives into reality, HKI collaborated with other organisations, including the International Rice Research Institute (IRRI), AgriSmart, Cambodian Agricultural Research and Development Institute (CARDI), and Uni4Coop, and other governmental institutions – such as Council for Agricultural and Rural Development

(CARD), Ministry of Agriculture, Forestry and Fisheries (MAFF), General Directorate of Agriculture (GDA), PDAFF, and the Provincial/Municipal Working Groups for Coordinating Food Security and Nutrition (PWG-FSN) – in the implementation of the project.

Main commodities and activities

The project focuses on various grains and vegetables, which include rice, cauliflower, potato, choy sum, tomato, water convolvulus, amaranth, long bean, pumpkin, watermelon, turnip, luffa gourd, cucumber, okra, edamame, eggplant – as key commodities (Table 1).

Table 1: Food classification by group

Grains	Rice
Dark green leafy vegetables	Water convolvulus, choy sum, amaranth, cauliflower.
Orange-fleshed vegetables	Tomato, pumpkin, okra.
Other vegetables	Turnip, long bean, watermelon, cucumber, eggplant, French bean, luffa gourd.

The project is divided into three phases. The first phase was the preparatory phase lasting approximately four weeks. During this phase, the main activities consisted of clearly defining the respective roles and responsibilities of key stakeholders during project implementation and ensuring that there is full buy-in to the project's strategic vision. This was achieved through meetings with key stakeholders, including CARD, MAFF, Ministry of Health (MOH), PWG-FSN, and UNI4COOP. The expected outcome of these meetings was project activity harmonisation with any ongoing government and NGO-run initiatives in the same project areas so that conflicting approaches to issues of food and nutrition security can be avoided.

The second phase, which lasts 18 months, will focus on direct project implementation in the field. This includes capacity-building activities targeting the 40 ACs to enhance their skills and knowledge so they can work independently in the future. From the project's perspective, all ACs are solid and capable of working with respective partners in their area. HKI, in collaboration with their partner organisations, provided training of trainers (ToT) to 121 lead farmers (35 women) on rice growing techniques, vegetable growing techniques, utilisation of compost fertiliser, botanical pesticide preparation, nutritious crop selection and production plans so they can train other members of their cooperatives. After the training, three (3) participants will be the focal trainers in one AC. Those focal trainers will have to perform the following responsibilities:

- Work with the project staff to provide further training to farmers who are AC members.
- Follow up with members about growing rice and vegetables.
- Provide technical assistance to farmers.
- Collect data on rice and vegetable yields from farmers.
- Keep records of growing statistics with forms provided by the project.

The project also distributed four (4) mechanised direct seedling tools to ACs for rice growing. This activity is a collaboration between IRRI and AgriSmart. The use of

transplanters is to pilot growing techniques (i.e. growing rice in lines), which aim to provide higher yields than traditional approaches. Moreover, the project has planned to pilot net greenhouses (size 10*25m^2) with ACs.

Furthermore, the project builds the capacity of the ACs on bookkeeping by deploying their staff to work with ACs in the province. This is to manage agricultural statistics at the AC level. More specifically, the paperwork will help ACs manage the quantity their members produce.

More importantly, smallholder farmers will also receive a series of trainings to improve their capacity to grow rice and vegetables. The training focuses on growing techniques, natural fertiliser processing techniques and uses, and pesticide management. The project conducted pre- and post-harvest demonstrations to educate beneficiaries (farmers) in the ACs on how to grade and set prices for agricultural commodities that appear to be working well. When they harvested their produce, the project provided technical assistance coaching for them to understand the grading process.

The last phase, which will last two months, involves handing over the critical project components to local authorities. During the handover phase, a phase-out workshop will be conducted to ensure that the different aspects of the project, including monitoring and linkages with service providers, will be maintained.

In other words, while strengthening the capacity of ACs, the project attempts to secure access to food among smallholder farmers who are members of the selected agricultural cooperatives and diversify vegetable growing at the homestead. Currently, HKI is putting conscious efforts into the food production of rice and vegetables, as indicated in Figure 3 below.

Nutrition-sensitive actions

The project is promoting production of a variety of vegetable thus increasing access to diverse and nutritious local foods, which are vital aspects of nutrition-sensitive agri-food systems. Figure 3 shows the critical activities of the project in the nutrition-sensitive agri-food systems. Apart from a training series and the distribution of rice seeds and fertilisers to farmers, the project also distributed seeds of 14 different vegetables to beneficiaries to grow at home (Table 1). One smallholder farmer (representing a household) can receive seeds of 14 vegetables that they need to grow based on the plan developed by HKI.

ACs signed conditional contracts with the project, guaranteeing accountability, defining the transparency of roles and responsibilities, and specifying agriculture inputs and equipment. The contract was jointly signed by representatives from GIZ-MUSEFO, HKI, and ACs. In return for the project providing inputs, equipment, and technical assistance, ACs agreed to sell nutrient-dense foods (i.e. vegetables and rice) to consumers at a subsidised rate. A critical condition for target ACs is that they sell diverse and nutritious foods to families designated as IDPoor 1 and 2 or who have pregnant women, lactating mothers, or children under two years old, at a price discounted by 30%. The producers who received a net house or mechanised direct seedling tool will be required to discount 40% of the prices of food sold to families described above.

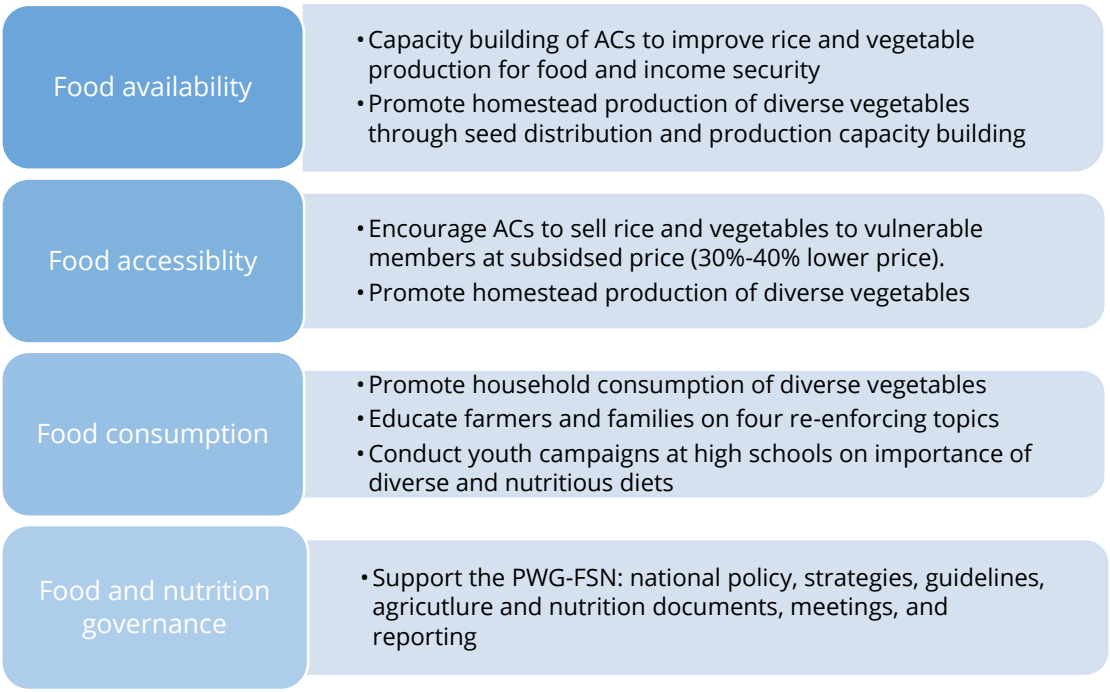

Figure 2: Key activities of the project targeting nutrition-sensitive agri-food systems

ACs: Agriculture Cooperatives
Vulnerable members: households that are IDPoor 1 and 2 or who have pregnant women, lactating mothers, or children under two years old
PWG-FSN: Provincial/Municipal Working Groups for Coordinating Food Security and Nutrition

The project also aims to improve food consumption practices among the farmers in the target districts by building their skills and knowledge on (i) the importance of dietary diversity and nutritious foods among all members of the household, (ii) what proper nutrition and good dietary diversity looks like; (iii) how what you eat contributes to your nutrition and overall health, and (iv) which crops contribute to specific food security, nutrition, and development needs. These are expected to contribute to behaviour changes in food consumption practices. HKI also includes youth in the project. In this regard, 26 high school students were invited and trained as focal agents at the school level to disseminate information on the importance of healthy and diverse diets for families. This is intended to promote nutrition at the local level, including at the household level, and the dissemination through youth campaigns aims to reach another 5,000 students in the target high schools.

The project also engages the Provincial/Municipal Working Groups for Coordinating Food Security and Nutrition (PWG-FSN). HKI supports capacity building of the working group related to food security and nutrition issues, including policy framework and report writing for higher level (i.e. CARD), as the working group has recently been created. The project also distributes national policies, strategies, guidelines, and agricultural and nutrition-related documents to the working group. Plus, the project supports their quarterly meetings to strengthen the reporting system in the circle of food security and nutrition with the higher level. The working group is an essential coordinating body on food security and nutrition at the sub-national level. The project also connects the working group with targeted ACs and producers through field visits.

Gender and youth inclusion

In terms of gender, women and women-headed families are engaged in the project. The women participated in a series of training sessions related to vegetable production and nutrition and received vegetable seeds to grow at home. The youth are targeted explicitly by training high school focal agents at the school level who will, in turn, participate and lead through youth campaigns to disseminate nutrition information. The project also has a specific target to reach a total of 1,603 vulnerable households, smallholder farmers and poor farmers.

Cross cutting strategies

The project addresses other cross-cutting issues such as climate change and natural resources management. In order to respond to climate change, the project encourages farmers to grow seeds that are climate-resilient and produce diverse vegetables. Equally important, the project educates farmers to keep updated with climate information, such as information disseminated by the Ministry of Water Resources and Meteorology (MoWRAM) and rain statistics in their location. The beneficiaries also received training on Integrated Pest Management (IPM) and agricultural land improvement. Moreover, the use of compost fertilisers was demonstrated so that farmers could use them properly with crops.

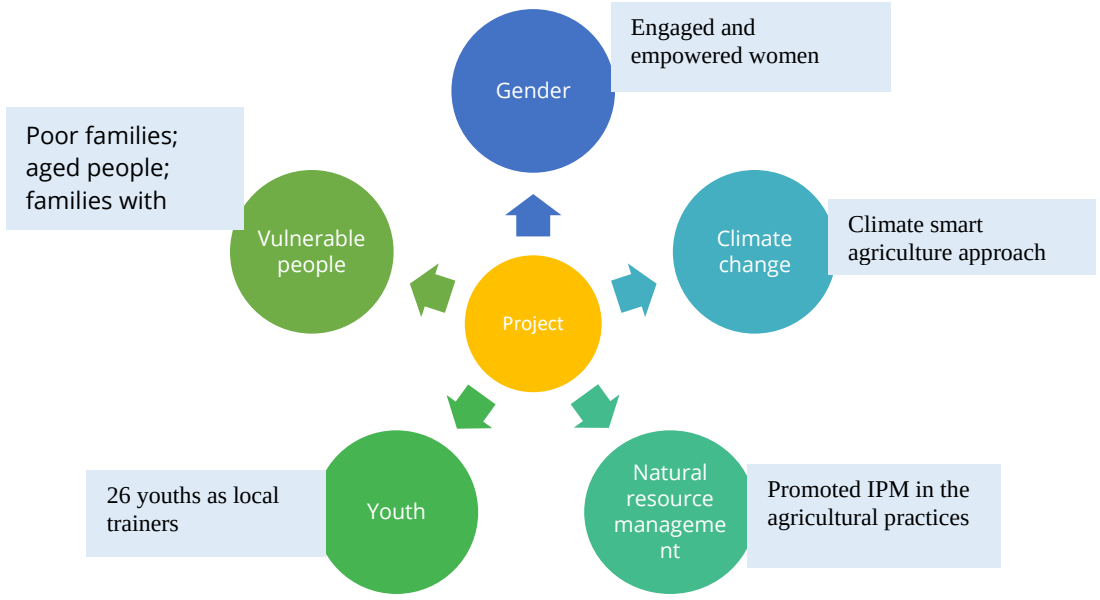

Figure 3: Key different cross-cutting issues the project contributes to addressing

Monitoring and evaluation

The project set out some administrative channels in the monitoring and evaluation process. At the implementation level, a baseline study was undertaken at the beginning of the project to assess and learn the current situation of the target provinces. The project deployed three staff to work with the target ACs in the province. To effectively monitor implementation of project activities, forms developed by HKI were utilized. A data collection form is employed through the three lead farms in each AC to collect information from their members, including types of crops, quantities, land size, and input

use. The purpose is to follow up with farmers on whether they utilise the input provided. Additionally, the monitoring and evaluation team conducts random checks with farmers to verify the resources distributed to them and their commitment to those resources. Technical assistance form is also used to collect information on training provided to beneficiaries. In addition to this, there is a monitoring which is conducted every three months. The quarterly report is prepared for the project implementation.

Regarding nutrition-related issues, the project focuses on mainstreaming and has no official form to record that information yet. Nutrition issues are raised during the meeting with beneficiaries. In the meeting, the beneficiaries can also raise what they have followed with the agreement. Moreover, the minutes prepared by the target ACs for the project are the sources for learning nutrition on the ground. The minute the recorded information on selling rice and vegetables at the committed rates.

Project progress and best practices

The project has only been implemented for around ten months. As such, a formal monitoring and evaluation exercise has not yet been conducted. However, some key achievements from the implementation at the time of writing were noted, and these were related to capacity building and material distribution. These include:

- Built capacity of 121 lead farmers (35 women) to be farmer promoters in their agricultural cooperatives.
- Distributed four rice seedling machines to ACs for piloting rice growing.
- Provided a series of training (as mentioned above, depending on ACs) to 1,344 farmers (722 women) of the target agricultural cooperatives.
- Provided four net greenhouses (size 10*25) to the target agricultural cooperatives.
- Distributed vegetable seeds to 493 households (14 vegetables/household).
- Distributed rice seed Phka Rumduol and Sen Kraob 01 to 1,110 households (50kg/household).
- Conducted awareness raising of nutrition issues through lead youth at high school.
- Trained ACs on how to use the transplanters distributed (two representatives from each AC received training from IRRI and Agrismart).

HKI identified some opportunities to expand and improve the project's impacts in the next phase. HKI deployed a staff at the province to support the target agricultural cooperatives in relation to paperwork and data management. However, the data collection has not been undertaken yet. When the data on the agricultural production of AC members is appropriately collected, and quantities produced are recorded well, the project will be able to begin market linkages in the next phase. Chicken production has been seen as a good livelihood opportunity and source of nutrient-dense food, which the project is considering adding in the next phase.

In terms of bezt practices, several activities can be considered. One is the youth campaigns can be another good practice in promoting an understanding of nutrition issues. The project notices that local nutrition issues have received more attention among smallholder farmers and local families. The final evaluation will need to document the extent to which the youth campaigns contributed to nutrition awareness so that youth engagement in the project can be replicated for other NGOs in similar fields.

Another is helping farmers understand how to grade and set prices of agricultural commodities after harvest, as indicated in Figure 5 below. The project educates farmers to classify their commodities before selling. Taking cucumbers as an example, farmers collected and graded them based on sizes and shapes for selling to consumers and sellers. The cucumbers were graded into three types: number 1, number 2, and number 3. With the grading, the project educated farmers that if grading has not been carried out, farmers lose to buyers (i.e., market vendors). In the meanwhile, they need to have a proper record of information, such as quantities and prices sold, in order to report back to the project.

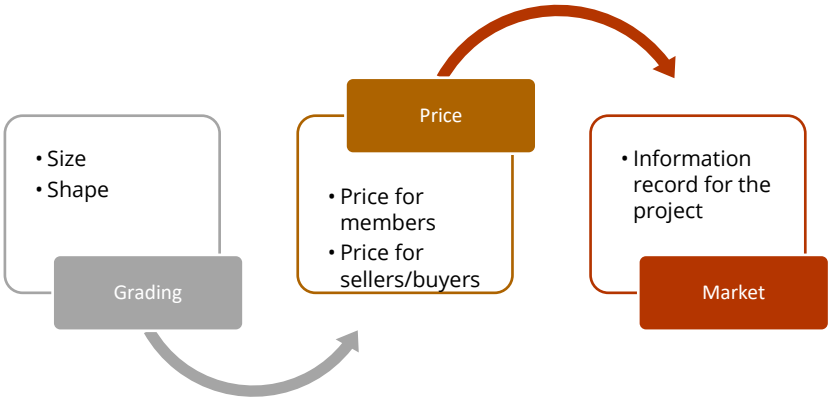

Figure 4: Good practice of cucumbers collected from their cultivated land

Project challenges

During the project some main challenges were noted. One of the challenges is that households that were registered for the project rotate the members that participate in the project events, including training and input distribution. That is, family members would participate in any given training or project event. This might be because of their availability, knowledge, and skills. Consequently, training and input distribution can be ineffective when the production activities start, as there are inconsistencies in knowledge transfer.

Migration also continues to attract more labour from farming. Some farmers, especially young people, migrated to work elsewhere to strengthen their livelihood and incomes. This can affect the engagement of farmers in vegetable supply chains to strengthen nutrition-sensitive agri-food systems in the future if this trend continues. On the production side, there will be a lack of young people engaging in agricultural work (Nguyen & Sean, 2021), and between 5% to 10% of the hours worked by members left behind were reduced due to migration (Roth & Tiberti, 2017). On the food consumption side, migration reduces the demand for food consumption in the household. The economic returns of farmers' migration not only improve the transformation of

household food consumption from a staple food-dominated dietary structure to one that includes more meat and dairy products but also reduces nutrient intake among left-behind family members (Shi, HOU, Hermann, HUANG, & Mu, 2019).

Case study 3: Poultry Project of National Pride in Cambodia (PPNP)

Background and scope

Heifer International-Cambodia (HIC) works to strengthen self-help groups and agricultural cooperatives as agri-enterprise-oriented entities, transferring skills and knowledge to smallholder farmers to increase the production and productivity of agricultural commodities and improve market linkages. It continues strengthening smallholder native chicken, vegetable, and fish chains while exploring opportunities in other agricultural value chains, including beef cattle. Native chicken (i.e. local chicken) has been one of HIC's focus commodities since 2014. In 2019, the average annual household income from selling native chicken was $4,900 (Heifer International Cambodia, 2022a). Heifer Cambodia aims to increase the annual household income to $7,700 by 2030 (Heifer International Cambodia, 2022a).

HIC has been implementing the "Poultry Project of National Pride in Cambodia (PPNP)" from 2021 to 2026 with a 6.4 million USD investment in 11 provinces in Cambodia. Three provinces in the Mekong Delta include Takeo, Prey Veng, and Svay Rieng. All eleven provinces were selected based on the following criteria: poverty rate, large number of agricultural cooperatives, community forestry, community fisheries, and the status of migration to neighbouring countries for lower-skilled paid work (Heifer International Cambodia, 2022b).

PPNP equips farmers with the tools they need to produce chickens to meet domestic demand and fetch fair market prices. HIC reinforces the poultry value chain through the project and closes the living income gap for 88,300 smallholder farmers and their communities. PPNP aims to scale up the development of the Cambodia backyard chicken sector. This will be achieved through empowering cooperatives, social entrepreneurs union of agricultural cooperatives (SEUAC) institutional capacity development, investing in native poultry processing plants, modern chick hatchery enterprises, establishing collection centres, investing in transport vehicles and working with farmers eager to set up small-and-medium-sized enterprises. PPNP will also look at household economic improvements for the target smallholder producers—social impacts for their communities and macroeconomic benefits for the country's poultry sector. Farmers will receive inputs, specialised training, and assistance and access to capital to create inclusive and profitable agri-enterprises connected to the market.

The impact development goal is to accelerate the transformation from a traditional backyard chicken production system into poultry entrepreneurship led by smallholder farmers for an inclusive development that would become one of the national prides of Cambodia agriculture. The project prepared five chains to achieve the objectives above (Heifer International Cambodia, 2022a), as shown in Figure 6 below.

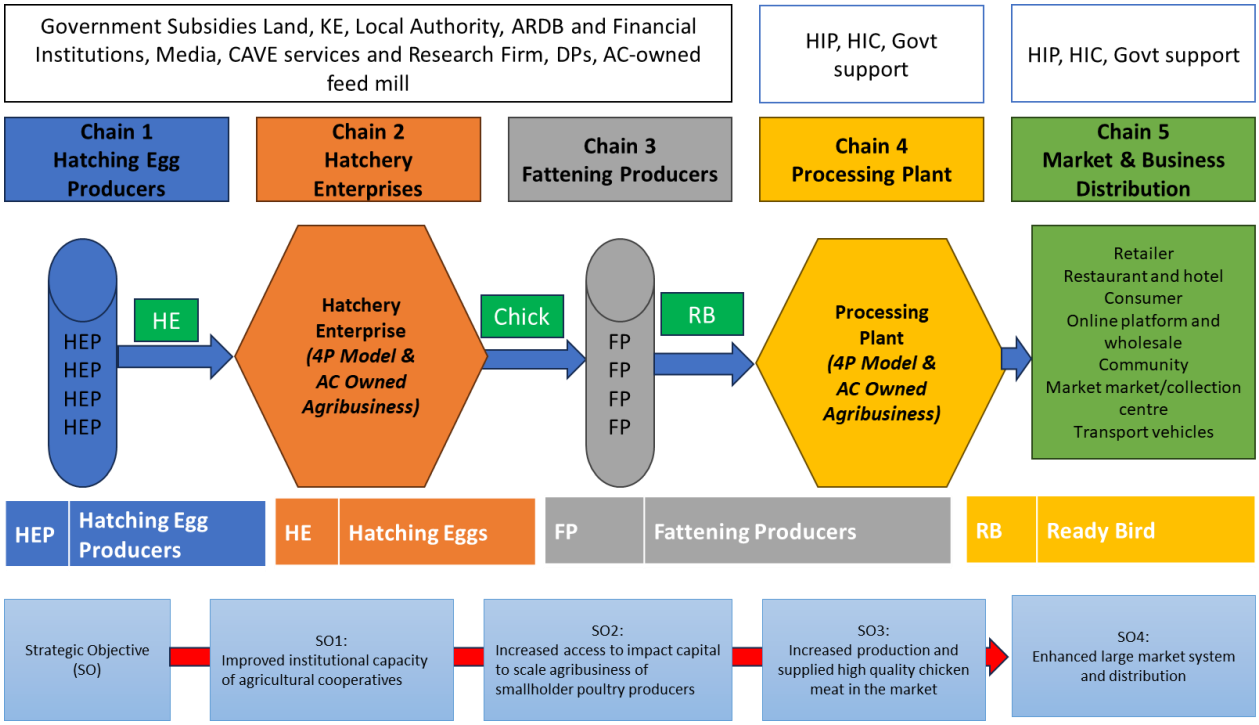

Figure 5: Chains of the project contributing to strengthen chicken supply chains

This case study focused on how the project contributed to nutrition-sensitive agri-food systems in Prey Veng, as project activities are the same in the other two provinces. The project has been implemented in 5 agricultural cooperatives with 2,000 smallholder farmers in five communes (including Theay, Boeng Preah, Roung Damrei, Reaks Chey, and Prey Poun), located in two districts of Baphnum and Kampong Trabaek. This project has been implemented in collaboration with agricultural cooperatives, producer groups, and the private sector, such as GREENNAT Store, CSDS Co., ltd, Kenko Shuko, Co., ltd, Tropocam Fruit and Vegetable Co., ltd and focused on enhancing backyard chicken production.

Main commodities and activities

HIC has made conscious efforts to work with agricultural cooperatives, farmers, implementing partners, banks, the private sector, development partners, and the government to address the constraints and challenges local smallholder chicken producers face and support farmers in scaling the backyard poultry sector in Cambodia. The project intervened across a range of aspects of food systems – food production, value addition, and supply chain – and promoted collaboration with other projects.

Under the food production component, HIC attempts to build and strengthen the foundations of local chicken production. The project supports and upscales the development of hatcheries and their agricultural cooperatives (chain 1). It developed hatchery enterprises owned by agricultural cooperatives (chain 2) and invested in agribusiness models for micro-small and medium-sized enterprises (MSMEs) and farmers fattening chicken (chain 3). Under these components, HIC established producer groups of smallholder farmers under the targeted ACs to meet market demand. All producer groups received capacity building on chicken production techniques. They received support in the development of business plans. The project strengthened the capacity of

village livestock agents so that they could provide further training to smallholder farmers. Figure72 shows actions to support food systems.

Apart from the capacity building of smallholder farmers and Collaborative Learning and Adaptation for Community Agro-Vet Entrepreneurs (CAVE), the project supported ACs in promoting collective business which can provide business services, enhance the collecting and purchasing of chickens from members, and mobilise resources from various sources, including from local government. ACs received capacity building in financial management to ensure transparency and trust with members. The project worked alongside ACs to help them increase their capital investment and perform as agricultural enterprises. Following this, ACs will have their own capital and a revolving fund for their members to start and/or expand their chicken production.

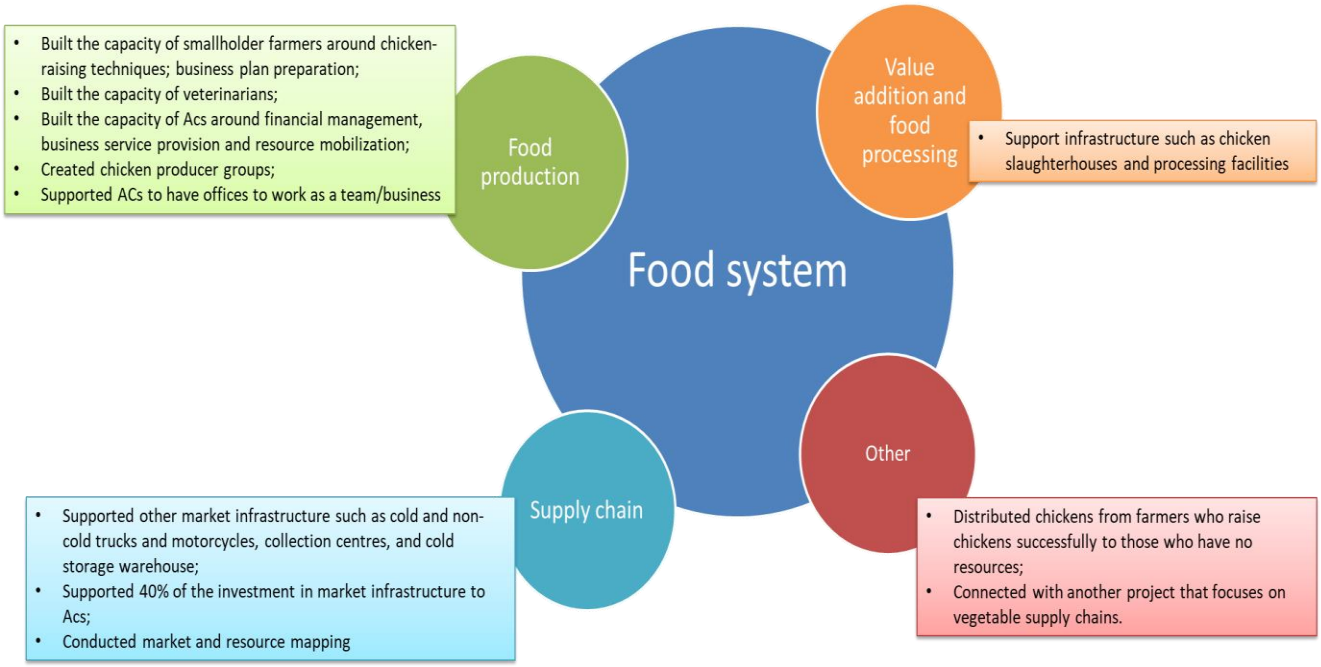

Figure 6: Actions targeting food systems

The project also supported value addition and food processing with a plan to build a processing plant for backyard chickens. It was managed through the 4P model (chain 4). Heifer Cambodia supported market infrastructure such as a chicken slaughterhouse and processing facility building for ACs to process chickens purchased from smallholder farmers. Chickens are slaughtered into pieces, including wings, thighs, sausage, nuggets, and patties. The project built the capacity of ACs in grading chickens for sale to markets.

The project supported training and technical inputs to enhance the chicken supply chain. Under chain 5, the intervention supported other market infrastructures for linking smallholder poultry producers to markets. ACs received cold chain trucks and motorcycles, non-cold chain trucks, collection centres, and cold-storage warehouse. These help ACs purchase, collect, and transport chicken products to the connected markets in the province and Phnom Penh. The project uses a contribution approach (60% from the project and 40% from the AC) with ACs with their transport. The project also supports breeders, chick producers, and broiler producers, where one village, 3-5

hatching chick producers, can supply 10-12 families. HIC deploys staff to map resources and markets while following up with farmers to connect farmers to markets.

To help strengthen livelihoods and increase farmers' incomes, HIC connected the poultry project to another project focusing on vegetable supply chains. The project built the capacity of smallholder farmers on compost fertiliser processing techniques using chicken waste. This can help them widen the scope of their livelihoods besides chicken production. Smart agricultural practices are taught to farmers in the selected provinces.

Nutrition-sensitive actions

The project has promoted nutritional outcomes in the selected province by improving livelihoods through increased income and food consumption of animal-source foods, particularly poultry in households. Incomes earned from chicken sales help improve the living standards of smallholder farmers and ultimately contribute to addressing malnutrition-related issues in households. That is, they can access a variety of foods, including animal protein, with the result that children are much healthier, as noticed in the project implementation.

Under the project, there is a theme, "nutrition-health-income' that helps families reflect on their food consumption practices. Through participatory review and planning, HIC conducted a meeting with households to reflect on their child development, share and learn experiences pertaining to food consumption practices. The project also educates and encourages beneficiaries to consume chicken raised, not just focus on sales and income. In order to increase consumption of animal protein and the accompanying micronutrients.

In addition, the project supported scaling out amongst poor farmers by practising the "passing on the gift" approach. That is, farmers who have raised chickens successfully distribute chickens to other farmers.

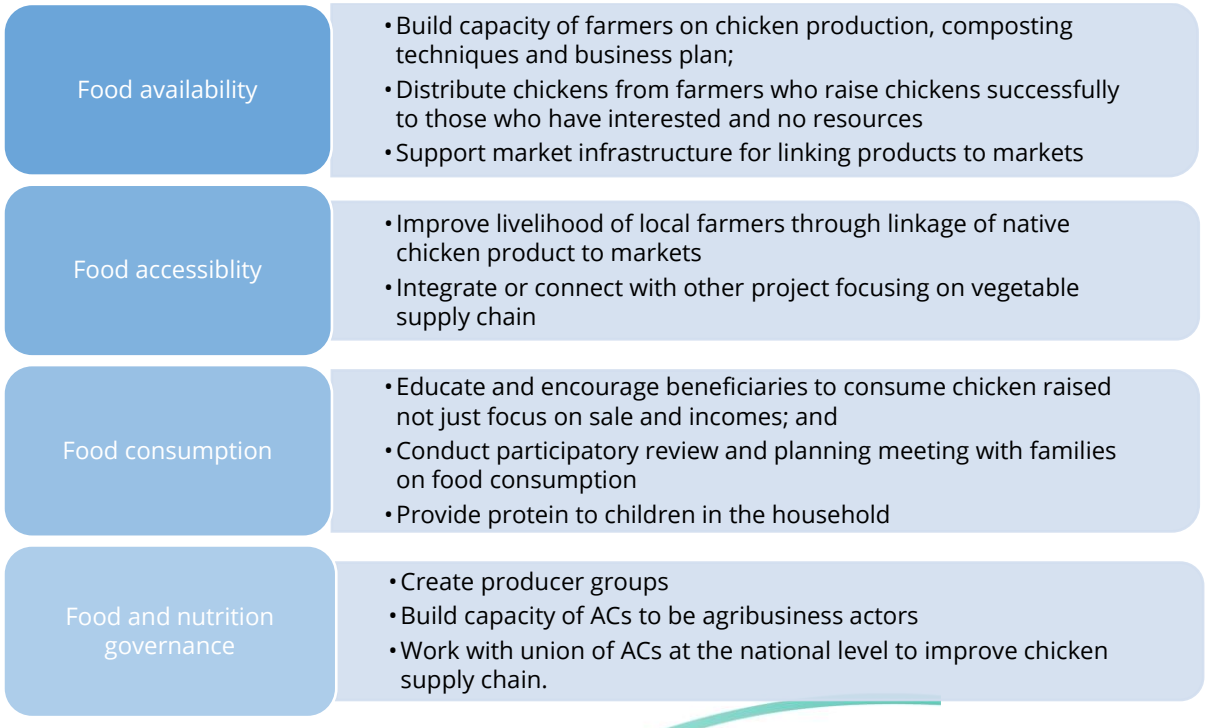

Figure 7: Key activities of the project targeting nutrition-sensitive agri-food systems

Gender and youth inclusion

The project builds the capacity of women and poor households around native chicken production techniques and provides chickens through the principle of passing on the gift. This helped improve their livelihoods and engage them in the implementation process.

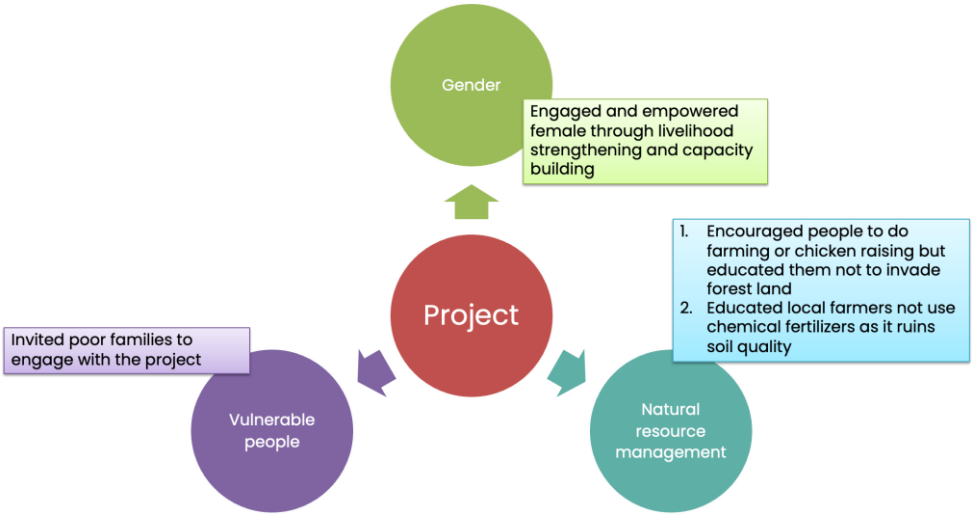

Figure 8: Cross-cutting issues in the project

In addition to women inclusion, the project addresses other cross-cutting issues such as climate change, and natural resources management. By linking up with another project, farmers received training related to climate agricultural practices, including the use of net houses for vegetable growing and compost fertiliser processing techniques. Equally important, the project educated farmers not to encroach on forest land and to appropriately use chemical fertilisers to avoid ruining soil quality. It also provided them with an alternative livelihood through chicken production or vegetable farming.

Monitoring and evaluation

For the monitoring and evaluation process, the project employed different tools for measuring and tracking project implementation to ensure that objectives are achieved. At the stage of project design, HIC set a formulation guideline, including result framework, pathways of change, and clear targets, as shown in table 2 below.

Table 2: Result framework of the project (Heifer International Cambodia, 2022a)

Result 1: Improved institutional capacity of agricultural cooperatives, Union of Agricultural	1. Strengthened leadership and governance systems of agricultural cooperatives, Union of Agriculture Cooperative
	2. Enhanced capacity of agricultural cooperatives on agribusiness and accounting system
	3. Strengthened sustainable functioning of Community Agro-Vet Entrepreneurs (CAVE)
	4. Increased agricultural cooperatives capital for scaling up agribusiness through savings and shareholder mobilization
	5. Increased the sustainable participation of youth and women in decision-making in agricultural cooperatives and agricultural value chains
Result 2: Increased access to impact capital to scale agribusiness of smallholder farmers	1. Mobilized resources and funds from Governments and funding agencies
	2. Deployed impact capital for scaling business on hatching eggs, chicks, and fattening production
Result 3: Increased production and supply of high-quality chicken meat in the market	1. Built poultry hatchery enterprises and processing plants to fulfil the market demand
	2. Ensured hatching egg producers to supply sufficient quality eggs to hatching enterprises through adoption of technologies and biosecurity
	3. 3Ensured fattening producers to supply sufficient quality ready birds to native chicken processing plants through the adoption of technologies and biosecurity
Result 4: Enhanced large market system and distribution	1. Improved market infrastructure and logistics for better distribution of agriproducts
	2. Mobilized value-based private sector partnership to promote and develop large market system for chicken meat
	3. Promoted native chicken branding and license
	4. Created and strengthened online sales platform, franchise systems and AC-owned profitable outlets

Different tools have been developed and used to track project results. A baseline study was undertaken. The project used an integrated project management system. HIC developed a self-capacity assessment tool to measure the capacity of two main actors – ACs and farmers. The collection and purchasing of agricultural commodities from members, market and financial management, and market linkages with other stakeholders are examined to assess the capacity of ACs. Farmers are assessed on production capacity and sales. The assessment is carried out on a yearly basis. The global impact monitoring is conducted annually to measure changes or progress of ACs and the communities. This tool has clear, measurable indicators. The project also has different tracking reports for his donor, including monthly plans and reports, quarterly reports, Semi-annual reports, and annual reports. Case studies on the story of the change of farmers who raise chickens successfully have been documented.

Project progress and best practices

The project has significantly strengthened chicken supply chains on the ground. On the farmer side, the project noted that farmers can work and help each other in raising chickens in the community. They also have adopted the standard of raising and selling

chicken for income. More importantly, the recent evaluation found that families have increased their income; one family could earn income up to $5,500 per year.3 The farmers connected with potential buyers and wet markets for selling chickens. Market infrastructures and transportation means (ten trucks and one motorcycle) are essential for chicken producers. To promote added value, chicken slaughterhouses play significant roles in processing and packaging. One agricultural market was constructed in the province (ALiSEA, 2022). "Passing on the Gift" is the cornerstone of the project that contributed to scaling out sustainably. Reflection meetings with farmers are also vital and need to be conducted annually to learn about food consumption practices in families. Figure 10 below shows the results that the project has made across the eleven provinces (Heifer International Cambodia, 2022a).

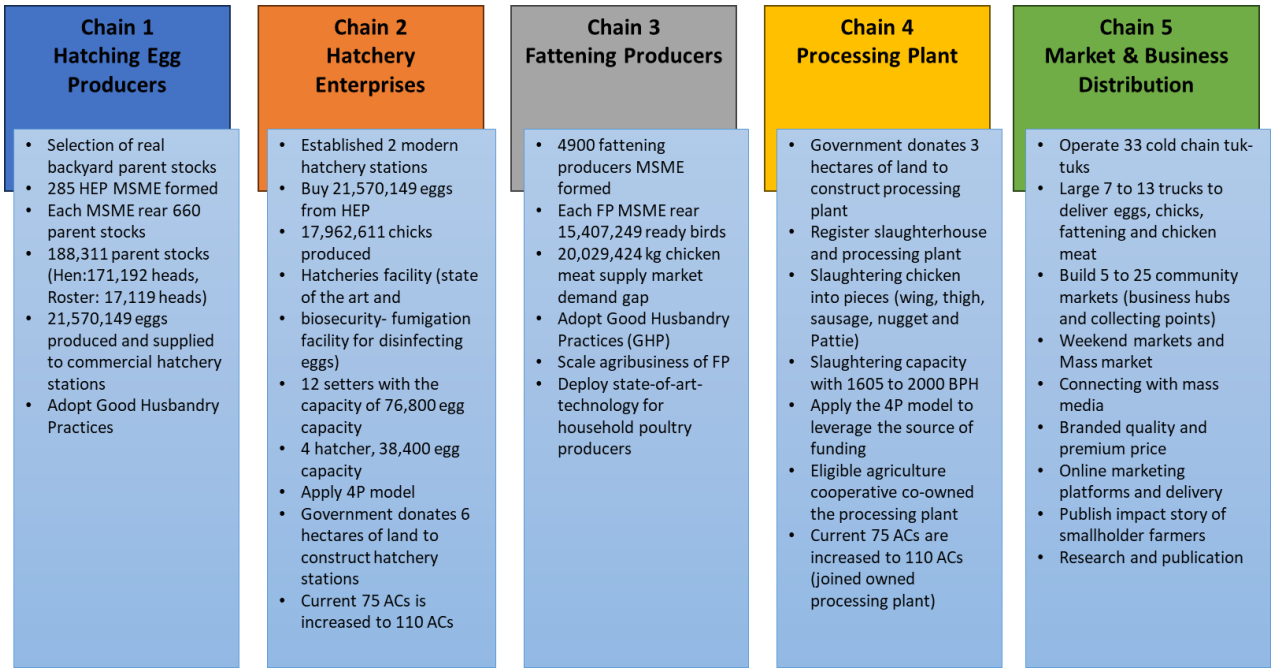

Figure 9: Results made by the project across the eleven provinces

In the project implementation, HIC determined a number of best practices that improve the production and availability of chicken and income from poultry as elaborated below:

- **Chicken distribution:** Through passing on the gift, chickens are distributed from farmers who raise chickens successfully to those who are interested but have no resources. The rationale for this approach is to ensure that other farmers benefit as well.
- **Social capital strengthening.** The project helps build the capacity of farmers to work collectively and promote sharing resources with those with fewer resources. This helps low-income families start their own businesses.
- **Contract farming.** Farmers have assured markets for their produce as the project connected them with buyers and suppliers through contract farming arrangements. Those buyers or suppliers who agreed to purchase those products provide training to farmers to ensure quality standards.

[3] Interview with the Association Director of Programs

- **Capacity building of ACs.** The project builds the capacity of ACs to deal with different stakeholders, including local authorities, the provincial department of agriculture, collectors, and private companies, to mobilise resources for enterprise development independently.

Project challenges

The project has encountered challenges in promoting nutrition-sensitive agri-food system in the target province as follows:

1. Climate change. With hotter weather, farmers find it difficult to raise chickens
2. Fluctuation of market price. The price of chicken is uncertain and fluctuates. It can range from $4.25 per 1kg, and a few days later, the price can decrease to $3.5 per 1kg.
3. A lack of trust between the private sector and ACs/farmers. Some private sectors (vendors) do not want to engage in contract farming. They are willing to buy when they need produce.
4. A lack of capital. Farmers want to expand their businesses but face a lack of capital. Accessing credit requires procedures and high-interest rates that can be challenging for local farmers.

Synthesis

Lessons and best practices for nutrition-sensitive agri-food system projects in the Mekong Delta

All projects built the capacity of vulnerable farming households and ACs to strengthen food production and improve nutrition at the local level. Apart from this, each project has different characteristics targeting nutrition-sensitive agri-food systems. The project, implemented by WorldFish, has both nutrition specific activities and nutrition-sensitive activities to cope with forms of malnutrition among children under five and food production. HKI project aims to promote food and nutrition security among vulnerable people through access to diverse nutrient rich foods at a committed price. HIC attempted to increase farmers' income by enhancing backyard chicken production and value chains.

Learning from the implementation of the projects, best practices were identified and shared. Best practices shared by WorldFish focused on improving the management of fish raising and food consumption behaviours of mothers to address forms of malnutrition at the community level. In this process, gender engagement and empowerment were conducted to enhance knowledge and skills related to fish consumption and fish-raising management.

The roles of youth in the development process have been promoted through the project of HKI. HKI has worked with youth to raise awareness about nutrition-related issues among other young adults in high school. This is expected to improve food consumption behaviours among young adolescents. At the same time, the project contributed to helping farmers gain more income through product grading (i.e. farmers classify their commodities before selling).

Enhancement of the local chicken supply chain is the key focus of the project of HIC to improve farmers' incomes. Activities, such as social capital strengthening and contract farming, have contributed to enhancing the livelihood of farmers/producers. Still, best practices in response to nutrition-sensitive agri-food systems have received less attention. The project only recently had a reflection meeting with a group of mothers to learn about their child's development (i.e., children under 5).

Gaps and opportunities for nutrition-sensitive agri-food system projects in the Mekong

Although the projects contributed to food production, availability, access, and consumption, there remained low incentives for producers to engage in agriculture, especially diversified agriculture. Market linkages are limited, and few products have been connected to the markets. Farmers in the case studies encounter similar constraints, especially market uncertainty and price fluctuation, to improve their livelihood and enhance food and nutrition security, labour limitations, production challenges, poverty, and climate change notwithstanding. Consequently, migration further weakens food production. None of the projects have the capacity to address migration-related matters. This likely requires a more integrated approach with other projects to understand and jointly reduce issues between migration and agriculture.

In addition, monitoring and evaluation of nutrition-sensitive agri-food systems interventions remains low among the projects reviewed in this study. Even though the projects contribute to enhancing nutrition outcomes, tools were used to monitor, evaluate, and track the project activities particularly focused on monitoring the number of trainings attended by participants and input distribution, and production and income indicators and less on food consumption and nutrition indicators. Only one project employed specific tools for tracking nutrition outcomes. One intervention aimed to increase farmers' incomes but did not have a tool to track whether better income contributes to strengthening nutrition outcomes. In addition, while ensuring nutrition security, the projects rely on ACs. It is noted that the capacity of ACs needs more improvement, including reporting.

Conclusion and recommendations

Conclusion

Nutrition-sensitive agri-food system interventions in this study focused largely on the capacity building of farmers to improve productivity which aims to increase food accessibility and consumption of diverse foods for improved nutritional status of target beneficiaries. The projects included capacity building on production, value addition, nutrition, as well as input distribution, such as seeds, compost fertilisers, and financial contribution, was undertaken for farmers to participate in the farm. The interventions also contributed to enhancing food production at scale. Producer groups were created and put under the management of ACs. Contract farming received attention from the projects while focusing on the capacity building of ACs to be the agri-enterprise on the ground.

Additionally, the projects deal with cross-cutting issues—women empowerment, youth inclusion, climate change adaptation and natural resource management—in the Mekong Delta region. Women, including the poor, were empowered through capacity building to improve livelihood, ensure food security, and tackle their children's development. Youth were effectively engaged in the project of HKI. More youth were reached, and their understanding of nutrition-related issues was improved. In addition, natural resource management and climate change adaptation were integrated into the capacity building of farmers and ACs.

Even though progress has been made, monitoring and evaluation of the impact of these projects on the nutritional status of the beneficiaries remains a significant gap. Capacity building of those designing and implementing the projects on food and nutrition security indicators and further study on context-specific indicators is needed.

Recommendations

Nutrition enhancement cannot be achieved when the food systems receive less or inconsistent stakeholder attention. Promoting nutrition- and gender-sensitive agri-food systems must begin from food production through to food consumption, appropriately targeting the supporting or hindering behaviours and practices. In this respect, all interventions must be connected and complementarily to each other and ensure that farmers and consumers benefit from those interventions directly or indirectly. The following are proposed recommendations to enhance nutrition-sensitive agri-food systems.

1. ***Strengthening food production****:* Profitable engagement in food production is key to improving the livelihoods of households in the Mekong, ensuring food availability and access, and supporting further participation in the food system. Therefore, interventions should consider the following actions.
    - Create producer groups under ACs to produce at a large scale to increase capacity and leverage. Where Acs producing different food groups can also be linked to enhance access to diverse foods.
    - Integrate good agricultural practices and climate adaptation into capacity building of farmers, and actors along the value chain. This requires technologies that are land, labour, cost and time-sensitive to address the existing challenges.
    - Engage the private sector across the food system in the design and development. Such that activities and farmer capacity and activities respond to and also inform quality, access, information, etc.
2. ***Enhancing supply chains to incentivise farmers or producers:*** Producers face market uncertainty and price fluctuation after harvesting. Improving the link between farmers and markets (input and outputs) can contribute to sustainable incomes and enhance accessibility of foods. The interventions can be considered the following:
    - Conduct mapping nutrient dense foods and indigenous foods and their market demand, and work to enhance the availability and demand.

- Connect farmers with market vendors, including those in the same location as producers, to also ensure that there are diverse food available within these communities.
- Promote the implementation of contract farming with producer groups/Acs and their capacity to grade and market produce accordingly.
- Work with to private sector and government to ensure food price and accessibility.

3. ***Improving nutrition knowledge in response to food consumption behaviours:*** Activities directly targeting food consumption practices were limited. One project improved producers' income, and one educated youth on the importance of a good diet. However, these have not yet clearly shown positive changes in food consumption behaviours. In this regard, awareness raising around nutrition should consider the following actions.
    - Implement behaviour change approaches to tackle unhealthy dietary patterns and bridge income and consumption for all community member categories, children, women, men, elderly, leaders, etc.
    - Engage various influential actors in the communities including village health support groups (or village health volunteers) in awareness-raising activities about food, nutrition, hygiene, and health.
    - Use various channels for awareness creation and nutrition education such as social media such as Facebook or TikTok in the dissemination.
4. **Enhancing monitoring and evaluation.** All people have a right to food. However, food consumption practices are changing significantly in the face of rapid development. Proper tracking of food sourcing and consumption practices, and nutrition outcomes would nutritional surveillance activities and intervention contextualisation and targeting. The following actions should be considered.
    - Organize a plan with food system actors and beneficiaries or target groups to respond to the project's objectives.
    - Develop tool(s) that can serve at least two purposes: (i) tracking the project activities and (ii) follow up food consumption practices.
    - Conduct reflection meetings with beneficiaries on food access and consumption.
5. ***Enhancing multisectoral collaboration to enhance nutrition outcomes.*** Knowledge and skills are needed to equip food system actors including farming households to improve production, processing, and food consumption practices. Therefore, the following actions should be considered:
    - Incorporate or join partnerships with other organisations in the target locations to address more factors of the food system. For example, income

and consumption, food markets in the communities, labour, and migration, etc.

- Mainstream or integrate critical activities of successful projects into the authority of the Provincial/Municipal Working Groups for Coordinating Food Security and Nutrition to build their ownership in addressing food and nutrition security under their mandate.
- Incorporate the strengthening of local and diverse food production into other projects/programs, such as school feeding program, through multisectoral collaborations.

References

ALiSEA. (2022). *Brief Note: Thematic session on chicken production and value chain*. Retrieved from https://ali-sea.org/wp-content/uploads/Notes-for-Thematic-of-Chicken-production-and-value-chain_ALiSEA_Eng.pdf

Alkire, S., Kanagaratnam, U., & Suppa, N. (2023). The global Multidimensional Poverty Index (MPI) 2023 country results and methodological note.

Brooks, A., & Sieu, C. (2016). *The potential of community fish refuges (CFRs) in rice field agro-ecosystems for improving food and nutrition security in the Tonle Sap region*: WorldFish.

CDC. (2023). Number of Projects by Term Of Assistant. Retrieved from http://odacambodia.com/Reports/reports_by_status.asp

Chuon, S. (2021). Food Security and Agriculture in Cambodia: Structural Changes and Impacts. *Mekong Connect, 3(2),* 36. Retrieved from https://www.kas.de/documents/264850/264899/Food+Security+in+the+Mekong+Region.pdf/1652a889-ae6e-18dd-a5f9-590b6bb0c962?version=1.1&t=1643859420138

Heifer International Cambodia. (2022a). *Knowledge Sharing on Poultry Project of National Pride in Cambodia*. Retrieved from Phnom Penh, Cambodia: https://ali-sea.org/wp-content/uploads/Heifer-Cambodia-Feb-18.22-Dr.-Nhem-Sareth_2.pdf

Heifer International Cambodia. (2022b). *REQUEST FOR PROPOSAL: Baseline Study for Poultry Project of National Pride in Cambodia (PPNP)*. Retrieved from https://bongsrey.sgp1.digitaloceanspaces.com/library/1008/downloads/62bd03a3c122d.pdf

Kim, M., Mam, K., Sean, V., Try, V., Brooks, A., Thay, S., . . . Gregory, R. (2019). Guidelines for community fish refuge-rice field fisheries system management in Cambodia. In: Cambodia Fisheries Administration.

MoH. (2018). *National Multisectoral Action Plan for the Prevention and Control of Noncommunicable Diseases 2018-2027*. Retrieved from Phnom Penh, Cambodia: https://moh.gov.kh/content/uploads/2017/05/NMAP-NCD_-13-06-2018-Signed_En.pdf

Nguyen, T. P. L., & Sean, C. (2021). Do climate uncertainties trigger farmers' out-migration in the Lower Mekong Region? *Current Research in Environmental Sustainability, 3*, 100087.

NIS. (2023). Key Figures. Retrieved from https://www.nis.gov.kh/index.php/km/

NIS, MoH, & The DHS Program. (2023). *Cambodia Demographic and Health Survey 2021-2022*. Retrieved from Phnom Penh, Cambodia: https://www.nis.gov.kh/nis/CDHS/2021-22/Cambodia_DHS2021-2022_Final_Report_EN.pdf

NIS, & MoP. (2009). *General Population Census of Cambodia 2008 National Report on Final Census Results*. Retrieved from Phnom Penh, Cambodia: https://www.nis.gov.kh/nis/census2008/GPC2008_Report_ENG.pdf

NIS, & MoP. (2015). *Census of Agriculture of the Kingdom of Cambodia 2013 National Report on Final Census Results*. Retrieved from Phnom Penh, Cambodia: https://nis.gov.kh/nis/CAC2013/Final_Report_En.pdf

NIS, & MoP. (2020). *General Population Census of the Kingdom of Cambodia 2019 National Report on Final Census Results*. Cambodia: Phnom Penh: National Institute of Statistics,

Ministry of Planning,.

NIS, & MoP. (2022). *Report of Cambodia Socio-Economic Survey 2021*. Retrieved from Phnom Penh, Cambodia: https://www.nis.gov.kh/nis/CSES/Final%20Report%20of%20Cambodia%20Socio-Economic%20Survey%202021_EN.pdf

NIS, MoP, & MoAFF. (2020). *Cambodia Inter-Censal Agriculture Survey 2019 (CIAS19) Final Report*. Retrieved from Phnom Penh, Cambodia:

NIS, & WFP. (2022). *Food and Nutrition Security Trend Analysis Report: Cambodia Socio-Economic Survey 2014-2019/20*. Retrieved from Phnom Penh, Cambodia:

Roth, V., & Tiberti, L. (2017). Economic effects of migration on the left-behind in Cambodia. *The Journal of Development Studies, 53*(11), 1787-1805.

Shi, M., HOU, L.-l., Hermann, W., HUANG, J.-k., & Mu, Y.-y. (2019). The impact of migration on the food consumption and nutrition of left-behind family members: Evidence from a minority mountainous region of southwestern China. *Journal of Integrative Agriculture, 18*(8), 1780-1792.

Shieh, J., Eam, D., Kim, M., Mam, K., Ou, P., Sean, V., . . . Freed, S. (2021). Integrating nutrition and gender into community fish refuge-rice field fishery system management: A results report.

Shieh, J., Eam, D., Sok, S., Long, H., Try, V., Sean, V., . . . Freed, S. (2021). *Integrating nutrition and gender into community fish refuge-rice field fishery system management: A practitioners's guide*. Retrieved from https://digitalarchive.worldfishcenter.org/bitstream/handle/20.500.12348/4870/d9214e70c009d77a6005ef55bee725ab.pdf?sequence2=

Un, S., Chheng, P., Tress, J., Baran, E., & Simpson, V. (2014). *Fish productivity by aquatic habitat and estimated fish production in Cambodia. Report for the project "Assessing economic and welfare values of fish in the Lower Mekong Basin."* Retrieved from Phnom Penh:

World Bank. (2023). Diabetes prevalence (% of population ages 20 to 79) - Cambodia. Retrieved from https://data.worldbank.org/indicator/SH.STA.DIAB.ZS?end=2021&locations=KH&start=2021&view=bar

World Food Programme, UNICEF, Development, C. f. A. a. R., & (CARD). (2023). *Fill the Nutrient Gap Cambodia*. Retrieved from Phnom Penh, Cambodia:

WorldFish. (2021). *Feed the Future Cambodia Rice Field Fisheries II: Project brief October 2020-September 2021*. Retrieved from https://digitalarchive.worldfishcenter.org/bitstream/handle/20.500.12348/5152/58dc661d6a5dba77cc3414b502fe152a.pdf?sequence=2&isAllowed=y

WorldFish. (2023). *Household production practices and consumption patterns in Cambodian Mekong Delta*. Phnom Penh, Cambodia.

Photo by: WorldFish

The **Initiative on Asian Mega-Deltas** (AMD) aims to create resilient, inclusive and productive deltas, which maintain socio-ecological integrity, adapt to climatic and other stressors, and support human prosperity and wellbeing, by removing systemic barriers to the scaling of transformative technologies and practices at community, national and regional levels.

Alliance Bioversity & CIAT

CIP INTERNATIONAL POTATO CENTER

CIMMYT International Maize and Wheat Improvement Center

IRRI

IWMI International Water Management Institute

WorldFish