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SUAAHARA II
GOOD NUTRITION PROGRAM

EVALUATING A DECADE OF MULTISECTORAL NUTRITION INTERVENTIONS: IMPACT EVALAUTION REPORTS

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Evaluating a Decade of Multisectoral Nutrition Interventions: Impact Evaluation Reports

DISCLAIMER:

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List of Acronyms

ANC	Antenatal Care
BCC	Behavior Change Communication
BMI	Body Mass Index
CAPI	Computer Assisted Personal Interview
CARE	Cooperative for Assistance and Relief Everywhere
CB-IMCI	Community-based Integrated Management of Childhood Illness
CSA	Climate Smart Agriculture
DAGs	Disadvantaged Groups
DD	Dietary Diversity
DGLV	Dark-green Leafy Vegetables
EHFP	Enhanced Homestead Food Production
FANTA	Food and Nutrition Technical Assistance
FAO	Food and Agriculture Organization
FCHV	Female Community Health Volunteer
FGD	Focus Group Discussion
FHI	Family Health International
FP	Family Planning
FWD	Family Welfare Division
GESI	Gender Equality and Social Inclusion
GMP	Growth Monitoring and Promotion
HAZ	Height for Age Z-score
HFIAS	Household Food Insecurity Access Scale
HFP	Homestead Food Production
HH	Household
HKI	Helen Keller International
HMG	Health Mother's Group
HMIS	Health Management Information System
HTSP	Healthy Timing and Spacing of Pregnancy
IFA	Iron and Folic Acid
IMAM	Integrated Management of Acute Malnutrition
IR	Intermediate Results
IYCF	Infant and Young Child Feeding
JHPIEGO	Johns Hopkins Program for International Education in Gynecology and Obstetrics
JTA	Junior Technical Assistance
KII	Key Informant Interview
LARC	Long-Acting Reversible Contraceptive
MAM	Moderate Acute Malnutrition
MARM	Malikaarjun Rural Municipality
MER	Monitoring, Evaluation, and Research

MIYCN	Maternal, Infant, and Young Child Nutrition
MoHP	Ministry of Health and Population
MSNP	Multi-Sectoral Nutritional Plan
MUAC	Mid-upper Arm Circumference
MUM	Mahakali Urban Municipality
NDHS	Nepal Demographic and Health Survey
NE	New ERA
NEWAH	Nepal Water for Health
NHRC	Nepal Health Research Council
NPCS	National Promotion and Consultancy Service
NTAG	Nepali Technical Assistance Group
ODK	Open Data Kit
ORS	Oral Rehydration Solution
PIP	Program Impact Pathways
PNC	Postnatal Care
PNGO	Partner Non-Government Organization
PPS	Probability Proportion to Size
RM	Rural Municipality
RUTF	Ready-to-use Therapeutic Food
SABAL	Sustainable Action for Resilience and Food Security
SAM	Severe Acute Malnutrition
SATH	Self-Applied Technique for Health
SBCC	Social and Behavior Change Communication
SD	Standard Deviation
SRM	Shaileshekhar Rural Municipality
TEM	Technical Error of Measurement
TOT	Training of Trainers
UM	Urban Municipality
USAID	United States Agency for International Development
USC	University of South Carolina
VDCs	Village Development Committee
VDCs	Village Development Committees
VMF	Village Model Farm
WASH	Water, Sanitation and Hygiene
WAZ	Weight for Age Z-score
WHO	World Health Organization
WHZ	Weight for Height Z-score

Foreword

The Government of Nepal (GoN) and international development partners recognized the importance of tackling a relatively high burden of maternal and child undernutrition and devised strategies to implement its Multisectoral Nutrition Plan (MSNP). The Suaahara – Good Nutrition program funded by the United States Agency for International Development (USAID) is one such program that supported the GoN's MSNP. Spanning through two phases over ten years, Suaahara I (2011-2016) and Suaahara II (2016-2023), aimed to reduce the high burden of maternal and child undernutrition in Nepal. Initially launched in 20 of the 75 districts, the program was later scaled-up to cover 42 of 77 districts in Nepal spanning across three distinct agroecological zones -- mountains, hills, and terai.

In Phase I (2011-2016), Suaahara was led by Save the Children International in partnerships with Helen Keller International (HKI), JHU Center for Communications Programs, JHPIEGO, Nepal Water for Health (NEWAH), the National Promotion and Consultancy Service (NPCS), and the Nepali Technical Assistance Group (NTAG). Since the beginning, *Suaahara II* deployed comprehensive monitoring, evaluation, and research systems for data driven planning, learning and adaptation, and for generating evidence through research. Thus, prior to the start of *Suaahara* interventions*,* an impact evaluation with cluster randomized quasi-experimental design was conceived. The baseline and counterfactual for program evaluation was set at the beginning of the program in 2012. The baseline data was collected by an independent external evaluation agency (New Era) from eight matching intervention and eight comparison districts thereby setting the counterfactuals.

The endline survey was originally planned at the end of Phase 1 (2016), however, due to the massive Nepal earthquake in 2015, the evaluation could not take place. Since Suaahara continued for Phase II (2016-2023) implementation, the endline evaluation was postponed to 2020. Again, due to the COVID-19 pandemic related lockdowns and movement restrictions throughout 2020, the evaluation was further delayed. Therefore, the final endline evaluation survey was conducted in 2022, by the same research agency (New Era), during the same months to minimize research bias, from the same intervention and comparison areas.

In Phase II of the program (2016-2023), Suaahara was led by Helen Keller Intl in partnership with Cooperative for Assistance and Relief Everywhere, Inc. (CARE), Family Health International 360 (FHI360), NTAG, Digital Broadcast Initiative Equal Access (DBIEA), Environmental and Public Health Organization (ENPHO), and Vijaya Development Resource Center (VDRC) and was implemented by more than 40 local NGOs and CBOs. Since any evaluation of a multisectoral program must be juxtaposed against its objectives, it is important to reflect on the objectives with which Suaahara was introduced.

Suaahara's primary aim was to reduce the prevalence of stunting, wasting, and underweight among children under 5 years of age, and to reduce the prevalence of anemia among women of reproductive age (WRA) and children 6-59 months. To achieve this goal, Suaahara adopted a multi-sectoral approach to achieve four key intermediate results (IRs):

1. Improved household nutrition, sanitation, and health behaviors;
2. Increased use of quality nutrition and health services by women and children;

3. Improved access to diverse and nutrient-rich foods by women and children; and
4. Accelerated roll-out of the MSNP through strengthened local governance.

To achieve the above four IRs, Suaahara's inputs and interventions spanned across health and family planning (FP); women's and child's nutrition; agriculture and homestead food production (HFP); and water, sanitation and hygiene (WASH). A wide range of social and behavior change communication (SBCC) interventions were used, primarily to generate demand for and access to improved services, and to motivate households to adopt optimal health, nutrition, and WASH practices. All Suaahara interventions were supported by a crosscutting theme of gender equity and social inclusion (GESI), in part by targeting women and disadvantaged groups (DAGs), and by conducting activities that addressed GESI-related barriers to optimal health, nutrition, and WASH behaviors.

Figure 1 below presents Suaahara's theory of change, and how specific components of evaluation were conceived and designed to attain a deeper understanding about the program interventions, and their pathways to impact. From the figure we can observe, there are three separate pieces of evaluation corresponding with four IRs:

1. For IR1 and IR2, a quantitative evaluation with matching case-control design was conceived. This is because over 70% of the program's key performance indicators fell under IR1 and IR2. Initially, baseline data was collected from eight matching intervention and comparison areas. However, since the program was later scaled to cover four additional comparison districts, the endline data was collected from four matching intervention and comparison areas. The overall objective of this part of the impact evaluation is to assess whether *Suaahara* reduced maternal and child undernutrition and improved household behaviors related to health, nutrition, and WASH, and whether *Suaahara* interventions improved health services. The detail description about the evaluation methods and design is available in the first part of this evaluation report.

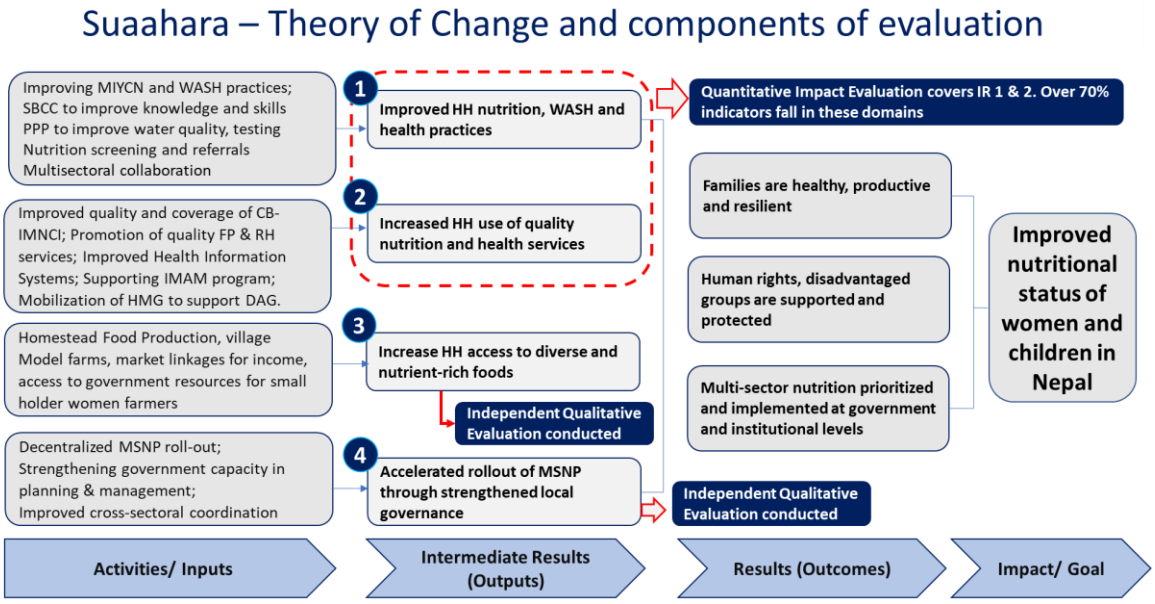

Figure 1: Suaahara – Components of Evaluation

2. For IR3, the evaluation consisted of a quantitative study and a separate qualitative study – both conducted by two separate external evaluators. The quantitative study was conducted with a small sample of a cohort of village model farmers adopting a simple pre-post research design. However, due to its smaller sample size, a separate qualitative evaluation in the same district, with some of the same village model farmers was conducted. An integral part of Suaahara's intervention was Homestead Food production (HFP) through which *Suaahara* promoted production and consumption of nutrient-rich foods towards improving household food security and nutritional outcomes among children and mothers. The interventions aimed to improve access to and consumption of diverse nutrient-rich foods by women and children. Adopting two separate methods of evaluation to assess the effectiveness of this intervention therefore has improved the robustness of the study and has helped corroborate the findings and the results. The details about this evaluation is available in the second part of this report.
3. Finally, to assess Suaahara's impact on accelerated rollout of MSNP through strengthened local governance (IR4), a separate qualitative evaluation by an independent researcher was conceived. *Suaahara* supported the Nepalese government at local, provincial, and national levels to implement Nepal's MSNP, which includes attention to the allocation and utilization of government funds for nutrition-specific and nutrition-sensitive interventions. The qualitative evaluation was aimed at assessing the effectiveness of *Suaahara II* in improving multi-sectoral coordination for implementing MSNP at the national, provincial, and municipal levels in Nepal. The qualitative evaluation aimed to answer what was the status of decentralized implementation of Nepal's MSNP? how have *Suaahara II* interventions contributed to this decentralized implementation; and what were the gaps barriers in the decentralized MSNP implementation? Details about this evaluation are available in the third part of this report.

For the reader, it is important to keep in mind that every step of the evaluation were designed in consultation with a wide range of stakeholders by a well-established Evaluation Advisory Committee that included reputed academics, researchers, and policy makers on board. All the individual pieces of evaluation had a well-established research protocol designed in consultation with various stakeholders and approved by USAID. It is also important to be mindful of the complexity in evaluating a large scale and highly complex, multisectoral nutrition program. It was therefore prudent to evaluate the IRs separately. Moreover, having separate pieces of evaluation for each program goal also provides greater flexibility in terms of research designs and approaches – such as quantitative, qualitative or mix methods; or experimental design versus simple pre-post assessments. This provides robustness and greater reliability in results and findings. The results will be used to inform and design future nutrition policies and programs in similar contexts.

What follows next are the individual pieces of evaluation of a decade of multisectoral nutrition intervention. We hope you enjoy reading them.

Executive Summary

Suaahara, funded by USAID, is a comprehensive multi-sectoral nutrition program. Implemented in two phases – Suaahara I (2011-2016) and Suaahara II (2016-2022) – the program aimed to improve maternal and child nutrition in 42 of Nepal's 77 districts. To achieve this goal, Suaahara delivered interventions in 3,353 wards/communities depending on local needs across nutrition, health and family planning, agriculture and markets, water, sanitation, and hygiene, and nutrition governance. Through these interventions, Suaahara aimed to achieve four Intermediate Results (IRs): IR1) Improved household nutrition, WASH, and health behaviors; IR2) Increased use of quality nutrition and health services by women and children; IR3) Improved access to diverse and nutrient-rich foods by women and children; and IR4) Accelerated rollout of Multi-Sector Nutrition Plan (MSNP) through strengthened local governance. Suaahara was extensively built upon government structures, community platforms and national programs to target marginalized and socially vulnerable groups.

To evaluate the impact of Suaahara, a series of independent impact evaluation studies were conducted. This report presents each of the evaluation studies separately. Each evaluation was geared towards assessing the impact of Suaahara on each of the intermediate results (IRs) as outlined in the foreword. The evaluation of IR1 observed that Suaahara improved mother's lives as manifested by improved maternal dietary diversity, weight, and rate of institutional delivery. Possibly reflecting improved prenatal conditions, the length of infants 0-5.9 months improved. Complementary feeding of infants and young children ages 6 to 23.9 months improved as reflected in improved dietary diversity, minimum acceptable diet, minimum meal frequency, and offering children more food when sick. Availability of soap and water at handwashing stations improved. These improvements in intervention districts relative to comparison districts were achieved despite substantial challenges Suaahara faced during the ten years of intervention.

The evaluation of IR2 assessed Suaahara's impact on health system strengthening. This evaluation observed that health facility workers and FCHVs in the intervention districts reported better knowledge on CB-IMCI, and GMP than in comparison districts. In terms of improved service delivery, the mean scores for service availability were higher in the intervention districts for maternal nutrition services, child nutrition services, ANC services, and FP services. Health facilities in intervention districts, compared to comparison districts, had better availability and use of reference materials and guidelines for GMP service, and counseling aids to provide nutrition assessment and GMP, FP, ANC, and PNC services. Also, a higher proportion of FCHVs from the intervention districts (36% vs. 4%) mentioned implementing the Self-Applied Technique for Health (SATH) approach in the mother groups they facilitate. In short, Suaahara interventions contributed to strengthen the health system across the two components (capacity building and improved quality service delivery).

For evaluating IR3, two separate studies were conducted – quantitative and qualitative. The quantitative study aimed to understand the role of the HFP program in improving availability,

accessibility, and consumption of diverse nutrient-rich foods in the marginalized and food insecure communities in Darchula. The evaluation observed that vegetable production diversity increased by 49% after the households received the HFP program. In addition, the likelihood of production of dark-green leafy vegetables and beans and pulses increased for the households after receiving the HFP program. Income from the sale of surplus vegetables was about USD 69 greater among the households after participating in the HFP program than before the program. Women's knowledge on child nutrition and health improved after receiving the HFP program. Women were more empowered after being enrolled into the HFP program as indicated by their improved decision-making power over the use of income and the control of productive assets in the households.

To substantiate the findings of the quantitative evaluation, a qualitative study was conducted in the same district (Darchula) with participating HFP members. This qualitative evaluation also observed that knowledge and practice related to homestead gardening improved among program participants. The knowledge HFP-participants had on consumption of nutrient-rich foods was also being translated into practice. For example, the knowledge and practice on child's dietary diversity was quite high. The evaluation found the increased availability of nutrient-rich food at both household and community levels. There was increased income among HFP households through selling of surpluses which was largely due to growing off-season vegetables. However, a few barriers that prevented from yielding better results were lack of necessary materials (building fences, constructing semi-intensive coops etc.), lack of financial resources (purchasing polyhouses, purchasing materials for fence or coops etc.), lack of skilled manpower (installing polyhouses, constructing semi-intensive coops etc.) and lack of space (constructing semi-intensive coops, land availability to undertake tunnel farming etc.). The qualitative evaluation suggests that there's need to establish strong linkages between farmers and local markets. Also, one of the key criteria for VMF selection should be based on their dedication and commitment for full engagement.

The final part of the evaluation assessed Suaahara's impact on improving multi-sector coordination for implementing the MSNP at the national, provincial, and municipal levels in Nepal. This study followed a rigorous qualitative design. The study observed that most multi-sector stakeholders understand their role in implementing the MSNP to promote nutrition in Nepal and can articulate specific programs within their sector that advances multi-sector nutrition activities. Suaahara II has positively contributed to building stakeholders' capacity and facilitating an effective implementation of the MSNP, however challenges remain. Suaahara II has been particularly effective at promoting awareness for multi-sector roles, leadership, and coordination for promoting nutrition; demanding budgets for multi-sector nutrition activities; and nutrition-related concepts and practices across sectors and government levels. Suaahara II was effective at navigating and adapting to the shift to federalism and leveraging existing networks to strengthen their implementation of nutrition-focused activities, particularly at the local level. Yet, there exist gaps and challenges that hinder the effective implementation of the MSNP. Such challenges include insufficient human resources at the provincial level to adequately coordinate implementation at the municipal level and the lack of a formal reporting mechanism to enable

provincial and municipal level stakeholders to effectively monitor progress towards goals and implementation activities. Additionally, the lack of a formal coordination mechanism hinders productive provincial and municipal level stakeholder collaboration, as does the limited capacity of available trained, technical specialists at the municipal level to design and implement activities.

The study observed that the GoN heavy relied on Suaahara II to implement nutrition-focused awareness raising and promotion activities, to strengthen capacity building, facilitate multi-sector coordination, and to enable vertical coordination. Suaahara II was effective at reaching local communities to promote nutrition, as evidenced by the differences in nutrition knowledge and awareness reported by municipal-level stakeholders in intervention and comparison areas.

Part 1 – Evaluating Intermediate Results – Improved household nutrition, WASH, and health behaviors (IR1)

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Executive Summary

Suaahara uses multiple sectors to achieve four key intermediate results: (1) improved household nutrition, sanitation, and health behaviors; (2) increased use of quality nutrition and health services by women and children; (3) improved access to diverse and nutrient-rich foods by women and children; and (4) accelerated roll-out of the MSNP through strengthened local governance. *Suaahara* interventions span health and family planning, nutrition, agriculture/homestead food production, and water, sanitation, and hygiene.

This evaluation study was designed to evaluate key measures and indicators of the impact of the *Suaahara* interventions by including comparison districts to allow us to identify, quantify, and plausibly attribute changes in outcomes to *Suaahara* interventions. The endline survey was originally planned for the end of *Suaahara I* but could not be conducted due to the Nepal earthquakes in 2015. It was then postponed to 2020, and then had to be delayed further due to the COVID-19 pandemic. Thus, the impact evaluation endline survey was conducted in 2022, in the same season and sites and by the same survey firm as was done in 2012. This report focuses on the first three key intermediate results.

Suaahara improved mother's lives as manifested by improved maternal dietary diversity, weight, and rate of institutional delivery. Possibly reflecting improved prenatal conditions, the length of infants 0-5.9 months improved. Complementary feeding of infants and young children ages 6 to 23.9 months improved as reflected in improved dietary diversity, minimum acceptable diet, minimum meal frequency, and offering children more food when sick. Availability of soap and water at handwashing stations improved. These improvements in intervention districts relative to comparison districts were demonstrated with plausible evidence despite the substantial challenges that Nepal and Suaahara faced during the ten years between baseline (2012) and endline (2022) and the limitations in statistical power that resulted from the small number of districts that then could be included in the evaluation study.

Background and Rationale

Over the last several decades, Nepal substantially reduced undernutrition in children under five years of age; yet, Nepal has among the highest prevalence of child undernutrition in the world. According to the Nepal Demographic and Health Survey 2016, about the time when *Suaahara II* began, approximately 36% of children below five years were stunted, 27% were underweight, and 10% were wasted (NDHS 2016). Food insecurity, inadequate access to nutrient-rich foods and health services, inappropriate infant and young child feeding (IYCF) practices and inappropriate water, sanitation and hygiene facilities and practices are the primary causes of malnutrition in the country. Only two-thirds of Nepalese children under the age of 6 months were exclusively breastfed. Only about 20% of children between the age of 6 and 23 months received a minimum acceptable diet. Less than half (47%) of children ate food from at least 4 of 7 food groups to attain minimum dietary diversity (DD), whereas less than 10% consumed egg (Nepal DHS 2016). Furthermore, the Nepal NDHS 2016 found that 17% of women of reproductive age (15-49 years) were underweight (BMI<18.5) and 41% of women of reproductive age were anemic. There was

also substantial variation across nutrition indicators, for example, by socio-economic status, caste/ethnicity, and agroecological zone of residency (e.g., plains, hills, or mountains).

The Government of Nepal and development partners have prioritized multi-sectoral (integrated) nutrition as a key development agenda [1]. The *Suaahara* program funded by the United States Agency for International Development (USAID) is one of the programs that supports the Government of Nepal's multi-sectoral nutrition plan (MSNP). It aimed to improve maternal and child nutrition behaviors and health services over a period of more than ten years, spanning two phases: *Suaahara I* (2011-2016) and *Suaahara II* (2016-2021, extended until 2023). Initially launched in 20 of 75 districts, the program has scaled-up to 42 of 77 districts that span across Nepal's three agroecological zones and from east to west of the country too.

Suaahara I was led by Save the Children International in partnership with Helen Keller International (Helen Keller), JHU Center for Communications Programs, JHPIEGO, Nepal Water for Health (NEWAH), the National Promotion and Consultancy Service (NPCS), and the Nepali Technical Assistance Group (NTAG). *Suaahara II* was led by Helen Keller in partnership with Cooperative for Assistance and Relief Everywhere, Inc. (CARE), Family Health International 360 (FHI360), NTAG, Digital Broadcast Initiative Equal Access, Environmental and Public Health Organization, and Vijaya Development Resource Center and was implemented by more than 40 local NGOs and community-based organizations.

Suaahara's primary aim is to reduce the prevalence of stunting, wasting, and underweight among children under 5 years of age and to reduce the prevalence of anemia among women of reproductive age and children 6-59 months of age. For this, the program uses multiple sectors to achieve four key intermediate results (IRs): (1) improved household nutrition, sanitation, and health behaviors; (2) increased use of quality nutrition and health services by women and children; (3) improved access to diverse and nutrient-rich foods by women and children; and (4) accelerated roll-out of the MSNP through strengthened local governance. *Suaahara* interventions span health and family planning (FP), nutrition, agriculture/homestead food production (HFP), and water, sanitation, and hygiene (WASH). *Suaahara* also strengthened nutrition policies and governance. Diverse social and behavior change communication (SBCC) interventions are used, primarily to generate demand for access to improved health services and to motivate households to adopt optimal health, nutrition, and WASH practices. All *Suaahara* interventions are supported by a crosscutting theme of efforts to improve gender equality and social inclusion (GESI), in part by targeting women and disadvantaged groups (DAGs) and conducting activities that address reducing GESI-related barriers to optimal health, nutrition, and WASH behaviors.

Suaahara has a comprehensive monitoring, evaluation, and research for learning plan and related data systems. Prior to the start of *Suaahara I* interventions, an impact evaluation with a quasi-experimental design was planned and baseline data collection was conducted in the 8 earliest intervention districts and 8 matched (based on agro-ecology as well as socio-economic characteristics) comparison districts in 2012. In 2014, after two years of implementation *Suaahara* conducted a mixed-methods process evaluation to assess progress in implementation and effects at the household, frontline worker, and policy levels.

In *Suaahara II,* a program-representative quantitative annual monitoring survey was carried out annually in (2017, 2018, 2019 and 2022) to monitor progress and enable assessment of *Suaahara*

II progress over time in intervention districts at the input, output, and outcome levels and assess change over time in anthropometry and hemoglobin as well (2017 and 2022 surveys). These monitoring surveys also included performance indicators at the health facility and FCHV level data in 2017 and 2020 to assess *Suaahara II* progress over time in strengthening the health system level. In addition to the quantitative surveys, several qualitative studies were conducted, including two external mid-term assessments, formative research on five key behaviors, and an assessment of municipal-government allocation and utilization of nutrition-related funds.

This evaluation study was designed to evaluate key measures and indicators of the impact of the intervention by including comparison districts to allow us to identify, quantify and plausibly attribute changes in impacts and outcomes to *Suaahara* interventions. The endline survey was originally planned for the end of *Suaahara I* but could not be conducted due to the Nepal earthquakes in 2015. It was then postponed to 2020, and then had to be delayed further due to the COVID-19 pandemic. Thus, the impact evaluation endline survey was conducted in 2022, in the same season and sites and by the same survey firm as was done in 2012.

Study Objectives and Primary and Secondary Research Questions

The overall objective of the impact evaluation is to assess whether *Suaahara* improved household behaviors related to health, nutrition, and WASH and reduced maternal and child under-nutrition as well as whether *Suaahara* interventions improved health services. The primary research questions for *Suaahara's* impact evaluations at household and health system level include:

1. What is *Suaahara*'s impact on reducing child stunting (0-23 months and 24-59 months) and improving maternal and child (6-23 months) dietary diversity?
2. What is *Suaahara*'s impact on improving health, nutrition, and WASH knowledge and skills among health workers and FCHVs?

This report focuses on the primary research questions around impacts on mothers and children. In addition to stunting and dietary diversity, the analysis in this section of the report seeks to answer the following secondary research questions:

1. What is *Suaahara*'s impact on reducing maternal underweight and anemia and child underweight, wasting, and anemia?
2. What is Suaahara's impact on reducing equity gaps in maternal underweight and anemia; child stunting, underweight, wasting, and anemia; and maternal and child dietary diversity?
3. What is *Suaahara*'s impact on improving other maternal and child health, nutrition and WASH practices (e.g., ANC, PNC, modern family planning, breastfeeding, complementary feeding, handwashing with soap and water at critical times, and appropriate drinking water treatment methods and frequency)?
4. What is *Suaahara*'s impact in reducing equity gaps in other maternal and child health and nutrition and WASH practices (e.g., ANC, PNC, modern family planning, breastfeeding, complementary feeding, handwashing with soap and water at critical times, and appropriate drinking water treatment methods and frequency)?

Study Design and Analysis

Design

The impact evaluation endline was conducted in four interventions and four comparison districts. Only a total of eight districts could be used because half of the original comparison districts became intervention districts in *Suaahara II*. The intervention districts were Sindhupalchowk, Syangja, Rupandehi, and Darchula whereas the pair-matched comparison districts in the corresponding order were Ramechhap, Tanahu, Chitwan, and Jumla. Sampling at the endline was done in 120 of the same old (i.e., pre federalism) wards as was at baseline. At baseline, 17 households were sampled per old ward for a total sample of 2,040. At the endline, 20 households were sampled from each of 40 old wards and 21 households were sampled from each of 80 old wards, for a total of 2,480. The study is registered at clinicaltrials.gov with identifier NCT05448287.

Statistical Analysis

Data were checked for the assumption of normal distribution when relevant. Multivariable linear and logistic regression models were used to assess impact with the dependent variable for each model being a primary or secondary outcome. The models were used to compare changes in each outcome from baseline to endline between the intervention and comparison arms of the study. Impact was estimated and tested using an intent-to-treat, difference-in-differences analysis in which survey (baseline vs. endline), arm (comparison vs. intervention), and their interaction were specified as fixed effects. The interaction terms provided the estimate and test of impact. That is, the interaction term estimated the difference between arms in the differences between baseline and endline. Specifically, difference-in-differences estimates were the endline minus baseline difference for the intervention districts minus the endline minus baseline difference for the comparison districts. The analyses conducted inherently adjusted for any differences at baseline through the incorporation of the baseline measure for each outcome. The analyses accounted for clustering at the district level (i.e., the unit of assignment for intervention vs. comparison), ignoring the old wards, using a cluster sandwich estimator of the standard errors with data at the household level. The sandwich estimator accounts for the clustering of households within districts. This analytic method was appropriate because districts were assigned to receive either the intervention and or comparison, and the variation among districts within arms and the number of districts determined the standard errors and p-values used for testing estimates of the difference in differences. That is, the amount of variation among districts within each arm and the number of districts are the major determinant of the standard errors and the p-values. Estimates and corresponding exact p-values are presented in line with the 2019 recommendations from leading scientists [2] and the American Statistical Association [3] to not use p-value cut-offs or the term “statistical significance.” The analyses were done for children 0-59.9 months combined and then stratified by three age categories: 0-5.9 months, 6-23.9 months, and 24-59.9 months. The sample sizes for these three age categories were at baseline 201, 702, and 1,137 and at endline 453, 1,587, and 440 at endline, respectively.

In addition to the confirmatory analyses of impact just described, we conducted exploratory stratified analyses to examine whether impact appeared to differ by social and economic variables. Socio-economic status was measured descriptively using the Equity Tool. The 2011 version was used for the baseline dataset and the 2016 version was used for endline. Due to the difference in versions, discrepancies were found between the results in baseline and endline with important differences in the socio-economic status distribution. To address this issue, for the exploratory analyses, a wealth index was constructed with principal components analysis using overlapping household asset items that were observed in the baseline and endline surveys. This wealth index was used for stratified analyses to assess any differences in the results between low wealth and high wealth households. Caste was also used as an equity measure, and stratified analyses were conducted between socially disadvantaged households (i.e., Dalits, Muslims, and disadvantaged Janajatis) and non-socially disadvantaged households (i.e., Brahmin/Chhetri, Newar, Gurung/Thakali non-dalit terai castes). The pattern of the results from these exploratory analyses are summarized, but the large number of results (i.e., about 7,500 numerical values) are not tabulated in this report.

Results

Sample Demographics

The demographic makeup of the sample of respondents at baseline and endline in the comparison and intervention districts are presented in Table 1.1.

Primary Outcomes

The results for the primary outcomes for the overall samples are listed in Table 1.2A. Tables 1.2B-D present the data disaggregated by child age groups: 0-5.9 months, 6-23.9 months, and 24-59.9 months. Descriptive data about prevalence of outcomes at baseline and endline are presented as percentages for binary outcomes and means with standard deviations for continuous outcomes. Difference-in-difference analyses were conducted to assess the strength of the differences in outcomes at baseline and endline between the intervention and comparison districts. The differences are presented in percentage points for binary outcomes and coefficients with standard errors for continuous outcomes. The outcomes with evidence of impact are highlighted in red font.

Table 1.1: Sample Demographics of Comparison and Intervention Districts at Baseline and Endline

Demographic Variables	Comparison Districts		Intervention Districts	
	Baseline (N= 1020) Mean (SD) / %	**Endline** (N=1240) Mean (SD) / %	**Baseline** (N=1020) Mean (SD) / %	**Endline** (N = 1240) Mean (SD) / %
Mothers' age (years)	26.67 (6.39)	25.84 (5.37)	26.85 (5.98)	26.22 (5.46)
Child Age (months)	27.14 (16.82)	16.63 (12.65)	28.30 (16.69)	16.96 (12.70)

0-5.9 month	10.78%	19.60%	8.92%	16.94%
6-23.9 month	34.90%	62.66%	33.92%	65.32%
24-59 month	54.31%	17.74%	57.16%	17.74%
Child sex: female	46.27%	44.68%	46.76%	46.69%
Caste/ethnicity				
Disadvantaged Group (*(Dalit, Muslim, Disadvantaged, Janajati)*	42.55%	46.05%	43.04%	42.34%
Brahmin/Chhetri	46.18%	42.98%	45.29%	39.68%
Other	11.27%	10.97%	11.67%	17.98%
Socioeconomic status (quintiles using the Equity Tool for 2011 and 2016)				
Quintile 1 (lowest)	47.84%	30.56%	22.35%	17.42%
Quintile 2	19.31%	19.73%	19.61%	17.26%
Quintile 3	15.59%	23.12%	27.75%	21.53%
Quintile 4	9.80%	21.42%	21.96%	37.66%
Quintile 5 (highest)	7.45%	5.17%	8.33%	6.13%
Agroecological zone				
Terai	25%	25%	25%	25%
Hills	50%	50%	25%	25%
Mountains	25%	25%	50%	50%

Table 1.2A: Primary Outcomes for the Overall Sample

Primary Outcomes	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Coefficient (SE) or %	p-value
Child Dietary Diversity Score (7 food groups, 6-59.9 month)	3.51 (1.13)	3.81 (0.99)	3.62 (1.12)	4.00 (1.06)	0.070 (0.14)	0.619
Maternal Dietary Diversity Score (IDDS 9 food groups)	3.80 (1.21)	3.82 (1.05)	3.94 (1.05)	4.17 (1.09)	0.211 (0.22)	0.372
Stunting (H/LAZ < -2)	43.51%	22.40%	40.47%	19.60%	0.24%	0.757
Underweight (WAZ <-2)	33.66%	14.41%	33.14%	14.19%	0.30%	0.978
Wasting (W/LAZ < -2)	8.91%	6.38%	13.75%	8.64%	-2.58%	0.629
Child Anemia (6-59.9 month)	55.32%	59.28%	48.87%	61.07%	8.24%	0.143
Maternal Underweight (BMI < 18.5)	19.82%	12.98%	25.59%	10.32%	-8.43%	<0.001
Maternal Anemia	38.54%	36.61%	37.78%	34.52%	-1.33%	0.816

Table 1.2B: Primary Outcomes for Respondents with Children Between 0-5.9 Months of Age

Primary Outcomes	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Coefficient (SE) or %	p-value

Maternal Dietary Diversity Score (IDDS 9 food groups)	3.78 (1.28)	3.88 (1.18)	4.0 (1.15)	4.29 (1.20)	0.187 (0.24)	0.470
Stunting (H/LAZ < -2)	10.48%	6.36%	10.99%	5.77%	-1.10%	0.786
Underweight (WAZ <-2)	13.89%	5.39%	16.48%	5.24%	-2.74%	0.735
Wasting (W/LAZ < -2)	6.54%	2.99%	6.98%	6.37%	2.94%	0.447
Maternal Underweight (BMI < 18.5)	8.18%	8.23%	23.08%	4.29%	-18.84%	<0.001
Maternal Anemia	50.91%	34.16%	36.26%	33.33%	13.82%	0.136

Table 1.2C: Primary Outcomes for Respondents with Children Between 6-23.9 Months of Age

Primary Outcomes	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Coefficient (SE) or %	p-value
Child Dietary Diversity Score (7 food groups)	3.40 (1.18)	3.78 (0.99)	3.27 (1.23)	3.95 (1.07)	0.294 (0.140)	0.072
Maternal Dietary Diversity Score (IDDS 9 food groups)	3.87 (1.19)	3.84 (1.01)	4.00 (1.04)	4.15 (1.07)	0.185 (0.210)	0.396
Stunting (H/LAZ < -2)	39.83%	25.19%	37.39%	21.66%	-1.09%	0.584
Underweight (WAZ <-2)	33.99%	16.54%	31.88%	15.31%	0.88%	0.981
Wasting (W/LAZ < -2)	11.83%	7.15%	17.89%	9.08%	-4.13%	0.565
Child Anemia (6-59 month)	75.93%	65.38%	65.90%	68.40%	13.05%	0.071
Maternal Underweight (BMI < 18.5)	20.85%	14.54%	28.32%	11.85%	-10.16%	0.008
Maternal Anemia	39.55%	38.35%	41.91%	34.20%	-6.51%	0.292

Table 1.2D: Primary Outcomes for Respondents with Children Between 24-59.9 Months of Age

Outcomes	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Coefficient (SE) or %	p-value
Child Dietary Diversity Score (7 food groups)	3.58 (1.09)	3.91 (1.01)	3.83 (0.99)	4.17 (0.99)	0.007 (0.15)	0.965
Maternal Dietary Diversity Score (IDDS 9 food groups)	3.77 (1.20)	3.70 (1.01)	3.90 (1.04)	4.15 (1.05)	0.310 (0.20)	0.158
Stunting (H/LAZ < -2)	52.30%	29.95%	46.97%	25.11%	0.49%	0.898
Underweight (WAZ <-2)	37.32%	16.82%	36.49%	18.64%	2.65%	0.482
Wasting (W/LAZ < -2)	7.48%	7.31%	12.31%	9.13%	-3.01%	0.422
Child Anemia (6-59 month)	42.10%	37.73%	38.77%	34.19%	-0.21%	0.916
Maternal Underweight (BMI < 18.5)	21.48%	12.73%	24.36%	10.45%	-5.16%	0.083
Maternal Anemia	35.44%	33.18%	35.57%	36.82%	3.51%	0.657

Dietary Outcomes

Child Dietary Diversity: Dietary diversity scores for children between 6 to 59.9 months of age were calculated using the child dietary diversity instrument consisting of 7 food groups: 1) grains, white roots and tubers, and plantains; 2) legumes and nuts; 3) dairy; 4) meat, poultry, and fish; 5) eggs; 6) vitamin-A rich fruits and vegetables; 7) other fruits and vegetables. These scores were computed based on the dietary recall data collected in the mothers' survey. Child dietary diversity in the 6-23.9 months age group improved more in intervention districts than comparison districts by 0.294 food groups (p=0.072).

Maternal Dietary Diversity: Dietary diversity scores for mothers were calculated using the Individual Dietary Diversity Score (IDDS) instrument that categorizes diets into nine categories: 1) starchy staples; 2) beans, lentils, and nuts; 3) dairy; 4) meat and poultry; 5) eggs; 6) fish; 7) dark green leafy vegetables 8) vitamin-A rich fruits and vegetables; 9) other fruits and vegetables. These scores were computed based on the dietary recall data collected in the mothers' survey. Minor improvements were noted in the maternal dietary diversity scores that were not different between intervention and comparison districts.

Anthropometric Outcomes: The data collection instruments included anthropometric measurements of all the children and mothers in the evaluation samples. The measures included hemoglobin levels for mothers and children, weight of mothers, and weight and height for children. Each measurement was taken twice, and the average of the measurements was calculated for each indicator.

Stunting: Child stunting was calculated using height for age z scores (HAZ). Children were considered stunted if their HAZ was lower than -2. For the overall sample, there was a reduction in stunting between baseline and endline of about 21 percentage points for both intervention and comparison districts, but there was no difference in this reduction between the intervention and comparison districts.

Underweight: Child underweight was calculated using weight for age z scores (WAZ). Children were considered underweight if their WAZ was lower than -2. For the overall sample, there was a reduction of about 19 percentage points between baseline and endline for both intervention and comparison districts, but there was no difference in this reduction between the intervention and comparison districts.

Wasting: Child wasting was calculated using weight for height z scores (WHZ). Children were considered underweight if their WHZ was lower than -2. For the overall sample, there was a reduction between baseline and endline for both intervention and comparison districts but little difference in this reduction between the intervention and comparison districts**.**

Child Anemia: Child anemia was calculated based on children's hemoglobin levels adjusted for altitude and was defined as hemoglobin levels <11 g/dl. Children under the age of 6 months were excluded from this sample. Child anemia increased by 13.05 percentage points (p=0.071) in the intervention districts relative to the comparison districts for children 6-23.9 months of age.

Maternal underweight: Maternal underweight was defined by BMI values <18.5. The difference in differences for maternal underweight in the overall sample was -8.45 percentage

points (p<0.001), meaning that the intervention districts had reduced maternal underweight by 8.45 percentage points more than the comparison districts. This effect was consistent across mothers of the three child age categories, with the largest difference-in-difference being -18.84 percentage points among mothers of children aged 0-5.9 months.

Maternal Anemia: Maternal anemia was calculated based on mothers' hemoglobin levels adjusted for altitude and pregnancy. For pregnant women, anemia was defined as hemoglobin levels <11 g/dl and for non-pregnant women, anemia was defined as hemoglobin levels <12 g/dl. There were no differences between baseline and endline between the intervention and comparison districts.

Secondary Outcomes: Dietary Diversity & Anthropometry

The results for the secondary outcomes around dietary diversity and anthropometry for the overall sample are listed in Table 3A. Tables 3B-D present the data disaggregated by child ages and are separated into the following age groups: 0-5.9 months, 6-23.9 months, and 24-59.9 months. Descriptive data about prevalence of outcomes at baseline and endline are presented as percentages for binary outcomes and means with standard deviations for continuous outcomes. Difference-in-difference analyses were conducted to assess the differences for each outcome at baseline and endline between the intervention and comparison districts. The differences are presented in percentage points for binary outcomes and coefficients with standard errors for continuous outcomes, and p-values are noted for all. The outcomes with evidence of impact are highlighted in red font.

Table 1.3A: Secondary Outcomes: Dietary Diversity & Anthropometry for the Overall Sample

Secondary Outcomes: Minimum Dietary Diversity & Anthropometry	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Coefficient (SE) or %	p-value
Child Minimum Dietary Diversity (≥ 4 of 7 groups for 6 – 59.9 month)	49.01%	62.59%	56.51%	70.00%	-0.09%	0.882
Maternal Minimum Dietary Diversity (≥ 5 of 9 groups)	26.76%	23.47%	28.04%	36.77%	12.02%	0.167
HAZ	-1.75 (1.31)	-0.93 (1.39)	-1.75 (1.12)	-0.81 (1.41)	0.125 (0.132)	0.375
WAZ	-1.53 (1.06)	-0.73 (1.23)	-1.64 (1.05)	-0.80 (1.19)	0.039 (0.133)	0.780
WHZ	-0.73 (1.00)	0.32 (1.21)	-0.90 (1.04)	-0.56 (1.14)	-0.071 (0.155)	0.662
Maternal BMI	20.68 (2.70)	22.40 (6.70)	20.45 (2.88)	22.73 (3.77)	0.571 (0.546)	0.330
Maternal Hemoglobin	12.25 (1.59)	12.45 (3.71)	12.33 (1.57)	12.81 (6.17)	0.268 (0.354)	0.474
Child Hemoglobin	10.50 (1.98)	11.67 (10.09)	10.96 (1.41)	11.44 (9.19)	-0.694 (0.458)	0.174

Table 1.3B: Secondary Outcomes: Dietary Diversity & Anthropometry for Respondents with Children Between 0-5.9 months of age

Secondary Outcomes: Dietary Diversity & Anthropometry	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Coefficient (SE) or %	p-value
Maternal Minimum Dietary Diversity (≥ 5 of 9 groups)	30.91%	25.51%	32.97%	40.48%	12.9	0.209
HAZ	-0.45 (1.28)	-0.11 (1.29)	-0.77 (1.14)	0.33 (1.51)	0.761 (0.18)	0.004
WAZ	0.70 (1.12)	-0.06 (1.11)	-1.00 (1.15)	-0.01 (1.20)	0.355 (0.255)	0.206
WHZ	0.38 (1.11)	0.03 (1.18)	-0.46 (1.20)	-0.37 (1.25)	-0.313 (0.310)	0.347
Maternal BMI	21.24 (2.27)	23.23 (12.85)	20.87 (2.92)	23.25 (3.43)	0.391 (1.169)	0.748
Maternal Hemoglobin	11.98 (1.59)	12.75 (5.65)	12.49 (1.58)	12.34 (1.44)	-0.913 (0.549)	0.140

Table 1.3C: Secondary Outcomes: Dietary Diversity & Anthropometry for Respondents with Children Between 6-23.9 Months of Age

Secondary Outcomes: Dietary Diversity & Anthropometry	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Coefficient (SE) or %	p-value
Child Minimum Dietary Diversity (≥ 4 of 7 groups)	46.07%	61.90%	43.06%	68.40%	9.51%	0.028
Maternal Minimum Dietary Diversity (≥ 5 of 9 groups)	28.09%	23.29%	30.06%	35.93%	10.67%	0.258
HAZ	-1.67 (1.24)	-1.05 (1.38)	-1.68 (1.13)	-0.97 (1.30)	0.090 (0.148)	0.562
WAZ	-1.57 (1.00)	-0.81 (1.23)	-1.57 (1.16)	-0.90 (1.16)	-0.090 (0.146)	0.557
WHZ	-0.95 (0.95)	-0.37 (1.20)	-0.93 (1.18)	-0.58 (1.13)	-0.223 (0.173)	0.238
Maternal BMI	20.70 (2.93)	22.09 (3.96)	20.24 (2.78)	22.53 (3.70)	0.903 (0.531)	0.133
Maternal Hemoglobin	12.13 (1.66)	12.39 (3.38)	12.22 (1.42)	13.04 (7.54)	0.565 (0.394)	0.195
Child Hemoglobin	9.85 (1.90)	11.45 (10.06)	10.44 (1.32)	11.36 (9.87)	-0.679 (0.512)	0.226

Table 1.3D: Secondary Outcomes: Dietary Diversity & Anthropometry for Respondents with Children Between 24-59.9 Months of Age

Outcomes	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Coefficient (SE) or %	p-value
Child Minimum Dietary Diversity (≥ 4 of 7 groups)	50.90%	65.00%	64.49%	75.91%	-2.68%	0.914
Maternal Minimum Dietary Diversity (≥ 5 of 9 groups)	25.09%	21.82%	26.07%	36.36%	13.56%	0.090
HAZ	-2.06 (1.19)	-1.41 (1.12)	-1.96 (1.02)	-1.29 (1.16)	0.011 (0.161)	0.950
WAZ	-1.66 (1.00)	-1.18 (1.04)	1.78 (0.91)	-1.18 (0.98)	0.110 (0.083)	0.230
WHZ	-0.66 (0.99)	-0.53 (1.21)	-0.94 (0.91)	-0.68 (1.06)	0.136 (0.125)	0.310
Maternal BMI	20.56 (2.61)	22.55 (3.85)	20.50 (2.93)	22.95 (4.24)	0.461 (0.604)	0.471
Maternal Hemoglobin	12.38 (1.53)	12.34 (1.35)	12.38 (1.65)	12.37 (1.57)	0.026 (0.269)	0.925
Child Hemoglobin	10.92 (1.93)	12.46 (10.17)	11.27 (1.37)	11.72 (6.02)	-1.09 (0.751)	0.191

Child Minimum Dietary Diversity: Child minimum dietary diversity is defined by children eating foods from at least 4 of the 7 food groups that make up the child dietary diversity score. This was calculated for children aged 6-59.9 months in the sample. Among children aged 6-23.9 months, we see evidence of differences in the prevalence of meeting minimum dietary diversity between the intervention and comparison districts at baseline and endline, with a 9.51 percentage point greater improvement in the intervention districts (p=0.028).

Maternal Minimum Dietary Diversity: Minimum dietary diversity for mothers was measured using the IDDS maternal dietary diversity score and is defined as intake of foods from at least 5 of the 9 food groups. In the overall sample, we observe more improvements in the intervention districts compared to the comparison districts, with the Intervention districts improving 13.56 percentage points more than the comparison districts (p=0.090) in the 24-59.9 age group.

Child HAZ: There were large differences in HAZ scores between baseline and endline in both intervention and comparison districts. For the overall sample, there was a reduction of 0.94 z-scores in the intervention districts and 0.82 z-scores in the comparison districts. For children aged 0-6 months, HAZ improved 0.761 z-scores more in the intervention districts than in the comparison districts (p=0.004).

Child WAZ: There were large differences in WAZ scores between baseline and endline in both intervention and comparison districts. For the overall sample, there was no substantial difference in the reduction between the intervention and comparison districts; the intervention districts had a reduction of about 0.84 z-scores, and the comparison districts had a reduction of about 0.80 z-scores.

Child WHZ: There were large differences in WHZ scores between baseline and endline in both intervention and comparison districts. For the overall sample, there was no substantial difference in the reduction between the intervention and comparison districts; the intervention districts had a reduction of about 0.34 z-scores, and the comparison districts had a reduction of about 0.41 z-scores.

Maternal BMI: There were minor differences in maternal BMI between baseline and endline in both intervention and comparison districts. For the overall sample, there was no substantial difference between the intervention and comparison districts. The intervention districts had an average increased BMI of about 2.28 units, and the comparison districts had an average increased BMI of about 1.72 units.

Maternal Hemoglobin: There were minor differences in maternal hemoglobin between baseline and endline in both intervention and comparison districts. For the overall sample, there was no substantial difference between the intervention and comparison districts; the intervention districts had an average increased hemoglobin of about 0.48 g/dL, and the comparison districts had an average increased hemoglobin level of about 0.20 g/dL.

Child Hemoglobin: There were minor differences in child hemoglobin between baseline and endline in both intervention and comparison districts. For the overall sample, there was no substantial difference between the intervention and comparison districts; the intervention districts had an average increased hemoglobin of about 0.48 g/dL, and the comparison districts had an average increased hemoglobin level of about 1.17 g/dL.

Secondary Outcomes: Child Nutrition Practices

The results for the secondary outcomes around child nutrition practices for the overall samples are listed in Table 4A. Tables 4B-D present the data disaggregated by child age groups: 0-5.9 months, 6-23.9 months, and 24-59.9 months. Descriptive data about prevalence of outcomes at baseline and endline are presented as percentages for binary outcomes and means with standard deviations for continuous outcomes. Difference-in-difference analyses were conducted to assess the strength of the variations between outcomes at baseline and endline between the comparison and intervention districts. The differences are presented in percentage points for binary outcomes and coefficients with standard errors for continuous outcomes, and p-values are noted for all. The outcomes with evidence of effects are highlighted in red font.

Table 1.4A: Secondary Outcomes: Child Nutrition Practices for the Overall Sample

Secondary Outcomes: Child Nutrition Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline Mean (SD) / %	**Endline** Mean (SD) / %	**Baseline** Mean (SD) / %	**Endline** Mean (SD) / %	%	p-value
Exclusive breastfeeding (0-5.9mo only)	57.27%	57.61%	50.00%	60.00%	9.66%	0.422
Early initiation of breastfeeding (0-24mo only)	46.57%	67.00%	35.01%	67.33%	11.89%	0.307

Introduction of complementary feeding (6-23.9mo only)	18.70%	28.48%	12.12%	32.20%	10.30%	0.154
Sick child feeding (among children who had illness)	25.07%	31.38%	15.56%	32.44%	10.57%	0.025
Minimum meal frequency (6-23.9 month only)	78.93%	80.95%	66.76%	83.83%	15.05%	0.004
Minimum acceptable diet (6-23.9 month only)	39.33%	48.13%	32.28%	55.43%	14.35%	0.022

Table 1.4B: Secondary Outcomes: Child Nutrition Practices for Respondents with Children Between 0-5.9 Months of Age

Secondary Outcomes: Child Nutrition Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	%	p-value
Exclusive breastfeeding	57.27%	57.61%	50.00%	60.00%	9.66%	0.422
Early initiation of breastfeeding	49.09%	68.05%	29.67%	64.90%	16.27%	0.190
Sick child feeding (among children who had illness)	28.95%	24.39%	16.13%	26.67%	15.10%	0.281

Table 1.4C: Secondary Outcomes: Child Nutrition Practices for Respondents with Children Between 6-23.9 Months of Age

Secondary Outcomes: Child Nutrition Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	%	p-value
Early initiation of breastfeeding	45.79%	66.67%	36.42%	67.96%	10.66%	0.366
Introduction of complementary feeding	18.70%	28.48%	12.12%	32.20%	10.30%	0.154
Sick child feeding (among children who had illness)	28.95%	34.39%	12.59%	34.77%	16.74%	0.002
Minimum meal frequency	78.93%	80.95%	66.76%	83.83%	15.05%	0.004
Minimum acceptable diet	39.33%	48.13%	32.28%	55.43%	14.35%	0.022

Table 1.4D: Secondary Outcomes: Child Nutrition Practices for Respondents with Children Between 24-59.9 Months of Age

Secondary Outcomes: Child Nutrition Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	%	p-value
Sick child feeding (among children who had illness)	21.77%	26.83%	17.92%	26.15%	3.17%	0.698

Exclusive breastfeeding: Exclusive breastfeeding was defined as feeding the infant only breast milk until the child is 6 months of age and was measured only among children in the sample who were younger than six months of age. Descriptively, a moderate increase (10%) in the prevalence of children being exclusively breastfed was observed in the intervention districts from baseline to endline, while this prevalence remained almost identical at baseline and endline in the comparison districts. The p-value for the difference in differences between intervention and comparison districts was 0.422, and therefore there was no evidence of impact.

Early initiation of breastfeeding: This outcome was defined as the initiation of breastfeeding within one hour of birth and was measured only among children in the sample who were younger than 24 months of age. For the overall sample, there was an increase of about 20 percentage points for the comparison district and 32 percentage points for the comparison district between baseline and endline. The difference in differences, however, had p-value of 0.307.

Introduction to complementary feeding: This outcome was defined by the introduction of all types of complementary foods during the appropriate age window of 6 to 8.9 months. For the overall sample, there was an increase of about 10 percentage points for the comparison district and 20 percentage points for the comparison district. The difference in differences, however, had a p-value of 0.154.

Sick child feeding: This outcome was defined as offering more food than usual during the child's illness and was only measured among children who had an illness in the two weeks prior to data collection. The difference in differences for the overall sample was 10.57 percentage points (p=0.025), providing plausible evidence of the positive impact of Suaahara interventions on this outcome. This effect was largest for children aged 6-23.9 months with a difference in differences of 16.74 percentage points (p=0.002).

Minimum meal frequency: Minimum meal frequency was defined as consuming solid, semi-solid, or soft foods at least the minimum number of times in the previous day and was assessed only for children aged 6 to 24 months. Within this sample, the difference in differences for having an appropriate minimum meal frequency was 15.05 percentage points (p=0.004), which provides plausible evidence of the positive impact of Suaahara interventions on this outcome.

Minimum acceptable diet: Minimum acceptable diet, consuming minimum dietary diversity and minimum meal frequency in the previous day, was assessed only for children aged 6 to 23.9 months. Within this sample, the difference in differences for having an appropriate minimum

acceptable diet was 14.35 percentage points (p=0.022), which provides plausible evidence of the positive impact of *Suaahara* interventions on this outcome.

Secondary Outcomes: Health & WASH Practices

The results for the secondary outcomes around health and WASH practices for the overall sample are listed in Table 5A. Tables 5B-D present the data disaggregated by child age groups: 0-5.9 months, 6-23.9 months, and 24-59.9 months. Descriptive data about prevalence of outcomes at baseline and endline are presented as percentages for binary outcomes and means with standard deviations for continuous outcomes. Difference-in-difference analyses were conducted to assess the strength of the variations between outcomes at baseline and endline between the comparison and intervention districts. The differences are presented in percentage points for binary outcomes and coefficients with standard errors for continuous outcomes, and p-values are noted for all. The outcomes with evidence of effects are highlighted in red font.

Table 1.5A: Secondary Outcomes: Health & WASH Practices for the Overall Sample

Secondary Outcomes: Health & WASH Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline Mean (SD) / %	Endline Mean (SD) / %	Baseline Mean (SD) / %	Endline Mean (SD) / %	%	p-value
Adequate antenatal care (0-23.9 month only)	62.88%	85.82%	69.34%	91.94%	-0.34%	0.485
Adequate postnatal care (0-23.9 month only)	14.38%	24.31%	17.16%	34.71%	7.62%	0.300
IFA supplementation (0-23.9 month only)	38.63%	56.15%	35.93%	58.45%	5.00%	0.557
Modern family planning	33.57%	35.40%	38.96%	35.81%	-4.98%	0.405
Institutional delivery (0-23.9 month only)	48.93%	81.18%	42.76%	90.49%	15.48%	0.074
Handwashing station with soap and water	40.51%	80.08%	34.77%	88.29%	13.95%	0.067
Handwashing at 6 critical times (mothers)	N/A	23.31%	N/A	23.06%	-0.25%	0.980
Appropriate drinking water treatment methods (observation)	5.69%	21.13%	5.78%	28.23%	7.01%	0.371

Table 1.5B: Secondary Outcomes: Health & WASH Practices for Respondents with Children Between 0-5.9 Months of Age

Secondary Outcomes: Health & WASH Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline Mean (SD) / %	Endline Mean (SD) / %	Baseline Mean (SD) / %	Endline Mean (SD) / %	%	p-value
Adequate antenatal care	59.09%	85.96%	72.53%	93.20%	-6.20%	0.718
Adequate postnatal care	13.64%	25.51%	20.88%	39.05%	6.30%	0.834
IFA supplementation	36.36%	52.67%	32.97%	58.85%	9.57%	0.337
Modern family planning	1.82%	11.93%	14.29%	17.14%	-7.26%	0.051
Institutional delivery	53.64%	85.19%	57.47%	90.95%	1.93%	0.487

Handwashing station with soap and water	37.61%	79.25%	31.11%	87.62%	14.87%	0.034
Handwashing at 6 critical times (mothers)	N/A	20.58%	N/A	19.52%	-1.06%	0.910
Appropriate drinking water treatment methods (observation)	4.55%	22.22%	5.49%	25.71%	3.49%	0.990

Table 1.5C: Secondary Outcomes: Health & WASH Practices for Respondents with Children Between 6-23.9 Months of Age

Secondary Outcomes: Health & WASH Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	%	p-value
Adequate antenatal care	64.04%	85.77%	68.50%	91.61%	1.38%	0.429
Adequate postnatal care	14.61%	23.94%	16.18%	33.58%	8.07%	0.210
IFA supplementation	39.33%	57.24%	36.71%	58.34%	3.72%	0.655
Modern family planning	27.91%	40.28%	32.93%	39.88%	-5.42%	0.294
Institutional delivery	47.47%	79.92%	39.00%	90.37%	18.92%	0.048
Handwashing station with soap and water	43.94%	80.00%	36.71%	88.86%	16.09%	0.081
Handwashing at 6 critical times (mothers)	N/A	24.58%	N/A	23.09%	-1.49%	0.870
Appropriate drinking water treatment methods (observation)	5.34%	20.85%	8.09%	30.00%	9.15%	0.911

Table 1.5D: Secondary Outcomes: Health & WASH Practices for Respondents with Children Between 24-59.9 Months of Age

Secondary Outcomes: Health & WASH Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	%	p-value
Modern family planning	44.10%	44.09%	46.77%	38.64%	-8.12%	0.391
Handwashing station with soap and water	38.88%	81.28%	34.19%	86.82%	10.23%	0.049
Handwashing at 6 critical times (mothers)	N/A	21.82%	N/A	26.36%	4.54%	0.699
Appropriate drinking water treatment methods (observation)	6.14%	20.91%	4.46%	24.09%	3.18%	0.351

Adequate antennal care (ANC): Adequate ANC was defined as a mother having at least four or more antenatal care visits during pregnancy prior to delivery. For the overall sample of mothers with children 0 to 23.9 months, there was an increase of about 23 percentage points for both intervention and comparison districts between baseline and endline, but there was no difference in this increase between the intervention and comparison districts.

Adequate postnatal care (PNC): Adequate PNC was defined as a mother having at least three postnatal care visits in the week after delivery. For the overall sample of mothers with children 0 to 23.9 months, there was an increase of about 10 percentage points for the comparison districts and 18 percentage points for the intervention districts between baseline and endline. The p-value for the difference between intervention and comparison districts was 0.300, so no evidence of impact.

Iron Folic Acid (IFA) supplementation: Appropriate IFA was defined as a mother taking IFA supplementation tablets for at least 180 days during her pregnancy. For the overall sample, there was an increase of about 18 percentage points for the comparison district and 23 percentage points for the intervention comparison district between baseline and endline. The p-value for the difference between intervention and comparison districts was 0.557, so no evidence of impact.

Modern family planning: The use of modern family planning methods was defined as using female sterilization, male sterilization, IUCD, implants, injectable, pills, or condoms. Among mothers of children aged 0-5.9 months, the difference in differences was -7.26 percentage points (p=0.051), indicating a reduction in the use of modern family planning among mothers with babies in this age group in the intervention districts relative to the comparison districts.

Institutional delivery: This outcome was defined as the delivery of the child at a health facility. The increase in institutional delivery was larger in the intervention districts, with a difference in differences for the overall sample of 15.5 percentage points (p=0.074); among mothers of children aged 6-23.9 months the difference-in-differences result was even larger. 18.92 percentage points (p=0.048). That is, the increase in institutional delivery was larger in the intervention than comparison districts.

Handwashing stations with soap and water: This outcome was measured by observation. The availability of handwashing stations with soap and water doubled or more in both the comparison and intervention districts. The difference was larger in the intervention district, and the difference in differences for the overall sample was 13.95 percentage points (p=0.067). The difference in differences was 14.87 percentage points (p=0.034) for mothers of children aged 0-5.9 months, 16.09 percentage points (p=0.081) for mothers of children aged 6-23.9 months, and 10.23 percentage points (p=0.049) for mothers of children aged 24-59.9 months. That is, the increase in handwashing stations with soap and water was larger in the intervention than comparison districts.

Handwashing at 6 critical times: This outcome was measured as mothers' practicing handwashing at six critical times. The baseline survey did not have data around handwashing at all critical times; at endline, there was no difference between the comparison and intervention districts, with about 1 in 4 mothers in the sample practicing handwashing at 6 critical times.

Appropriate drinking water treatment methods at all times: Appropriate treatment methods for drinking water were defined as boiling, adding bleach or chlorine, using a water filter (ceramic, sand, and composite), or using solar disinfection (Sodis method); this was measured as a household always engaging in these appropriate methods, without the use of any inappropriate treatment methods. This practice increased from baseline to endline in both the comparison and intervention districts, but the difference in differences had p-value of 0.371.

Secondary Outcomes: Knowledge of Nutrition, Health, and WASH Practices

The results for the secondary outcomes around maternal knowledge of nutrition, health, and WASH practices for the overall samples are listed in Table 6A. Tables 6B-D present the data disaggregated by child ages and are separated into the following groups: children between the ages of 0-5.9 months, 6-23.9 months, and 24-59.9 months. Descriptive data about prevalence of outcomes at baseline and endline are presented as percentages for binary outcomes and means with standard deviations for continuous outcomes. Difference-in-difference analyses were conducted to assess the strength of the variations between outcomes at baseline and endline between the comparison and intervention districts. The differences are presented in percentage points for binary outcomes and coefficients with standard errors for continuous outcomes, and p-values are noted for all. The outcomes with evidence of effects are highlighted in red font.

Table 1.6A: Secondary Outcomes: Knowledge of Nutrition, Health and WASH Practices for the Overall Sample

Secondary Outcomes: Knowledge of Nutrition, Health, and WASH Practices	**Comparison Districts**		**Intervention Districts**		**Difference in differences**	
	Baseline Mean (SD) / %	**Endline** Mean (SD) / %	**Baseline** Mean (SD) / %	**Endline** Mean (SD) / %	%	p-value
Knowledge of key nutrition/IYCF behaviors (among mothers)						
Exclusive breastfeeding	N/A	73.23%	N/A	86.61%	13.38%	0.014
Early initiation of breastfeeding	N/A	85.65%	N/A	85.97%	0.32%	0.948
Introduction of complementary feeding	21.67%	49.35%	32.65%	51.69%	-8.64%	0.476
Sick child feeding (offering more food during illness)	37.65%	44.52%	39.02%	55.89%	10.00%	0.488
Knowledge of key health behaviors (among mothers)						
Adequate antenatal care	N/A	66.29%	N/A	74.35%	8.06%	0.266
Adequate postnatal care	N/A	20.73%	N/A	25.40%	4.67%	0.397
IFA supplementation	N/A	75.97%	N/A	80.48%	4.51%	0.405
Modern family planning	N/A	98.71%	N/A	99.35%	0.64%	0.188
Knowledge of key WASH behaviors (among mothers)						
Handwashing at 6 critical times	N/A	6.05%	N/A	12.98%	6.93%	0.094
Appropriate drinking water treatment methods	N/A	94.52%	N/A	97.82%	3.30%	0.214

Table 1.6B: Secondary Outcomes: Knowledge of Nutrition, Health, and WASH Practices for Respondents with Children Between 0-5.9 Months of Age

Secondary Outcomes: Knowledge of Nutrition, Health, and WASH Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	%	p-value
Knowledge of key nutrition/IYCF behaviors (among mothers)						
Exclusive breastfeeding	N/A	75.31%	N/A	85.71%	10.40%	0.278
Early initiation of breastfeeding	N/A	87.65%	N/A	85.71%	-1.94%	0.745
Introduction of complementary feeding	21.82%	48.97%	37.36%	48.10%	-16.41%	0.296
Sick child feeding (offering more food during illness)	38.18%	48.97%	43.96%	54.76%	0.01%	0.993
Knowledge of key health behaviors (among mothers)						
Adequate antenatal care	N/A	68.72%	N/A	72.86%	4.14%	0.139
Adequate postnatal care	N/A	22.63%	N/A	25.24%	2.61%	0.571
IFA supplementation	N/A	77.37%	N/A	81.90%	4.53%	0.443
Modern family planning	N/A	98.35%	N/A	100%	1.65%	--
Knowledge of key WASH behaviors (among mothers)						
Handwashing at 6 critical times	N/A	5.35%	N/A	10.95%	5.60%	0.176
Appropriate drinking water treatment methods	N/A	97.12%	N/A	96.67%	-0.45%	0.876

Table 1.6C: Secondary Outcomes: Knowledge of Nutrition, Health, and WASH Practices for Respondents with Children Between 6-23.9 Months of Age

Secondary Outcomes: Knowledge of Nutrition, Health, and WASH Practices	Comparison Districts		Intervention Districts		Difference in differences	
	Baseline	Endline	Baseline	Endline		
	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	Mean (SD) / %	%	p-value
Knowledge of key nutrition/IYCF behaviors (among mothers)						
Exclusive breastfeeding	N/A	72.07%	N/A	85.80%	13.73%	0.007
Early initiation of breastfeeding	N/A	85.59%	N/A	87.16%	1.57%	0.719
Introduction of complementary feeding	22.75%	50.84%	36.99%	52.59%	-12.49%	0.374
Sick child feeding (offering more food during illness)	39.61%	44.02%	54.76%	56.42%	-2.75%	0.445
Knowledge of key health behaviors (among mothers)						

Adequate antenatal care	N/A	66.67%	N/A	74.81%	8.14%	0.196
Adequate postnatal care	N/A	20.59%	N/A	26.91%	6.32%	0.277
IFA supplementation	N/A	77.61%	N/A	82.22%	4.61%	0.411
Modern family planning	N/A	98.71%	N/A	99.26%	0.55%	0.381
Knowledge of key WASH behaviors (among mothers)						
Handwashing at 6 critical times	N/A	5.79%	N/A	13.21%	7.42%	0.053
Appropriate drinking water treatment methods	N/A	94.47%	N/A	98.27%	3.80%	0.080

Table 1.6D: Secondary Outcomes: Knowledge of Nutrition, Health, and WASH Practices for Respondents with Children Between 24-59.9 Months of Age

Secondary Outcomes: Knowledge of Nutrition, Health, and WASH Practices	**Comparison Districts**		**Intervention Districts**		**Difference in differences**	
	Baseline Mean (SD) / %	**Endline** Mean (SD) / %	**Baseline** Mean (SD) / %	**Endline** Mean (SD) / %	%	p-value
Knowledge of key nutrition/IYCF behaviors (among mothers)						
Exclusive breastfeeding	N/A	75.00%	N/A	90.45%	15.45%	0.001
Early initiation of breastfeeding	N/A	83.64%	N/A	81.82%	-1.82%	0.787
Introduction of complementary feeding	20.94%	44.55%	29.33%	51.82%	-1.12%	0.813
Sick child feeding (offering more food during illness)	36.28%	41.36%	37.39%	55.00%	12.53%	0.309
Knowledge of key health behaviors (among mothers)						
Adequate antenatal care	N/A	62.27%	N/A	74.09%	11.82%	0.089
Adequate postnatal care	N/A	19.09%	N/A	20.00%	0.91%	0.898
IFA supplementation	N/A	68.64%	N/A	72.73%	4.09%	0.497
Modern family planning	N/A	99.09%	N/A	99.09%	0.00%	>0.999
Knowledge of key WASH behaviors (among mothers)						
Handwashing at 6 critical times	N/A	7.73%	N/A	14.09%	6.36%	0.303
Appropriate drinking water treatment methods	N/A	91.82%	N/A	97.27%	5.45%	0.149

Knowledge of exclusive breastfeeding: Data around knowledge of exclusive breastfeeding were not available in the baseline survey, and the data collected at endline are presented. At endline, the difference in differences for knowledge of exclusive breastfeeding for the overall sample was 13.38 percentage points (p=0.014), with a difference in differences of 13.73 percentage points (p=0.007) for mothers of children aged 6-23.9 months and 15.45 percentage points (p=0.001) for mothers of children aged 24-59.9 months. That is, knowledge about exclusive breastfeeding improved more in the intervention than comparison districts.

Knowledge of early initiation of breastfeeding: Data around knowledge of early initiation of breastfeeding was not available in the baseline survey, and the data collected at endline are presented. At endline, the prevalence of knowledge around early initiation of breastfeeding was almost identical for the comparison and intervention districts in the overall sample.

Knowledge of introduction of complementary feeding: Knowledge of complementary feeding increased substantially from baseline to endline for both the comparison and intervention districts. For the overall sample, there was an increase of about 28 percentage points for the comparison districts and 19 percentage points for the intervention comparison districts. The difference in differences, however, had p-value of 0.476. meaning that the increase in knowledge of complementary feeding was not different between intervention and comparison districts.

Knowledge of sick child feeding: There was evidence of differences in knowledge of sick child feeding between baseline and endline in both intervention and comparison districts. For the overall sample, there was an increase of about 11 percentage points for both intervention and comparison districts.

Knowledge of adequate ANC: Data around knowledge of adequate ANC were not available in the baseline survey, and the data collected at endline are presented. At endline, the prevalence of knowledge around ANC was similar for the comparison and intervention districts in the overall sample, with 68.72% of the comparison districts and 72.86% of the intervention districts having knowledge around adequate ANC.

Knowledge of adequate PNC: Data around knowledge of adequate PNC were not available in the baseline survey, and the data collected at endline are presented. At endline, the prevalence of knowledge around PNC was similar for the comparison and intervention districts in the overall sample, with 22.63% of the comparison district and 25.24% of the intervention district having knowledge around adequate PNC.

Knowledge of adequate IFA supplementation: Data around knowledge of IFA supplementation were not available in the baseline survey, and the data collected at endline are presented. At endline, the prevalence of knowledge around PNC was high and similar for the comparison and intervention districts in the overall sample, with 77.37% of the comparison districts and 81.90% of the intervention districts having knowledge around adequate IFA supplementation.

Knowledge of modern family planning: Data around knowledge of modern family planning were not available in the baseline survey, and the data collected at endline are presented. At endline, the prevalence of knowledge around modern family planning was high and similar for the comparison and intervention districts in the overall sample, with 98.35% of the comparison district and 100% of the intervention district having knowledge around modern family planning.

Knowledge of handwashing at 6 critical times: Data around knowledge of handwashing at 6 critical times were not available in the baseline survey, and the data collected at endline are presented. At endline, the difference in differences for mothers' knowledge of handwashing at 6 critical times was 7.42 percentage points (p=0.053) for mothers of children aged 6-23.9 months, meaning that the knowledge in the intervention districts was greater than in the comparison districts. The difference in differences had high p-values for the overall sample and other age categories.

Knowledge of appropriate drinking water treatment methods: Data around knowledge of appropriate drinking water treatment methods were not available in the baseline survey, and the data collected at endline are presented. At endline, the prevalence of knowledge around drinking water treatment was high and similar for the comparison and intervention districts in the overall sample, with 94.52% of the comparison districts and 97.82% of the intervention districts having this knowledge.

Results for Impact Stratified by Wealth and Caste

Because tabulating all the results of outcomes stratified by wealth and caste would require enumerating about 7,500 values, we instead summarize by stratum the outcomes that changed differently in intervention than comparison districts.

Analysis by Wealth

These outcomes changed (i.e., increased or decreased) more in intervention than comparison districts in the high-wealth category but not in the low-wealth category:

- Child dietary diversity score increased in the 6-23.9 month group
- Child wasting decreased in the full sample
- Child anemia increased in the 6-23.9 month group
- Maternal anemia decreased in the 0-5.9 month group
- Child minimum dietary diversity improved in the 6-23.9 month group
- Child HAZ increased in the 0-5.9 month group
- Child sick feeding increased in the overall sample
- Child minimum diet increased in the overall sample
- IFA supplementation increased in the 0-5.9 month group
- Modern family planning increased in the 0-5.9 month group
- Institutional delivery increased in the 6-23.9 month group
- Knowledge of adequate ANC increased in the overall sample and in the 24-59.9 month group
- These outcomes improved more in intervention than comparison districts in the low-wealth category but not in the high-wealth category:
- Child hemoglobin in the 24-59.9 month group
- Women's BMI for the overall sample and the 6-23.9 month group
- Handwashing station with soap and water for the overall sample and all the age groups

- Knowledge of handwashing at six critical times in the overall sample and 6-23.9 month group
- Knowledge of appropriate water treatment methods in the 24-59.9 month group

Other outcomes did not have differential changes by wealth category.

Analysis by Caste

The following outcomes improved more in intervention than comparison districts in the socially disadvantaged castes category but not in the non-socially disadvantaged castes:

- Stunting in the 24-59.9 month group
- Child underweight in 24-59.9 month group
- Child anemia 6-23 month group
- Maternal underweight of mother with children 0-5.9 month and 6-23.9 month group
- Child WAZ in the 0-5.9 month group
- Exclusive breastfeeding in the overall sample
- Sick child feeding in the overall sample
- Child minimum meal frequency of the overall sample and 6-23.9 months group
- Modern family planning in the 24-59.9 month group
- 4 ANC during pregnancy in the overall sample
- Handwashing with soap and water in the 0-5.9 month group and 6-23.9 month group

The following outcomes improved more in intervention than comparison districts in the non-socially disadvantaged castes but not in the socially disadvantaged castes:

- Women's dietary diversity score in the 6-23.9 month group
- Stunting in the 6-23.9 month group
- Child anemia in the 24-59.9 month group
- Maternal underweight in the overall sample
- Child WAZ in the 0-5.9 month group
- Child WHZ in the 24-59.9 month group
- Women's BMI in the overall sample and the 6-23.9 month group
- Introduction to complementary feeding in the overall sample and 6-23.9 month group
- Modern family planning in the 0-5.9 month group
- Introduction to complementary feeding in the overall sample
- Introduction to complementary feeding in the 6-23.9 month group

- Sick child feeding in the 6-23.9 month group
- Handwashing with soap and water in the overall sample

Other outcomes did not have differential improvements by caste category.

Discussion

The data from this evaluation demonstrate substantial impacts on multiple child and maternal outcomes plausibly attributable to the *Suaahara* interventions. The intervention districts, relative to comparison districts, reduced maternal underweight, consistent with improvements in maternal and fetal condition that were manifested in the early post-natal period as greater linear size of the young infant 0 to 5.9 months. Complementary feeding practices with children between 6 and 23.9 months of age improved more in intervention districts than comparison districts, including child dietary diversity, sick child feeding, minimum meal frequency, and minimum acceptable diet. These improvements are consistent with the content and focus of the *Suaahara's* interventions on enhancing child nutrition for this age group through improving infant and young child feeding practices.

Several outcomes had improvements in both intervention and comparison districts, aligning with the general trends in the population in Nepal over the past ten years. For example, stunting reduced in both arms from baseline to endline from about 40% to 20%, a large reduction of about 2 percentage points per year. Other data support this trend in the reduction of stunting in children under five over the past decade as well as secular changes in other maternal and child metrics. For example, comparing the Nepal DHS surveys in 2016 and 2022, stunting, underweight, and wasting were reduced from 36% to 25%, 27% to 19%, and 10% to 8%, respectively, from 2016 to 2022. Exclusive breastfeeding was reduced from 66% to 56% during the same period. Children having minimum dietary diversity increased from 47% to 78%, and the prevalence of anemia in women of reproductive age went from 41% to 34%. Similar secular trends have been observed in other countries. For example, during the first phase of *Alive & Thrive* in Bangladesh, exclusive breastfeeding [4] and complementary feeding [5] improved more in intensive (i.e., intervention) sub-districts than in non-intensive (i.e., comparison) sub-districts but child stunting prevalence was reduced in both intervention and comparison sub-districts, reflecting the underlying secular trend in improved child linear growth.

The exploratory analyses by wealth and caste showed that differences between intervention and comparison districts can depend on wealth and caste categories. The patterns of these dependencies were inconsistent and difficult to interpret, however, and this evaluation study was not designed to provide confirmatory conclusions about such dependencies on conditions. Therefore, this report does not provide interpretations or programmatic implications for the patterns of results from these exploratory analyses. These exploratory results may suggest opportunities for further research into conditions that enable improved outcomes.

In summary, *Suaahara* improved mother's lives as manifested by improved maternal dietary diversity, weight, and rate of institutional delivery. Possibly reflecting improved prenatal conditions, the length of infants 0-5.9 months improved. Complementary feeding of infants and

young children ages 6 to 23.9 months improved as reflected in improved dietary diversity, minimum acceptable diet, minimum meal frequency, and offering children more food when sick. Availability of soap and water at handwashing stations improved. These improvements in intervention districts relative to comparison districts were demonstrated with plausible evidence despite the substantial challenges that Nepal and *Suaahara* faced during the ten years between baseline (2012) and endline (2022) and the limitations in statistical power that resulted from the small number of districts that then could be included in the evaluation study.

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Part 2 – Evaluating Intermediate Results – Increased use of quality nutrition and health services by women and children (IR2)

Analysis of end-line surveys of health facilities and Female Community Health Volunteers

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Executive Summary

Suaahara's primary aim is to reduce the prevalence of stunting, wasting, and underweight among children under 5 years of age and to reduce the prevalence of anemia among women of reproductive age and children 6-59 months of age. The program uses multiple sectors to achieve four key intermediate results: (1) improved household nutrition, sanitation, and health behaviors; (2) increased use of quality nutrition and health services by women and children; (3) improved access to diverse and nutrient-rich foods by women and children; and (4) accelerated roll-out of the MSNP through strengthened local governance. *Suaahara* interventions span health and family planning, nutrition, agriculture/homestead food production, and water, sanitation, and hygiene.

This report focuses on the second intermediate results related to the quality nutrition and health services from the health system perspective. In line with the program impact pathway of *Suaahara*, the evaluation at the health system level aimed to assess the impact of *Suaahara* interventions on improving quality health and nutrition services, which was measured in terms of improved capacity building (knowledge and skills of health facility workers and FCHVs), and increased availability of health, nutrition, and family planning services at facility and community level.

The endline evaluation included a quantitative quasi-experimental design where data were collected from four intervention (Darchula, Syangja, Rupandehi, and Sindhupalchowk) and four pair-matched comparison (Jumla, Tanahu, Chitwan, and Ramechhap) districts employing a multi-stage cluster sampling. One health facility from each of the survey clusters (altogether 40 health facilities) and one FCHV per (old) (ward (altogether 120 FCHVs) were included in the survey. Although the overall evaluation included a quasi-experimental design, the health system component of the evaluation was a cross-sectional comparative. Surveys were administered using an android version of the ODK programming for Computer Assisted Personal Interview (CAPI) by trained field researchers. Composite indices for different indicators for *capacity building and service delivery* were developed. Regression models appropriate for each outcome variable were used to compare between intervention and comparison districts and estimate the effect of *Suaahara* interventions. These models accounted for clustering at the district level to address the variation among the sample districts.

Health facility workers and FCHVs in the intervention districts reported better knowledge on CB-IMCI, and GMP than in comparison districts. Although the score was higher in the intervention districts for both health facility workers and FCHVs, the differences between the intervention and comparison districts were not estimated confidently on the number of health and nutrition training received and knowledge on IYCF, maternal health and family planning. In terms of improved service delivery, the mean scores for service availability were higher in the intervention districts for maternal nutrition services, child nutrition services, ANC services, and FP services. Health facilities in intervention districts, compared to comparison districts, had better availability and use of reference materials and guidelines for GMP service, and counseling aids to provide nutrition assessment and GMP, FP, ANC, and PNC services. The differences were not important in the availability of PNC services, and availability and use of reference materials and counseling aids for FP, ANC, and PNC services. FCHVs in the intervention districts more often reported providing GMP services and had better availability of job aids and BCC materials on nutrition counseling. A

higher proportion of FCHVs from the intervention districts (36% vs. 4%) mentioned implementing the Self-Applied Technique for Health (SATH) approach in the mother groups they facilitate.

Suaahara interventions contributed to strengthen the health system across the two components (capacity building and improved quality service delivery). Both health workers and FCHVs in the intervention districts received training in a higher number of topics and had better knowledge on GMP, CB-IMNCI and identifying malnourished children. Impacts of the *Suaahara* interventions were observed in improving service delivery as the scores for the availability and delivery of services for maternal nutrition, GMP, ANC, and FP, as well as the availability and use of reference materials and guidelines and counseling aids were better in the *Suaahara* intervention facilities.

Introduction

Helen Keller International in partnership with different international, national, and local level organizations have implemented the *Suaahara II* program in 42 districts of Nepal from 2016 to 2022. *Suaahara II* is the continuation of the first phase of the Suaahara program implemented from 2011- to 2015. *Suaahara* is a USAID funded multisectoral nutrition program with an overall aim of reducing undernutrition among women and children, particularly those in the 1000-day period between conception and a child's second birthday, with a special focus on poor and marginalized communities. *Suaahara* works closely with the government stakeholders to strengthen programs and policies to improve the health and nutritional status of women and children. The program has employed a multi-sectoral approach across four key intermediate results (IRs) themes:

(1) improved household nutrition, sanitation and health behaviors;

(2) increased use of quality nutrition and health services by women and children;

(3) improved access to diverse and nutrient rich foods by women and children; and

(4) accelerated roll-out of the Multi-sectoral Nutrition Plan (MSNP) through strengthened local governance.

This report focuses on the second intermediate results related to the quality nutrition and health services. The program worked within the government system, primarily through community health workers in local health facilities and Female Community Health Volunteers (FCHVs). The program aimed to improve the capacity of these frontline health workers, as well as overall health system to disseminate health and nutrition messages and provide quality health and nutrition services at the household, community, and health facility level.

An independent research group carried out the endline impact evaluation of the *Suaahara II* interventions in April – December 2022. As a part of the endline impact evaluation of the Suaahara program, surveys with health workers and FCHVs were conducted.

Objectives and Evaluation Questions

The evaluation of *Suaahara* at the health system level aimed to assess the impact of *Suaahara* interventions on strengthening the health system in providing quality health and nutrition services. In line with the program impact pathway for *Suaahara*, the assessment looked at the contribution of *Suaahara* to improve quality of nutrition and health services, which has been measured in terms of improved knowledge and skills of health facility workers and FCHVs on health and nutrition, and increased availability of health, nutrition, and family planning services at facility and community level.

Overall Evaluation Question

What is the impact of Suaahara in strengthening health and nutrition services at local health system?

Sub-questions

1. To what extent is *Suaahara* successful in building the capacity of the health facility workers and FCHVs?
2. What is the effect of *Suaahara* on delivering improved nutrition, health, and family planning services at local health facilities?

Evaluation Method

Design

The endline evaluation included a quantitative quasi-experimental design where data were collected from four intervention (Darchula, Syangja, Rupandehi, and Sindhupalchowk) and four comparison (Jumla, Tanahu, Chitwan, and Ramechhap) districts employing a multi-stage cluster sampling.

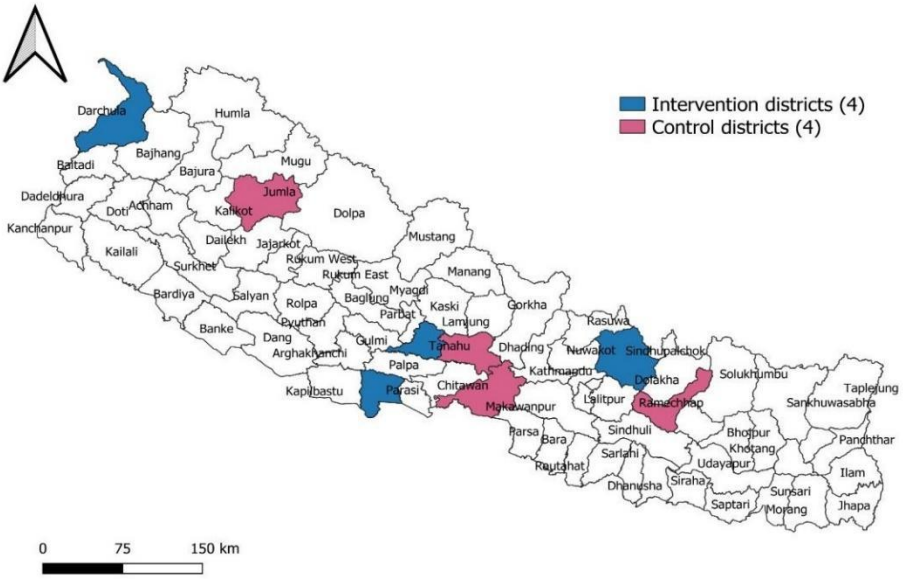

Figure 2. Intervention and comparison districts selected for the survey

Although the overall evaluation included a quasi-experimental design, the health system component of the evaluation was a cross-sectional comparative –compared intervention districts with pair-matched comparison districts at endline only, as the baseline survey did not include survey with health facility workers.

Participants and Sample Size

Health facility workers and FCHVs from the same wards where the household surveys were conducted were chosen as survey respondents for the endline evaluation at the health systems level. Each survey cluster (VDC) has only one health facility. Therefore, a total of 40 health facilities (Primary Health Care Centers and Health Posts) from each of the 40 sample VDCs were included in the survey (5 VDCs X 8 districts), which were divided evenly between intervention and comparison districts). One FCHV per old ward was included in the survey. Most wards had only one FCHV but if a ward had more than one FCHV, an FCHV was randomly selected by the field supervisors using a lottery method. The sample included 40 health facility workers and 120 FCHVs.

Data Collection

Surveys with health facility workers and FCHVs were administered using an android version of the ODK programming for Computer Assisted Personal Interview (CAPI).

The health facility questionnaire included 4 different modules – identification and background information of the facility, family planning services, maternal health and nutrition services, child health and nutrition services, knowledge on integrated nutrition, exposure to *Suaahara* interventions -- as well as an observation on the availability of health and nutrition related logistics and supplies. The first module also included information on the health facility's supervision

structure, and other basic information on facility management, and was asked to the facility in-charge, while modules related to services were administered with the relevant health facility workers. The FCHV questionnaire included 10 different modules related to background information, FCHV related work activities, exposure to health and nutrition training, knowledge on integrated nutrition, supervisory support, and exposure to *Suaahara* interventions as well as an observation checklist on the availability of health and nutrition related logistics and supplies.

Data Management and Analysis

The e-data submitted in the KoBo collect was downloaded (in Excel) and imported in the SPSS for data cleaning, and then exported to the Stata for analysis. Composite indices for different indicators under each of the two research questions were developed as shown in Table 2.1.

Table 2.1: Health System Level Indicators Assessed in the Endline Survey

SN	Indicator	Indicator definition	Measurement	Possible score range	HF	FCHV
1	**Capacity building**					
1.1	Received training on different aspects of health and nutrition	Training received on different aspects of maternal and child health and nutrition (MIYCN, IMAM, CB-IMCI, HTSP, WASH, counselling methods, GESI, etc.) during the past 5 years.	1 for training on each topic received within the past 5 years. 23 different topics were included.	0 – 23	√	√
1.2	Knowledge on IYCF	IYCF components related to breastfeeding and complementary feeding.	1 for correct knowledge on each component. 7 different IYCF components.	0 – 7	√	√
1.3	Knowledge on CB-IMCI	Diagnosis of PSBI, pneumonia, and diarrhoea.	A summative score ranging from 1 to 17 with a higher score indicating better knowledge.	0 – 17	√	√
1.4	Knowledge of maternal health	ANC check-ups, TT/TD vaccine, iron/folic acid tablets during pregnancy and postpartum, PNC check-ups, and vitamin A capsule.	1 for correct knowledge on each of the six components.	0 – 6	√	√
1.5	Knowledge on HTSP	Birth spacing, pregnancy interval after a miscarriage or induced	1 for correct knowledge on	0 – 3	√	√

SN	Indicator	Indicator definition	Measurement	Possible score range	HF	FCHV
	recommendations	abortion, and age at first pregnancy.	each of the three components			
1.6	Knowledge on GMP	Process of measuring weight, height/length; and use and interpretation of GMP card.	A summative score ranging from 0 to 20 with a higher score indicating better knowledge	0 – 20	√	√
1.7	Knowledge on identifying SAM and MAM	Identifying SAM and MAM children, which included weigh the child properly as per protocol; measure length/height of child as per protocol; calculate WHZ score; correctly classify child's WHZ score; measure MUAC and classify as per protocol; and check edema on foot.	1 for correct knowledge on each of the six components	0 – 6	√	-
2	**Improved service delivery**					
2.1	**Availability of health and nutrition services**					
2.1.1	Availability of maternal nutrition services	HFs providing five services during ANC: maternal weight measurement, MUAC assessment, screening for anemia, nutrition counseling, provision of IFA supplements and Albendazole/deworming	HWs were asked how often they provide four different maternal nutrition services during ANC as a part of routine ANC check-up. Response options included 0 (Never) to Always (4).	0 - 20	√	-
2.1.2	Availability of child nutrition services	Nutrition assessment services for children: measure weight, height, and MUAC; record measurement in the child health card; discuss result/child growth with child caregiver; counsel caregiver to attend GMP every month, and interpretation of growth curves; counsel caregiver about child health and nutrition; provide services or refer for treatment, if SAM/MAM discovered; checking for oedema; and provide therapeutic foods.	Each of the services included response options 0 (Never) to 4 (Always). There were 12 services for health facilities and 8 for FCHV.	0 – 48 for health facility and 0 -32 for FCHVs	√	√
2.1.3	Availability of ANC services	Iron/folic acid supplementation; TT/Td vaccine; deworming; Misoprostol; fundal height	14 different ANC services recorded as	0 - 56	√	-

SN	Indicator	Indicator definition	Measurement	Possible score range	HF	FCHV
		examination; MUAC assessment; weight monitoring; vital signs check; counseling about the importance of ANC visit; counseling on maternal health and nutrition; counseling on child health and nutrition; counseling on WASH; Screening for anaemia (Hb test); and blood glucose test	providing Never (0) to Always (4).			
2.1.4	Availability of PNC services	Weighing the lactating mother; Counseling about the importance of at least 3 PNC visits; Counseling about maternal health and nutrition; WASH counseling; and family planning counseling	5 different PNC services recorded as providing Never (0) to Always (4)	0 - 20	√	-
2.1.5	Availability of FP services	FP counseling, Condoms, Depo/injectables, Pills, Implants, IUCD, Minilap, Vasectomy, Emergency Contraception, and referral	9 different neonatal health services (4 in case of FCHV) recorded as providing Never (0) to Always (4)	0 – 40 for health facilities and 0 to 16 for FCHVs	√	√
2.1.6	Health facilities providing any LARC services	% of health facilities providing any LARC (implants or IUCD) services		-	√	-
2.2	**Availability and use of reference materials/job aids**					
2.2.1	Availability and use of reference materials and guidelines for GMP services	MIYCN Manual; MIYCN flip chart; CNSI manual/flip chart; and CBIMCI manual.	4 different reference materials	0 - 16	√	-
2.2.2	Availability of reference materials/job aids for FP	National Medical Standard for Reproductive Health (Volume III); FP clinical Protocol for health workers; Reference manuals (CoFP/C, Implant, IUD, VSC); Decision Making Tool (DMT) tools/ FP Flip Chart; and MEC wheel	Availability of 5 different reference materials and guidelines	0 - 5	√	-
2.2.3	Availability of reference materials/job aids for ANC and PNC services	RH clinical protocol for medical officers; Maternity guideline (National Medical Standard Volume III); and ICC/BCC materials (danger sign posters, BPP flipchart, ANC/PNC job aids, pamphlets)	3 reference materials and guidelines	0 - 3	√	-
2.2.4	Availability of counseling aids/materials used to provide	MIYCN flip chart; Complementary feeding (CF) wheel cards; Nutrition Assessment, Counseling, and Support (NACS) wheel cards;	9 counseling aids/materials	0 - 9	√	-

SN	Indicator	Indicator definition	Measurement	Possible score range	HF	FCHV
	nutrition assessment/GMP services	Letter to the father; Poshan Sandesh Card; Breastfeeding poster; CNSl flip chart; Growth chart examples; and Other Posters/brochures/pamphlets.				
2.2.5	Availability of counseling aids/materials used to provide FP services	Decision Making Tool (DMT) tools/ FP Flip Chart; FP Method Specific Brochures; FP Informed Choice Poster; FP Tool Kit Box; Medical Eligibility Criteria Wheel (WHO); and FP/Tihart Poster.	6 counseling aids/materials	0 – 6	√	-
2.2.6	Availability of counseling aids/materials used to provide ANC and PNC services	Letter to the father; Jeewan Surakshya (BPP) Flipchart; BPP flyer; ANC Leaflets; Poshan Sandesh Card; Breastfeeding Charts; PNC Danger Signs Charts; FP Charts and Real Objects; Immunization Card/Charts; Maternal and newborn care flip chart.	10 different counseling aids/materials	0 – 10	√	-
2.2.7	FCHVs providing health and nutrition services to pregnant women	Iron/folic acid; deworming; MUAC assessment; counseling about the importance of at least 4 ANC; counseling on maternal health and nutrition; counseling on child health and nutrition; and WASH counseling.	7 different ANC services	0- 28	-	√
2.2.8	Availability of BCC materials and job aids among FCHVs	HMIS 4.2: FCHV register; ARI classification card; Zinc card; Home therapy card; Chlorhexidine/Kawach card; Chlorhexidine doll; Basic flip chart; FCHV sign board; FCHV Manual; BPP flip chart; BPP action card (to pregnant women); MIYCN flip chart; Complementary feeding (CF) wheel cards; Nutrition Assessment, Counseling, and Support (NACS) wheel cards; HMG monthly calendar; Letter to the father; ANC leaflet; Poshan Sandesh Card; Breastfeeding Charts; PNC Danger Signs Charts	Availability of 20 different SBCC materials and job aids	0 – 20	-	√
2.2.9	FCHVs implementing SATH in HMG	% of FCHVs implementing SATH in HMG			-	√

Descriptive data are presented in counts and % for categorical variables and mean (+/- SD) for continuous variables. Linear or logistic regression models appropriate for each outcome variable were used to compare between intervention and comparison districts and estimate the effect of Suaahara interventions. These models accounted for clustering at the district level using a

sandwich estimator of standard errors that recognizes the number of districts and the variation among them.

Results

The results of the endline survey have been presented under each of the two research questions. The detailed tables of the findings have been attached in Annex I.

Capacity Building of health facility workers and FCHVs

The evaluation assessed whether health facility workers and FCHVs received training on 23 different aspects/topics related to maternal and child health and nutrition (MIYCN, IMAM, CB-IMCI, HTSP, WASH, counseling methods, GESI, etc.) and family planning during the 5 years prior to the survey. A mean score, with a possible range from 0 to 23 was calculated. On average, health facility workers from the intervention group reported having received training on 14 different topics (13.85±5.71), while health workers from the comparison group received training on 12 different topics (11.90±6.38), with a p-value of the difference of being 0.474 (Table 2.2).

In terms of knowledge, health facility workers from intervention districts showed better knowledge on CB-IMCI (difference of 1.94, p = 0.005), GMP (difference of 1.75, *p* = 0.030), and identification of malnourished children (difference of 0.85, *p* = 0.090). There was no difference in knowledge scores between the intervention and comparison groups in terms of knowledge on IYCF, HTSP, and maternal health and nutrition, and HTSP among health facility workers.

Table 2.2: Impact of Suaahara Intervention on Capacity Building of Health Workers and FCHVs

Indicators	Possible range	Health workers				FCHVs			
		Intervention (n = 20)	Comparison (n = 20)	Difference	p-value	Intervention (n = 20)	Comparison (n = 60)	Difference	p-value
		Mean (SD)	Mean (SD)	B (SE)		Mean (SD)	95% CI	B (SE)	
Received training on different aspects of health and nutrition	0 - 23	12.90 (5.75)	10.45 (6.94)	2.45 (2.78)	0.408	12.95 (7.59)	8.18 (8.02)	4.77 (2.33)	0.080
Knowledge on IYCF	0 - 7	6.55 (0.51)	6.40 (0.60)	0.15 (0.14)	0.322	6.30 (0.81)	6.48 (0.62)	-0.18 (0.17)	0.315
Knowledge on CB-IMCI	0 - 17	11.30 (1.98)	9.35 (2.64)	1.95 (0.77)	0.050	8.20 (1.79)	6.72 (2.64)	1.48 (0.54)	0.029
Knowledge on maternal health	0 - 6	5.50 (0.76)	5.30 (0.92)	0.20 (0.35)	0.587	5.77 (0.59)	5.53 (1.05)	0.23 (0.15)	0.176
Knowledge on HTSP	0 - 3	3.00 (0.00)	3.00 (0.00)	0.00	1.000	2.95 (0.22)	2.98 (0.13)	-0.03 (0.05)	0.518

recommendations									
Knowledge on GMP	0 - 20	13.00 (3.36)	11.25 (3.11)	1.75 (0.65)	0.030	7.33 (2.45)	4.93 (2.12)	2.40 (0.55)	0.003
Knowledge on identifying SAM and MAM	0 - 6	4.10 (1.29)	3.25 (1.02)	0.85 (0.43)	0.090	-	-	-	-

FCHVs in the intervention district reported receiving training on a greater number of topics related to health and nutrition (mean scores of 12.95) compared to comparison districts (mean scores of 8.18; p = 0.080). FCHVs from the intervention districts had better knowledge on CB-IMCI (difference 1.48, p = 0.029), and GMP (difference 2.40, p = 0.003). There was no difference in knowledge scores between the intervention and comparison groups in terms of knowledge on IYCF, HTSP, and maternal health and nutrition among FCHVs.

Service Delivery

Health facilities were assessed on the availability of different types of maternal and child nutrition, ANC, PNC, and FP services. Mean scores for service availability were higher in the intervention districts for maternal nutrition services (difference of 3.60, p = 0.010), child nutrition services (difference of 8.20, p = 0.016), ANC services (difference of 5.95, p = 0.021), and FP services (difference of 5.10, p = 0.056). The proportion of facilities providing Long-Acting Reversible Contraceptive (LARC) services was higher in intervention districts (75.0%), compared to comparison districts (60.0%), with the difference of 15 percentage points (p = 0.306). Health facilities in intervention districts, compared to comparison districts, had better availability and use of reference materials and guidelines for GMP services (difference of 3.60, p = 0.042). The availability of counseling aids to provide nutrition assessment and GMP services (difference of 2.10, p <0.001), FP services (difference of 0.095, p = 0.008), and ANC and PNC services (difference of 2.45, p = 0.003) was also higher in intervention districts than in comparison districts. (Table 2.3).

Table 2.3: Impact of Suaahara Intervention on Service Delivery in Health Dacilities

Indicators	Possible score range	Intervention (n = 20)	Comparison (n = 20)	Difference	p-value
		Mean (SD)	Mean (SD)	B (SE) or %	
Availability of maternal nutrition services	0 - 20	16.1 (2.17)	12.5 (2.06)	3.60 (1.02)	0.010
Availability of child nutrition services	0 - 48	37.85 (7.49)	29.65 (8.89)	8.20 (2.59)	0.016
Availability of ANC services	0 - 56	43.65 (4.7)	37.7 (4.74)	5.95 (2.01)	0.021
Availability of PNC services	0 - 20	13.80 (7.61)	15.85 (3.36)	-2.05 (1.74)	0.279
Availability of FP services	0 - 40	22.15 (5.43)	17.05 (5.67)	5.10 (2.23)	0.056
% of health facilities providing any LARC services	-	75.00%	60.00%	15.00%	0.306

Availability and use of reference materials and guidelines for GMP services	0 - 16	10.5 (3.27)	6.90 (3.21)	3.60 (1.45)	0.042
Availability of reference materials/job aids for FP	0 - 5	2.35 (1.04)	1.95 (1.08)	0.40 (0.30)	0.220
Availability of reference materials/job aids for ANC and PNC services	0 - 3	1.30 (0.86)	1.45 (0.6)	-0.15 (0.25)	0.571
Availability of counseling aids/materials used to provide nutrition assessment/GMP services	0 - 9	4.60 (1.46)	2.50 (1.15)	2.10 (0.301)	<0.001
Availability of counseling aids/materials used to provide FP services	0 – 6	3.40 (1.31)	2.45 (1.15)	0.95 (0.258)	0.008
Availability of counseling aids/materials used to provide ANC and PNC services	0 – 10	6.45 (2.16)	4.00 (1.62)	2.45 (0.548)	0.003

Most of the service delivery indicators assessed for FCHVs were found higher in the intervention districts compared to the comparison districts (Table 2. 4:). The mean scores for FCHVs providing GMP services were higher in the intervention districts (scores of 19.23 in intervention vs. 11.18 in comparison, difference of 8.05, p = 0.015). There was also a better availability of job aids and BCC materials on nutrition counseling among FCHVs from the intervention districts (scores of 7.32 in intervention and 4.00 in comparison), with the difference of 3.32 (p = 0.015). More than one-third (35.71%) of FCHVs reported implementing the Self-Applied Technique for Health (SATH) program in HMGs in the intervention district, while compared to only 3.77% of FCHVs reported implementing SATH in the comparison districts (difference of 31.94 percentage points, p = 0.010).

Table 2. 4: Impact of Suaahara Intervention on Service Delivery Among FCHVs

Indicators	Possible score range	Intervention (n = 60)	Comparison (n = 60)	Difference	p-value
		Mean (SD)	Mean (SD)	B (SE)/%	
FCHVs providing health and nutrition services to pregnant women	0- 28	18.83 (4.40)	17.50 (4.16)	1.33 (1.34)	0.353
FCHVs providing child nutrition services	0 -32	19.23 (5.97)	11.18 (6.80)	8.05 (2.51)	0.015
Availability of BCC materials and job aids	0 - 20	7.32 (4.07)	4.00 (3.00)	3.32 (1.04)	0.015
FCHVs providing FP services	0 - 16	9.45 (3.50)	8.78 (3.26)	0.67 (1.21)	0.599
% of FCHVs implementing SATH in HMG	-	35.71%	3.77%	31.94%	0.010

Discussion and Conclusion

The comparison with comparison districts showed that both health facility workers and FCHVs in the intervention districts had received training in a higher number of topics related to maternal and child health, and nutrition. Health workers and FCHVs in the intervention districts also had a better knowledge particularly on CB-IMCI, GMP, and identification and management of SAM and MAM among children. Impacts of the Suaahara interventions were observed in improving service delivery as the scores for the availability and delivery of services for maternal nutrition, child nutrition including GMP, ANC, and FP, as well as the availability and use of reference materials and guidelines and counseling aids for GMP, FP, ANC and PNC services were better in the Suaahara intervened facilities. FCHVs in the intervention districts had better availability of job aids and BCC materials, and were more often providing GMP services, and counseling on breastfeeding and complementary feeding. The implementation of SATH was also higher among HMGs in the intervention districts. Overall, the end-line survey showed that the Suaahara interventions have contributed to strengthen the health system by improving the knowledge of health facility workers and FCHVs and improving service delivery.

Part 3 – Evaluating Intermediate Results – Improved access to diverse and nutrient-rich foods by women and children (IR3)- Quantitative

Quantitative Evaluation of Homestead Food Production Program in Darchula district, Nepal, 2012-2022

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Evaluation Research Team: Shiva Bhandari, PhD, Independent Consultant

Executive summary

Suaahara II is a multisectoral nutrition program being implemented in 42 of Nepal's 77 districts from 2016 to 2022. SII aims to reduce the prevalence of stunting, wasting and underweight among children under five years of age and to reduce the prevalence of anemia among women of reproductive age and children 6-59 months of age. As one of SII's thematic areas is agriculture, the program implements homestead food production (HFP), promoting the production and consumption of nutrient-rich foods and to improve household food security and nutritional outcomes among children and mothers among marginalized communities.

In 2013, HFP was initially implemented in nine highly food-insecure districts, but the HFP program gradually scaled-up into all 42 SII districts. Darchula, one of the four intervention districts selected for the *Suaahara* impact evaluation, is a district in the far-western region of Nepal where the HFP interventions have been implemented since 2013.

A separate evaluation of HFP program was not part of the evaluation design at the baseline but given interest in understanding this component's contribution in reducing malnutrition among mothers and children, and the realization that in one of the districts for the evaluation there was baseline data on about 70 households, an evaluation study was designed.

The goal of the evaluation was to understand the role of the HFP program in improving availability, accessibility, and consumption of diverse nutrient-rich foods in the marginalized and food insecure communities in Darchula. To achieve this goal, a pre-test/post-test design without a comparison group was used. The primary outcomes of the evaluation were household food insecurity and women's dietary diversity. Secondary outcomes were gardening practices, poultry-raising practices, vegetable production diversity, chicken and egg production, income by selling surplus vegetables and poultry, women's knowledge on child nutrition and health, and women's empowerment. To assess gardening and poultry-raising practices, a summed score was calculated based on several individual gardening or poultry-raising practices performed by the households. Out of 70 households present at the baseline, 53 households reached at the endline nine years after the HFP program was implemented in 2013. Random-effects models with households as the random effect were developed to estimate the coefficients for the differences in outcome variables before and after the HFP program within households.

Vegetable production diversity increased by 49% ($p < 0.001$) after the households received the HFP program. In addition, the likelihood of production of dark-green leafy vegetables and beans and pulses increased for the households after receiving the HFP program. Income from the sale of surplus vegetables was about USD 69 greater among the households after participating in the HFP program than before the program. Women's knowledge on child nutrition and health improved after receiving the HFP program. Women were more empowered after being enrolled into the HFP program as indicated by their improved decision-making power over the use of income and the control of productive assets in the households. On the other hand, the chances of households being food insecure increased after they were enrolled into the HFP program. The HFP program did not affect women's dietary diversity, gardening practices, and chicken poultry production.

Further research using in-depth interviews and experimental designs might be helpful to understand these changes in outcomes associated with the HFP program.

Introduction

Vegetables, fruits, meat, and eggs are important sources of nutrients and often referred to as nutrient-rich foods. Consuming them daily, however, in Nepal, is still difficult for many families. Low consumption of such nutrient-rich foods is partly because of lack of knowledge of the importance of such foods,[1] and less accessibility and availability, from either household production or market purchase.[2,3] Lack of markets in rural settings leave those populations with limited options for purchasing nutrient-rich foods. Often, if there are markets, they sell mainly staples, such as oils, sugar, and spices/condiments that people want to buy frequently. In addition, the cost of nutrient-rich foods is higher in low- and middle-income countries as shown by a study done analyzing price data from 2011 from across 176 countries revealed that the cost of nutrient-rich foods is considerably higher than staples in low- and middle-income countries. For example, in Asia, caloric prices of dark green leafy vegetables were 5-9 times higher in Asia than staple cereals.[4] Even the most affordable diet proposed by EAT-*Lancet* commission[5] cost a global median of about US$ 3 per day in 2011, of which the largest share was the cost of fruits and vegetables (31%).[6] In Nepal, the cost of optimal diet that includes nutrients-rich foods is about US$ 8 in the mountains and about US$ 6 in the hills and Terai.[7]

One important way to deal with issues of poor availability, affordability, and accessibility of food items is to promote household food production. Helen Keller International has been working to promote diversified homestead gardens and small-animal production in several Asian and African countries.[8] Helen Keller's Homestead Food Production (HFP) programs are designed to empower women from poor households in Africa and Asia with agriculture, nutrition, and health education and together with agricultural resources needed to produce and consume their own nutritious foods such as vitamin A -rich fruits and vegetables, iron-rich green leafy vegetables, and vital protein sources like poultry, goat, and fish. These HFP programs have proven successful at improving health outcomes like dietary diversity,[9,10] growth of children,[11] household food security,[11] and hemoglobin levels.[12]

HFP Program in Nepal

In Nepal, Helen Keller Intl has been implementing HFP programs for well over a decade, including through *Suaahara II*, a USAID-funded multi-sectoral integrated nutrition program. In *Suaahara II*, it is currently implemented in 42 out of 77 districts, and the project has a specific intermediate result related to HFP: to improved access to diverse and nutrient-rich foods by women and children, especially among marginalized communities. To achieve this outcome, in 2013, this HFP component was initially launched in 9 highly food-insecure districts. HFP was scaled up and implemented in an additional 11, 5, and 16 districts in 2013, 2014, and 2015, respectively. In 2015 and 2016, during the transition from *Suaahara I* (2011-2016) to *Suaahara II* (2016-2022), HFP activities were expanded to all remaining intervention districts, with HFP reaching the 2 additional

Suaahara II districts by 2017. The list of districts added in different years is presented in Appendix A. As the HFP intervention is intended for marginalized, food-insecure communities within the target districts only, the specific HFP program catchment areas within the target districts are shown in Figure 3.

Suaahara II's HFP program consists of interventions with Village Model Farmers (VMFs), selected to be the lead trainers and suppliers, and groups of households they support. Helen Keller International collaborated with local farmers and community organizations to establish 1 VMF per ward, the smallest administrative unit in Nepal (pre-federalism). A total of 5,686 VMFs were initially trained for five days and given the responsibility of establishing their model farm for demonstration purposes, providing ongoing technical assistance to beneficiary households, and organizing the household beneficiaries into groups of about 20-25 members. VMFs also coordinate with the District Agriculture Development Office, District Livestock Services Office, and other local community development partners. The HFP program targets households within the first 1000-days period. The first 1,000 days refers to a child's life from the moment they are conceived until they reach 2 years of age (24 months). This is a time when their brain, body and immune system grows and develops significantly. Households were selected for inclusion in the HFP program if they: (1) had a pregnant woman or a mother of at least 1 child less than 2 years old residing in the household at the time of the listing for the training and (2) had at least 40 to 75 m^2 of land near the home suitable for cultivation. These households received a 2-day basic HFP training, distribution of seasonal seeds for 3 seasons (dry and rainy) during the year immediately following the basic HFP training, distribution of 5 chicks to 1000-day mothers, and linkage with a VMF for further technical support and inputs. In total, an estimated 114, 000 HFP beneficiaries participating households across 1, 001 VDCs of 42 districts were reached. As the basic HFP training and seeds and chick distribution was a one-time effort per community, new households meeting these criteria later were not direct beneficiaries of the HFP program provided to one cohort of households at the time the project first began activities in that community.

The HFP program targets women among marginalized communities as they are most likely to contribute to improved household diet and health. In addition, in rural Nepal, women provide most of their labor force in agricultural production in addition to their traditional household chores.[13] Empowering women with input and training contributes to improved farm productivity and household food security, among farms managed by women.[14] In addition, HFP program empowers women,[15,16] which in turn help to improve household dietary diversity,[17] health care utilization,[18] and growth of children.[16,19,20] Women need trainings, inputs and information on agriculture to improve agricultural practices.[21] Training, inputs, and information improves women's knowledge on agricultural practices, which increases agricultural productivity.[22]

HFP is based on 4 programming principles: (1) ensuring households' access to diverse and nutrient-rich foods throughout the year; (2) focusing on production of nutrient-rich foods-vegetables, egg, meat; (3) promotion of low-cost but easy to adopt technologies; and (4) empowerment of small-holder farmers to build resilient and sustained household food production. Applying these principles, HFP is implemented at three levels: household, community, and structural. At the household level, the program targets families within first1000-day period with an aim to increase production and consumption of diverse nutrient-rich foods throughout the year. At the community level, the program establishes VMFs to support the household beneficiaries with

agricultural practices training and production inputs, particularly when there is limited access to agricultural extension services and production inputs. At the structural level, the program collaborates with agricultural/livestock offices at the VDCs and works to upscale, mainstream, and sustain HFP through mainstreaming and leveraging resources.

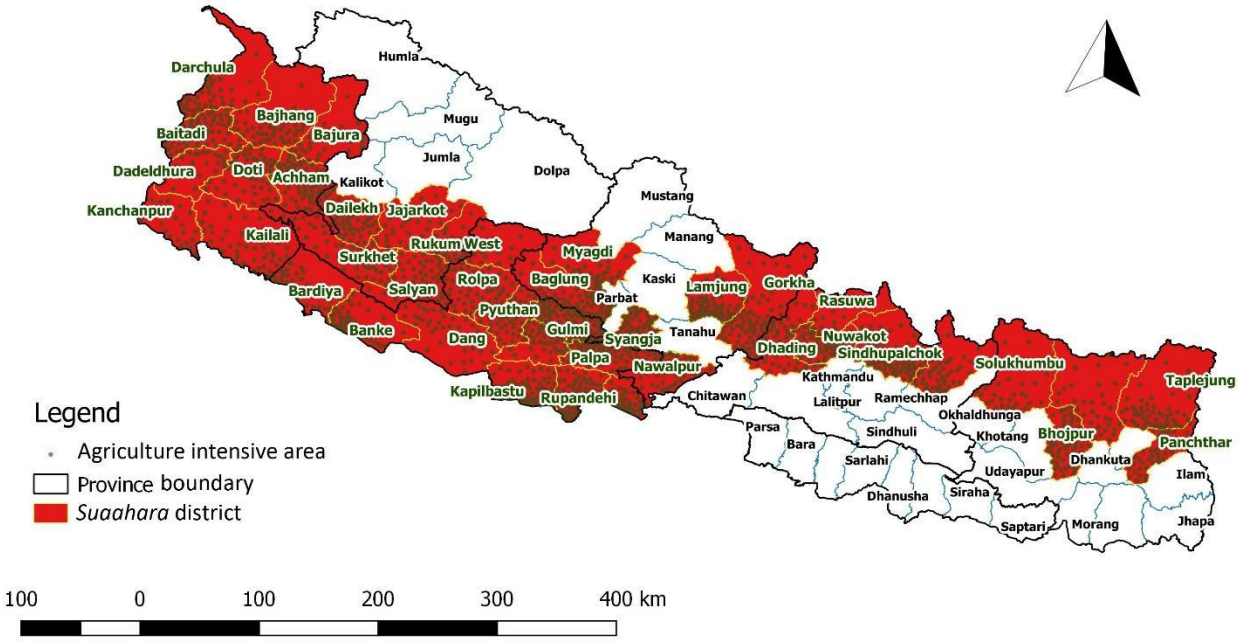

Figure 3: Reach by HFP component of Suaahara program in Nepal (Quant.)

Evaluation Aim and Research Questions

The overall goal of the study is to understand whether the HFP program improved availability, accessibility, and consumption of diverse nutrient-rich foods in these remote, marginalized communities. The specific primary research questions for evaluation of *Suaahara's* HFP program include:

1. Did Suaahara HFP interventions improve household food security among HFP households?
2. Do HFP households have improved dietary diversity compared to before the intervention?
3. The secondary research questions include:
4. Do HFP households have improved relevant agricultural, especially HFP, practices after the HFP intervention?
5. Do HFP households have greater production diversity of vegetables and increased quantity of poultry (eggs and chicken) after the HFP intervention?
6. Do HFP households sell their HFP surplus and, if so, how does this influence their income after the HFP intervention?

7. Do HFP households, particularly mothers, have improved knowledge related to child health and nutrition after the HFP intervention?
8. Are women from HFP households more empowered after the HFP intervention?

Methods

Study Setting

The HFP evaluation was conducted in Darchula, one of the four impact evaluation districts. The district was selected among the four evaluation intervention districts, because it had the highest number of households with baseline data that participated in the HFP interventions. Darchula, a mountainous district in western Nepal, has an area of 2,322 km^2, 24,618 households, and a total population of approximately 133,274. The district borders with India in the west, China in the north, Bajhang district in the east, and Baitadi district in the west. The elevation ranges elevation from 532 meters to 7,132 meters, with 90% of the population practicing subsistence agriculture. This district has higher rates of food poverty (61%) (defined as expenditure on food is insufficient to meet the established basic food requirements), stunting (50%), underweight (40%), and wasting (11%).[23]

Study Design

A pre-post design without a comparison group was used. Households with a child 0-5 years of age randomly selected as participants in the evaluation baseline survey who started receiving the HFP intervention in 2013 (n=70) were followed and again interviewed in the evaluation endline survey.

At the time of data collection for the endline survey, 53 of the 70 households were present in the district. Thirteen households had migrated to another district, one household had no female respondent due to death of mother, and three households were not available at the time of the endline survey. The primary respondent was an adult female present in the household.

Primary Outcomes

Household food security: The Household Food Insecurity Access Scale (HFIAS) score was used to measure the prevalence of household food security. This measure is based on the guideline by the Food and Nutrition Technical Assistance (FANTA) Project questionnaire, which ask about the severity and frequency of food insecurity experienced over the previous 30 day period.[24] The nine occurrence questions asked whether a specific condition associated with the experience of food insecurity ever occurred during the past 30 days. Each severity question was followed by a frequency-of-occurrence question, which asked how often a reported condition occurred during the past 30 days.

Women dietary diversity score: Women's dietary diversity score was measured as defined in the questionnaire of the guideline on dietary diversity by Food and Agricultural Organization.[25] Among the nine food groups defined by the guideline, information on "organ meat" (e.g., any liver, kidney, heart, lungs) was not collected separately at the baseline survey. Therefore, we modified the score by merging information on "organ meat" with "meat and fish" food group at the endline and calculated the score based on a total of eight food groups.

Secondary Outcomes

Gardening practices: Gardening practices were assessed by examining five individual practices that were collected at both baseline and endline. A summed score of the total number of following individual practices that were collected at both baseline and endline was created, with 1 point for each practice reported. If the respondents reported practice of the activities, a score of 1 was given for each, otherwise 0 was given. Then, a total score was created by summing the individual scores for each practice (range 0 to 5). Higher score reflects better gardening practices, which could result in improved production of vegetables. These practices were:

(i) Growing local crop/vegetables varieties

(ii) Using improved seed/saplings/crops

(iii) Using hand tools (e.g., axe, sickle)

(iv) Using mechanized tools (e.g., thresher, harvester, tractor)

(v) Using plough

Poultry-raising practices: Poultry raising-practices were assessed by examining individual seven practices as well as creating a summed score of following individual practices only for the endline, as this information was not collected at the baseline. If the respondents reported practice of the activities, a score of 1 was given for each; otherwise, 0 was given. Then, a total score was created by summing the individual scores for each practice (range 0 to 7). Higher score reflects better gardening practices, which could result in improved production of poultry. The practices evaluated were:

- Use of chicken coop for rearing chicken
- Maintaining fresh air and ventilated space
- Facility of clean water and pot
- Clean or fresh chicken feed and pot
- Proper security of the chicken coops
- Deworming chickens
- Vaccination against NewCastle Disease

Vegetable production diversity: Based on the major nutrients present in the vegetables and adapted from the groupings used in a study of homestead food production program in Bangladesh,[26] vegetables produced were grouped into five types: dark-green leafy vegetables

(DGLV), other vitamin A-rich vegetables, beans and pulses, roots and tubers, and other vegetables. This grouping is aligned with those of dietary diversity for children 6 to 23 months of age as guided by World Health Organization[27] and for women as guided by Food and Agriculture Organization.[25]

Number of chickens produced: Respondents were asked how many chickens the households had at the time of survey. Information on three different chicken types: improved (e.g., New Hampshire, Black Australorp); local (e.g., *Sakini, Ghanti Khuile*); and boilers/layers was obtained at the endline. For the analyses, regardless of the types of the chicken raised, the numbers were combined. At baseline, information on number of chicken was not collected separately from other birds like ducks. Raising of other birds with chicken might be rare in the district, hence allowing for the potential comparison before and after the intervention.

Number of eggs produced: At the baseline, the number of eggs produced were measured by asking respondents the number of eggs produced in the last 12 months. The total number of eggs produced was divided by 12 to get an average number of eggs produced in one month. At the endline, respondents were asked how many eggs were produced in the last one month.

Income by selling vegetables: Income was measured from the information provided by the respondents on earnings by selling vegetables in the last 12 months. Price of 2012 was adjusted to price of 2021 to account for the inflation using the guidance provided by USAID.[28] The formula used is: real $price_{(2021)}$ = (CPI_{2012} ÷ CPI_{2021}) x nominal $price_{(2021)}$, where CPI is the consumer price index. The data on consumer price index was obtained from the World Bank Data Repository (CPI for 2012 = 119.6 and CPI for 2021 = 206.4).[29] Finally, the price in Nepalese rupees was converted into United States dollars (USD) (1 USD = 85.23 Nepalese rupees (NPR) in 2012 and 118.13 NPR in 2021).[30]

Income by selling poultry: Income was measured from the information provided by the respondents on earnings by selling chicken and eggs in the last 12 months. Price of 2012 was adjusted to price of 2021 to account for the inflation using the guidance provided by USAID.[28] The formula used is: real $price_{(2021)}$ = (CPI_{2012} ÷ CPI_{2021}) x nominal $price_{(2021)}$, where CPI is consumer price index. The data on consumer price index was obtained from the World Bank Data Repository (CPI for 2012 = 119.6 and CPI for 2021 = 206.4).[29] Finally, the price in Nepalese rupees was converted into United States dollars (USD) (1 USD = 85.23 Nepalese rupees (NPR) in 2012 and 118.13 NPR in 2021).[30]

Women's knowledge on child nutrition: Knowledge was measured based on information on a questionnaire covering colostrum feeding, appropriate age for feeding certain foods, knowledge on causes of malnutrition, and feeding of a child during her/his illness was assessed. All the responses were dummy coded, and the correct responses were scored one. A summed score was calculated to measure the overall knowledge on child nutrition.

Women's empowerment: Women's empowerment was assessed by adapting and modifying the Women's Empowerment in Agriculture Index (WEAI).[20] This index measures the empowerment, agency, and inclusion of women in the agriculture sector in an effort to identify ways to overcome those obstacles and constraints. Due to insufficient information in both the rounds to create WEAI, the index was modified to include information collected at both baseline and endline, and therefore, women's empowerment was measured through these covered three domains: (i)

decisions about agricultural production, (ii) decisions over use of income, and (iii) decisions over control of productive assets in the households. A greater score in these domains indicated greater empowerment.

Note: A description of information used to measure these outcome variables is explained in Appendix B.

Covariates

Socio-economic status and whether the households received agricultural assistance from any organization were treated as time-variant covariates, and household caste/ethnicity as time-invariant covariate. Principal component analysis was conducted based on a list of household assets using the method described by Ruestein and colleagues.[31] Tertiles of this scale were then created. Agricultural assistance was measured by assessing if any member of the households received agricultural assistance from the government, NGO, etc. in the last 12 months preceding the survey in both baseline and endline. The agricultural assistance included seeds, fertilizer (e.g., chemical, organic), agricultural tools, other agricultural inputs other than seeds, fertilizer, or agricultural tools (e.g., pesticides); animals (e.g., livestock/poultry/fish), and inputs for care of animals (e.g., fodder, medicine, shelter). Socially disadvantaged caste groups consisted of *Dalits*, Muslims, and disadvantaged *Janajatis* while advantaged caste groups consisted of Brahmins or Chhetri, Gurung, Thakali, Newar, and non-*Dalit Terai* caste based on the caste/ethnicity defined by the Government of Nepal Health Information and Management System.[32]

Statistical Analysis

Descriptive statistics were calculated for the outcomes at baseline and endline. Linear and logit random-effects models with households as the random effect were developed to estimate the coefficients for the differences in outcome variables before and after the HFP intervention within households. For the number of chickens and eggs produced, and income from the sale of vegetables, chickens, and eggs, left-censored regression models were run that incorporated the zeros representing no production. First, bivariate random-effects models were run. Second, the models were adjusted using socio-economic status (rich, middle, poor) and whether the households received agricultural assistance from any other organization (binary) as time-varying covariates, and household caste/ethnicity as a time-invariant covariate. All the analyses were done using Stata version 14.2 and accounted for clustering using a robust sandwich estimator of standard errors.

Findings

The demographic makeup of the sample of respondents before and after the HFP intervention are presented in Table 3.1.

Women's dietary diversity remained almost the same from baseline to endline (Table 3.2). Households experiencing food insecurity increased at the endline. Overall, improved gardening

practices remained constant from baseline to endline. Production of vegetables, chicken, and eggs improved at the endline. Income from selling surplus vegetables and eggs increased from baseline to the endline.

Table 3.1: Socio-demographics of Households Before and After Implementation of HFP Intervention in Darchula district, Nepal, 2012-2022.

Socio-demographic variables	**Baseline** (2012) N (%)	**Endline** (2022) N (%)
Household size (mean, SD)	6.0, 2.2	5.2, 1.9
Caste/Ethnicity		
Socially advantaged	48 (50.0)	48 (50.0)
Socially disadvantaged	5 (50.0)	5 (50.0)
Household wealth		
Poor	25 (58.1)	18 (41.9)
Middle	16 (45.7)	19 (54.3)
Rich	10 (38.5)	16 (61.5)
Household received agricultural assistance	17 (38.6)	27 (61.4)

Table 3.2: Comparison of Outcome Variables Before and After Implementing the HFP Intervention in Darchula, Nepal, 2012-2022.

Outcomes	**Baseline** (2012) N (%)	**Endline** (2022) N (%)
Women's dietary diversity score (8 food groups) (mean, SD)	4.0, 1.1	3.9, 1.0
HFIAS score (mean, SD)	1.8, 3.6	3.7, 4.4
Gardening practices		
Growing local crop/vegetables varieties	53 (100.0)	49 (92.5)
Using improved seed/saplings/crops	34 (64.2)	37 (69.8)
Using hand tools (e.g., axe, sickle)	0	53 (100.0)
Using mechanized tools (e.g., thresher, harvester, tractor)	53 (100.0)	0
Using plough	51 (96.2)	45 (84.9)
Overall summed score (mean, SD)	3.6, 0.5	3.5, 0.6
Production of vegetables		
Dark-green leafy vegetables	31 (58.5)	52 (98.1)
Other vitamin A-rich vegetables	31 (58.5)	33 (62.3)
Beans and pulses	2 (3.8)	17 (32.1)
Starchy roots and tubers	3 (5.7)	46 (86.8)
Other vegetables	52 (98.1)	52 (98.1)
Summed vegetable production diversity score (0-5) (mean, SD)	2.2, 0.8	3.8, 1.0
Chicken produced (at present)		
No	43 (81.1)	39 (73.6)

Yes	10 (18.9)	14 (26.4)
Number of chicken produced (at present) (mean, SD)	1.0, 2.5	1.3, 3.5
Eggs produced (in last 1 month)*		
No	46 (86.8)	43 (81.1)
Yes	7 (13.2)	10 (18.9)
Number of egg produced (in last 1 month) (mean, SD)	0.5, 1.3	4.3, 9.7
Income (in USD) in 12 months by selling (mean, SD)**		
Vegetables	1.3, 8.0	8.9, 42.8
Chicken	3.5, 11.9	2.1, 8.2
Eggs	0.1, 0.3	0.2, 0.7
Total income	4.9, 1.9	11.2, 6.0
Mother's knowledge regarding child nutrition and health (mean, SD)	10.4, 1.7	13.0, 2.4
Women's Decision-making Power		
Decision made about agricultural production (number of activities)	6.7, 0.7	6.8, 0.5
Decision made over the use of income (number of activities)	4.9, 0.8	6.7, 0.7
Decision made over control of productive assets (number of assets)	0.8, 1.3	1.3, 1.0

**in the last 12 months at baseline*

***prices of 2012 (1 USD = 85.23 NPR) adjusted to price of 2021 (1 USD = 118.13 NPR) to account for inflation*

In the bivariate random-effects models, the results showed that after receiving the HFP intervention, the chances of a household being food insecure increased by about 89% (Table 3.2). Receiving the HFP intervention, however, increased the chances of vegetable production diversity increased by 53%, increased the number of eggs produced each month by 4, and increased the household's income from the sale of surplus vegetables, chicken, and eggs by about USD 6. Mother's knowledge on child nutrition and health improved from baseline to endline and mothers had improved decision-making power over the use of all household income and greater control of productive assets in the households.

In the regression models that adjusted for socio-economic and other covariates, the overall results remained the same with household food insecurity worsening, but vegetable production diversity, production of eggs, income from sale of surplus vegetables and eggs, mother's knowledge on child nutrition, and women's decision-making power increasing from baseline to the endline (Table 3). In addition, chances of production of dark-green leafy vegetables and beans/pulses increased from baseline to endline. Overall gardening practices decreased after the implementation of the HFP program.

Table 3.3: Changes in outcomes among households before and after receiving the HFP interventions in Darchula, Nepal, 2012-2022.[a]

Outcomes	Bivariate random-effects model			Multivariable random-effects model		
	Coefficient (95% CI)	Standard error	P-value	Coefficient (95% CI)	Standard error	P-value
Women's diet diversity	-0.15 (-0.50, 0.20)	0.18	0.397	-0.20 (-0.57, 0.17)	0.19	0.297
Household food insecurity access scale	**1.89 (0.48, 3.29)**	**0.72**	**0.008**	**2.26 (0.69, 3.82)**	**0.80**	**0.005**
Overall summed score of gardening practices	-0.13 (-0.36, 0.10)	0.12	0.263	**-0.21 (-0.43, 0.01)**	**0.11**	**0.053**
Vegetable production						
Vegetable production diversity score	**1.53 (1.17, 1.89)**	**0.18**	**<0.001**	**1.49 (1.11, 1.86)**	**0.19**	**<0.001**
DGLV	3.61 (-13.62, 20.83)	8.79	0.681	**3.54 (1.34, 5.75)**	**1.13**	**0.002**
Other vitamin-A rich vegetables	0.16 (-0.71, 1.03)	0.44	0.723	0.06 (-0.86, 0.98)	0.47	0.902
Beans and pulses	**2.77 (0.73, 4.81)**	**1.04**	**0.008**	**2.78 (0.81, 4.75)**	**1.01**	**0.006**
Roots and tubers	4.70 (-7.22, 16.61)	6.08	0.440	**5.95 (3.50, 8.40)**	**1.25**	**<0.001**
Other vegetables	0.01 (-2.85, 2.85)	1.46	>0.999	1.20 (-4.48, 6.88)	2.90	0.678
Chicken production	2.13 (-1.49, 5.75)	1.85	0.249	1.28 (-2.60, 5.16)	1.98	0.518
Egg production	**14.6 (2.77, 26.42)**	**6.03**	**0.016**	**10.24 (-0.99, 21.46)**	**5.73**	**0.074**
Income (in USD) from sale of surplus						
Vegetables	**70.15 (17.33, 122.97)**	**26.95**	**0.009**	**68.83 (13.47, 124.18)**	**28.24**	**0.015**
Chicken	-11.54 (-37.04, 13.96)	13.01	0.375	-3.68 (-28.9, 21.54)	12.87	0.775
Egg	**2.24 (-0.48, 4.96)**	**1.39**	**0.107**	**2.22 (-0.61, 5.05)**	**1.44**	**0.123**
Women's knowledge regarding child health and nutrition	**2.62 (1.77, 3.47)**	**0.43**	**<0.001**	**2.6 (1.68, 3.52)**	**0.47**	**<0.001**
Women's empowerment						
Decision made about agricultural production (number of activities)	0.11 (-0.14, 0.37)	0.13	0.380	0.13 (-0.13, 0.38)	0.13	0.333
Decision made over the use of income (number of activities)	**1.79 (1.50, 2.08)**	**0.15**	**<0.001**	**1.81 (1.51, 2.11)**	**0.15**	**<0.001**
Decision made over control of productive assets (number of assets)	**0.47 (0.09, 0.86)**	**0.20**	**0.016**	**0.38 (-0.04, 0.80)**	**0.21**	**0.073**

[a] *Entries that are bolded have p-values of about 0.1 or lower*

Discussion

Overall, the findings suggest that the *Suaahara* program that included the HFP interventions in Darchula improved vegetable production diversity overall and specifically the production of dark-green leafy vegetables and beans and pulses as well as the production of eggs and income from the sale of vegetables and eggs. Over nearly a decade of interventions, mother's knowledge on child nutrition and health and women's empowerment also improved. This study highlights that where availability, affordability, and accessibility of nutrient-rich foods is limited, promotion of improved production-related practices can improve production of vegetables and poultry and income from the sale of surplus production which might have important implications for nutritional outcomes. On the other hand, a result of increased prevalence of household food insecurity demands greater attention as food insecurity also links with nutritional outcomes.

Several studies corroborate our findings on improved vegetable and poultry production from HFP. For example, a study using nutrition-sensitive agriculture project that promoted production-related activities aimed to improve production, sales, and dietary diversity in Ethiopia, Kyrgyzstan, Nepal, Pakistan, and Peru showed an improved production of nutrients-rich foods including vegetables and fruits.[33] Recent randomized controlled trials in Kenya, Tanzania, and Uganda also reported that home garden interventions improved vegetable production.[34] A longitudinal study found that interventions that improved poultry-raising practices in four African countries was important for increasing egg and chicken production.[35] Promotion of optimal production-related practices along with other types of trainings, inputs, and awareness-creation activities have been found to be important to promote improved food production and consumption choices.[33,36]

Further studies are necessary to understand the role of homestead gardening on household food insecurity, especially among hard-to-reach and disadvantaged communities. Since the HFP model targets smallholder farmers, with small plots for cultivation, improving vegetable and poultry production alone in such small plots might not be sufficient to improve household food security. HFP models along with other community-level interventions such as cash transfer programs that promote access to and availability of nutritious foods might be needed to improve household food security in marginalized communities.[37] In addition, promoting livestock rearing along with poultry may be a means of improving household food security. For example, damage or loss of livestock (large, small, or poultry) in the last 12 months was positively associated with household food insecurity (p=0.199) in a supplementary analysis conducted for this study (Appendix C). In addition, there might be social and economic determinants such as increasing food prices, geographical constraints, and overall food policies which need to be further researched in relation to home gardening and household food security.

Nutrition-sensitive agriculture interventions often have a goal to improve nutritional outcomes through household production of vegetables, fruits, and small livestock by promoting improved gardening and poultry-raising practices along with low-cost, easy to adopt technologies. It is also equally important to consider the number of improved practices to be taught to the farmers. Prioritization of topics and interventions might be needed for farmers, especially from marginalized communities, as there may be constraints in rapid adoption of multiple new practices due to no or limited awareness of the practices, poor motivation, and lack of access to and availability of resources.[35]

A strength of this study was the long measurement window, which is usually needed to see an impact of agricultural interventions. In addition, having a longer duration of interventions helped to understand the need for sustainable interventions and measurement of outcomes over a longer time rather than just 3-5 year periods. Findings from this externally designed and executed evaluation provide an estimate of the change over time in outcomes before and after *Suaahara II's* implementation of HFP interventions, but non-randomization and lack of an appropriate counterfactual prevents establishing causality between the interventions and the outcomes. Social desirability bias, inherent with behavior-related questions, could not be avoided and might have affected the responses, particularly regarding whether the households remained engaged in the gardening and poultry-raising activities. Reliance on recall-based outcomes like assessing growth of vegetables in the past year might have introduced recall bias. Some of the information regarding improved gardening practices and poultry-raising practices was not collected at baseline, which limited the evaluation of some of the outcome variables. This study was not a part of the evaluation design at baseline, therefore, data collected at the baseline was not complete to compare the measures at the endline.

Although a long period after the intervention (almost a decade) is important to see the impact of agricultural interventions, such a period may have diluted the effects of the HFP program. For example, knowledge and skills received from the initial training might have diminished, despite the household having received inputs from the HFP program staff and local organizations at certain intervals throughout the period. To explore in further depth whether initial and refresher trainings were helpful or not and what could be additional challenges over a long period, future studies, especially, qualitative studies, would be helpful. In addition, measurements of the outcomes at shorter intervals, rather than waiting at the end of the intervention, would be helpful for the programmers to modify and improve the program.

Conclusions

Participation in the HFP program was associated with several outcomes. Vegetable production diversity; production of dark-green leafy vegetables, beans and pulses; production of eggs; income from sale of vegetables and eggs; women's knowledge on child nutrition and health; and women's empowerment improved after the implementation of the HFP program. However, household food security and overall gardening practices decreased after the implementation of the HFP program. This could be due to several factors, such as, small, and unviable landholding size, the effect of Covid-19 and supply chain related disruptions especially in the mountainous areas, and rising cost of food and fuel. A detailed investigation into the factors is needed to better understand their impact.

While understanding and interpreting the results, one must be mindful of the global disruptions in supply chain due to the twin effects of Covid-19 and Ukraine war. Both these global incidents affected poor and marginalized households in Nepal severely. The pandemic led to disruptions in global supply chains causing production slowdowns, leading to shortages and price increase for foodgrains. Additionally, movement restrictions made it difficult for farmers and other producers to transport their products to market, further exacerbating supply chain disruptions. Further, the

conflict between Russia and Ukraine that started in February 2022, impacted global commodity markets, particularly for foodgrains and other agricultural products. Thus, the twin-effects of Covid-19-19 and Ukraine war aggravated phenomenal increase in food, fuel and fertilizer prices in Nepal leading to a shortage of food supplies, especially in remote and mountainous areas. In addition, Suaahara faced a challenging implementation context since the entire HFP program was targeted to smallholder farmers from marginalized communities in remote areas with poor access to markets. These factors potentially limit the effectiveness of HFP program.
While designing and implementing nutrition-sensitive agriculture interventions like HFP, the following points need to be considered for better outcomes.

First, sustaining participation and ensuring performance of improved agricultural practices over a long period is necessary to have improved nutritional outcomes. For this, understanding socio-economic determinants might help to sustain the participation and performance of households in nutrition-sensitive agricultural interventions including HFP. Moreover, supporting activities delivered to the households should go deeper than vegetables, chickens, and eggs to address underlying cultural and gender norms that constrain women's active participation in homestead food production.[38-40] Further research using in-depth interviews and experimental designs might be helpful to understand effect of these determinants in outcomes associated with the HFP program.

Second, while designing nutrition-sensitive agriculture programs like HFP, duration of program implementation needs to be considered in conjunction with the level of training, inputs, and resources provided to the farmers. If the farmers learn the practices quickly and perform them effectively to increase the productivity, even a shorter duration of implementation might suffice. A program implemented for a shorter duration, however, with fewer inputs or poorer quality will not necessarily result in improved productivity and nutrition outcomes.[41]

Finally, along with consumption of diverse nutrients-rich foods and nutritional outcomes, focus needs to be placed on training farmers, ensuring they learned the methods well, and are practicing correctly in the gardens. Trainings and methods for improved vegetable and poultry production are usually offered at lower cost and pose less risk, however, they are not easy, and more easily adopted practices for low-resource settings are required.[35]

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Appendices

Appendix A: List of Districts where HFP Program was Implemented.

Year of HFP implementation	Districts	Number of districts
2013	Rasuwa, Dolakha, Taplejung, Sankhuwasabha, Manang, Mustang, Bajura, Bajhang and Darchula*	9
2013	Solukhumbu, Bhojpur, Baglung, Myagdi, Gorkha, Lamjung, Syangja, Parbat, Rupandehi, Nawalparasi, Sindupalchowk	11
2014	Accham, Dadeldhura, Baitadi, Doti and Nuwakot	5
2015	Banke, Bardiya, Dang, Salyan, Surkhet, Dailekh, Jajarkot, Pyuthan, Rolpa, Rukum, Kapilbastu, Argakhanchi, Palpa, Gulmi, Kailali and Kanchanpur	16
2017	Panchathar and Dhading	2

**District included in the present evaluation.*

Appendix B: Association Between socio-economic Events and Household Food Insecurity Among Households in Darchula District at Endline, 2022.

Socio-economic events	Bivariate regression coefficients			Multivariable regression coefficients		
	Coefficient (95% CI)	Standard error	P-value	Coefficient (95% CI)	Standard error	P-value
Damage or loss of livestock (large, small, poultry) in the last 12 months	1.63 (-0.77, 4.04)	1.2	0.178	1.63 (-0.89, 4.15)	1.25	0.199
Damage or loss of crops in the last 12 months	0.64 (-1.86, 3.13)	1.24	0.611	0.8 (-1.71, 3.31)	1.25	0.525
Chronic or short-term illness of household member in the last 12 months	0.77 (-1.81, 3.34)	1.28	0.553	0.37 (-2.28, 3.01)	1.32	0.782

Part 4 – Evaluating Intermediate Results – Improved access to diverse and nutrient-rich foods by women and children (IR3) - Qualitative

Assessing the effectiveness of agricultural interventions under Suaahara: A Qualitative Evaluation of HFP Program in Darchula district, Nepal, 2012-2022

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Evaluation Research Team: Ramesh P. Adhikary, Helen Keller INTL
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Executive Summary

Hellen Keller International (HKI) has been implementing Suaahara II, a USAID-funded multi-sectoral integrated nutrition program in Nepal over the last one decade. One of the integral components of the program was Homestead Food Production (HFP) that aimed to promote production and consumption of nutrient-rich foods towards improving household food security and nutritional outcomes of children and mothers. Additionally, the focus of the intervention was geared towards identifying and supporting the village model farmers (VMFs) who could serve as a local resource on homestead food production for the community.

As an integral part of Suaahara's monitoring, evaluation and research system, baseline and endline surveys for impact evaluation were conducted in 2012 and 2022 respectively. The impact evaluation primarily focused on health and nutrition aspects of the intervention, but did not cover the effectiveness of agricultural interventions under Suaahara II. This qualitative study aimed to fill this gap to generate knowledge and evidence on the effectiveness of Suaahara HFP interventions. The study was conducted in three municipalities of Darchula district, namely Mahakali Municipality, Malikarjun rural municipality and Shaileshekar rural municipality

Four primary research questions formed the basis of overall research design. The research questions included: i. are the HFP intervention households' practices and knowledge, and consumption of quality diet continuing over time? ii. how have HFP interventions impacted kitchen gardening and chicken rearing practices for increased production and crop diversity; iii. what are the key barriers and facilitators for improving household production practices; and iv. to what extent have VMFs delivered supports in their communities. The questions determined the methodology and guided all stages of inquiry, analysis and reporting. To answer the research questions two data collection methods were used: i. key informant interviews; and ii. focus groups discussions. The multi-module semi-structured checklists were used to collect the data (Annex-1.1-Annex 1.6). The evaluation team consisted of 1 team leader, four interviewers and four translators. The data was collected in the month of November. As a part of the ethical consideration, the approval was obtained from Nepal Health Research Council (NHRC).

The following section presents the key findings of this qualitative study:

- There was an improvement in knowledge and to some extent practice among the program participants with respect to homestead gardening. For example, the data indicates the increased use of fencing around their kitchen gardens. The scenario was quite similar to the backyard poultry rearing. For example, information collected suggests the increased use of semi-intensive chicken coops in the study location.
- The knowledge the study participants had with respect to consumption of nutrient-rich food was evidently being translated into practice. For example, the knowledge and practice on child's dietary diversity, that is, feeding children from four different food groups was quite apparent from this evaluation.
- The evaluation found the increased availability of nutrient-rich food at both household and community levels. The information can to some extent suggests more production at the local level.

- The evaluation suggests the enhanced practice of growing diverse vegetables using technologies (machines, poly-houses etc.). There were however some locations where the production could have improved with training on the use of technology.
- One of the findings that emerged from the evaluation was the increased income among the beneficiary households through selling surpluses which was largely due to growing off-season vegetables. In some locations however, particularly those in remote parts where markets were not readily available, the surpluses rotted at homes.
- Some of the key barriers that could have prevented from yielding better results included lack of necessary materials (building fences, constructing semi-intensive coops etc.), lack of financial resources (purchasing polyhouses, purchasing materials for fence or coops etc.), lack of skilled manpower (installing polyhouses, constructing semi-intensive coops etc.) and lack of space (constructing semi-intensive coops, land availability to undertake tunnel farming etc.).
- With respect to enabling factors, local government units and non-government entities were providing support in form of materials or by providing training, or both. The support to a certain degree has contributed to improved practices.
- This evaluation suggests that social bonding, to some extent, has helped promote improved kitchen gardening and backyard poultry rearing practices. For example, a program participant in one of the study locations helped others by informing the latter about the places where improved seeds and appropriate pesticides could be obtained.
- Mixed responses were received about the services provided by the VMFs in the study locations. The findings suggest that the VMFs were quite successful in forming groups and imparting knowledge to the members. Additionally, VMFs in some study locations were able to leverage government resources through effective communication with the local authorities. Nevertheless, there were a few issues concerning VMFs and their roles: i. VMFs benefiting themselves from the interventions; ii. time management issue particularly for female VMFs; and iii. not communicating fully with the group members about obtaining appropriate materials associated with improved kitchen gardening and poultry rearing practices.

Recommendations

- The evidence from the evaluation emphasizes the need to promote kitchen gardening and backyard poultry rearing practices further which can be undertaken in collaboration with the local government units (support for materials and training). The units have resources at hand and decision-making power following the change in structure (shift to federalism).
- It is crucial to institute proper mechanisms for effective knowledge transfer. This is because, individuals directly involved with intervention, such as VMFs, were benefiting the most. The transfer of knowledge will help other program participants to understand the benefits of improved kitchen gardening and poultry rearing practices.

- The findings suggest the importance of enhancing the availability of nutrient-rich foods particularly in rural markets. This can be achieved by collaboration between producers and local government units.
- Cultivation of off-season vegetable farming should be encouraged as this was one of the leading reasons for income augmentation among program participants. It can be achieved by partnering with local governments and private sectors (such as agrovets, cooperatives and traders) for implementation.
- This study suggests the need to establish strong linkages between farmers and local markets. This is because the evaluation found that in remote areas surplus vegetables lied rotten as the farmers couldn't find the markets to sell their produce.
- The study recommends building capacity of the local communities through various formal and informal groups (such as women's groups) for leveraging resources from local governments. Developing and fostering strategic partnerships between development interventions and local government units can help facilitate achieving this goal.
- It is important to promote all three types of social capital (bonding, bridging and linking) in locations where future initiatives would be undertaken.
- One of the key criteria for VMF selection should be based on their dedication and commitment of full engagement. The approach will further enhance the delivery of services such as distribution of seeds, chicks, impart knowledge etc. VMFs should communicate with the program participants about where important materials related to kitchen gardening and backyard poultry rearing are obtained.

Background

In Nepal, Helen Keller International implemented *Suaahara*, a USAID-funded multi-sectoral integrated nutrition program for over a decade, ultimately covering 42 out of 77 districts. An integral part of the intervention was Homestead Food production (HFP) through which *Suaahara* promoted production and consumption of nutrient-rich foods towards improving household food security and nutritional outcomes among children and mothers. ***Suaahara's*** specific intermediate result related to HFP was to improve access to diverse and nutrient-rich foods by women and children. To achieve this outcome, in 2012, HFP was initially launched in 9 highly food-insecure districts and expanded to all 42 districts from 2013 to 2017. The HFP intervention targets disadvantaged food-insecure communities, thus its implementation varies by district. In some districts, the implementation was district-wide (i.e. all communities are targeted) and in other districts only selected communities are targeted (Figure 1).

Women were the target for the HFP program because most are engaged in homestead agricultural production while also tending to household chores in most low- and middle-income countries including Nepal (Food and Agriculture Organization, 2011). Several studies have shown that empowering women can contribute to improved farm productivity (Diiro, Seymour, Kassie,

Muricho, & Muriithi, 2018). In addition, the HFP program has been shown to empower women (Heckert, Olney, & Ruel, 2019; Olney et al., 2016), which in turn can improve dietary diversity (Sinharoy et al., 2018), health care utilization (Sado, Spaho, & Hotchkiss, 2014), and growth of children (Cunningham et al., 2015; Heckert et al., 2019; Shroff et al., 2011). Also, the absence of extension services targeting women and providing technical support for horticulture and small-animal raising, highlights the need to target trainings, inputs and information on agriculture to improve agricultural practices to women (Farinde & Ajayi, 2005). Research has shown that targeting women for training, agricultural inputs and information on improved horticultural and poultry improves their knowledge of agricultural practices and increases agricultural productivity (Rivera-Ferre, 2008). In addition to the household focus of the HFP program, which emphasizes a garden-to-plate model by encouraging consumption of home-grown production, *Suaahara* II (2016 onwards) also supported small producers (both VMFs and beneficiary households) to link with markets for the sale of excess production as a means to supplement household income. In this way, the HFP approach serves to both incentivize home production for home consumption, but also to sell and generate income to increase household purchasing power and well-being.

Suaahara's HFP approach was to identify and support Village Model Farmers (VMFs) who could serve as a resource on homestead food production for households in the community. Through a collaborative process, Helen Keller identified local farmers and community organizations to establish one VMF per ward, the smallest administrative unit in Nepal (pre-federalism). A total of 5,686 VMFs were established through training and other support to serve as model farms for on-farm demonstrations, provision of technical extension assistance to beneficiary households, and for organizing the household beneficiaries into HFP groups (~20 members per group). Households were selected, at one point per community, for inclusion in the HFP program if they: (1) had a pregnant woman or mother of at least one child less than 2 years of age (1000-day women) residing in the household at the time of the listing for the training and (2) had at least 40 to 75 m^2 of land near the home. These households received a two-day basic HFP training consisting of (kitchen gardening, poultry rearing, diverse food consumption etc.). Immediately after the training, the households were given packets of seeds—one for each of the three growing seasons-- and five chicks. Households were also linked to the local VMF for further inputs and technical support. In total, the program served an estimated 114,000 beneficiaries across 1504 wards in the 42 districts covered by the Suaahara program. It is important to note that the basic HFP support package (i.e. training, seed and chick distribution) was a one-time effort per community, and new households meeting these criteria at a later date did not directly receive inputs, but relied on VMF inputs and support.

Suaahara adopted four fundamental principles of HFP programming: (1) ensuring households' access to diverse and nutrient-rich foods throughout the year; (2) focusing on production of vegetables, eggs, and meat; (3) promotion of low-cost but easy to adopt technologies; and (4) empowerment of smallholder farmers to build resilient and sustained household food production. Applying these principles, HFP was implemented at three levels: household, community and structural levels. At the household level, the program targeted 1000-day women with an aim to increase production and consumption of diverse nutrient-rich foods throughout the year. At the community level, the program established VMFs to support the household beneficiaries with

agricultural practices and production, particularly when there is limited access to agricultural extension services and production inputs. At the structural level, the program worked with governmental agricultural/livestock offices at the local level and worked to scale-up and sustain HFP through mainstreaming and leveraging resources both from other development projects as well as the Nepal government.

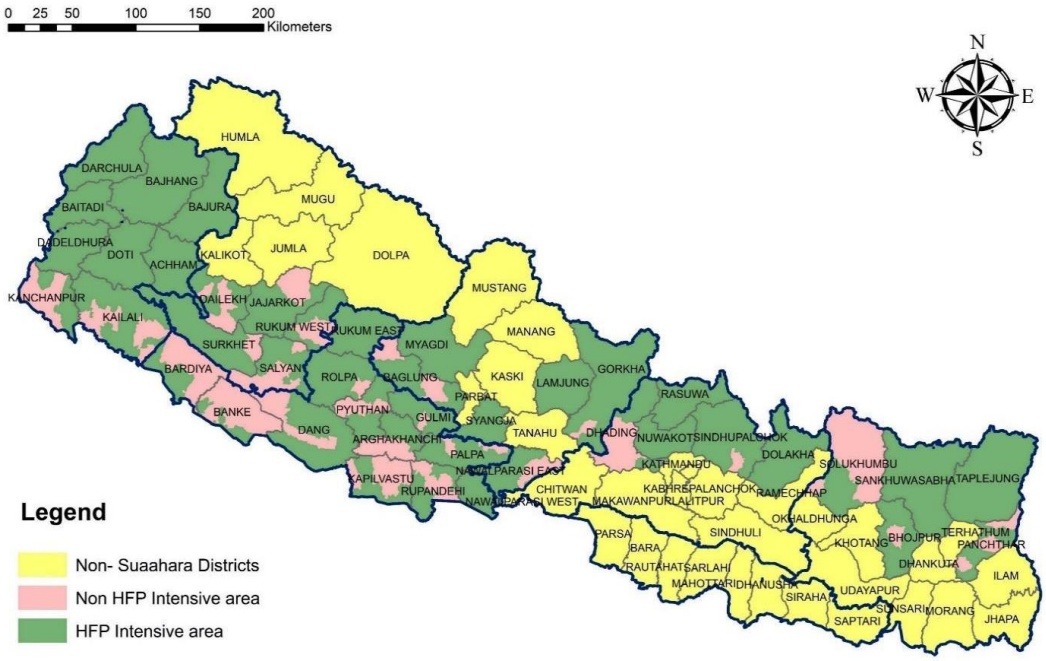

Figure 4: Reach by HFP Component of Suaahara Program in Nepal (Qual.)

Rationale

Suaahara had a comprehensive monitoring, evaluation and research (MER) for learning plan and related data systems. As a part of the larger MER, impact evaluation endline survey was undertaken in 2022. Both the baseline survey carried out in 2012 and the endline survey largely focused on health and nutrition aspects of the program. The surveys did not cover the agricultural component to the extent required. It was thus important to conduct the evaluation of Suaahara's agricultural components that primarily focused on HFP. The HFP quantitative survey was conducted in Darchula district with the rationale that the district has the highest prevalence of households that participated in in HFP component at the baseline survey. Some of the key preliminary results[1] (see Annex-2 for more details) of the quantitative survey included: i. women's diversity remained the same between baseline and endline; ii. increased households' experiencing food insecurity; iii. improved production of vegetables and eggs; iv. reduced chicken

[1] The results are based on the comparison between the baseline and endline surveys

production; and v. increased consumption of dark leafy vegetables, beans and pulses and starchy roots and tubers.

Although the quantitative survey did provide crucial information on HFP, it did not explore the intervention's positive and negative impacts on the lives of the people. To gain insights into the impacts and to supplement the quantitative data collected, it was essential to have the evaluation guided by qualitative approach in place.

Research Questions

The preliminary results from the HFP quantitative survey were taken into consideration to develop the following research questions:

1. Are the HFP intervention households' practices and knowledge, and consumption of quality diet continuing over time?
2. How have HFP interventions impacted kitchen gardening and chicken rearing practices for increased production and crop diversity?
3. What are the key barriers and facilitators for improving household production practices?
4. To what extent have VMFs delivered supports in their communities?

Study Design

The qualitative study was conducted in three municipalities of Darchula district. Darchula was the only district included in the HFP quantitative survey that was largely aimed at assessing changed in HFP knowledge, practices, production and market linkages. The municipalities where the study was carried out included: i. Mahakali Urban Municipalities; ii. Malikarjun Rural Municipality; and iii. Shaileshikar Rural Municipality. The municipalities were selected purposively based on urban/rural category and density of panel HFP households (high density M/RM were selected).

The study used key informant interviews (KIIs) among Village Model Farmers (VMFs), mothers, local government officials (eg. agri-extension workers), NGO/private sector representatives and Female Community Health Volunteers (FCHVs). In addition, focus group discussions (FGDs) were conducted with the beneficiaries mainly 1000 day mothers. The study participants were purposively selected on their basis of involvement (direct and indirect) in the Suaahara program. Their involvement was essential particularly to gain an in-depth understanding of purpose and impact of the HFP component. To facilitate the FGDs and KIIs, tailor made interview guides were developed (see annexes 1.1-.1.6).

Table 4.1: Sample allocation of respondents by municipality

Municipalities	KII						FGD
	VMF	**Mother**	**FCHV**	**Local government officials** (agri-extension worker)	**PNGOs /Private sector** (Agrovets)	**Total**	**FGD with mothers**
Mahakali UM	2	2	2	2	2	10	2
Malikarjun RM	2	2	2	1	1	8	2
Shaileshikhar RM	2	2	2	1	1	8	2
Total	**6**	**6**	**6**	**4**	**4**	**26**	**6**

Training

Prior to the actual field work, 2-day long training was provided to the interviewers (moderators and recorders/note takers led jointly by the HKI (Suaahara/USAID) representatives and the team leader. The team leader ensured that each interviewer participated actively in the entire period of the training. Adequate supply of required stationaries, training aids, manuals, recorder were ensured by the HKI.

The key focus of the training was to familiarize the interviewers with the objectives, methodology and tools in relation to the study. Additionally, the training included mock sessions that were aimed at making familiar the data collection team with questions to be administered and operational procedures of the field work.

Data Management and Analysis

The interviewer's audio-recorded all the interviews that were later transcribed by the interviewers themselves. The transcripts were then translated from Nepali to English.

Information collected through KIIs and FGDs was analyzed using thematic analysis method (Braun, Clarke and Terry, 2019). The key steps of the analysis included: i. reading and re-reading the data (translated transcripts) and noting of ideas; ii. generation of codes; iii. data organized into meaningful groups; and iv. revise coding scheme (eliminate and collapse codes). For the data management and analysis process, the software package called Nvivo was used.

For the data collection and analysis purposes, a number of variables related to kitchen gardening and backyard poultry rearing were used. Variables for homestead gardening included: i. fencing; ii. vegetable diversification; iii. climate smart agriculture (CSA); iv. insect pest management; v. water management; vi. integrated cultivation management; vii. seed production; and viii. solar drying. Likewise, variables for backyard poultry rearing included: i. use of semi-intensive coop; ii. providing nutritive feed and clean water; iii. coop hygiene and sanitation; iv. regular vaccination; and v. separate chicks and chickens if any diseases and consult with vet.

Ethical Consideration

Ethical approval for this study was obtained from the Nepal Health Research Council (NHRC), Government of Nepal.

Use of quotes as a part of reporting

Study participants' quotes for the reporting purpose are used as evidence more than as arguments. Additionally, they are used for a number of other purposes mainly including explanation, illustration and representation. To the extent possible, attention is paid in selecting quotes that reflect strong pattern of data. While discrepant examples served an important purpose, their use was mostly purposeful and explicit. Following quotations in the text, each participant is differentiated by: i. data collection instrument; ii. type of participant; and iii. geographical locations. For geographical location, initial of the municipality is used followed by initials of type of municipality (for urban municipality 'UM' and for rural municipality 'RM' are used).

Results

Research questions as in any other qualitative study occupied the central place (Onwuegbuzie & Leech, 2006). The questions framed for this evaluation determined the data collection methods, analysis techniques, sample size and sampling scheme. The section to follow attempts to present and summarize the findings of the study by putting them into context with research questions. The attempt is made to report all relevant results concisely and objectively in a logical order. The findings from the evaluation are presented under each research question.

1. Are the HFP intervention households' practices and knowledge, and consumption of quality diet continuing over time?
2. How have HFP interventions impacted kitchen gardening and chicken rearing practices for increased production and crop diversity?
3. What are the key barriers and facilitators for improving household production practices?
4. To what extent have VMFs delivered supports in their communities?

Are the HFP intervention households' practices and knowledge, and consumption of quality diet continuing over time?

The study explored the knowledge and practice among the study participants in relation to three key themes namely kitchen gardening, backyard poultry rearing and consumption of quality diet. Mainly for two themes (kitchen gardening and backyard poultry rearing), a number of variables (as discussed in data management and analysis section) were taken into account for investigating the research questions.

Knowledge and Practice in relation to kitchen gardening

Homestead gardening which is undertaken in a space set apart in the landscape for growing vegetables, herbs and fruits for everyday use was found to be gradually making headway in the study locations. This evaluation found that across almost all the kitchen gardening variables, the

knowledge and practice among the study participants were quite evident. The following presents some of the illustrative examples:

Fencing: There was an awareness by and large among the study participants about the benefits of having fencing in place around their kitchen gardens. There was a general agreement among the study participants about the damage to the garden that domestic and wild animals could cause. The practice of using sturdy and appropriate materials for fencing purpose was becoming more common unlike in the past. A 1000-Days mother commenting on the use of sturdy materials and its benefits:

> *"We did not use to install fence before but now we have it in place…Now we use wire for fencing. Previously, we did not use to plant vegetables, we used to buy vegetables from the nearby market. Use of sturdy materials has helped maximize the yield."* <KII_1000 Day Mother_SRM>

Vegetable diversification: The findings revealed that the program participants in the study locations for the most part were aware of vegetable diversification. They understood vegetable diversification as growing more than one crop in an area or adding more crops into an existing rotation. Some program participants had reflected that into practice. A statement below from a 1000-days mother suggested the knowledge she had on benefits of diversification particularly in terms of yield maximization and income it generated.

> *"We can plant potato, coriander, mustard greens, radish, garden cress, beans, carrot, spinach, and coriander. We can plant other vegetables also but due to fear that potatoes might get damage we don't plant other vegetables. We plant dill leaves; it is useful. We can sell it at a high price, it is sold for R.s. 25-30 rupees per bundle. We also plant beans and also various types of a gourd. We plant various types of vegetables."* <FGD_1000 Days Mothers_SRM>

Climate Smart Agriculture: Climate smart agriculture was largely perceived by the study participants as the use of available machines and equipment and poly-house/tunnel farming. In a wider sense, locals did possessed knowledge about the benefits of using machines and use of poly-houses for farming. The comment below from a VMF indicated that a few farmers were planting off-season vegetables adopting tunnel farming and generating income through the practice. An example:

> *"There are few people in Shaileshikhar municipality-3 who have planted off-season vegetables with the help of advanced technology like growing tomatoes, cabbages and cauliflowers inside tunnels and have earned Rs. 1,50,000-2,00,000 annually. Other people are also earning money by selling vegetables and are sustaining a living."* <KII_VMF_MARM>

Although, the knowledge on the benefits of CSA was present, it is important to note that it was practiced by only a few. One of the key reasons informed by a respondent was the accessibility or in other words, it was accessible to the individuals who represented one group or other such as farmers' group.

> *"This (poly-houses) is not available for everybody. Some people mainly those related to agricultural groups are given these things. They make poly-houses*

and plant lots of green vegetables. I have seen people growing a lot of green vegetables." <KII FCHV_SRM>

Knowledge and practice in relation to backyard poultry rearing

Backyard poultry farming has been one of Suaahara's mainstream HFP activities with an overarching goal of increasing year-round access to diverse and nutritious foods at home. This evaluation found that the study participants had the knowledge on the poultry rearing variables and translating that into practice. Some of the examples included:

Providing nutritive feed and clean water: The interviews conducted conveyed the impression that program participants were generally aware of the benefits of providing nutritive feed and clean water to chickens. There was a common understanding among the study participants that nutritive feed provides poultry the energy and material required for the development of bone, flesh, feathers and eggs. Further, particularly in relation to a laying flock, there was a general awareness about importance of clean water supply and its shortage can result in reduced egg production. The comments below from the study participants were examples indicating their awareness regarding the significance of providing nutritive feed and clean water to chickens.

"If we provide foods and clean water to chickens properly then only they lay eggs. If we have more eggs we can use both for our own consumption and selling purpose. This way we can be healthier and at the same time generate some income" <KII_FCHV_MARM>

Construction of semi-intensive coops: Introduction to semi-intensive coops in the project locations was one of Suaahara HFP's important initiatives. The construction of semi-intensive coops is primarily intended to reduce poultry diseases and improve sanitation status of houses and their surroundings. The orientation provided by Suaahara has to some extent instilled awareness among the community people on the benefits of constructing semi-intensive coops. The comments below from an agro-vet suggested the improvement in practice of constructing semi-intensive coops:

"People have started to build semi-intensive coop in their houses. Yes, there are coops even if there are two or three chickens, there are small coops for them. It is not like at the large-scale chicken firms but is small." <KII_Agro-vet_ MUM>

Regular vaccines to chickens: Those study participants in the study locations who were engaged in poultry rearing had the knowledge about the benefits of vaccinating chickens. Further, they were aware of the fact that minimizing the occurrence of diseases result in increased productivity. A 1000-Days mother stating on the benefits of regular vaccines:

"We are aware that the vaccination prevents chickens from contracting diseases. It is always good to have healthy chickens. More the chickens, more we can sell." <KII_ 1000 Days Mother_MARM>

Coop hygiene: Maintaining good coop hygiene is critically important aspect of poultry rearing not just for chickens' health but for family rearing them. If the cleaning is not done regularly,

bacteria and other diseases can grow in the coop. The knowledge and practice among the study participants was apparent in relation to maintaining proper coop hygiene. The program participants who were maintaining the coop hygiene were found to use gloves instead of hand unlike in the past. The statement below from a 1000-days mother indicated the use of protective gears such as gloves while cleaning the coop.

> *"We use gloves now. We need to clean by wearing gloves. There would be a lot of manures if we raise chickens."* <KII_1000 Days Mother_MUM>

However, there were variables such as chick reproduction that were not practiced as much. An example:

> *"We are aware that if we reproduce chicks, we do not have to buy from a market. It saves money. But we have heard that chicks die due to the lack of proper management. It is a costly affair for us."* <KII_FCHV_MARM>

Knowledge and practice in relation to consumption of quality diet

The findings to a large extent suggested that there's been an improvement in knowledge and practices in relation to intake of quality diet among the beneficiaries. A statement below from one of the VMFs suggesting the change in practice in terms of consumption of quality diet.

> *"There is a change. I have said earlier also, in the past people did not used to give enough food to pregnant women. They used to give one or two meals of flatbread or rice, they did not give vegetables, meat or fruits thinking that it would affect the child as they might get a common cold. Now they give everything. They now understand that they should provide four types of meals to small children and pregnant women. Everyone understands it. We also say these things about what they should do"* <KII_VMF_MUM>>

The knowledge among the program participants was not only possessed but imparted as well. The statement below from one of the FCHVs interviewed:

> *"I have seen this in many people around here. I will show you who Purnamaya (name changes) is. There was a two-year-old child who acted like 10 years old. I said that if a child gets all the nutrition then they would grow up to develop their brain and be smart. When people tell me that their child is slow, doesn't know anything and forgets taught things easily, I tell them the same thing that their brain has not developed yet. If the child is not given proper nutrition when it is in the womb until they reach two years of age, then this happens so I tell them that there is a lack of proper food for the child. This really does happen so just giving them a stomach full of food is not enough."* <KII_FCHV_SRM >

How have HFP interventions impacted kitchen gardening and chicken rearing practices for increased production and crop diversity?

One of the key HFP goals is to encourage targeted community members to adopt improved gardening and poultry rearing practices that can result in increased vegetable production diversity and quantity, eggs and chicken production. Since there is a dearth of evidence that establishes

positive correlation between improved practices and greater household production, a few proxy indicators were considered for this evaluation. The indicators mainly included availability of nutrient rich food particularly at the household level, awareness in relation to consumption of quality diet, production practices in general and improved income.

Availability of nutrient rich food: Availability of diverse nutrient rich food could likely be due to the increased production. Simply put, more the production more the food is available. The statement below from a study participant suggested the increased production and diversity of vegetables in the study locations:

> *"People grow green leafy vegetables and legumes in their fields. Green leafy vegetables, legumes, eggs, and lentils are available at home."* <KII_VMF_MUM>

For those who did not practice kitchen gardening and poultry rearing at the household level, they were dependent on a nearby market for nutrient rich food mainly including vegetables, meat and eggs. An example:

> *"Meat and fish are not regularly available at the market. Some people don't grow legumes so it is not available in all people's home. That's the problem. It could be better if these could be available easily at our local market. Shops should be opened for it. If everything is available locally then it would be easier. If a shop with all these products is opened, then we can buy them easily."* <KII_VMF_SRM>

Consumption of quality diet: There is a strong association between consumption and production of nutrient rich food or in other words neither could exist without the other. Production creates the food for consumption, and consumption realizes/ actualizes production. The knowledge and practice in relation to consuming nutrient rich food was to a reasonable extent related to diverse production. An example:

> *"Without vegetables, how can we eat now, it is most essential. We follow saying each day four types of food "harek bar khana char". Now, curd, and milk are not enough to eat rice. Previously, people use to eat milk and curd only, they don't use to care about vegetables. But now everything like green leafy vegetables, curd, and milk are required…Now, people also eat lentils along with vegetables. This knowledge and practice somehow is responsible for production of diverse vegetables in this location."*<KII_VMF_SRM>

Likewise, the knowledge and practice in relation to significance of having improved breed of chicken has affected the production positively. A FCHV in the course of an interview informed to have produced more improved breed of chicken due to its benefits:

> *"We got a good breed of chickens than before. We got good chickens which give more eggs and meats. It became good after getting chickens of good breed. Since such chickens give more eggs and meat, we have started to produce more."* <KII_FCHV_MARM>

It is likely that the improved consumption of diverse vegetables, meat and eggs results in increased demand. To meet the demand, the production of chicken and vegetables is essential. A FGD participant commenting on the improved knowledge and practice about the consumption of vegetables, meat and eggs that could have resulted in increased production:

> *“In the past people ate green vegetables and other things but now they eat meat as well as eggs. They also eat green vegetables now. Yes, they have started eating meat monthly as well as weekly. In the past, people only used to eat meat in Dashain and Tihar but nowadays they eat every other day and to meet the demand, chickens have to be produced in a large scale.”* <FGD 1000 Days Mother_MUM>

Production practices: The change in production practices was noticed in the study locations. Production was not considered important by the program participants in the past. However, the trend appeared to be slowly changing. An example:

> *“Previously, they (program participants) don’t use to focus more on the production. They used to say that if it grows it’s good, if not then that is also fine. But now, cultivation and production are very important. Now, people plant daily. If you plant you can get lentils and vegetables. Likewise, if you raise chicken you can get eggs and meat.”* <KII_VMF_MUM>

Program participants informed by the study participants were keen to grow diverse vegetables unlike in the past. To put in another way, the focus these days was more geared towards production of diverse vegetables. An example:

> *"Its main positive point is people are growing more or fewer lentils, rice, wheat, and other vegetables in their homestead food production. As per our understanding in the rural area, people can increase some vegetables in their homestead food production. They have to make homestead food production near their houses for their families. They have to eat the vegetables of the homestead food production. They have to eat vegetables as well along with lentils, rice, and bread. They have to eat more legumes. They have the awareness that must produce some vegetables in their homestead food production. We can see that people have produced mustard greens, spinach, coriander, radish, carrot, garlic, and legumes though in fewer lands."*

However, it was reported that the production in the study locations such as remote parts of Shaileshekar Municipality could be better with training to the program participants on the use of advanced technology. A government staff commenting on the lack of training and knowledge about advanced technology:

> *"Our Shaileshikhar municipality area is a geographical area where there is good production of everything from growing mushrooms to apples. We have areas where mushrooms are grown as well as apples. Everyone could not get that knowledge and skill. They have skills since they have been doing it, we have seen that. But also there is a lack of training and knowledge about advanced technologies. It would have been more effective if we could provide them with more training."* <KII_Government staff_SRM>

One of the major impacts of the Suaahara’s HFP component that was noticed was the increased income among the beneficiary households through selling surpluses (after own consumption). A

key reason reported by the study participants was the practice of growing off-season vegetables. An example:

> *“On an average people earn 1 to 1.5 lakh yearly. Yes, they are doing modern vegetable farming (indicating off season vegetable farming) and increasing their income. Earning amount varies from person to person; some people earn even more than that amount. While some do not earn that much also.”* <KII_Government staff_SRM>

In the study location, it is likely that use of modern farming and technology resulted in increased production. Additionally, availability of water, improved irrigation facilities and availability of hybrid seeds were also informed as factors that may have affected the production positively. The study participants commenting on the increased production due to modern farming techniques and use of technology that possibly could have increased their income.

The program participants were reported to engage in professional vegetable farming as well and generating income through it.

> *"Yes, people in my community are doing professional vegetable farming and earning selling those products.”* <KII_VMF_SRM>

With the income augmentation due to the increased production, program participants were supporting their children in buying useful materials such as notebooks and pens.

> *“Yes, they also have benefited from it. They had to buy vegetables to eat before. But, they don’t need to buy it. They can grow vegetables from their lands. It is good for all of us. We are getting enough money for the soaps, copy, and pen for our son and daughter and other necessary expenses.”* <KII_FCHV_MUM>

Although improvement in terms of production was evident in the study locations, there were concerns expressed by some study participants with respect to selling vegetables for relatively low prices. An example:

> *“Sir, there is an improvement in the financial situation also. Whenever there is high market value we sell it later we have to sell in low price. A lot of vegetables remains at home. We feed them to buffalos.”* <KII_VMF_SRM>

What are the Key barriers and facilitators for improving household production practices?

The study explored some of the key barriers and facilitators that contained or improved household production practices among the beneficiaries in the study locations. As previously mentioned in the relevant section, a number of variables were taken into account associated with kitchen gardening and backyard poultry rearing. It is important to note that although the knowledge and practice in relation to kitchen gardening and backyard poultry rearing have improved, ***barriers could have prevented from yielding better results.***

Kitchen Gardening

Barriers existed across all kitchen gardening variables. Some of illustrative examples include:

Fencing: The findings suggested a couple of key barriers that could have prevented from beneficiaries in installing fences around the garden. The following statement from a VMF suggested the lack of materials in the study locations as a key related barrier:

> *"People are not much interested. They might not be doing it because it is difficult to manage bamboo as it is not easily available… Those who have money can only afford it, others cannot buy it"* <KII_VMF_MUM>

CSA: There was a general agreement among the study participants in relation to lack of skilled manpower to build tunnels in the study locations. An example:

> *"No, sir… And also, we need skilled people to build it (poly-house). If we have the knowledge and skills, we can also build it."* <KII_FCHV_MARM>

Likewise, to practice CSA, various materials are required which raises the question of affordability. The statement below from a two 1000-day mothers were examples of issues in relation to affordability:

> *"Cost of building poly-house is around 10 to 15 thousand which we cannot afford."* <KII_1000 Days Mother_MARM>

Integrated Cultivation Management: When the barriers concerning integrated cultivation management were explored, traditional thoughts particularly among the senior citizens were at times preventing the practice.

> *"Here agriculture is derived from ancestors so it is hard to change it. The old people are having difficulties adopting advanced agriculture here."* <KII_Government staff_SRM>

Backyard Poultry rearing:

Barriers existed across all backyard poultry rearing variables. Some of the important examples include:

Providing nutritive feed: the lack of sufficient amount of nutritive feed at the household level emerged as a barrier. The statement from a FCHV suggesting the same and also the lack of knowledge on the location where the feed can be obtained.

> *"There is a Lack of sufficient amount of nutritive feed for the chickens at our home. What we lack is the understanding that to raise chicken we need everything like rice and pulses. But we do not know where one would get all the required things from."* <KII_FCHV_SRM>

Semi-intensive coop: Lack of adequate space and lack of time and materials were informed as barriers. A VMF during the course of the interview informed the same as barriers:

> *"Some people don't have enough space to build semi-intensive coops. it is a village and most of the houses are close to each other. So, if we raise chickens*

openly, they might go to others' houses which creates problems… we don't have time to build it as well as it requires various materials too." <KII_VMF_MARM>

Chick reproduction: Barriers such as lack of insurance and lack of service centers existed with respect to chick reproduction. The comment below from a government staff highlighting the barriers:

"I have heard this, when they are small they die. If we get 1000 chicks then 300 chicks die, this type of thing has occurred. There are cases where they die due to lack of management. There is a lack of insurance in this issue. If they are insured, then they would not have to carry its loss... Challenges may be, if the chickens get infected there is no place nearby for their timely treatment." <KII_Government Staff_SRM>

Regular vaccine: The lack of timely services provided by concerned government officials such as TA was a key barrier in relation to the chicken vaccination.

"They might get diseases but the timely vaccination was not given to them." <KII_FCHV_SRM>

Enabling Factors:

One of the key facilitators that emerged from the evaluation was the support provided by the local government units. The support as reported by the study participants was in form of materials and also training. A statement below is a statement from a 1000-days mother suggesting the support being provided by the wards and municipalities:

"We got material support and training from the wards and municipalities. This has motivated us to construct fences around our gardens." <KII_1000 Days Mother_SRM>

Likewise, the knowledge itself emerged as another facilitator. For example, with respect to soil nutrient management, the knowledge on making soil thinner and less use of chemical fertilizers was present among the study participants. A 1000-Days mother commenting on the same:

"We need to make the soil clod small. We need to hit the soil with a small hoe to make the soil fertile. We need to make the same level of soil…we also should minimize the use of chemical fertilizers" <KII_1000 Days Mother_MUM>

Similarly, availability of resources such water can help significantly in improving practices. The regular flow of water appeared to have enabled the program participants to manage water in the kitchen garden appropriately which in turn has helped to certain degree to diversify vegetables. A 1000-Days mother commenting on the benefit of having reading available water:

"We have a water facility now. There are one or two taps in the houses. There is a water facility in every house now. People could not access water even by spending money. So, they have to carry water from a distant place and managed to pour little into vegetable farming. We have water in all houses now and then,

and we will use that water on farms. We can eat different vegetables." <KII_ 1000 Days Mother_MARM>

The next facilitator reported was the changes in attitudes in relation to farming practices. The statement below from a government staff indicated the gradual change in attitudes particularly among the youths. The statement below from a government staff indicates the changes in attitudes particularly among the youths:

> *"…But the new generation of people are attracted to follow advanced agriculture. They are moving towards it and the production thus is improving"* <KII_Government staff_SRM>

Likewise, although a few there were program participants, who were helping other community members by getting the medicines and informing about the significance of regular vaccination in case of sick chicks. This could be indicative of the fact that bonding social capital[2] can play a significant role in encouraging the improved practices in the study locations. A 1000-days mother commenting on the contribution she's making in the community:

> *"Few people don't vaccinate the chicken but are aware of the importance. Sometimes, they get sick at that time I bring medicine from the veterinary and give them. Till now chickens have not got serious sickness. In addition, I tell them about benefits of regular vaccination."* <KII_1000 Days Mother_MAUM>

To What extent have VMFs delivered supports in their communities?

To gain deeper insights into the services delivered by VMF, four main variables were taken into account: i. lead HFP group; ii. provide agri-extension services including kitchen gardening, backyard poultry and CSA etc. to group members during the group meeting; iii. provide seeds/seedlings/chicks/eggs/vegetables to community members at free of cost or subsidized rate; and iv coordinate with government stakeholders to leverage government resources.

Lead homestead food production group

One of VMFs' key roles included forming HFP group and conducting meetings with the members. The findings suggested that leading HFP group largely was associated with imparting knowledge to the members. In addition, VMFs were expected to set an example in the study locations. The mixture of responses was received from the study participants when asked about the services provided by the VMFs in the study locations. The general perception among the study participants was that VMFs to a large extent were successful in leading the HFP group and imparting knowledge to the members. Some of the typical responses from the study participants:

> *"The VMF here has done his duties sir. They have been working hard. If there are 100 farmers, then 80-90 farmers learn new things because of the VMF. Hence, it can said they have been teaching."* <KII_Government Staff_SRM>

[2] Bonding social capital is derived from relationships among the people within the same community.

"The VMF here has been Providing information and teaching mothers regarding types of food that should be fed to children below 2 years and also lactating mothers. In addition, she also has been providing information to the community people." <KII_1000 Days Mother_SRM>

VMFs were also found to be setting an example in the study locations. The statement below from a study respondent was a common response:

"We have appointed one village model farmer in every village. Model farmers can become an example for others. Other farmers become motivated to engage in farming by looking at their farms". <KII_Agri-Technician_MUM>

However, the study revealed a number of issues concerning VMFs and their roles. One of the key issues that often was raised by the participants was that the VMFs were benefiting themselves by the initiative. A FGD participant commenting on the services provided by VMF:

"She (VMF) personally farms vegetables and sells them but what has she done for the group? She has not done anything." <FGD_1000 Days Mother_SRM>

This could be substantiated to some extent by the information provided by a VMF, who stated to have learned a number skills mainly with respect to vegetable farming, writing applications and speaking with authority with confidence.

"I learn about vegetable framing. I can write an application to local authorities asking for support. Now, I can openly talk with government staff and also can keep my thoughts." <KII_VMF_MARM>

There were other issues that emerged from the study such as VMFs' unsuitability for the role and time management particularly for the female VMFs. The statements below were the common perceptions among the participants in relation to VMFs' roles and challenges associated with female VMFs.

"Some female model farmers can't give more time. They have to give more time to the household chores if they have a big family. If the female has to work a lot as a daughter-in-law, and if we select them as a model farmer, she can't give time. If some women can take complete responsibility and she can convince others, they can work as Village Model Farmers effectively. But, some females don't have convincing capacity. Some male farmers can work themselves hard but they might not have convincing capacity. So, we have to think a lot at the time of selecting Village Model Farmers. This is the situation. Most of the females are in agricultural fields. So, it would be better, if we could select energetic females as model farmers." <KII_FCHV_MARM>

The communication gap between the VMFs and program participants was another issue that emerged from the study. A statement below from a 1000-day mother was an example:

"It is difficult, sir. We would not know if they (VMFs) would provide the necessary materials or not. We do not know when we would get it or where we get it from.

They tell us to go to a certain office and give documents. Sometimes they provide a little so it is difficult." <KII_1000-Days Mother_MUM>

Providing Agri-extension services

VMFs in some study locations were informed to be providing materials that largely included seeds and was motivating the program participants to undertake vegetable gardening. An example from a study participant:

"She motivates people to cultivate, helps people to spread seeds, and also shares her seeds with other people if it is not enough for all." <KII_1000 Days Mother_MARM>

VMFs seemed more active with the members of the farmers' or women's' groups. A typical statement from a study participant.

"Now they (VMFs) give information about things. There is an agriculture group that says that they have received certain training. Now there are also agriculture groups as well as women's groups." <KII_Agro-vet_MARM>

Providing seeds/ seedlings/chicks/eggs/vegetables to community members at free of cost or subsidized rate

Another VMFs' key role was to distribute materials mainly including seeds/ seedlings/chicks/eggs/vegetables to community members at free of cost or subsidized rate. According to VMFs in the study locations, aforementioned materials were being provided free of cost to the community members. An example:

"I have been providing materials such as vegetable seeds to community members for free. I always distribute materials at free of cost." <KII_VMF_MUM>

However, not to be ignored, there were some study participants who mentioned not to have received any material from the VMF. As a common example, statement 1000-days mother:

"No, he (VMF) did not give me anything when I went there in the group meeting." <KII_1000 Days Mother_MUM>

Coordinate With government stakeholders to leverage government resources

One of the activities that VMFs were actively engaged in was leveraging government resources with the local government authorities. The statement below from a VMF indicated the leveraging of resources through the local government unit:

"The group also does that and I also go there. We have talked with them about vegetables, equipment and requested to provide us with iron tunnels and hand held tractors. We go to the municipality and discuss this. " <KII_VMF_MUM>

Likewise, due to the VMFs' effort in coordinating with municipal officials, program participants were able to receive grants for undertaking vegetable farming. The statement below from a FGD participant suggesting the receipt of the grant:

"I ask for an agricultural tools grant with rural municipality. If they cannot provide that then I demand agricultural tools from a separate budget with local authorities. Previously, rural municipality did not to provide us grants but this year they did. They provide us a poly house. Rural Municipality have also provided us this fan which helps to blow dust from the paddy. It is used during the winnowing process." <FGD__1000-Days Mother_MARM>

Discussions

This section provides the discussion of the study findings and an attempt has been made to put them into context with the research questions. Simply put, the section is geared towards discussion of findings that largely attempted to answer the research questions. As mentioned previously in the results section, the research questions played a significant role in steering the study.

Knowledge and Practice

Knowledge is often defined as information acquired largely through a number of sensory inputs such as reading, listening and watching. Additionally, it refers to familiarity with factual information and can be transferred or can be self-acquired through observation and study. Practice on the other hand is application of knowledge acquired.

The findings of the study suggested that with the exception of a couple of variables taken into consideration in relation to kitchen gardening and poultry rearing, there appeared to be an improvement in knowledge among the study participants. Improvement in knowledge was revealed particularly in terms of fencing, vegetable diversification, soil nutrient management and water management among other variables. Likewise, there was an improvement in knowledge regarding backyard poultry farming (mainly building semi-intensive coops, separating sick chicks from rest of the flock and regular vaccination to chickens). With reference to practice, although there was an improvement, there were opportunities for further progress. For example, many participants possessed knowledge about the benefits (protection from wild and domestic animals) of having a fence around their kitchen garden in place but were yet to install it. The findings were consistent with other variables including vegetable diversification or building semi-intensive coops.

Evidence-based knowledge is crucial component for change (Ahmed et. al. 2018). In the study locations, there was a positive association between knowledge and practice supporting similar studies conducted in Nepal (Jones et. al, 2005). Individuals particularly those directly related to the project such as VMFs had higher odds of having adequate knowledge and adopting improved practices compared to participants who were indirectly benefiting (program participants in general). The higher level of practice among those directly related individuals was likely due to their direct access to different materials and knowledge imparted as a part of the program. Knowledge they had was the main modifier to bringing a positive practice towards kitchen gardening and backyard poultry rearing.

Impact of Improved Practices

Suaahara program is in its final year of implementation and it was important to gain an in-depth understanding of its impact. It is important for any development project that intended impact is achieved during or after the project period. This section discusses the findings in relation to impact of the improved practices. The study findings indicated the link between the production and: i. availability of food; ii. consumption of food; iii. improved practices; and iv. improved income.

Availability of Food and Production

The findings from the study revealed that the diverse nutrient foods particularly the vegetables were available at the household level which could likely be due to the increased production. However, there was a common concern expressed by those who were not engaged in household level vegetable farming and backyard poultry farming. According to these program participants, meat and eggs were not readily available at the market. The notion of production is premised on the belief that people will buy foods that are widely available (Kotler, 2000).

Consumption and Production

There is a strong association between consumption and production of nutrient rich food or in other words neither could exist without the other. Production creates the nutrient-rich food for consumption, and consumption realizes production. The findings suggested that there was an improvement in consumption of quality diet among the study participants. The improved consumption may suggest the increased demand which in turn tends to promote production.

Production Practices

The production practices are strongly influenced by the knowledge such as adoption of new technologies, application of alternatives for pesticides, undertake organic farming etc. There were program participants in the study locations lacking knowledge with reference to use of technologies to grow vegetables and rear chickens. It is often contended that use of technologies is an essential aspect in improving the farming yields (Suvedi, Ghimire and Kaplowitz, 2017).

In some study locations, knowledge among the existed in relation to higher income vegetables could generate. They had the knowledge about significant role that factors such as availability of water, irrigation facilities and hybrid seeds can play in improved production. These factors are considered as fundamental requirement for any type of farming including the vegetable farming (Biswas, 1989 & Gauchan, 2017).

Improved kitchen gardening practices had to some extent contributed to the increased income of the program participants in the study locations. The improved income was largely due to selling surpluses. A key reason behind the existence of surpluses was the gradual popularity of off-season vegetable farming. It was encouraging to note that although in a small scale, off-season vegetable production was making headway in the study locations. Generally, in Nepal the number of off-season vegetable growers is few with nominal production that barely can fulfil the demand (Kunwar, Dhakal & Panta, 2015).

For improved income of the vegetable growers and the poultry rearers, it is crucial to have an efficient market network which some study locations lacked. Usually, households appeared to be linked to a vegetable collection centers that were established more informally. Further, for improved production, profitable supply chain (producers, distributors and marketers) is believed to be essential (Meijerink, 2010). There were program participants who informed that due to the lack of efficient market, the vegetables they grew lied rotten at home.

Barriers and Facilitators

As discussed earlier, an improvement was noticed with respect to kitchen gardening and poultry rearing knowledge and practice. However, barriers in almost all the variables related to kitchen gardening and poultry rearing did exist that could have prevented from yielding better results.

The process of translating knowledge into practice is often accompanied by barriers and challenges. Some of the typical barriers emerged from the study included: i. lack of materials; ii. lack of financial resources; iii. lack of skilled manpower; iv. lack to time; v. lack of knowledge and skills; and vi. lack of adequate space.

Lack of materials: It is often challenging for rural people particularly those from poorer households to have the materials available. It is easier to explain the benefits of fencing or semi-intensive coops but translating that into practice requires materials such as bamboo or wires which are not readily available.

Lack of financial resources: Installing fences and building semi-intensive coops require financial resources which poorer household often lack.

Lack of skilled manpower: Building fences, semi-intensive coops, poly-houses require investment of both capital and skilled manpower. The lack of skilled manpower often acts as a deterrent from installing fences or building coops and poly-houses.

Lack of time: Making home-made pesticides or making nutritive chicken feed at home can be time intensive. People particularly those engaged as daily wage labourers tend to be more focused on generating income rather than spending time making the pesticides and chicken feed.

Lack of adequate space: Many people mainly in rural Nepal do not possess private land that is adequate to build the semi-intensive coops and to undertake tunnel farming.

Enabling Factors

A leading enabling factor that could have motivated the kitchen gardening and backyard poultry rearing in some study locations was the support provided by the local government units in form of materials and training. For example, in one of the study locations, materials such as wires and bamboo were provided by the units. With the decision-making power in relation to resource mobilization that local government units have, the focus of any intervention should be geared towards leveraging the resources. To accomplish the leveraging of the resources, it is crucial for the local government leaders to possess knowledge on the benefits of improved kitchen gardening and poultry rearing practices.

Social capital was another factor emerged from the study that could have motivated the improved kitchen gardening and poultry rearing practices. All three types of social capital namely bonding, bridging and linking (Claridge, 2018) were in place. The program participants were found to impart related knowledge to their neighbors and other villagers and also helping them by obtaining better and improved seeds and appropriate pesticides from a nearby market.

The knowledge that the program participants possessed was also crucial component in motivating to undertake improved practices. For example, program participants in some study locations had knowledge to some extent about the soil nutrient management such as making soil thinner, less use of chemical fertilizers and pH testing that measures the soil acidity and alkalinity.

VMFs' Service Delivery

A key role of the VMFs in the study locations was forming the HFP groups and leading the same. Leadership quality was assessed from a number of perspectives mainly including self-awareness, relationship-building, empowering others, becoming role models and full engagement in the intervention (see Astin and Astin, 2000). There was mixture of responses from the study participants when asked about whether the VMFs were fulfilling the leadership role.

VMFs in some study locations were leading the HFP group by imparting the knowledge in relation to improved kitchen gardening and poultry farming practices. This to some extent had helped empower the program participants with the knowledge. Some were translating the knowledge into practice. Likewise, for some program participants VMFs were setting an example or becoming role models in the study locations. One quality that a good leader has is setting an example by inspiring others to follow suit.

An important role that VMFs were fulfilling was coordinating with the local government units thereby leveraging resources. Although local government leaders have the authority, resources and political incentive to do more for the beneficiaries, they lack technical and managerial knowhow (USAID, 2019). Involving individuals such as VMFs particularly at the rural setting can contribute significantly in enhancing technical and managerial capacity of the leaders.

Another quality that the good leader has to possess is to have self-awareness and the ability to transfer the knowledge to empower concerned others. The VMFs were aware of benefits of improved kitchen gardening and poultry rearing practices through the training they received. Possessing knowledge but not transferring the same will not enhance the practice at the community level. VMFs in some study locations were informed to be benefiting themselves or in other words not transferring the required knowledge to the program participants.

Full engagement of a leader in any development initiative is considered as an important leadership quality. There were issues expressed by a number of study participants about lack of dedication among the VMFs. There were challenges informed particularly with respect to the female VMFs. Social expectations (caring for children and elderlies and take care of the household chores) for women mostly in rural areas often is a barrier for female VMFs to carry out their tasks efficiently.

Another issue that emerged from the study was the gap in communication between the VMFs and the program participants. Effective communication is often considered as an important non-

technical skill that every leader must possess. Without good communication skills, a leader would never be heard or understood by others. Program participants in the study locations reported that, they were barely informed about the venues where the materials required for the improved practices. The meetings are important for the particularly to gain knowledge about the improved practices.

Conclusions

The Home Food Production has been one of Suaahara's integral component. The component is largely aimed at promoting production and consumption of nutrient-rich food. In addition, Suaahara intends to identify VMFs and equip them with the knowledge and skills about the improved kitchen gardening and poultry rearing practices. The VMFs had the roles to impart the gained knowledge to other beneficiaries and also to set themselves as an example in the community.

Suaahara is nearing its completion and it was important to undertake evaluations (quantitative and qualitative) of the HFP component mainly to gain insights into intervention's achievements. This qualitative evaluation largely was intended to explore four key areas: i. improved knowledge and practices in relation to kitchen gardening; ii. impact of the intervention on production; iii. barriers and enabling factors; and iv. VMFs roles. The research questions framed were based primarily on these key areas.

The data collection was carried out in three municipalities of Darchula district namely Mahakali Municipality, Malikarjun rural municipality and Shaileshekar rural municipality. The data collection instruments included KIIs and FGDs with several types of respondents including MF, 1000-days mothers, female community health volunteer, local government officials, PNGO representatives and private sector. Use of multiple data sources and methods considerably contributed to data triangulation.

Based on the evaluation findings, it can be argued that there was a significant improvement in knowledge about the benefits of improved kitchen gardening and poultry rearing practices. This was true across almost all the variables considered. Although the practice has improved, it was quite evident from the study that there was still room for improvement. This applied to some of the key variables in particular climate smart agriculture, integrated cultivation management and regular vaccine to chickens. The reasons for lower level of practice when compared to knowledge on the benefits were to a large extent tied to the barriers explored. The barriers such as lack of materials, lack of financial resources, lack of skilled manpower could have prevented from delivering better results.

One of the key findings with respect to the motivating factor for practicing improved kitchen gardening and poultry rearing was the support from the local government units. This is particularly important when examined from sustainability perspective. Since Suaahara is approaching its end, it is entities such as local government units that can play a significant role in providing continuity to the practice. With the formal adoption of federalism, the state was restructured into federal government, seven provincial governments and 753 local governments (293 urban municipalities and 460 rural municipalities). The local government units now have the authority are solely tasked to deliver basic services including health and nutrition. Although in a few study locations, it was

quite encouraging to note the ability of the program participants to leverage resources through the local government units.

Since there is a dearth of evidences that indicate the enhanced production due to adoption of improved kitchen gardening and poultry rearing practices, a few proxy indicators were considered. The indicators included availability of nutrient-rich food at the household and community levels, consumption practices, production practices and income augmentation. The responses were mixed from the study participants with respect to all the indicators. For example, in a few study locations growing off-season vegetables was generating more income than before while in some due to the lack of proper marketing management, the surpluses lied rotten. This to some extent warrants establishment of marketing mechanism such as linking farmers directly to buyers.

There were mixed responses from the study participants in relation to roles and responsibilities of VMFs. It appeared from the findings that some VMFs were notably active and some lacked enthusiasm. The VMFs were active particularly in terms of forming the HFP groups. Although by a few, efforts were informed to be made to leverage resources from the local government units. There were however a few areas emerged from the evaluation that had potential for growth such as lack of full engagement. There were challenges informed particularly with respect to the female VMFs. There were certain expectations for the female VMFs such as caring for their children, taking care of the household chores etc. that may have prevented them from engaging fully in the interventions.

Recommendations

Based on the evaluation findings, following recommendations are proposed:

- Although, there's been an improvement in kitchen gardening and backyard poultry rearing practices, the evidence from the study underscores a need to promote them further through entities mainly including local government units given that they have resources at hand and decision-making power to use the resources rests with them. The awareness on the benefits of the practices generally existed among the participants.
- In general, it was noticed that those individuals directly involved in the program (such as VMF.) were benefiting the most or in other words locals were not benefiting from the knowledge to the extent required. Therefore, the planning for effective transfer of knowledge which is sharing information, abilities and ideas across various areas is crucial. Since Suaahara program is nearing its completion, the transfer of knowledge relies on the knowledge and capacity of mainly local government units or the private entities to design and implement the plan to effectively transfer the knowledge. The plan could include short or long-term mentorship, people's lived experiences and simulations.
- It is important to make available nutrient rich food particularly meats and eggs at nearby markets. This will help both the parties namely producers and consumers benefit from the outcome. The producers will benefit from the increased income and consumers will have an opportunity to consume diverse nutrient rich food. Therefore, it is suggested that more promotion is needed in relation to production of meat and eggs.
- It is recommended that a mechanism be in place to continue knowledge enhancement among program participants with respect to a number of factors that positively affect the production mainly including availability of water, irrigation facilities and hybrid seeds.

- It is suggested that the promotion of off-season vegetable farming be more vigorous. Off-season farming was found to be one of the key reasons for income augmentation among the program participants. This can be accomplished by creating controlled environment for vegetables such as by making polyhouses or undertaking tunnel farming. Although ambitious, it is worthwhile to have local government units and private sectors such as agrovets, cooperatives and traders as implementing partners.
- Efficient market network is needed for both vegetable and poultry rearing farmers to sell their produces not only linking them to the collection centers but formally established entities such as market. This could be accomplished by contractual farming arrangements or through linking groups such as farmers' groups directly with buyers. This approach can help in circumventing the middlemen.
- It is suggested that continued effort be made by the program participants through various formal and informal groups such as farmers' groups and women's groups to encouraging the local government units to provide them with necessary support (materials, training or financial). For achieving this, it is important to develop and foster strategic partnerships between any development initiatives and the local government units.
- It is also important to promote all three types of social capital (bonding, bridging and linking) in the locations where the interventions are undertaken. Building social capital is a part of the asset based community development approach that promotes utilization and strengthening of existing networks and relationship within the community.
- It is suggested that continued effort be made in VMFs imparting knowledge and setting an example in relation to improved knowledge and practice. Transfer of knowledge however should be done in more systematic way that mainly involves effective mentorship and simulations.
- The selection of VMFs should be done mainly based on their dedication and commitment of full engagement. The approach will further enhance the delivery of services such as distribution of seeds, chicks, impart knowledge etc.
- Communication skill is one of the crucial aspects of leadership. Approaches to develop communication skills among the VMFs would help them to convincingly interact with the program participants. In addition, information in relation to the meetings and venues to obtain materials should be provided in a clear manner.

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Annex

Annex 1.1: Interview with 1000 Day Mothers

Name (Pseudo)…… Date: ……
Province: ..…… Start time: ……
District: ……. End time……...
Municipality: ……
Ward/ Old VDC name: ……
Location: ……..…..

Q. No.	Main Question	Probe Questions
1. Perceptions on Homestead Gardening		
1	How do you perceive vegetable farming or kitchen gardening? Has the practice of vegetable farming or kitchen gardening changed over the years? What are some of the areas that have changed? [If no response, ask the probe questions]	● What are some of the practices that you have been adopting in relation to the following components (instruction: also ask if there's been any changes in the practices): i. vegetable diversification; ii. agri-extension services [related to kitchen gardening, backyard poultry, Climate Smart Agriculture (CSA)]; iii. soil nutrient management (examples include organic manure, compost, FYM, green manure, legume cropping etc.); iv. water management [drip, wastewater, rainwater etc.]; vi. insect pest management; v. seeds production; vi. solar-drying and post-harvest management; and vii. integrated cultivation systems [mixed cropping, relay cropping etc.] ● Why have you been adopting the existing practices? ● If there's been a change in practice, why? ● What are associated challenges that you face? (for each component)? How are these challenges often tackled? ● How have the practices that you have been adopting impacting your lives (changes in income level leading to improved economic situation, consumption pattern)?
2. Perceptions on Chicken Rearing		
2	Have there been any changes in practice in relation chicken rearing	● What are some of the practices that you have been adopting in relation to the

	over the years (for the respondent and community in general)?	following components (instruction: also ask if there's been any changes in the practices): i. semi intensive coop; ii. providing nutritive feed and clean water to chicken; iii. coop hygiene; iv. regular vaccine; v. separating sick chicks/chickens; vi. and vii. chick reproduction; ● Why have you been adopting the existing practices? ● If there's been a change in practice, why? ● What are associated challenges that you face? (for each component)? How are these challenges often tackled? ● How have the practices that you have been adopting impacting your lives (changes in income level leading to improved economic situation)?
3. HFP's Impact on Production, Consumption and incom		
3	Has HFP improved the consumption of nutrient rich food (eg. vegetables, fruits, eggs, meat etc.)? How? Has it improved the income level (by selling the surplus)?	● What do you understand by nutrient-rich food? What are some of the main sources of such food? How do you/community members make such food available? ● Have there been any changes in your practices in relation to consumption of nutrient-rich food over the years? If there are changes, why? What are some of the challenges associated with nutrient rich food availability? ● Do you members sell the surplus nutrient rich food (after consumption)? If yes, where and how do you sell the food? What are some of the main associated challenges in selling surplus? How do you tackle the challenges? ● Do you make more/less/around the same income selling the surplus nutrient rich food? Why? How can marketing of agricultural products be enhanced that can result in improved income level?
4. Village Model Farmers' (VMFs) Roles		
4	What kind of support you are receiving from VMF (mainly in relation to kitchen gardening and poultry rearing)	● What is your perception on VMFs' role as: i. a leader of HFP groups; ii. agri-extension service providers; iii. providers of seeds /seedlings/chicks/eggs/vegetables to the community members at free of cost or subsidized rate; and iv. facilitators in coordinating with local government representatives; and v. facilitators of HFP group registration. [positive and negative perceptions]

		• Do you face any challenges in receiving services (mentioned above) from the VMFs? • How can the services provided by VMFs be improved?
5. Suggestions to Improve HFP program		
5	What are some of your suggestions in improving the HFP component of the Suaahara program? Particularly, what areas need to be considered for its sustainability?	

Annex 1.2: Interview with Villager Model Farmer (VMF)

Name (Pseudo)…… Date: ……
Province: ..…… Start time: ……
District: …….. End time……...
Municipality: ……
Ward/ Old VDC name: ……
Location: ……..…..

Q. No.	Main Question	Probe Questions
1. VMF Roles and Responsibilities		
1	What are some of your key roles as a VMF? What are some of the opportunities/challenges in fulfilling your roles?	● What are some of the opportunities/ challenges in leading the HFP? ● What are some of the opportunities/ challenges in providing agri-extension services *[related to kitchen gardening, backyard poultry, Climate Smart Agriculture (CSA)]* ● What are some of the opportunities/ challenges in providing seeds/ seedlings/ chicks /eggs/ vegetables to community members at free of cost or subsidized rate; ● What are some of the opportunities/ challenges in forming HFP groups? ● What are some of the opportunities/ challenges in coordinating with the government stakeholders; ● How the services you are providing have impacted the lives of the people (eg. changes in income leading to improved economic situation, consumption pattern)?
2. Homestead Gardening		
2	What are some of the key practices changed in relation to homestead gardening over the years?	● Have the practices in relation to the following gardening components changed: i. fencing; ii. soil nutrient management; iii. water management (drip, wastewater, rain water etc.); iv. insect pest management (bio pesticide, integrated pest management etc.); v. Climate Smart Agriculture; vi. Seed production; vii. Solar drying and post-harvest management; and viii. Integrated cultivation systems (eg. mixed cropping, relay cropping etc.). ● If the practices have changed, how? (instruction to interviewers: ask for examples)

		● What are associated challenges that community people face? (for each component)?How are these challenges tackled? ● How have the changed practices impacted the lives of the community people (eg. changes in income level leading to improved economic situation)?
3. Chicken Rearing Practice		
3	What are some of the practices in relation to chicken rearing that have changed over the years?	● Have the practices in relation to the following chicken rearing components changed: i. semi intensive coop; ii. providing nutritive feed and clean water; iii. coop hygiene; iv. regular vaccine; v. separating sick chicks/chickens; vi. and vii. chick reproduction; ● If the practices have changed, how? (instruction to interviewers: ask for examples) ● What are associated challenges that community people face (for each component)? How are these challenges tackled? ● How have the changed practices impacted the lives of the community people (eg. changes in income level leading to improved economic situation)?
4. HFP's Impact on Production, Consumption and income		
4	Has HFP improved the consumption of nutrient rich food (eg. vegetables, fruits, eggs, meat etc.)? How? Has it improved the income level (by selling the surplus)?	● What do you/community members understand by nutrient-rich food? What are some of the main sources of such food? How do you/community members make such food available? ● Have there been any changes in your/group members/community members practices in relation to consumption of nutrient-rich food over the years? If there are changes, why? What are some of the challenges associated with nutrient rich food availability? How are these challenges often tackled? ● Do you/group members sell the surplus nutrient rich food (after consumption)? If yes, where and how do you sell the food? What are some of the main associated challenges in selling surplus? How are these challenges often tackled? ● Do you/community members make more/less/around the same income selling the surplus nutrient rich food? Why? How can there be a proper marketing of agricultural products that can result in improved income level?

5. Suggestions to Improve HFP program	
5	What are some of your suggestions in improving the HFP component of the Suaahara program? Particularly, what areas need to be considered for its sustainability?

Annex 1.3: Interview with Female Community Health Volunteers (FCHV)

Name (Pseudo)…… Date: ……
Province: ..…… Start time: ……
District: …….. End time……...
Municipality: ……
Ward/ Old VDC name: ……
Location: ……....

Q. No.	Main Question	Probe Questions
1. Perceptions on Homestead Gardening		
1	What is your perceptions towards Suaahara's HFP component? What are some of the key practices changed in relation to homestead gardening over the years?	● Have the practices in relation to the following homestead gardening components changed: i. fencing; ii. soil nutrient management; iii. water management (drip, wastewater, rain water etc.); iv. insect pest management (bio pesticide, integrated pest management etc.); v. Climate Smart Agriculture (CSA); vi. Seed production; vii. Solar drying and post-harvest management; and viii. Integrated cultivation systems (eg. mixed cropping, relay cropping etc.). ● If the practices have changed, how? (instruction to interviewers: ask for examples) ● What are associated challenges that community people face? (for each component) ? How are these challenges often tackled? ● How have the changed practices impacted the lives of the beneficiaries (eg. changes in income level leading to improved economic situation)?
2. Perceptions on Chicken Rearing		
2	What are some of the practices in relation to chicken rearing that have changed over the years?	● Have the practices in relation to the following chicken rearing components changed: i. semi intensive coop; ii. providing nutritive feed and clean water; iii. coop hygiene; iv. regular vaccine; v. separating sick chicks/chickens; vi. and vii. chick reproduction; ● If the practices have changed, how? (instruction to interviewers: ask for examples)

		● What are associated challenges that community people face (for each component)? ● How have the changed practices impacted the lives of the beneficiaries (eg. changes in income level leading to improved economic situation)?
3. Maternal and Child Health Nutrition		
4	What are some of the practices in relation to maternal and child health that have changed over the years?	● Have the practices in relation to the following maternal and child health changed: i. nutrient rich food to child; ii. food during pregnancy; iii. food for lactating mothers; iv. breastfeeding; and v. complementary food. ● If the practices have changed, how? (instruction to interviewers: ask for examples) ● What are associated challenges that community people face (for each component) ● How have the changed practices impacted the lives of the beneficiaries? (eg. changes in health situation)?
4. Village Model Farmers' (VMFs) Roles		
4	What is your opinion towards roles and responsibilities of VMF?	● What is your perception on VMFs' role as: i. a leader of HFP groups; ii. agri-extension service providers; iii. providers of seeds /seedlings/chicks/eggs/vegetables to the community members at free of cost or subsidized rate; and iv. facilitators in coordinating with local government representatives; and v. facilitators of HFP group registration. ● Do community people face challenges in receiving services (mentioned above) from the VMFs? ● Do you suggest members of health mothers' groups to visit VMFs if they require information in relation to kitchen gardening and poultry rearing? (materials, services, knowledge etc.)
5. Suggestions to Improve HFP program		
5	What are some of your suggestions in improving the HFP component of the Suaahara program? Particularly, what areas need to be considered for its sustainability?	

If FCHV is VMF herself, use the following checklist

Q. No.	Main Question	Probe Questions
1. Perceptions on Homestead Gardening		
1	What is your perceptions towards Suaahara's HFP component? What are some of the key practices changed in relation to homestead gardening over the years?	● Have the practices in relation to the following homestead gardening components changed: i. fencing; ii. soil nutrient management; iii. water management (drip, wastewater, rain water etc.); iv. insect pest management (bio pesticide, integrated pest management etc.); v. Climate Smart Agriculture (CSA); vi. Seed production; vii. Solar drying and post-harvest management; and viii. Integrated cultivation systems (eg. mixed cropping, relay cropping etc.). ● If the practices have changed, how? (instruction to interviewers: ask for examples) ● What are associated challenges that community people face? (for each component) ? How are these challenges often tackled? ● How have the changed practices impacted the lives of the beneficiaries (eg. changes in income level leading to improved economic situation)?
2. Perceptions on Chicken Rearing		
2	What are some of the practices in relation to chicken rearing that have changed over the years?	● Have the practices in relation to the following chicken rearing components changed: i. semi intensive coop; ii. providing nutritive feed and clean water; iii. coop hygiene; iv. regular vaccine; v. separating sick chicks/chickens; vi. and vii. chick reproduction; ● If the practices have changed, how? (instruction to interviewers: ask for examples) ● What are associated challenges that community people face (for each component)? ● How have the changed practices impacted the lives of the beneficiaries (eg. changes in income level leading to improved economic situation)?

3. Maternal and Child Health Nutrition		
3	What are some of the practices in relation to maternal and child health that have changed over the years?	● Have the practices in relation to the following maternal and child health changed: i. nutrient rich food to child; ii. food during pregnancy; iii. food for lactating mothers; iv. breastfeeding; and v. complementary food. ● If the practices have changed, how? (instruction to interviewers: ask for examples) ● What are associated challenges that community people face (for each component) ● How have the changed practices impacted the lives of the beneficiaries? (eg. changes in health situation)?
4. Suggestions to Improve HFP program		
4	What are some of your suggestions in improving the HFP component of the Suaahara program? Particularly, what areas need to be considered for its sustainability?	

Annex 1.4: Interview with government officials (eg. agri-extension workers)

Name (Pseudo):……
Position: ……
Province: ……
District: ……..
Municipality: ……..
Ward/ Old VDC name: ……
Location: ……...

Date:
……
Start time:
……
End time:
……..

Q. No.	Main Question	Probe Questions
1. General perception on HFP		
1	What is your opinion towards Suaahara's HFP component?	● What are some of the key activities in relation to Suaahara's HFP? ● What are some of the key benefits of the HFP component? ● How do villagers in general perceive the Suaahara's HFP component? ● What are some of the associated challenges? How are these challenges often tackled? ● What are some of the areas that need improvement?
2. Homestead Gardening		
2	Have the practices in relation to homestead gardening changed over the years in this geographical community? (focus on fencing, soil nutrient management, water management, insect/pest management and seed production)	● If the practices have changed, how? ● What factors have caused the change? ● Are there any impacts (positive and negative) of HFP's homestead gardening component over the lives of the community people? What are some of the impacts? ● What are some of the associated challenges that community people face?
3. Chicken Rearing Practice		
3	Have the practices in relation to chicken rearing changed over the years? (focus on semi-intensive coop, nutritive feed, regular vaccination, separation of infected chicks and chick reproduction)	● If the practices have changed, how? ● What factors have caused the change? ● Are there any impacts (positive and negative) of HFP's chicken rearing component over the lives of the

		community people? What are some of the impacts? ● What are some of the associated challenges that community people face?
4. HFP's Impact on Production, Consumption and income		
4	Has HFP improved the consumption of nutrient rich food (eg. vegetables, fruits, eggs, meat etc.)? How? Has it improved the income level (by selling the surplus)?	● What are some of the main sources of such food? How do you/community members make such food available? ● Have there been any changes in community members' practices in relation to consumption of nutrient-rich food over the years? If there are changes, why? What are some of the challenges associated with nutrient rich food availability? ● Do community members sell the surplus nutrient rich food (after consumption)? If yes, where and how do you sell the food? What are some of the main associated challenges in selling surplus? How do you tackle the challenges? Do community members make more/less/around the same income selling the surplus nutrient rich food? Why? How can there be an appropriate marketing of agricultural products that can result in improved income level?
5. VMF's roles and responsibilities		
5	What is your opinion towards VMF's roles and responsibilities?	● Do you think VMFs are fulfilling their responsibilities as a leader effectively? If yes, how? If no, why? ● What are some of the key challenges that VMFs face? How do they deal with the challenges? ● How can their roles/responsibilities be improved?
6. Suggestions to Improve HFP program		
6	What are some of your suggestions in improving the HFP component of the Suaahara program? Particularly, what areas need to be considered for its sustainability?	

Annex 1.5: Interview with NGO workers/private sector representatives

Name (Pseudo):……
Position: ……
Province: ……
District: ……
Municipality: ……
Ward/ Old VDC name: ……
Location: ……...

Date: ……
Start time:
……
End time:
……..

Q. No.	Main Question	Probe Questions
1. General perception on HFP		
1	What is your opinion towards Suaahara's HFP component?	● What are some of the key activities in relation to Suaahara's HFP? ● What are some of the key benefits of the HFP component? ● How do villagers in general perceive the Suaahara's HFP component? ● What are some of the associated challenges? How are these challenges often tackled? ● What are some of the areas that need improvement?
2. Homestead Gardening		
2	Have the practices in relation to homestead gardening changed over the years in this geographical community? (focus on fencing, soil nutrient management, water management, insect/pest management and seed production)	● If the practices have changed, how? ● What factors have caused the change? ● Are there any impacts (positive and negative) of HFP's homestead gardening component over the lives of the community people? What are some of the impacts? ● What are some of the associated challenges that community people face?
3. Chicken Rearing Practice		
3	Have the practices in relation to chicken rearing changed over the years? (focus on semi-intensive coop, nutritive feed, regular vaccination, separation of infected chicks and chick reproduction)	● If the practices have changed, how? ● What factors have caused the change? ● Are there any impacts (positive and negative) of HFP's chicken rearing component over the lives of the

		community people? What are some of the impacts? ● What are some of the associated challenges that community people face?
4. HFP's Impact on Production, Consumption and income		
4	Has HFP improved the consumption of nutrient rich food (eg. vegetables, fruits, eggs, meat etc.)? How? Has it impacted the income level (by selling the surplus)? How?	● What are some of the main sources of nutrient-rich food? How do you/community members make such food available? ● Have there been any changes in community members' practices in relation to consumption of nutrient-rich food over the years? If there are changes, why? What are some of the challenges associated with nutrient rich food availability? ● Do community members sell the surplus nutrient rich food (after consumption)? If yes, where and how do you sell the food? What are some of the main associated challenges in selling surplus? How do you tackle the challenges? Do community members make more/less/around the same income selling the surplus nutrient rich food? Why? How can there be an appropriate marketing of agricultural products that can result in improved income level?
5. VMF's roles and responsibilities		
5	What is your opinion towards VMF's roles and responsibilities?	● Do you think VMFs are fulfilling their responsibilities as a leader effectively? If yes, how? If no, why? ● What are some of the key challenges that VMFs face? How do they deal with the challenges? ● How can their roles/responsibilities be improved?
6. Suggestions to Improve HFP program		
5	What are some of your suggestions in improving the HFP component of the Suaahara program? Particularly, what areas need to be considered for its sustainability?	

Annex 1.6: FGD with 1000-day Mothers

Province:
……
District:
……
Municipality/ ward:
……..
Old VDC name:
……
Location:
……

Date: ……
Start time: ……
End time: …….

Participants' Characteristics Table (need to add other relevant sections to the table)

S.N.	Name	Age	Education	Group representation (self-help groups including mothers'/women's/farmers' groups)

Q. No.	Main Question	Probe Questions
1. Perceptions on Homestead Gardening		
1	How do you perceive vegetable farming or kitchen gardening? Has the practice of vegetable farming or kitchen gardening changed over the years? What are some of the areas that have changed? [If no response, ask the probe questions]	● What are some of the practices that you have been adopting in relation to the following components (instruction: also ask if there's been any changes in the practices): i. vegetable diversification; ii. agri-extension services [related to kitchen gardening, backyard poultry, Climate Smart Agriculture (CSA)]; iii. soil nutrient management (examples include organic manure, compost, FYM, green manure, legume cropping etc.); iv. water management [drip, wastewater, rainwater etc.]; vi. insect pest management; v. seeds production; vi. solar-drying and post-harvest management; and vii. integrated cultivation systems [mixed cropping, relay cropping etc.] ● Why have you been adopting the existing practices? ● If there's been a change in practice, why? ● What are associated challenges that you face? (for each component)? How are these challenges often tackled? ● How have the practices that you have been adopting impacting your lives (changes in income level leading to improved economic situation, consumption pattern)?
2. Perceptions on Chicken Rearing		
2	Have there been any changes in practice in relation chicken rearing over the years (for the respondent and community in general)?	● What are some of the practices that you have been adopting in relation to the following components (instruction: also ask if there's been any changes in the practices): i. semi intensive coop; ii. providing nutritive feed and clean water to chicken; iii. coop hygiene; iv. regular vaccine; v. separating sick chicks/chickens; vi. and vii. chick reproduction; ● Why have you been adopting the existing practices? ● If there's been a change in practice, why? ● What are associated challenges that you face? (for each component)? How are these challenges often tackled? ● How have the practices that you have been adopting impacting your lives

		(changes in income level leading to improved economic situation)?
3. HFP's Impact on Production, Consumption and incom		
3	Has HFP improved the consumption of nutrient rich food (eg. vegetables, fruits, eggs, meat etc.)? How? Has it improved the income level (by selling the surplus)?	● What do you understand by nutrient-rich food? What are some of the main sources of such food? How do you/community members make such food available? ● Have there been any changes in your practices in relation to consumption of nutrient-rich food over the years? If there are changes, why? What are some of the challenges associated with nutrient rich food availability? ● Do you members sell the surplus nutrient rich food (after consumption)? If yes, where and how do you sell the food? What are some of the main associated challenges in selling surplus? How do you tackle the challenges? ● Do you make more/less/around the same income selling the surplus nutrient rich food? Why? How can there be a appropriate marketing of agricultural products that can result in improved income level?
4. Village Model Farmers' (VMFs) Roles		
4	What kind of support you are receiving from VMF (mainly in relation to kitchen gardening and poultry rearing)	● What is your perception on VMFs' role as: i. a leader of HFP groups; ii. agri-extension service providers; iii. providers of seeds /seedlings/chicks/eggs/vegetables to the community members at free of cost or subsidized rate; and iv. facilitators in coordinating with local government representatives; and v. facilitators of HFP group registration. [positive and negative perceptions] ● Do you face any challenges in receiving services (mentioned above) from the VMFs? ● How can the services provided by VMFs be improved?
5. Suggestions to Improve HFP program		
5	What are some of your suggestions in improving the HFP component of the Suaahara program? Particularly, what areas need to be considered for its sustainability?	

Annex 2.1: Team Structure

Main responsibilities of the core research team and field team members

Key Team	Key Responsibilities
Team Leader	i. Lead the overall study; ii. Coordinate with HKI and hold regular discussions and ensure feedbacks are addressed effectively; iii. oversee and provide feedback in study related procedures; iv. monitor the performance of interviewers; v. visits to the field for the supervision and monitoring purposes; vi. ensure that all deliverables are submitted within the proposed timeframe; and vii. share findings of the survey with HKI officials.
Field Interviewers	Attend training and conduct individual interviews and focus group discussions; and transcription of interviews and discussions.

PART 5 – Evaluating Intermediate Results – Accelerated rollout of Multi-Sector Nutrition Plan (MSNP) through strengthened local governance (IR4)

Qualitative Evaluation of Suaahara II's Impact on Nutrition Governance

Principal Investigator: Sarah Eissler, Independent Consultant
Evaluation Research Team: Shraddha Manandhar, Independent Consultant
Kabita Shah, Independent Consultant

Executive Summary

In Nepal, maternal and child malnutrition remain major public health problems. Both health and non-health interventions are important for reducing malnutrition, but few multi-sectoral programs have been implemented at scale and even fewer, rigorously evaluated. *Suaahara* (2011-2023) is a USAID-funded multi-sectoral program in Nepal that operates at scale, with the overall objectives to reduce the prevalence of: stunting, wasting and underweight among children under 5 years of age, underweight and anemia among mothers, and anemia among children 6 to 59 months of age. As part of its four strategic objectives, *Suaahara II* supports the Nepalese government at local, provincial, and national levels to implement Nepal's MSNP, which includes attention to the allocation and utilization of government funds for nutrition-specific and nutrition-sensitive interventions to ensure sustainable improvements in nutrition. The primary purpose of this qualitative study is to assess the effectiveness and impact of *Suaahara II* in improving multi-sector coordination for implementing the MSNP at the national, provincial, and municipal levels in Nepal. This study follows a rigorous qualitative design and methods to answer the following primary research questions:

1. What is the status of the decentralized implementation of Nepal's MSNP?
2. How have *Suaahara II* interventions contributed to decentralized implementation of Nepal's MSNP?

    2.a. Are communities demanding for more funding for nutrition? What has been the influence of *Suaahara II* on this*?*

    2.b How has federalism contributed to or affected *Suaahara II*'s ability to achieve its nutrition governance goals?

What are the Remaining gaps/barriers in the decentralized MSNP implementation?

This study drew on primary and secondary research with multi-sector stakeholders across three governance levels (national, provincial, and municipal) to understand the status of the decentralized MSNP implementation in Nepal, the contribution of *Suaahara II* on this implementation, and the remaining gaps and challenges regarding the MSNP implementation. Key informant interviews, group interviews, and focus group discussions were conducted with over 100 stakeholders in both *Suaahara II* intervention areas and comparison areas. Qualitative data were analyzed using inductive and deductive thematic qualitative analysis techniques. Additional secondary data collected through a thorough document review were analyzed under the research questions to inform and triangulate the qualitative findings. The findings were organized based on the three main research questions, presented below.

Research Question 1: Most multi-sector stakeholders understand their role in implementing the MSNP to promote nutrition in Nepal and can articulate specific programs within their sector that advances multi-sector nutrition activities. And in summary, the findings of this study suggest that *Suaahara II* has positively contributed to building stakeholders' capacity and facilitating an effective implementation of the MSNP, however challenges remain, as described below.

Research Question 2: According to stakeholders, *Suaahara II* has been particularly effective at promoting awareness for multi-sector roles, leadership, and coordination for promoting nutrition; demanding budgets for multi-sector nutrition activities; and nutrition-related concepts and practices across sectors and government levels. *Suaahara II* was effective at navigating and adapting to the shift to federalism and leveraging existing networks to strengthen their implementation of nutrition-focused activities, particularly at the local level. And while there is an observable increased demand for nutrition budgets attributable to *Suaahara II* activities across sectors and levels, it is not met by sufficient allocation and utilization of budgets for nutrition, specifically in non-health sectors.

Research Question 3: There exist remaining gaps and challenges that hinder the effective implementation of the MSNP. While *Suaahara II* was able to navigate the shift to federalism, it did present challenges that have and continue to effect strong vertical coordination of MSNP implementation. Such challenges include insufficient human resources at the provincial level to adequately coordinate implementation at the municipal level and the lack of a formal reporting mechanism to enable provincial and municipal level stakeholders to effectively monitor progress towards goals and implementation activities. Additionally, the lack of a formal coordination mechanism hinders productive provincial and municipal level stakeholder collaboration, as does the limited capacity of available trained, technical specialists at the municipal level to design and implement activities.

Finally, a challenge raised by stakeholders in both intervention and comparison areas is the GoN's heavy reliance on *Suaahara II* to implement nutrition-focused awareness raising and promotion activities, strengthen capacity building, facilitate multi-sector coordination, and enable vertical coordination. *Suaahara II* is very effective at reaching local communities to promote nutrition, as evidenced by the difference in nutrition knowledge and awareness reported by municipal-level stakeholders in intervention and comparison areas. Stakeholders in comparison areas requested support from *Suaahara II* to strengthen their ability to promote nutrition awareness and knowledge, suggesting that *Suaahara II,* instead of the GoN, leads in capacity building and strengthening nutrition in Nepal. This remains a challenge for future implementation of the MSNP and strengthening nutrition governance at each level, particularly as *Suaahara II* funding for implementation ends in 2022.

Conclusion and Recommendations

In conclusion, these findings suggest that *Suaahara II* has been particularly effective at promoting awareness for multi-sector roles, leadership, and coordination for promoting nutrition; demanding budgets for multi-sector nutrition activities; and promoting nutrition-related concepts and practices across sectors and government levels. However, challenges remain for the effective implementation of the MSNP, mostly associated with limited vertical multi-sector coordination, insufficient human resource capacity at the provincial level and technical capacity at the municipality level, and an overreliance of the Government of Nepal on *Suaahara II* for implementing nutrition-related activities. Recommendations, are derived from the study findings

and those suggested by stakeholders during primary qualitative data collection, are presented for consideration to improve future iterations or similar programming.

Introduction

In Nepal, maternal and child malnutrition remain major public health problems. Both health and non-health interventions are important for reducing malnutrition, but few multi-sectoral programs have been implemented at scale and even fewer, rigorously evaluated. *Suaahara* (2011-2023) is a USAID-funded multi-sectoral program in Nepal that operates at scale, with the overall objectives to reduce the prevalence of: stunting, wasting and underweight among children under 5 years of age, underweight and anemia among mothers, and anemia among children 6 to 59 months of age. *Suaahara* covers nearly 60 percent of the communities in Nepal using a blanket coverage approach for all households in the 1000-day period between conception and a child's second birthday. The second phase of *Suaahara, Suaahara II* (2016-2023), is led by Helen Keller International with six core implementing partners: CARE, FHI360, Environment and Public Health Organization (ENPHO), Nepali Technical Assistance Group (NTAG), Vijaya Development Resource Center (VDRC) and Digital Broadcast Initiative – Equal Access Nepal (EAN); and more than 40 local partner organizations implementing community- and household-level activities.

Suaahara II primarily implements social and behavior change interventions in nutrition, health, family planning, agriculture, and nutrition governance all underpinned with a gender and social equality lens and organized to achieve four intermediate results:

- IR 1: Improved household nutrition, sanitation, and health behaviors
- IR 2: Increased use of quality nutrition and health services by women and children
- IR 3: Improved access to diverse and nutrient-rich foods by women and children
- IR 4: Accelerated roll-out of the Multi-sector Nutrition Plan (MSNP) through strengthened local governance.

In line with IR4, *Suaahara II* supports the Nepalese government at local, provincial, and national levels to implement Nepal's MSNP, which includes attention to the allocation and utilization of government funds for nutrition-specific and nutrition-sensitive interventions to ensure sustainable improvements in nutrition.

The primary purpose of this qualitative study is to assess the effectiveness and impact of *Suaahara II* in improving multi-sector coordination for implementing the MSNP at the national, provincial, and municipal levels in Nepal. This study follows a rigorous qualitative design and methods to answer the following primary research questions:

1. What is the status of the decentralized implementation of Nepal's MSNP?
2. How have *Suaahara II* interventions contributed to decentralized implementation of Nepal's MSNP?

2.a. Are communities demanding for more funding for nutrition? What has been the influence of *Suaahara II* on this*?*

2.b How has federalism contributed to or affected *Suaahara II*'s ability to achieve its nutrition governance goals?

3. What are the remaining gaps/barriers in the decentralized MSNP implementation?

For each of these 3 primary research questions, the following key themes are assessed: 1) mainstreaming of nutrition in health and non-health systems, 2) budget allocation and utilization for nutrition, 3) multi-sector coordination mechanisms, and 4) capacity of leaders to advocate for nutrition-sensitive programming.

Methods

This evaluation draws on secondary and primary data collected using mixed methods, including multiple qualitative data collection methods. Primary data collection included conducting key informant interviews, group interviews, and focus group discussions (FGDs) with purposively sampled participants from December 2021 to February 2022. Secondary data collection included reviewing *Suaahara II* monitoring data on budget allocation and utilization, and a comprehensive document review of key documents related to nutrition planning and programming. Descriptions of the methods and sampling strategies are presented below.

Study Areas: The sampling approach targeted four *Suaahara II* intervention districts and four comparison districts, with two municipalities sampled within each district. Districts were selected in 2014 as a sub-sample of the overall 8 evaluation districts and to represent three geographic zones (mountains, hills, and plains/*terai*). The five respective provinces where the eight study districts fall were included. At the national level, multi-sector nutrition government bodies, *Suaahara II* program staff, development partners and the private sector bodies were sampled. Table 1 presents the comparison and intervention districts selected and the respective provinces included in this study.

Table 5.1: Study Areas in Nepal

National	Province	Intervention / Comparison	District
Kathmandu	Bagmati Pradesh	Intervention	Sindhupalchowk (upper hills/lower mountains)
		Comparison	Ramechhap (upper hills/lower mountains)
	Gandaki Pradesh	Intervention	Rupandehi (*terai*)
		Comparison	Chitwan (*terai)*
	Lumbini	Intervention	Darchula (mountains)
		Comparison	Jumla (mountains)

	Sudurpaschim	Intervention	Syangja (hills)
	Karnali	Comparison	Tanahun (hills)

Sampling: At the national, province and municipal levels, key government stakeholders from nutrition sensitive and specific sectors including agriculture, livestock, health, planning, education, water sanitation and hygiene (WASH), and gender equality and social inclusion (GESI) were sampled. Additionally, *Suaahara II* staff were sampled at all three levels and non-governmental actors working on nutrition in Nepal were identified at the national and provincial levels, including those in the private sector and international donor partners. At the municipal level, key community members participating in nutrition planning and programming were also sampled, such as the municipal nutrition facilitator and CNV. See Table 2 for a list of the types of stakeholders sampled at each government level and by data collection activity.

Table 5.2: Types of Stakeholders Sampled at Each Government Level and by Data Collection Activity

	National	Province	Municipal	Community
Individual Interview	-MoFAGA -National Planning Commission -Family Welfare Division -Ministry of Health -Child Health and Immunization -Epidemiology Disease and Control Division -Ministry of Agriculture and Livestock -Ministry of DWSSM Ministry of Education -USAID -Suaahara Staff -NFSSC Expert	-Policy and Planning Commission -Provincial Health Directorate -Agriculture and Livestock Ministry -WASH Coordination Committee -Ministry of Education -Social Development Ministry -Ministry of Health and Population -MSNP Coordinator -Suaahara staff (intervention only)		
Group Interview	-World Food Program and UNICEF -Private Sector		-Deputy Chief, Chief Administrative Officer, and Ward Chairperson -CNV and Municipal Nutrition Facilitator (intervention only)	

Focus Group Discussion	-Health Coordinator -Agriculture Coordinator -Livestock Coordinator -WASH Focal Person -Education Coordinator -Women Development Officer	-Female Community Health Volunteer -Agriculture Extension Staff -Village Model Farmer -Women's Group Representatives

Research Ethics: This study was approved by the Nepal Health Research Council (NHRC) prior to the start of data collection. The interviewers received training on research ethics, including the process for seeking informed consent. Prior to being interviewed, the benefits and risks of participation, along with the purpose of the study, were explained to participants. All participants provided written informed consent for participation, and specifically for audio recording. All data have been de-identified/anonymized during analysis and reporting. Interview participants received a diary as a token of appreciation, whereas FGD participants were provided tea and snacks.

Data Collection

Data were collected by an external team of trained, Nepalese qualitative researchers with experience conducting qualitative data collection activities. The research team was trained by two of the authors over a two-week period. The training covered topics including background on *Suaahara II*, the interview guides, the sampling selection, best practices for qualitative data collection, data management, research ethics, and transcription and translation. The research teams were organized into small groups and the designated team leader held frequently check-ins with one of the authors throughout the data collection period.

Primary data collection: Primary data collection activities included semi-structured in-depth interviews with 48 stakeholders, 23 group interviews, and 30 focus group discussions with key stakeholders described above (Table 3). Group interviews were conducted with purposively fewer numbers of individuals (approximately 2 to 3 per interview) and are extractive in nature, where they aim to elicit information from participants without encouraging collaboration or discussion amongst the participants. Focus group interviews are participatory in nature, where they aim to encourage a facilitated discussion amongst participants regarding the discussion questions and their lived experiences.

Secondary data collection: Secondary data collection methods included a comprehensive document review of key documents related to nutrition planning and programming, as well as reviewing *Suaahara II* monitoring data for intervention districts. Two authors fluent in Nepali reviewed 58 relevant nutrition planning and policy documents at the provincial and municipal levels. Examples of documents reviewed include periodic plans, annual health & nutrition review reports, municipal annual policy and programs, documents evidencing investment in nutrition (e.g., budget allocation or utilization) and Nutrition and Food Security Steering Committee

(NFSSC) meeting minutes. The research team also collected and analyzed municipality-level data on budget allocation and utilization for nutrition-related activities. Data were collected on municipality-level budget allocation and utilization figures.

Table 5.3: Total Number of Data Collection Activities by Government Level

	National	Provincial		Municipal + Community		Total
		Intervention	Comparison	Intervention	Comparison	
KII	16	27	5			**48**
GI				16	7	**23**
FGD				16	14	**30**

Interview and focus group discussion question guides were developed for each category of stakeholder based on their role and government level. These guides followed a semi-structured approach to ask relevant questions about the participants' experience and perception of coordinating with other stakeholders to plan and implement nutrition-related activities in Nepal, and to assess their engagement and perspective of *Suaahara II's* effectiveness in strengthening nutrition governance at each level. Qualitative data were collected by 15 hired facilitators who were trained by two authors on research ethics, best practices for qualitative data collection, and the interview/discussion guides.

Data Analysis: The audio recordings were transcribed into Nepali by the data collection team and then were translated into English by a translation team. All interviews and FGDs were used for analysis to avoid selectivity bias. A single codebook was developed by the three authors that included deductive codes (established themes in the literature and predetermined themes stemming from the research questions) and inductive codes (developed from a preliminary review of the data) to guide qualitative analysis. The research team employed thematic qualitative analysis (Guest et al. 2012) using NVIVO Qualitative Analysis software (QSR International Pty Ltd, 2020). Three authors led the data coding and established inter-rater reliability prior to full coding. The research design and analysis team includes local experts with native Nepali language skills and contextual knowledge, as well as cultural outsiders.

Data limitations: The research team acknowledges limitations to the data collected as part of this evaluation. First, several key stakeholders that were initially identified to participate in the data collection were either not available to conduct an interview or not able to due to COVID-19 restrictions (n=3), or the specific post was vacant and therefore was dropped from the sampling strategy (n=8). Additionally, as this study focuses on questions related to nutrition governance,

intended community-level participants in *Suaahara II* program activities are not included in this sample nor are represented in the findings. Next, data collection from comparison municipalities related to budget allocation and utilization was unable to be verified as municipalities only offered some documents that did not record all related budget allocation and utilization figures across sectors. Therefore, the comparison data on budget allocation and utilization cannot be considered comprehensive. Finally, response bias may have influenced the qualitative data collected. The authors took steps to mitigate response bias, including to articulate to participants that their responses would be kept confidential and reported only in the aggregate.

Findings and Discussion

This section presents the findings and discussion synthesized across all data collected to answer each research question. When applicable, comparisons are made between intervention and comparison areas, as well as to the findings from the 2015 study conducted on nutrition governance, specifically budgeting, commissioned by the *Suaahara* activity to demonstrate change over time (Khatri et al. 2015). Findings and discussion are organized around the three research questions. While this is primarily a qualitative study that draws on stakeholders' perceptions and experiences, it cannot attribute change or draw conclusions with statistical significance. The authors intentionally utilize words of salience, such as "most", "several", "few" to signify the prevalence of themes across the many stakeholders consulted for this study.

Research Question 1: What is the status of the decentralized MNSP implementation?

This section presents the findings that address Research Question 1. These key findings include that most multi-sector stakeholders understand their role in implementing the MSNP to promote nutrition in Nepal and can articulate specific programs within their sector that advances multi-sector nutrition activities. Second, stakeholders articulated how awareness of the MSNP and its implementation has increased across multi-sector stakeholders. And finally, stakeholders explained mechanisms, such as the NFSSC fora, for facilitating the implementation of the MSNP.

The Nepal MSNP II for 2018-2022 takes a multi-sector approach to tackling malnutrition and sets out guidance for the integration of both nutrition-specific and nutrition-sensitive interventions (Manandhar et al. 2020). Multi-sector stakeholders at each governance level (national, province, municipal) recognized and articulated the role they play in advancing nutrition and elaborated on how nutrition-focused or related programming is integrated across and within respective sectors in both intervention and comparison areas. Multi-sector stakeholders articulated how they contribute to implementing the MSNP, indicated they are aware of the MSNP and their role in its implementation. This level of awareness by stakeholders of the MSNP is a key improvement since 2015, where stakeholders had only a basic understanding of the MSNP, its purpose, and their role in its implementation (Khatri et al. 2015). Stakeholders in this study provided examples of nutrition-focused programs within their respective sector. An illustrative list of examples provided by stakeholders regarding nutrition-focused programs within their respective sector is presented

in Table 4. Additionally, private sector stakeholders at the national level shared that contribute to nutrition by promoting fortified food supplies and products. Other donor partner stakeholders at the national level also explained that they contribute to nutrition agendas by generating evidence to inform policy development and supporting key programs, like the Mother Baby Friendly Hospital Initiative (MFFHI) to promote breastfeeding, among other examples.

Table 5.4: Illustrative Examples of Multi-sector Programming to Address Nutrition

Sector	Example
Education (province and municipal)	School Meals programs for grades 1-5.
WASH (province and municipal)	Programs promoting drinking clean water and hygiene practices, such as handwashing.
GESI (province)	Programs at the household level to target behavior change to address equal food consumption patterns (for example, so that families do not favor sons over daughters for nutritious food consumption).
Agriculture and Livestock (province and municipal)	Programs targeted at the community level to promote kitchen gardens, production and consumption of indigenous crops, increased seed distribution, and poultry rearing.

Most stakeholders observed that there is good horizontal coordination to implement the MSNP. The MSNP structure that intentionally integrates multi-sector stakeholders to advance policies and programming to address nutrition gaps and promote good nutrition practices, is a key enabler of the MSNP implementation. A stakeholder from the municipal level in a comparison area shared,

> *"Coordination plays a pivotal role in it. It's not that everyone will do the same work. We need to find out our roles to improve the overall condition of nutrition of the community. Some departments work in some sectors and others in another sector. Like, the health sector also works with the education sector. The other sectors will support the poor families in their own way. We will discuss the improvement level of our nutrition condition in the meantime and discussed at which level we are in"* (Comparison, Municipality, Planning).

Another stakeholder at the province level shared,

> *"This multi-sectoral system is itself an opportunity. Single effort can't make it successful. Single effort can't achieve the goal. It needs collective efforts. The MSNP came to expose collective efforts. It is a beautiful concept itself because there are resources. There are many sectors, many thematic ministries, many stakeholders, many external development partners, many donors, and many parties participate there as a partner"* (Comparison, Province, Health).

Several provincial-level stakeholders elaborated that the MSNP coordinator is an extremely important role at the province level to manage, monitor, and support the implementation MSNP at the municipal levels, although this role is under capacitated in most provinces, according to

stakeholders (The findings under Research Question 3 address remaining gaps and persistent challenges to the MSNP implementation).

The Provincial Policy and Planning Commission under the Provincial Ministry of Federal Affairs led and formulated provincial Nutrition and Food Security Steering Committees (NFSSC). Participants reported that the provincial NFSSC is responsible for overall management of nutrition programs including budget allocation, planning and implementation. Stakeholders at every level and in both intervention and comparison areas noted that the NFSSC fora are critical to enabling the horizontal multi-sector coordination at both the province and municipal levels. One stakeholder from an intervention province explained how the NFSSC meetings work,

> *"There is a Province Planning Commission, we sit and discuss there, and each sector give a presentation about their subject matter. Based on that, the agriculture sector makes their own plans, the livestock sector makes their own plans, the education sector does it their own way, and the health sector make their own plans"* (Intervention, Province, Health).

The extent to which these fora are effective at facilitating multi-sector coordination varies by level and area. For example, some stakeholders noted that the NFSSC forum are effective at bringing multi-sector stakeholders together to discuss ideas and plan collaborations, but actual realization of these plans beyond the forum is limited. Different stakeholders, including *Suaahara II* staff at the province level, observed that collaboration during the NFSSC meetings is not always effective as stakeholders do not appreciate the purpose of such coordination and attend the meetings to "check a box". While there is room to improve the effectiveness of the NFSSC meetings to enable horizontal coordination, the functioning of the NFSSC meetings overall in 2022 demonstrates positive improvement since 2015 when the meetings at certain levels were essentially non-functional or irregular, at best (Khatri et al. 2015).

While stakeholders observed strong horizontal coordination to implement the MSNP, they noted variable strength in vertical coordination between government levels to implement the MSNP. Specifically, municipal level stakeholders described strong coordination between the two levels to implement the MSNP activities at the local level. However, stakeholders at all three levels described weak vertical coordination between national and provincial, and provincial to municipal levels, the dynamics of which are further described in the findings presented under Research Question 3.

Most stakeholders at the municipal and provincial level explained that MSNP awareness raising activities have contributed to improved diets at the local level. While many municipal level stakeholders in comparison areas observed changes to an extent, almost all municipal level stakeholders in intervention areas noted observable change. Such changes include, but are not limited to, increased variation in the number of crops being grown or livestock being raised compared to prior years, and increased purchasing and consumption of more nutritious foods for themselves and their households. A stakeholder from the municipal planning commission in Karnali said,

> *"I have seen it has improved a lot. If I talk about the earlier days, there wasn't the trend of major farming for fishes, meat, egg, green vegetables, or vegetables.*

> *Moreover, it wasn't like fishes, meat and eggs also should be taken regularly, it was like they would eat when they got it, else they wouldn't. Now, people have started to eat by buying as well, they believe it, the nutritional food must be eaten, balanced diet should be taken"* (Comparison, Province, Planning Commission).

A female community health volunteer (FCHV) from an intervention community observed changes in behavior related to nutrition in her community,

> *"Also, they used to feed green vegetables bought outside before but now, they make a kitchen garden at home and produce whatever little they can and feed their children and consume themselves as well. They didn't use to raise chickens, which they do now and feed eggs to their kids. It wasn't there before"* (Intervention, Municipality, FCHV).

Research Question 2: How have *Suaahara II* interventions contributed to decentralized implementation of MSNP?

This section presents the key findings that address Research Question 2. These key findings include *Suaahara II*'s influence on increased awareness related to nutrition that has led to observable increases in funding, training, and technical support for nutrition across sectors. The technical and financial support provided by *Suaahara II* has led to direct, observable increases in behavior change within communities around nutrition. Second, stakeholders from comparison areas were aware of *Suaahara II's* role in advancing nutrition and providing support to key stakeholders to implement nutrition-related programming. Finally, stakeholders described how *Suaahara II* interventions were essential to facilitating stronger horizontal, and to an extent, vertical coordination among multi-sector stakeholders to implement the MSNP.

At every level, stakeholders from intervention areas attributed observable increases in nutrition awareness to *Suaahara II* funding, training, and technical support. This high level of awareness and appreciation for *Suaahara II* interventions and activities is similar to that found in 2015 (Khatri et al. 2015). Municipal level stakeholders specifically attributed their own increased awareness of nutrition to their participation in *Suaahara*-led trainings and activities. A FCHV shared, "*The making of jaulo from time to time is happening because of Suaahara. It's not been given from the health-related government to us. It is only happening because Suaahara has been providing these trainings"* (Intervention, Municipality, FCHV).

Stakeholders mentioned other *Suaahara II* trainings and activities that have been particularly useful, including trainings on how to prepare *jaulo* and how to breastfeed, providing vegetable seedlings to promote their production, helping to facilitate meetings with stakeholders and community members, and forming groups to exchange knowledge on nutrition-related activities with multi-sector stakeholders and community members. Some provincial level stakeholders mentioned that *Suaahara* conducted two-day sustainability workshops at the municipal level, which supported them to incorporate nutrition in their current and future planning. A community level stakeholder shared, "*When we did not know how to prepare a balanced diet in the village, the Misses from Suaahara came here and taught us and gave us. They have given support to 4*

months' pregnant women, mothers to 6 months' child, one-year-old child till the age of two" (Intervention, Municipality, GESI).

Most province and municipal level stakeholders cited *Suaahara II* as a key source of nutrition information and support. Many stakeholders particularly cited the IEC materials as key communication tools to promote raising awareness about nutrition among community members and across sectors. Specifically, the MSNP coordinator in an intervention province shared that the IEC materials had a significant, observable impact in raising awareness about best nutrition practices.

While municipal level stakeholders in comparison areas do not engage with nor benefit from *Suaahara II* interventions and activities, they were keenly aware of *Suaahara II's* role in improving awareness and action for advancing nutrition-sensitive and focused interventions. Several stakeholders at the municipal level in comparison areas explained that they knew of *Suaahara II* as a focal point for MSNP implementation. A WASH stakeholder from a comparison province shared their understanding of *Suaahara II,*

> *"Suaahara means, it is related to nutrients. The children who are recently born [infants] and from the time before they were born, they should be protected. They should be provided with a nutritious diet, and then they would be clean and healthy. I think that's the concept. If we take care of post-partum women, [babies] will be born healthy. That's the understanding"* (Comparison, Province, WASH).

Another stakeholder from a comparison municipality explained they were aware of Suaahara and where it was working, "*Suaahara is one project. It will do nutrition-related work. I have heard that this project is especially working in the eastern part, and it is not in our Karnali*" (Comparison, Municipality, Planning).

In addition to *Suaahara II's* strength in promoting awareness and knowledge of nutrition, stakeholders also indicated that *Suaahara II's* outreach and engagement at the municipal level is particularly strong. *Suaahara II* has enabled larger scale outreach to implement activities utilizing their strong and extensive network of staff and relationships at the community level, compared to government assistance, which is lacking, according to stakeholders. A donor partner observed,

> *"I think Suaahara must have implemented that in a large scale in the community, whereas the training component of the government itself has not been able to reach beyond female community health volunteers. In such condition, Suaahara has created an environment to interact with the mothers. Suaahara has a number of district bodies, municipal bodies, and thus has a large catchment area and is able to reach…They have even worked closely with the Family Welfare Division which is a key implementation body of the Ministry of Health and Population. Looking at the human resource as well, they are present up to the grass root level, and if you look up program, Suaahara shows up. Even if you have to do a pilot program, you need to turn to Suaahara because only they have the staffs at the ground level"* (National, Donor Partner).

This is particularly evident by the difference shared from stakeholders at the municipal level in comparison and intervention areas regarding the levels of support and information they've

received about nutrition. A municipality level stakeholder in an intervention area described an example of support received from *Suaahara II*,

> *"Earlier we did not know about what we should eat to keep our health in good shape. After the arrival of Suaahara program, we were taught that if we eat four types of food in a balanced way we could prevent illness, there would be development of mental health, we get immunity to fight against illness by consuming pulses and green vegetables, it could also prevent night-blindness. We received good information about these things"* (Intervention, Municipality, FCHV).

In comparison, a stakeholder from a non-intervention community described,

> *"We keep saying that we need to discuss, but we have not had any discussion since the establishment of the new rural municipality. We have not received training; we have not received any budget either, neither from agriculture, nor from the cooperatives or from the mother's group, volunteers, or chairperson of the mothers group. We have not received anything from anyone. We used to receive when there was no local government before; we used to get it when there was a provincial government, district government. We used to get trainings; they had provided us with a lot of seeds from agriculture [sector] as well. But now when there is local government, we have neither received any training, nor any seeds, nor anything else, so how would we know anything? There is no one to teach us, no one we can ask. We don't have anyone who would guide us to gather people as we have registered. We have registered [the group], but we don't know anything, where can we know it from?"* (Comparison, Municipality, Agriculture).

This difference in descriptions of experience shared between intervention and comparison stakeholders at the municipality level suggests that *Suaahara II's* assistance is much stronger and more effective compared to the Government of Nepal (GoN) stakeholders at raising awareness and providing support to municipality level stakeholders.

Finally, stakeholders at all levels and in both comparison and intervention areas described *Suaahara II*'s positive contribution to improving horizontal and, to an extent, vertical coordination among each policy level to implement and prioritize the MSNP. Khatri et al. (2015) had observed that *Suaahara's* coordination with multi-sector stakeholders was weak in 2015, highlighting a meaningful change in outcomes of *Suaahara's* engagement since 2015 with multi-sector stakeholders. As noted by several stakeholders at the provincial and some stakeholders at the municipal level, *Suaahara II* has helped to support areas where human resources are lacking, specifically for providing technical support. For example, one NFSSC member at the province level shared,

> *"Specially, when we look into the Suaahara program through the health sector, they have supported immensely good with technical support. We brought it theoretically, but all the technical support in coordinating and bringing it into action was done by them. They gave us trainings, plans and program designs or we created them together. They have played a major role"* (Intervention, Province, NFSSC Member, Health).

Suaahara II staff and many stakeholders in intervention areas described the role *Suaahara II* staff contribute to facilitate coordination via their participation in NFSSC meetings. Several stakeholders noted that *Suaahara II* staff are strong participants of these meetings at the province and municipal levels, where they communicate upcoming nutrition-related activities and actively facilitate linkages between multi-sector stakeholders at the meetings to identify opportunities to collaborate outside of the meetings. Province-level stakeholders noted that *Suaahara II* staff are also vocal in encouraging more frequent meetings at the province level stakeholders to continue multi-sector collaboration and coordination. A *Suaahara II* staff member at the province level explained,

> *"We work to facilitate the implementation of the NFSSC action plan, and we reach one NFSSC meeting in most palikas almost every year. At the province level, they hold NFSSC meetings. Sometimes we even constantly poke them to hold meetings. And in the meeting held by them, Suaahara reflects upon the work done from door-to-door level to the community level and in the palika wards, what activities have been carried out to strengthen the committee are also reflected and then advocacy for the solutions of existing problems"* (Intervention, Province, Suaahara II staff).

Stakeholders at the province and municipal levels in comparison areas shared their desire to emulate *Suaahara II's* approach for facilitating multi-sector coordination for nutrition and to strengthen the capacity of multi-sector stakeholders in their province to promote nutrition awareness and activities. In addition, stakeholders from comparison areas want *Suaahara II* activities to expand and directly support them in their design and implementation of activities. For example, a member of the Planning Commission from a comparison province shared,

> *"Yes, if Suaahara gets implemented in all the districts, nutrition education, nutrition importance, nutrition benefits, nutrition brought changes can aid more improvement. There is a big role of Suaahara in bringing sustainable development in the Karnali province and to reach the goals of the Karnali province*" (Comparison, Province, Planning Commission).

Another stakeholder from the comparison province shared,

> *"Our objective is to make a completely nourished Karnali province, not only Naugad rural municipality. Our vision is to make nutrition-centered work areas with the help of Suaahara. As they have the same objective, we can say it supportive organization*" (Comparison, Province, Health).

Research Question 2a: Are communities demanding for more funding for nutrition? What is the influence of *Suaahara II* on this*?*

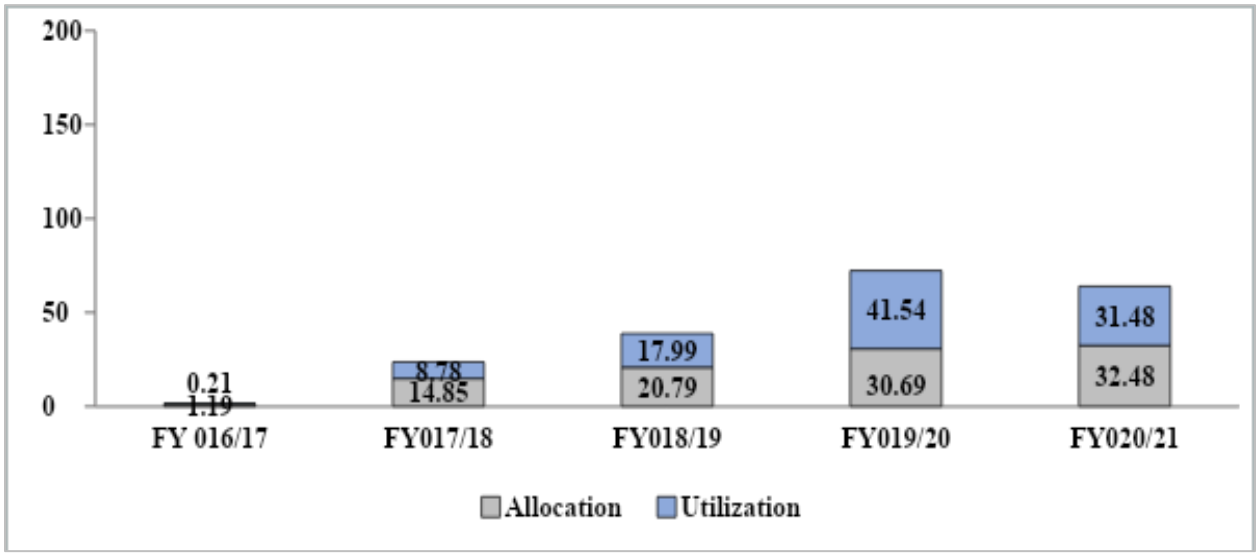
This section presents the key findings that address Research Question 2a, specifically that there is an observable increased demand for funding for nutrition across sectors and that this increased demand is positively influenced by *Suaahara II.* However, stakeholders note that despite the

increased demand, actual allocation and utilization of budgets is not sufficient to meet nutrition needs.

Across each governance level and sector, almost all stakeholders pointed to an increased observable demand for budgets for nutrition-related activities. Many stakeholders noted that nutrition has been increasingly receiving prioritization as an agenda item at each level. Several stakeholders noted that the GoN is increasingly prioritizing nutrition at both the provincial and local levels, where local groups, mothers' groups, farmers' groups, among others, have become empowered and aware of how government, non-governmental organizations (NGOs) and community are working together for nutrition.

According to *Suaahara II* monitoring data from Year 5 of implementation, investment in multisector nutrition programming has increased by more than 10-fold between 2016 and 2021. Figure 1 presents the increased allocation and utilization of budgets for nutrition between 2016 and 2021, highlighting incremental increases in both allocation and utilization in budgets for nutrition (except for utilization between FY19 and FY20).

Figure 5: Nutrition Budget Allocation and Utilization in Suaahara II between 2016 and 2021



Source: Suaahara II *monitoring data.* *Note that this figure only presents data on intervention areas and not the budgeting allocation and utilization data from comparison areas due to limitations discussed.

Stakeholders at both the provincial and municipal levels noted that there has been an increased utilization of funds on nutrition-sensitive programming across sectors. While the health sector still represents the largest share of allocated budget (22 percent), other sectors have been increasing their percent of allocated budget, such as WASH (15 percent), agriculture (13 percent), nutrition (12 percent) and strengthening the NFSSC (0.43 percent), respectively, according to *Suaahara II* monitoring data from Year 5. Stakeholders shared examples of types of multi-sector nutrition-related activities implemented under multisector budgets. For example, education sector stakeholders shared the example of the School Meals program for Grades 1-5 as an activity where funds were newly spent to support nutrition activities, whereas agriculture and livestock

stakeholders gave several examples of such activities, including kitchen garden programs, indigenous crops programs, increased and targeted distribution of seeds, and those that promote poultry rearing. Stakeholders from the WASH sector shared examples of programs focused on promoting drinking water and hand washing as those that support nutrition goals.

The only exception includes private sector stakeholders at the national level, who did not observe an increase in demand for nutrition-related budgets; other stakeholders observed that there remains limited private sector investment in nutrition at the national level and that this is an area for improvement. A private sector stakeholder at the national level shared,

> *"While talking about the investment of the private sector in nutrition, it's almost zero. While saying clearly, it is a different thing, if they invest without knowing. But, in Nepal's case, there is no private sector in Nepal that invests to improve the nutrition condition as much as I know"* (National, Private Sector).

In intervention areas, participants attribute the increased demand for budgets to support nutrition-related activities to *Suaahara II* interventions. Stakeholders from comparison areas also noted that nutrition is increasingly becoming a priority agenda item and that people are asking for more money to implement their programming, but the extent to which stakeholders strongly shared this view varied across comparison areas. Participants from intervention municipalities noted that *Suaahara II* programming was so well received that there is strong motivation to replicate and continue certain activities under the municipal budget. Such activities include the health baby competition and the nutritious food recipe demonstration. Participants noted that certain programs have already been included in the municipal red book joint programming, indicating a government commitment to continue the programming under the government budget.

Stakeholders described how budgets are utilized at the provincial and municipal levels. At the province level, stakeholders explained that their budgets are allocated and utilized for monitoring nutrition-related activities, rather than for implementation. A stakeholder in an intervention province shared,

> *"Now, the Provincial Policy and Planning Commission has allocated Rs. 1 million ($ 8,403,361) for nutrition. And the next is from the National Planning Commission on behalf of the federal government. However, the Ministry of Federal Affairs had allocated the budget and sent it to us, around Rs. 1 million ($ 8,403,361). Budgets will come again for the monitoring and other support, like logistic support to implement the program. Now we are thinking about making a profile, by collecting a few samples from any of the rural municipalities to make a nutrition profile using that Rs. 1 million ($ 8,403,361) budget. Asking, how is the situation of nutrition, how is our food security status, how is the level of nutrition in our foods, or whether the food is enough or not? How much food is available for nutrition?"* (Intervention, Province, Planning Commission).

Budgets at the municipal levels are allocated and utilized to design and implement programs related to nutrition activities.

However, stakeholders note that while there is increased demand for budgets for nutrition related activities and programming, the total budgets allocated and utilized in intervention and

comparison areas still not sufficient from all sectors (except health) to meet demand for nutrition related activities. According to *Suaahara II* monitoring data, only 53 percent of total allocated budgets are effectively utilized. Additionally, a very low percentage of the overall budgets are earmarked for strengthening the NFSSC (approximately 0.4 percent in FY2020/2021), which has not improved since 2016, representing a gap in funding for strengthening the implementation of the MSNP.

Several stakeholders from national, provincial, and municipal levels helped to explain the low utilization and allocation for nutrition-related activities across budgets at the municipal level. Several stakeholders observed that there is still a heavy focus on infrastructure programming when allocating and utilizing budgets for "development" activities compared to programs that focus on supporting nutrition or health, which is similar to challenges raised by stakeholders in Khatri et al. (2015). A private sector stakeholder observed,

> *"While talking about financing, there is no budget code of nutrition. The next thing is that nutrition is not in the prioritization. The government might say that we don't need nutrition, but we need roads. The people say that we don't need anything except soil and roads"* (National, Private Sector).

And as a result, many stakeholders at all three levels and in both comparison and intervention areas noted that there were insufficient budgets allocated to implement the needed and desired programs at the municipal level. One stakeholder at the municipal level shared, "*There is no one to develop programs. They are all competent here…to make program for nutrition, but the concern is related to finances*" (Intervention, Municipality, Planning). A stakeholder from a comparison municipality explained that insufficient budgets are a key challenge faced when trying to implement their programs,

> *"We can't get organic foods for twelve months in our places. There might be a lack of financial sources to do a nutritious Lito porridge exhibition. We can't cover [creating] nutrition programs with sufficient money. I think that financial issues are also an obstacle, mainly the lack of budget"* (Comparison, Municipality, GESI).

Research Question 2b: How has federalism contributed to or affected *Suaahara II*'s ability to achieve its goal of strengthening nutrition governance?

This section presents the key findings that address Research Question 2b. Stakeholders at all levels shared examples for how the national shift to federalism had created both opportunities and challenges for the implementation of the MSNP, and specifically, for *Suaahara II* to achieve its goal in strengthening the GoN's nutrition governance. Overall, participants reflected on how *Suaahara II* was able to leverage its existing position to respond well to the shift to federalism. Some *Suaahara II* staff explained some challenges that came with this shift, while several participants noted persistent challenges in the restructured GoN to effectively implement the MSNP, described below.

Most participants noted challenges that persist to hinder the implementation of the MSNP, beyond *Suaahara II's* influence or implementation. As a result of federalism, the GoN's governance

structure shifted; previous VDCs combined to form municipalities. This specific change resulted in vacuums of leaders with sufficient capacity, as well as trained technical specialists at the local level to proactively manage the implementation of the MSNP, sufficiently coordinate with the provincial level, and to respond to challenges or specific needs as they arose. Additionally, according to participants, prior to federalism, there was an established "chain of command" between the local and provincial levels for implementing the MSNP, which was disrupted after the shift to federalism as new governance structures were established and those who worked in the previous positions at the prior VDC level did not carry over. A province level stakeholder explained,

> *"The current situation is not the same as before the federal structure in the district. After federalism, the channel has fragmented from upper-level. The information we used to get from grass-root level is now ruptured"* (Intervention, Province, Agriculture).

This challenge has contributed to the limited sufficient vertical coordination to implement the MSNP. While federalism has been noted as a challenge, prior to the shift to federalism, Khatri et al. (2015) found similar, but distinct, challenges associated with MSNP implementation, such as uncertainty over ownership of the MSNP, lack of elected representatives at the district and former VDC levels, and unfulfilled positions at the regional level, which exacerbated workloads and stretched the bandwidth of government staff, which effectively deprioritized the MSNP. Stakeholders observed that with the shift to federalism human capacity and staff bandwidth continues to be a major constraint, albeit under different circumstances, to effective implementation of the MSNP.

Participants noted, however, that despite these challenges *Suaahara II* has been able to quickly and effectively adapt its implementation strategy to respond to the shift to federalism, and even sometimes finding opportunities from federalism for stronger *Suaahara II* implementation. All stakeholders from intervention areas noted that *Suaahara II* staff were quick to adapt their implementation strategy to the new structure. In response to a question about Suaahara II's ability to adapt, a donor partner shared, "*Suaahara is flexible…can adapt to any kind of change in environment. They have that skill and effort*" (National, Donor Partner). Another stakeholder at the national level shared,

> "*What to do through Suaahara program, the local government does not have design for that, the program is designed as the present federal structure. To implement the integrated nutrition program, specially related to nutrition and to implement the special nutrition program together, it has supported and contributed a lot*" (National, Nutrition Expert).

A *Suaahara II* staff member at the province level elaborated on how *Suaahara II* adapted to the federalism structure,

> "*Then the country went through the federal system, Suaahara also changed its working modality and structure according to the model of the federal system. Now there was the formation of the province and likewise Suaahara also established a body for coordination at the provincial level. There some people were assigned the*

responsibility for the coordination in each of the provinces. Likewise, people were also assigned at the local level and at municipalities… Before there was the village development committee but now there is the rural municipality. The local partner employees coordinated with the municipality level and have been doing their work. Suaahara has changed their model according to the model of the federal system. That is why there is a condition to work easily now" (Intervention, Province, Suaahara II staff).

Prior to federalism, *Suaahara* had built strong relationships with actors at the previous VDC and district levels, which enabled *Suaahara II's* effective adaptation during federalism to leverage such networks at the local level to continue implementing their activities, according to many participants.

However, while *Suaahara II* was able to quickly respond to federalism, several *Suaahara II* staff noted difficulties they continue their activities, and most participants across governance levels described persistent challenges that hinder effective implementation of the MSNP, described below under Research Question 3. *Suaahara II* staff noted that they had to redefine their strategies and protocols, which represented a total shift in the operational structure of the program. Several staff also noted that the restructuring of government offices increased the number of coordination points (e.g., 359 municipalities rather than 42 districts) for each *Suaahara* staff member, which exacerbated their workloads.

Research Question 3: What are the remaining gaps/barriers in decentralized MSNP implementation?

This section presents the key findings that address Research Question 3. These key findings include that vertical coordination between governance levels remains a key challenge for implementing the MSNP. Second, there is limited technical capacity at the municipal level and limited staff capacity at the provincial level to effectively implement the MSNP. These limitations in capacity are further detailed in the below sections. Third, stakeholders raised concerns that MSNP activities are not tailored designed to reach the most vulnerable groups or to address the nuanced needs of the different geographic zones in Nepal. Finally, a challenge raised by stakeholders in both intervention and comparison areas is the GoN's heavy reliance on *Suaahara II* to implement nutrition-focused awareness raising and promotion activities, strengthen capacity building, facilitate multi-sector coordination, and enable vertical coordination.

Vertical coordination between governance levels remains a key challenge according to many stakeholders that impedes the effective implementation of the MSNP. Post-federalism, the structure of governance levels changed, particularly at the local level when the previous VDCs combined to form municipalities, which spurred personnel changes and altered the chain of command between provinces and local level actors. As previously mentioned under Research Question 1, there continues to be limited to no formal mechanisms to facilitate effective vertical coordination, particularly between the national and province, and province and municipal levels. Stakeholders from both intervention and comparison areas raised this as a key challenge. One stakeholder from the health sector in the comparison province shared, "*Coordination is lacking*

among the three-level government after the federal restructuring" (Comparison, Province, Health). Another stakeholder from an intervention province explained in further detail,

> "*Institutional coordination has not yet happened. Few people coordinating is a different thing. The institutional one, which is required, has not happened yet. [Maybe] because provincial and local bodies have not fully come into operation. Hence, it [the coordination] is necessary. Province should play the role of mediator between local body and federal state, and coordinate between them… A lot of times, works are discussed from lower-level to the higher authorities, which instead should have been directed from upper-level. The coordination is yet to reach such level. This is required.*" (Intervention, Province, Health).

Many national and provincial level stakeholders shared they felt they have limited authority or ability to directly coordinate with municipal level, and there is a perceived lack of motivation among municipal level actors to engage or coordinate with provincial level stakeholders. Many provincial level actors indicated that municipal level actors do not always coordinate with them and that they operate independently to develop their own policies or implement their programming.

The decentralized MSNP allows for each government level to design their own policies related to nutrition programming, which has created challenges for vertical coordination. Several stakeholders observed that there is a misalignment between policies developed at the municipal level compared to those at the province and national level. A stakeholder at the province level shared, "*If you see at present, some of the palikas have formulated their own health policy, they have their own, which is seemingly contradicting with the federal policy"* (Intervention, Province, Health). Others observed that while many municipal level actors develop many policies related to nutrition, there is limited implementation of policies.

Further exacerbating this challenge are the limited human resources available, particularly at the provincial and municipal levels, to effectively coordinate to implement the MSNP. At the province level, stakeholders indicated that one person is effectively responsible to coordinate with the municipal level actors to implement the MSNP, and with only one dedicated staff position, this person is often overly committed and has limited bandwidth to effective coordinate the implementation. National level stakeholders observe that the effectiveness of province level actors has not met expectations, as shared as one stakeholder, "*the steering committees of the provincial level are not becoming quite effective as expected. They have been doing a minimum level of activities"* (National, Government). This also contributes to poor oversight and coordination of activity implementation from the province to municipal levels.

National and province level stakeholders also observed that there is limited staff capacity at the municipal level to be effective. They explained that current municipal level actors have not spent enough time in their position and or have not been properly trained, created an observable gap in sufficient technical capacity at the municipal level. This is similar to findings presented by Manandhar et al. (2020) in which limited or insufficient staff technical capacity at the municipal level hindered effective budgeting processes to ensure adequate budgets were allocated and utilized for nutrition programming. A donor partner shared, "*I have heard discussion that [staff at the municipal level] are all new, they need to be provided with more modern trainings and*

orientation on this, and how it can be taken be done functionally" (National, Donor Partner). Another national level stakeholder shared,

> "*There is the lack of technical capacity of local level or municipality, rural municipality, metropolitan city and previously we called it health post and public health office. There is the shift of roles and responsibilities. There is a lack of staff on the basis of roles and responsibilities. How can the two, three or four number of staffs handle this huge number of programs?*" (National, Suaahara staff).

This issue has been exacerbated by COVID-19 when many municipal level positions were left vacant and training activities were suspended during the pandemic.

In addition to challenges related to vertical coordination, there remain challenges with effective multisector coordination. As previously mentioned under the findings associated with Research Question 1, the NFSSC meetings are key enablers of strong multi-sector coordination but there exist challenges to optimizing this coordination. First, several stakeholders who participate in NFSSC meetings observe that they can sometimes be ineffective at facilitating linkages for multi-sector actors. Additionally, several stakeholders noted that it can be difficult to communicate to non-health sector stakeholders and ministries about the importance of promoting nutrition and for how to effectively coordinate to integrating nutrition into their programming. A WASH representative from the provincial level explained, "*We go to the [NFSSC] meeting, discuss, and what we agreed is lost. And then again, we are asked, called. And again, we go. But after than we stay idle. That's what is happening. If you are working with WASH, you need to work with us directly"* (Intervention, Province, WASH).

Several stakeholders at the provincial level in both intervention and comparison areas noted that the lack of a formal reporting mechanism to capture implementation and results for multi-sector nutrition activities hinders province-level stakeholders' ability to effectively monitor progress towards or the impact of the MSNP implementation at the municipal levels. A few stakeholders explained that the reporting systems for each sector are different and do not easily overlap, which hinders province-level stakeholders from capturing real-time results across the sectors and to disaggregate results by nutrition-related activities that contribute to the progress of the MSNP implementation. One NFSSC member at the province level shared an example, *"What we found was that, with the same amount of money, in some villages they have distributed 5 crates of eggs whereas in some only 1 crate, similarly, in some places distributed 25 kg of rice, whereas in some only 5 kg of rice was distributed"* (National, NFSSC Expert). Another stakeholder from the Planning Commission at the province level explained that monitoring is required even after program implementation. He shared examples of two municipalities where there were outbreaks of water-borne diseases because of open defecations, although both had been declared ODF. He further elaborated that he didn't have transportation to go to for monitoring visits, and he was therefore unable to sufficiently monitor the situation. However, one MSNP coordinator from an intervention province did share that there is a new web-based application that is being used to update and monitor progress on the MSNP implementation:

> "*Now, the Government of Nepal has started Web Based Reporting System under the MSNP. In the WBRS, there is an introduction of palika and everything needs*

to be updated there. From that update, the monthly health aspects (indicators) which we have…. 26 aspects (indicators) related with nutrition……. 16 aspects need to be updated and now the update is going on. The provincial NFSSC have also presumed to publish a profile of nutrition and food security…. These things are included in the WBRS app. We used to do our own but from this year we have transferred this responsibility to the palika… We have provided Tab Plus apps and provided training by installing the app in the tab. From this fiscal year, an integrated plan will also come" (Intervention, Province, MSNP Coordinator).

Many stakeholders observed that there was limited tailored design in the implementation of the MSNP to address the specific needs between the *terai,* hills, and mountains to reach the most vulnerable and meaningful include marginalized groups into activities. A *Suaahara* staff member at the national level explained,

> "*Like if we talk about Nepal, there are hills, terai and mountain and seven provinces. There are lots of equity gaps between the rich and poor. If you look at the malnutrition rates, then it is triple if we compare rich and poor. The targeted approach needs to be followed, but it is lacking in the implementation and design"* (National, *Suaahara* staff).

Several stakeholders specifically noted that it is unclear to what extent the most vulnerable or poorest of the poor are reached and benefit from MSNP activities. Several stakeholders at the province level, specifically, explained that MSNP programs and services do not reach the poorest and marginalized, and that only a handful of community elites get all the services, raising speculation that these activities end up targeting higher socio-economic families.

Additionally, a recent study by Pokharel and Pradhan (2020) found that women and marginalized groups are disproportionately excluded from meaningfully participating in local governance mechanisms and activities. Several stakeholders in this study from the NFSSC forum explained that although there is motivation to include marginalized groups, such as women and Dalits, into meaningful decision-making roles, in practice this has rarely occurred. For example, one NFSSC member said,

> "*We are the ones who do it all. There are programs, which are done with our decisions rather than women/Dalits' demands, targeting certain activities. To be honest, I don't think we have conducted programs with discussions with [women/Dalits]. There are not many targeted programs in the palika. There should be but, in reality, there isn't"* (Intervention, Municipality, NFSSC Member).

Another key challenge raised by stakeholders in intervention areas is the GoN's heavy reliance on *Suaahara II* and NGOs with similar goals to promote nutrition awareness and facilitate MSNP implementation. According to stakeholders, the GoN overly relies on *Suaahara II* to conduct awareness activities, advocate with non-health sectors, and implement activities and reach targeted groups at the local level, specifically as *Suaahara II* is extremely effective at leveraging their extensive networks and strong human resources to achieve their goals. A member from the planning commission at the provincial level said, "*Suaahara has supported the government and has been doing what government should be doing*" (Intervention, Province, Planning

Commission). A national level *Suaahara II* staff shared, "*sometimes we feel that we have made them a little dependent, when I went for field visit, I have observed that the coordination committee also calls the Suaahara coordination committee and for everything, they call [it] Suaahara"* (National, *Suaahara* staff). A stakeholder from a province-level health ministry observed,

> "*As I said before, the people's representatives should be sensitized and clarified. While working at the field level, it feels like the targeted groups are still beyond the boundary, we seemingly failed to include them*" (Intervention, Province, Health Ministry).

To provide further evidence to suggest *Suaahara II's* role in providing the necessary resources and support to implement the MSNP and related activities, several municipal stakeholders in intervention areas had requested that *Suaahara* expand their budgets to enable the municipality to implement their designed nutrition programs, suggesting stakeholders perceive nutrition budgeting coming from *Suaahara II* rather than the respective government budgets. The concern of government ownership over nutrition activities and facilitating multi-sector coordination to implement the MSNP was raised by Khatri et al. (2015) and continues to be of concern for the sustainable continuation of *Suaahara II* impacts.

Stakeholders from comparison municipalities continue to struggle in promoting nutrition awareness that leads to behavior change, specifically promoting consumption of nutritious foods at the local level. Several stakeholders shared these challenges are associated with designing communication strategies to reach illiterate or uneducated community members, including women, quoting pushback they receive such as, *"you do not need to teach me about eating or consuming foods,"* according to stakeholders. Municipality-level stakeholders in comparison areas also noted that there are limited opportunities to learn about nutrition, as these discussions are typically limited to FCHVs and mother's groups who receive municipality trainings. Other challenges include competition with marketing and preferences for packaged foods, although this was only mentioned by a few stakeholders, so it is unclear to what extent this is a serious impediment. A national level leader in nutrition shared, *"the biggest challenge we are facing now is the promotion of local level foods and another is the advertisement of these foods. A number of children are attracted towards the packaged foods because of advertisements"* (National, Nutrition Chief).

Conclusion and Recommendations

In conclusion, these findings indicate that *Suaahara II* has been particularly effective at promoting awareness for multi-sector roles, leadership, and coordination for promoting nutrition; demanding budgets for multi-sector nutrition activities; and nutrition-related concepts and practices across sectors and government levels. *Suaahara II* was effective at navigating and adapting to the shift to federalism and leveraging existing networks to strengthen their implementation of nutrition-focused activities, particularly at the local level. And while there is an observable increased demand for nutrition budgets attributable to *Suaahara II* activities across sectors and levels, it is

not met by sufficient allocation and utilization of budgets for nutrition, specifically in non-health sectors.

However, challenges remain for the effective implementation of the MSNP. The shift to federalism presented challenges that have and continue to effect strong vertical coordination of MSNP implementation. Such challenges include insufficient human resources at the provincial level to adequately coordinate implementation at the municipal level and the lack of a formal reporting mechanism to enable provincial and municipal level stakeholders to effectively monitor progress towards goals and implementation activities. Additionally, the lack of a formal coordination mechanism hinders productive provincial and municipal level stakeholder collaboration, as does the limited capacity of available trained, technical specialists at the municipal level to design and implement activities. Finally, the GoN's heavy reliance on *Suaahara II* to implement nutrition-focused awareness raising and promotion activities, strengthen capacity building, facilitate multi-sector coordination, and enable vertical coordination is an ongoing challenge related to sustainability. The following section presents several recommendations for consideration.

Recommendations

Based on the findings and conclusions of this study, we present some suggestions for consideration to improve future iterations of the *Suaahara II* programming or similar programs that aim to strengthen nutrition governance.

Future iterations of the program should aim to promote the improved capacity of various stakeholders to strengthen their ability to implement the MSNP and promote nutrition awareness and programming within their respective sectors.

- At the provincial, municipal, and palika levels, interventions should advocate for increased resources, both human and financial, and capacity building for stakeholders who manage and coordinate the MSNP for their respective municipalities.
- Promote increased capacity building for leaders in non-health sectors on nutrition education, awareness, and integration to facilitate their leadership in promoting nutrition-sensitive and related activities at their respective levels.
- Advocate for a fixed budget percentage across sectors for nutrition-related activities and for increased budgets to strengthen the NFSSC coordination.

Challenges for effective MSNP implementation could be addressed through the establishment of formal mechanisms that would enable stronger vertical coordination between relevant stakeholders.

- Establish a formal reporting mechanism for MSNP activities that incorporates activities, outcomes, and outputs from multi-sector activities that fall under the MSNP. Use formal reporting mechanisms to identify those who are actually reached and benefit from MSNP activities.

- Establish a formal vertical coordination mechanism, especially between province and municipal levels, which enables provincial-level actors to engage more directly with municipal level stakeholders to plan, design, implement and monitor MSNP activities.

Continue to work with GoN stakeholders to ensure stronger government ownership over MSNP activity design, budgeting, funding, and implementation, particularly at the local level.

- Increase ownership over and role of provincial level stakeholders and technical specialists at municipal level for MSNP implementation.
- Develop mechanisms for GoN stakeholders to expand their targeting at the local level to target the most vulnerable in MSNP activities to ensure their benefit.

The program should intentionally target underrepresented stakeholders into activity design, planning, implementation, and assessment, monitoring, and review for accountability measures, and to promote their voice in decision-making around nutrition governance at each government level.

- Encourage more private sector and civil society engagement in MSNP implementation at all levels.
- Work with local level stakeholders to increase women, youth, Dalit, and other marginalized populations in meaningful decision-making positions.

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