



This picture shows types of crops sold by the Business
Loop entrepreneurs

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Dissertation

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**Impact of Youth Employment Promotion Programs on Income and Food and
Nutrition Security among Agricultural Entrepreneurs in Sierra Leone**

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List of Abbreviations

ADLI – Agricultural Development-led Industrialization
ANOVA – Analysis of Variance
B-Loop – Business Loop program
BMI – Body Mass Index
BMZ – German Federal Ministry for Economic Cooperation and Development
CIP – Crop intensification program
CFS – Committee on World Food Security
DDS – Dietary diversity score
ECOWAS – Economic Community of West African states
EPAG – Economic Empowerment of Adolescent Girls and Young Women
EPP III – Employment Promotion Programme III
FAO – Food and Agriculture Organization of the United Nations
FIES – Food Insecurity Experience Scale
FGD – Focus Group Discussion
FSMS – Food Security Monitoring System
FNS – Food and nutrition security
GDP – Gross Domestic Product
HVAP – High-value agricultural products
IFAD – International Fund for Agricultural Development
ILO – International Labour Organization
IDDS – Individual Dietary Diversity Score
Lisgis – Liberia institute of statistics and geo-information services
MLSS – Ministry of Labour and Social Security
MDD-S – Minimum Dietary Diversity
MDD-W – Minimum Dietary Diversity of Women
MSMEs – Micro, Small and Medium Enterprises
MUAC – Mid-Upper-Arm Circumference
NGOs – Non-Governmental Organizations
OECD – Organization for Economic Cooperation and Development
OLS – Ordinary Least Square
OSP – Orange sweet potato
SDG – Sustainable Development Goal
SLNNS – Sierra Leone National Nutrition Survey
SPSS – Statistical Packages for Social Sciences
SSA – Sub-Saharan Africa
UNICEF – United Nations Children’s Fund
UNFPA - United Nations Population Fund
VIF – Variance Inflation Factor
VSLA – Village Savings Loan Association
WFP – World Food Programme
WFS – World Food Summit
WHO – World Health Organization
WRA – Women of reproductive age
YEI – Youth Employment Inventory

Abstract

Youth employment in connection with agricultural transformation in developing countries in Africa has gained attention in the recent years. Employment promotion is one way to promote youth involvement in Africa towards the improvement of their livelihoods. The objective of this study was to assess the effect of the Business Loop Program on the incomes of the agricultural entrepreneurs, to determine the effect of the program on their food and nutrition security and to assess the level of women participation in decision making in Sierra Leone. Quantitative and qualitative data on the entrepreneurs' businesses, agricultural characteristics, selling and socio-economic data were collected using semi-structured questionnaires and focus group discussions. The total study sample was 134 out of which 91 were in the treatment group and 43 in control group selected from three districts of the north-eastern and eastern parts of Sierra Leone. Descriptive statistics e.g. means, t-test, ANOVA were used to understand the socio-economic and institutional characteristics of program participants. A Probit regression was applied to determine program participation, while Ordinary Least Square (OLS) regression was used in determining factors that influence income and dietary diversity score (DDS). A 10-scale minimum dietary diversity score (MDDS) of food groups was created from data obtained from a semi-quantitative 24-h recall during the study. Results showed that men made more decisions regarding access to land and growing cash crops, compared to women. Women made more decisions on access to credit. Participation in the program was influenced by land size; months of selling; experience in business; types of businesses such as crop production- and marketing of raw agricultural produce, livestock rearing, annual crops (rice, vegetables) and producing and marketing processed food. Twenty-nine percent of women achieved higher dietary diversity (7 and 8), while 61 percent had moderate MDDS of 5 and 6. Only 10 percent of women achieved a lower MDDS between 1 and 4. However, the differences in MDDS between females and males, and that between treatment and control group are not significantly different. The study however cannot conclude that the program had no effect on dietary diversity because nutrition outcomes require more time to observe. The study found higher income in the first intervention group (Phase I) compared to the second intervention group (Phase II). Both intervention groups had higher incomes than the control group and therefore the null hypothesis is rejected. The study, therefore, recommends a scale-up of the existing enterprises while considering variation in outcomes of program components in gender and the three districts.

1. Introduction

It has been a major challenge for developing nations to integrate the youth into the labour market (Filmer et al. 2014, cited in Honorati, 2015). Inactivity, unemployment and under-employment among youths in African countries are typically higher than the rates of the older adults (Honorati 2015, Adesugba and Mavrotas 2016) although the proportion of unemployment of youth in West African countries like Nigeria has decreased slightly in the years owing to the creation of more targeted job programs (Adesugba and Mavrotas, 2016). In Sierra Leone, one recent government effort has been the implementation of the Employment Promotion Programme implemented by GIZ, which has aimed among other things to promote employment opportunities for the youth mainly in the agricultural sector¹.

The agricultural sector plays an important role in food security and economic wellbeing of most of the countries as it contributes 15 percent of total Gross Domestic Product (GDP) in Sub-Saharan Africa (SSA) (Organization for Economic Cooperation and Development (OECD)/ Food and Agricultural Organization of the United Nations (FAO), 2016). Agriculture is also the primary source of livelihood for 10 to 25 percent of urban households (OECD/FAO 2016; p.65). The FAO (2016) Sierra Leone country profile indicates that out of 7,230,000 ha of the country's area, 3,949,000 ha is an agricultural area. Since Sierra Leone is a country with a young population, facilitating youth participation in agriculture has the potential to drive widespread poverty reduction among youths and adults (adopted from OECD/FAO, 2016). The labour force in Sierra Leone is estimated to be 2.7 million (GIZ, 2017) whereas the annual Gross Domestic Product (GDP) growth for the same year was 4.2 percent². Agriculture is expected to drive the GDP growth by 4.2 percent in 2019, driven by increased investments and expansion of crops, livestock and fisheries³. It is also notable that from the early 1970s until the early 2000s before the war⁴ Sierra Leone was self-sufficient in food production and exported cocoa and coffee whereby the exports decreased (FAOSTAT, 2019) during the period of the civil war. Cocoa beans, oil palm and green coffee (unprocessed) are the top three commodity exports in Sierra Leone (FAOSTAT, 2017) which are also foreign exchange earners in the country.

On one hand, the State of Food Insecurity in the world 2020 shows that the number of food insecure (moderately or severely) people in 2019 was 2 billion worldwide (FAO, the International Fund for Agricultural Development (IFAD), the United Nations Children's Fund (UNICEF), the World Food Programme (WFP) and the World Health Organization (WHO), 2020). The prevalence of food insecurity

¹ See GIZ Sierra Leone for further discussion.

² <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2018&locations=SL&start=2012>

³ <https://www.worldbank.org/en/country/sierraleone/overview>

⁴ The war in Sierra Leone begun in 1991 March and ended in January 2002. For more information see <https://www.bbc.com/news/world-africa-14094419>

in Africa was estimated to be at 674.5 million. Sub-Saharan Africa had the highest prevalence of food insecurity, with West Africa being at 208 million. The prevalence of undernourishment in 2019 worldwide was estimated to be 8.9 percent, while Africa had an estimation of 19.1 percent. In Sub-Saharan Africa, an estimation of 22 percent was undernourished, with Western Africa being at 15.2 percent. Projection estimations for the prevalence of undernourishment for the year 2030 show no progress or worsening cases in Africa in all the four regions (FAO, IFAD, UNICEF, WFP and WHO, 2020). Severe food insecurity can contribute to various forms of malnutrition and this has consequences on the health and well-being of individuals (FAO, IFAD, UNICEF, WFP and WHO, 2020). In relation to employment, better health and well-being of individual results to a better work force.

Against this background, this thesis therefore builds on this literature and provides an impact evaluation of the Employment Promotion Programme III Business Loop (B-Loop) youth training component in the context of a lower-income country i.e. Sierra Leone, in Africa. The research used a mixed-method (qualitative and quantitative) designed to evaluate the impact of the Business Loop in Koinadugu, Kono and Kailahun districts. Therefore, this thesis will determine the impact of the program on the income, food and nutrition security status of the entrepreneurs. The thesis will also evaluate to what extent the women have been empowered such as in household decision making. The focus of EPP III is particularly on youth employment in agriculture which is also a way to directly promote rural transformation⁵. Chapters 2 and 3 review the statement of the problem and previous impact evaluations conducted in developing countries mainly in Africa, Asia and South America respectively. Chapter 4 gives the Sierra Leone demographics and an overview on the status of food and nutrition security. In addition, chapter 4 will provide the background and insight on the EPP III program and characteristics of the Business Loop. Chapter 5 explains the descriptive statistics and characteristics of enterprises in this study. Chapters 6, 7, 8 and 9 explain the data and methodology used to generate the findings of the impact evaluation. Here, the socio-economic factors that influence income and factors influencing Minimum Dietary Diversity Score will also be discussed. Average Participation Effect on the Treated will be discussed in Chapter 9. Chapters 6 – 9 further deliberate on the research findings. Chapter 10 concludes the thesis and the last section explores some of the prospects and recommendations for enhancing the Business Loop component of the EPP IV in Sierra Leone.

⁵ Rural transformation is a long-term process of change of fundamental characteristics of the economies and livelihoods of people in the rural areas, taking wider societal and global dynamics into account (Rauch et al., 2016). Rural transformation is embedded within structural transformation, because rural people change their occupations, invest, diversity livelihoods... (IFAD, N.A.) Available at https://www.ifad.org/documents/30600024/30604587/chapter_3.pdf/d51ff05f-3335-448e-b77e-fce56008e7b5 and <https://www.sle-berlin.de/files/sle/publikationen/Discussion%20Paper%2001.2016%20english%20small.pdf>

2. Statement of the Problem

Although various governmental and Non-Governmental Organizations (NGOs) including development agencies' been trying to improve the food and nutrition security through a couple of projects that are implemented in the country, food and nutrition insecurity in Sierra Leone is very high (WFP, 2018). The WFP Food Security Monitoring System FSMS (2019) food insecurity assessment report implied that over half of the population in Sierra Leone (4,232,593)⁶ were not consuming sufficiently nutritious diets for a healthy life. According to the Sierra Leonean country brief released by the WFP (2018), Sierra Leone is ranked at 184 out of 189 countries in the Human Development Index and has high poverty levels, with 53 percent of the population living under the poverty line.

This study therefore seeks to understand the implication of such programs on income and food and nutrition security and the need to see the impact with the case of the Business Loop Program.

2.1 Objectives of the Study

The overall objective of this research is to contribute to the understanding of the impact of employment promotion programs on income and food and nutrition security status of agricultural entrepreneurs. The specific objectives include:

- I. To assess the socio-economic factors that influence agricultural entrepreneurs' participation in the Business Loop Program
- II. To assess factors that determine incomes of the agricultural entrepreneurs in the youth employment promotion program and
- III. To determine the socio-economic factors influencing food and nutrition security status of the agricultural entrepreneurs

2.2 Definition of terms

"Impact" here will be defined as the change in outcomes observed for the participation group between the baseline and endline surveys, relative to the control group respondents who did not participate in the Business Loop training and coaching (adopted from Adoho et al., 2014).

Revenue and Income

"Revenue is the income generated from normal business operations and includes discounts and deductions for returned merchandise" (Kenton, 2019). It is the gross income from which costs are subtracted to determine net income (Kenton, 2019). Income is therefore the money that an individual or business receives, usually in exchange for providing a good or service or through investing capital (Kagan, 2020). Income in this study will be determined from the revenue sales of commodities

⁶ 2015 Sierra Leone Housing and Population, projected population

(entrepreneurial commodities such as crops, livestock, agricultural produce etc.) that both the participation group and the control group sell. Another determinant factor for income will be the units and market price of crops harvested by both participants (participation and control group). Harvest of crops was determined per unit of measurement i.e. kilograms or for example 50-kilogram bag. The units of harvested crops were then multiplied to determine the sales revenue as shown below,
 Sales Revenue = Sales Price X Units Harvested Crop (Source: adopted from Kenton, 2019)

Food and Nutrition Security

During the 1996 World Food Summit (WFS), food security was described to be achieved “when people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO 1996; cited by Pritchard in Routledge Handbook of Food and Nutrition Security 2016, p.1). Food security therefore consists of four dimensions namely, availability, accessibility, stability or resilience and utilization (Cumming et al., 2016, p.442). Food availability is having adequate quantities of nutritious food consistently (Cumming et al., 2016). Access is ensured when all households and individuals within the households have enough resources to obtain appropriate foods (through production, purchase or donation) for a nutritious diet (Gross et al., 2000 and Cumming et al., 2016). Stability or resilience is the ability to withstand seasonal, economic or environmental shocks, while utilisation refers when a person is sufficiently healthy to absorb and use the nutrients ingested (Cumming et al., 2016). “Nutritious and safe diets, an adequate biological and social environment, a proper health care to avoid diseases ensure adequate utilisation of the food” (Gross et al., 2000). Figure 1 illustrates the categorical elements within the conceptual framework of food and nutrition security.

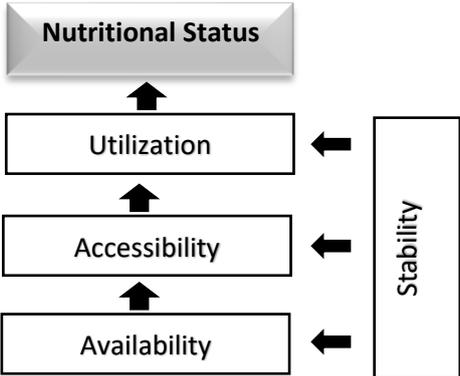


Figure 1: Food and Nutrition Security
 Source: Adapted from Gross et al., 2000

Two determinants influence the conceptual framework of food security i.e. a physical and a temporal determinant (Gross et al., 2000). The physical determinant is the food flow which consists of availability, accessibility and utilization as explained above, while stability refers to the temporal determinant of the food and nutrition security (FNS) (Gross et al., 2000). Stability affects all three physical elements (Gross et al., 2000). Nutrition security therefore “exists when all people at all times

consume food of sufficient quantity and quality in terms of variety, diversity, nutrient content and safety to meet their dietary needs and food preferences for an active and healthy life, coupled with a sanitary environment, adequate health, education and care” (FAO/AGN March 2012; cited in Committee On World Food Security (CFS) Thirty-Ninth Session 2012, P.6).

The close interlink between FNS is explained by the quality of diet (FAO, IFAD, UNICEF, WFP and WHO, 2020). Food insecurity is therefore a contributing factor to poor diet quality leading to undernutrition, overweight and obesity. Food insecurity severity is defined in three levels: (1) Food security with adequate access to food in both quality and quantity; (2) Moderate food insecurity whereby people face uncertainties about their ability to obtain food, and are therefore forced to compromise on the quality and/or quantity of food they consume and (3) Severe food insecurity whereby people typically run out of food and may have gone a day (or days) without eating food (Food Insecurity Experience Scale (FIES) in FAO, IFAD, UNICEF, WFP and WHO, 2019).

In situations of food insecurity, the role of FNS can be achieved only when sufficient culturally adapted foods are available within the households and communities to meet biological and social needs (Gross et al., 2000). Accessibility to a healthy diet is a prerequisite for achieving SDG 2 which aims to eradicate all forms of malnutrition (FAO, IFAD, UNICEF, WFP and WHO, 2020). Because achieving food and nutrition security in developing countries is important, this study evaluated the dietary diversity of the survey participants at individual level using the Minimum Dietary Diversity Score. It is also important to note that food security emphasizes on availability, accessibility and utilization. The inclusion of utilization underlines that nutrition security is more than food security (Gross et al., 2000).

Women Empowerment

Empowerment is defined as women’s control over key aspects of their lives whereby “control” is defined in relation to resources such as earnings and expenditures (Kishor 1997, cited in Kabeer 1999). Control is therefore described as self-reliance (whether women can support themselves without their husband’s support), or whether they have control in decision making; who has the last say concerning making decisions about certain issues and control as a choice e.g. choice of a spouse or being consulted regarding choice of a marriage partner (Kabeer, 1999). Kabeer (1999) argues that although “control” is often used as a means of operationalizing empowerment for the sake of measurements, “control” is indefinable and abstract to measure. Women empowerment is connected to SDG 5 which aims to promote gender equality and empower all women and girls⁷. Women empowerment is also a way to achieve all sustainable development goals including SDG 2 which aims to end hunger in all forms. This will be explained in detail in this thesis.

⁷ United Nations Development Program: Goal 5 Gender Equality. Available at <https://www.undp.org/content/undp/en/home/sustainable-development-goals/goal-5-gender-equality.html>

3. Literature Review

3.1 Background and Description of the Employment Promotion Program III

GIZ has been working in Sierra Leone since 1963 and implemented the third phase of the EPP, i.e. EPP III that aimed to reduce the high levels of unemployment especially among the youth (GIZ, 2017). The EPP III was a programme of the Ministry of Labour and Social Security (MLSS) in Sierra Leone and was funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) (GIZ, 2017). It was implemented until July 2020 in three rural districts of Sierra Leone, namely Kailahun, Koinadugu and Kono. The objective of EPP III was to create “an enabling environment for improved income and employment for youths between the age group of 18 to 35 years, with focus on women and disabled persons” (GIZ, 2017).

As mentioned above, Sierra Leone faces high levels of unemployment. Agriculture in Sierra Leone provides the principal support for the labour sector employing around 75 percent of the country’s active workforce, whereas fewer youth are employed in this sector. Some of the destabilizing factors included youth marginalization, exclusion from education, access to and control over resources and lack of employment opportunities. Support to Micro, Small and Medium Enterprises (MSMEs), particularly in the agricultural sector as promoted by GIZ is among the key factors that would strengthen the rural economy and improve income opportunities for youths and young people (GIZ, 2017).

The EPP III also aimed to strengthen the rural private sector in Sierra Leone by employing a multi-fledged strategy based on four thematic pillars: (1) Capacity Development of Partners, (2) Youth employment, (3) Agricultural Value Chains (4) Business Loop (B-Loop).

The Business Loop which was the focus of this study, targeted MSMEs from the private sector in local economies and provided business development services that help farmers to grow and improve their business performances. This component supported youth in gaining competencies that facilitated their inclusion in the economy through self-employment. Activities covered included agribusiness enterprises linked directly to other economic activities in the rural economy (GIZ, 2017). The Business Loop was a core component of the EPP III and had the objective to train and coach 1,000 entrepreneurs in business and entrepreneurial skills for approximately twelve months. The Business Loop consisted of four main pillars:

- I. Capacity Training Needs Assessment (CTNA) which ensured the objective assessment of the entrepreneur’s skills and the capacities of the enterprise.
- II. Business training which included three-day training on entrepreneurship, cash management, inventory record-keeping, communication skills, decision making etc.

- III. Business coaching done within a period of five months and
- IV. Access to finance which allowed the beneficiaries to access services and the financial institution to better understand the needs of MSMEs (GIZ, 2019).

The Business Loop therefore addressed three challenges facing SME in Sierra Leone:

1. “Inadequate business knowledge and management skills”
2. “Lack of guidance and practical steps that could bring about change and development” and
3. “Insufficient financial resources to grow business respectively” (GIZ, 2019)

The Business Loop targeted small businesses that permanently or casually employed less than 5 people, whereby business owners were sole proprietors, and largely agricultural businesses that have been existing for at least twelve months (GIZ, 2019). The program used pre-selection criteria as follows: 1) one had to be involved in an agricultural business or a business involved in rural development, 2) have an existing business for at least one year, 3) be a sole proprietor of their business, 4) be literate and 5) be a youth (aged between 18 and 35, or the age of up to 40 years).

Sierra Leone is predominantly a land of the youth and ideally, the project targeted a youth population that was higher than 2 million or 25 percent of the total population in 2015. Therefore, it is important to implement programs like the EPP III that promote youth employment to reduce high prevalence of food and nutrition insecurity. Likewise, the program’s linkage to the improvement of food and nutrition security enables the inclusion of youths in promoting food and nutrition security and rural employment.

All beneficiaries in the B-Loop were involved in cash and food crop enterprises indicating a strong link to poverty reduction, increased income and improved food and nutrition security. The Business Loop program was also aligned with the achievement of the 2030 Sustainable Development Goals (SDGs) especially goal 1 (No poverty) which aims to end poverty in all its forms and goal 2 (Zero hunger) with the goal of end hunger, achieving food security and improved nutrition and promoting sustainable agriculture (United Nations (UNs) SDGs).

3.2 Previous Research on the Impact Evaluation of Youth Employment and Training Programs

To enhance youth employment, governments worldwide have responded by creating job training and placement services programs (Chakravarty et al., 2016). Youth Employment Inventory (YEI) database provides comparative information on youth employment interventions worldwide, comprised of more than 400 youth employment programs from around 90 countries.⁸ Some public policies have rigorously been studied and evaluated as job training programs. In the African case, particularly credible evidence is available from various impact evaluations that could be applied to the Sierra Leone context. There

⁸ See <https://undatacatalog.org/dataset/youth-employment-inventory>

are a few impact evaluations launched under the aegis of the World Bank's Adolescent Girls Initiative (AGI) in 2009 to facilitate the transition to productive employment for young females (Chakravarty et al., 2016). This study makes specific reference to employment training programs by the World Bank initiative in Liberia and Nepal⁹ (Adoho et al., 2014 and Chakravarty et al., 2016). Impact evaluations conducted in countries such as the Dominican Republic, Kenya and Tanzania (and Uganda) are also considered (Card et al., 2007; Honorati et al., 2015; Buehren et al. 2017).

A key finding is that the effectiveness of training varies with the characteristics of participants and the type of training. For example, most of the studies reviewed have concluded that women benefit more from the training than men because women tend to be less skilled compared to men (Adoho et al., 2014; Chakravarty et al., 2016; Honorati et al., 2015). Adoho et al. (2014) presented findings from the impact evaluation of the Economic Empowerment of Adolescent Girls and Young Women (EPAG) project in Liberia, which was launched with the goal of "increasing the employment and income of 2,500 young Liberian women by providing livelihood and life skills training and facilitating their transition to productive work" (Adoho et al., 2014). Unemployment rates among youth women between 15 to 24 years are 8 percent, which is double the rate among young men [Liberia institute of statistics and geo-information services (Lisgis), cited in Adoho et al., 2014]. The EPAG skills training program was designed to eliminate the barriers of entering the labour market faced by young women in Liberia. The intervention consisted of a six-month phase of classroom-based training, followed by a six-month placement and support phase whereby "the trainees were supported in their transition to self or wage employment" (Adoho et al., 2014). The research findings showed employment increase by 47 percent and earnings by 80 percent among program participants compared to the control group. Beyond employment rates, the EPAG program also increased the intensity of employment among the participation group compared to control group. There was also improved food security and shifting attitudes towards gender norms in the intervention group (Adoho et al., 2014).

Chakravarty et al., (2016) presented the short-run effects of skills training and employment placement services in the Employment Fund (EF)¹⁰ Nepal. After three years of program intervention, the impact evaluation report showed positive improvement in employment outcomes. There was also increased non-farm employment by 15 to 16 percent points for an overall gain of about 50 percent. Chakravarty et al., (2016) reported average monthly earnings gain of about 72 percent. Employment impacts for women were significantly larger than for men, which was an indication that the program was "more effective at increasing both overall employment and non-farm employment" among women. The

⁹ The World Bank's Adolescent Girls Initiative (AGI) which was launched in 2009 comprised of eight pilot projects in Afghanistan, Haiti, Jordan, Lao People's Democratic Republic, Liberia, Nepal, Rwanda and South Sudan. This thesis only reviewed four countries, namely Liberia, Nepal, Rwanda and South Sudan (Chakravarty et al., 2016).

¹⁰ Employment Fund is financed by the United Kingdom's Department for International Development (DFID), the Swiss Agency for Development and Cooperation (SDC) and the World Bank (Chakravarty et al., 2016).

employment estimates of the EF program in Nepal were also reported to be somewhat higher than other recent experimental interventions in developing countries (Chakravarty et al., 2016).

In Latin America, job training programs “*Jovenes*” have been implemented since early 2000s (Chakravarty et al., 2016). Card et al. (2007) conducted an impact evaluation of the *Joventud y Empleo* program in the Dominican Republic on a wide range of labour market outcomes, including employment, hours of work and hourly wages. Results from the evaluation of the program showed no impact on the participant employment rate but a positive, though the insignificant impact on the individuals’ earnings, which may be driven by more educated workers i.e. secondary compared to primary graduates (Card et al., 2007).

Other studies have also shown differences in evaluation outcomes for example the comparison between the impacts of a youth program in Tanzania to that of Uganda. Buehren et al. (2017) evaluated an Empowerment and Livelihood for Adolescents (ELA) program that targeted adolescent girls in Tanzania which aimed to economically and socially empower them. The evaluation in Tanzania was a replication of the Ugandan study¹¹ with one key difference being that second participation was introduced in Tanzania combined with microcredit (Buehren et al., 2017). The evaluation in Uganda found that there was an increase in income generating activities, “increased monthly consumption expenditures, improved reproductive health knowledge and practices,” (Buehren et al., 2017) and immense reduction of teenage pregnancies and early marriage or cohabitation. Although the program was found to be successful in Uganda in terms of economic, health and social outcomes, in contrast, Buehren et al. (2017) found no notable effect on most of these outcomes in a Tanzanian setting.

3.3 Role of Small and Medium Enterprises in Economic Growth

Weldeslassie et al. (2019) affirm that small and medium enterprises (MSEs) have been for some time considered as an engine of economic growth and for promoting equitable development, especially in developing countries. The role of small and medium enterprises in the economic (and social) development of a particular country underpins the main driving force behind job creation, income distribution, reduction in income disparities and poverty reduction (Weldeslassie et al., 2019).

Wasihun and Paul (2011) showed that women need to be given attention when promoting and developing MSEs as a means of poverty reduction and increased employment creation. There are African countries that have achieved strong economic growth, for example, Ethiopia through the promotion of SMEs because they (as realized by the Ethiopian government) have been the key pillar in the implementation stages of agricultural development-led industrialization (ADLI) (Weldeslassie et al., 2019). Therefore, a country like Sierra Leone can also achieve tremendous economic growth

¹¹ The study in both countries (Uganda and Tanzania) examined the Empowerment and Livelihood for adolescents (ELA), which consisted of vocational and life skills training (Buehren et al., 2017).

through SMEs only with a well-structured strategy to promote their development by articulating and implementing appropriate strategic policies like the case of Ethiopia (Weldeslassie et al., 2019).

De Janvy and Sadoulet (2009) observe that when yields rise, the output grains are supported which in turn increase incomes in self-employment and employment opportunities for people in the labour market. Agriculture can offer rural households some pathways out of poverty through: 1) increasing their incomes by selling agricultural commodities; 2) leaving the subsistence economy and becoming market participants (market entrants) and 3) improving their well-being in the subsistence economy either by practicing farming or through other sources of income (De Janvy and Sadoulet, 2009).

3.4 Dietary Diversity and Malnutrition in Sierra Leone

Benfica and Kilic (2016) investigated how household agricultural involvement affects food consumption and dietary diversity in Malawi. The study found that a 10 percent increase in on-farm income share increases food consumption per capita by 2.9 percent, calorie intake per capita by 1.7 percent and little improvement in dietary diversity (Benfica and Kilic, 2016). Dillon et al. (2014) estimated the effect of agricultural production on household dietary diversity using both agricultural revenue and crop production diversity. The research found that a 10 percent increase in agricultural revenue increases dietary diversity by 1.8 percent while an increase in crop diversity increases dietary diversity by 2.4 percent. On average, this study found that when households have a 10 percent increase in agricultural income, they are 7.2 percent more likely to consume vegetables. Although the study has these findings, the results illustrate that agricultural income and growth and increase in crop diversity may not be sufficient to ensure an improved dietary diversity (Dillon et al. 2014). This is important for Sierra Leone because of the high prevalence of malnutrition.

Malnutrition refers to deficiencies, excesses or imbalances in a person's intake of energy and/or nutrients. Malnutrition has three broad groups of conditions i.e. undernutrition which includes wasting (low-weight-for-height), stunting (low height-for-age) and underweight (low weight-for-age) and micronutrient-related malnutrition, which includes micronutrient deficiencies (a lack of important vitamins and minerals) or micronutrient excess. Another form of malnutrition is overweight, obesity and diet-related non-communicable diseases (e.g. heart attack, stroke, diabetes and cancer) (WHO, 2020).

The Sierra Leone national prevalence of acute malnutrition¹² using the Mid-Upper-Arm Circumference (MUAC) was 5.7 percent among pregnant and/or lactating women although much lower at 0.1%

¹² Acute malnutrition occurs as a result of sudden reductions in food intake or due to diet quality combined with pathological causes. It also occurs when the body does not receive the nutritional support it requires, whereby the body adapts by reducing physical activity and slowing the process involved in proper organ function, cell and tissue maintenance (Adamu et al., 2016).

among the non-pregnant/lactating women. The prevalence of acute malnutrition, also defined as MUAC < 23 cm, varied from 0% in the Western Area rural compared to 8.4 percent in Kailahun district (Sierra Leone National Nutrition Survey (SLNNS) 2017, p.34). Koinadugu had acute malnutrition of 5 percent while Kono was reported to have 5.1 percent (Sierra Leone National Nutrition Survey, 2017). The national prevalence of underweight (Body Mass Index (BMI) under 18.5 kg/m²)¹³ was 5.1 percent among 6712 of the assessed non-pregnant/lactating women (Sierra Leone National Nutrition Survey, 2017). On the other hand, the Sierra Leone National Nutrition Survey (2017) documented the prevalence of overweight and obesity among pregnant and lactating mothers to be 18.4 percent and 7.5 percent respectively, which is an indication of an emerging double burden of malnutrition.

Figure 1 below shows the conceptual framework of malnutrition which recognizes that “human and resources, economic systems and political and ideological factors” (Gross et al., 2000) are basic causes of malnutrition. Individuals are affected by immediate causes, underlying causes relate to families while basic causes are related to the community and the nation (Gross et al., 2000). The double burden of malnutrition is characterized by the “coexistence of undernutrition along with overweight and obesity, or diet-related non-communicable diseases, within individuals, households and populations and across the life course” (WHO, 2020).

¹³BMI classification percentile and cut off points: Underweight is the condition of having a BMI under 18.5 kg/m²; normal weight is having BMI greater or equal to 18.5 to 24.9 kg/m²; overweight is BMI greater than or equal to 25 to 29.9 kg/m² and obesity a BMI greater than or equal to 30 kg/m² (Weir and Jan, 2019). Available at <https://www.ncbi.nlm.nih.gov/books/NBK541070/>

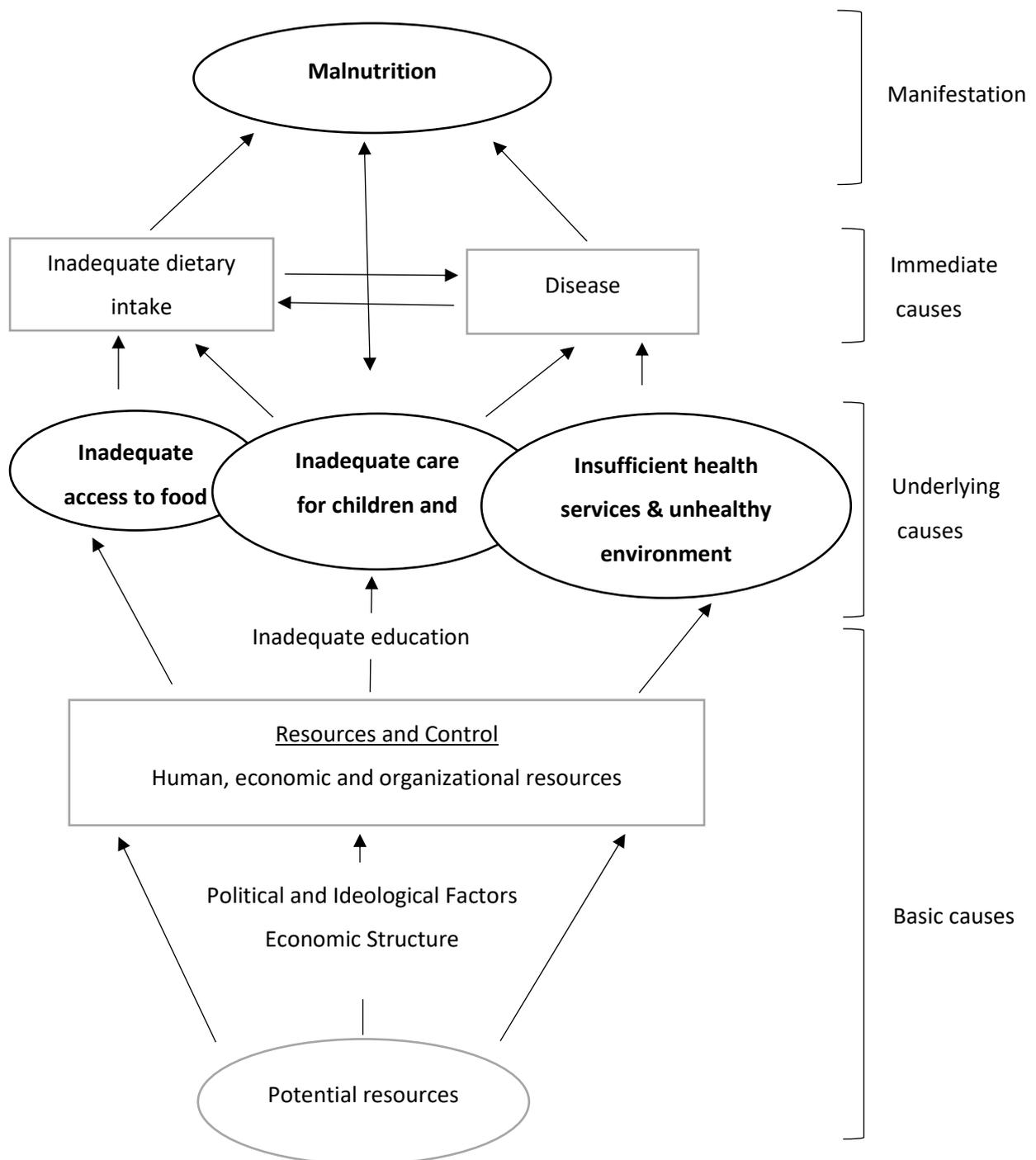


Figure 2: Conceptual Framework on the causes of Malnutrition (modified from UNICEF, 1990)

Among pregnant and lactating mothers, the prevalence of overweight and obesity was 18.4 percent and 7.5 percent respectively indicating the double burden of malnutrition (Sierra Leone National Nutrition Survey 2017, p.35). This double burden of malnutrition can exist at individual level e.g. obesity with deficiency of one or various vitamins and minerals, or overweight in an adult who was stunted during childhood at the household level (WHO, 2020). WHO (2020) defines the double burden

of malnutrition at population level as when there is a prevalence of both undernutrition and overweight in the same community, in a nation or region.

Among the research districts, Kailahun had the highest prevalence of obesity among women of reproductive age (15-49) with 17.7 percent compared to Koinadugu (16.7 percent) and Kono (15.2 percent). Koinadugu on the other hand recorded the highest rate of underweight among women with 8 percent in comparison to Kailahun that had 4.5 percent and Kono with 4.5 percent (Sierra Leone National Nutrition Survey 2017, p.36).

3.5 Production and Export Value of Cash and Food Crops in Sierra Leone

The EPP III focused on cash and food crops such as cocoa, coffee, vegetables, rice, cassava, sweet potatoes, oil palm among other crops. The production of cocoa (beans) has been increasing throughout the years as shown in Table 1, while the production of coffee (green) increased in the year 2016 but later decreased (FAOSTAT, 2019). The production of fresh vegetables, paddy rice and oil palm fruit has increased slowly over the years, although cassava and sweet potatoes production reduced (FAOSTAT, 2019). Crops that have stagnated in production are beans and palm kernels (FAOSTAT, 2019).

Table 1: Crop Production Quantity in Sierra Leone (own Presentation)

Crops	Production Quantity (Tonnes)			
	2015	2016	2017	2018
Cocoa (beans)	16600	47705	48903	50150
Coffee (green)	23020	31400	29867	28096
Vegetables (fresh)	338926	349596	359718	369840
Broad beans, horse beans (dry)	1406	1380	1380	1380
Rice (paddy)	871693	875304	897087	919785
Cassava	3671413	21869	22418	22981
Sweet potatoes	227771	149438	153188	157033
Oil palm fruit	230000	232000	246000	254000
Palm kernels	24500	24800	24900	25000

Source: adopted from FAOSTAT (2019)¹⁴

Cocoa has been a major export crop of Sierra Leone due to its high production and export levels before the war (Denis et al., 2014). Although the production of cocoa declined during and after the war, it has gradually increased over the last years even though it is still lower than the pre-war level (Denis et al., 2014). The total value of agricultural export of cocoa (beans) was 26,888,000 US\$ in 2014 and 12,132,000 US\$ in 2015. The export value increased to 31,942,000 and 70,248,000 US\$ in 2016 and

¹⁴ FAOSTAT Sierra Leone crop production quantity: <http://www.fao.org/faostat/en/#data/QC>

2017 respectively (FAOSTAT, 2019). The total value of coffee (green) was 2,816,000 US\$ in 2014 and 5,982,000 US\$ in 2015 (FAOSTAT, 2019). Although the export value of coffee in the year 2016 decreased to 2,358,000 US\$, it later picked up in the year 2017 to 4,582,000 US\$ (FAOSTAT, 2019).¹⁵ Although fruits are not among the focus crops in this study, the export value of fruits and vegetables increased from the year 2014 until 2016 from US\$ 1.06 million to US\$ 3.83 million and finally to US\$ 14.95 million (FAOSTAT, 2019). The export value of fruits and vegetables later dropped to US\$ 559,000 (FAOSTAT, 2019). The export value of rice increased from US\$ 1,000 in 2015 to US\$ 4,000 in 2016 which indicates that rice is not a main export product. Having seen the export value of the crops which may continue to increase, the Employment Promotion Programme was focusing on these crops (cocoa, coffee, rice and vegetables) to enable young people earn their livelihoods from the self-employed agricultural work (GIZ, 2017).¹⁶

3.6 Theoretical and Conceptual Framework

According to the theory of random utility, each agricultural entrepreneur is rational in decision making leading to maximization of the utility relative to his or her choices. It is assumed that an agricultural entrepreneur j is exclusively considering alternatives that constitute the choice set i (participation or non-participation). The entrepreneur j assigns each of this choice set i a perceived utility u_i^j and choose one that maximizes his utility. In making this choice, the entrepreneur considers the alternative measurable attributes and that of the decision maker.

$$u_i^j = u^j x_i^j$$

Where u^j is the perceived utility and x_i^j is a vector of attributes relative to alternative i and entrepreneur j . Utility cannot be observed with certainty and therefore represented by a random variable. The probability that an agricultural entrepreneur j will select to participate in the Business Loop Program conditional of his choice set i .

This study is based on the following hypotheses:

Hypothesis 1: Entrepreneurs with longer business experience are more likely to participate in the Business-Loop program compared to those with less experience.

Studies for example in Uganda have shown that participation was influenced by the business experience, type of business a youth was involved in, location of the business and the age of the youth (Ahaibwe and Kasirye, 2015). Also, uptake of technologies that are market-oriented and productivity-

¹⁵FAOSTAT Cocoa and coffee export value in Sierra Leone: <http://www.fao.org/faostat/en/#data/TP>

¹⁶ The Agricultural value chain component which is the largest component reaches up to 14,500 farmers. Here the main activities include “value chain analysis, the rehabilitation of abandoned or neglected fields, measures to increase production, capacity building activities, the development of business models and links to private companies, also scaling up and dissemination of successful business models” (GIZ, 2017).

enhancing, tend to promote smallholder participation in producer market groups (Shiferaw et al., 2006).

Hypothesis 2: The income of Phase I is higher than that of Phase II.

Income of Phase I was hypothesized to be higher than that of Phase II because of receiving intervention earlier. A study on the farmer field schools' effect on productivity and poverty in East Africa showed that income from crops and livestock was higher for participating farmers compared to those who did not participate (Davis et al., 2011). Some studies have shown that youth training has improved the income of participants (Buehren et al., 2017; Card et al., 2007). Many factors contribute to increase in income for the participants e.g. increased technical skills learnt from the training programs. Buehren et al. (2017) evaluated an Empowerment and Livelihood for Adolescents (ELA) program that targeted adolescent girls in Tanzania which aimed to empower them economically and socially. The evaluation in Tanzania was therefore replication of the Ugandan study¹⁷ with one key difference: a second participation was introduced whereby the standard ELA model was combined with microcredit. The evaluation in Uganda (which was done two years after the program) found that there was increase in income generating activities, "increased monthly consumption expenditures, improved reproductive health knowledge and practices," (Buehren et al. 2017). Although the program was found to be successful in Uganda in terms of economic, health and social outcomes, in contrast, Buehren et al. (2017) evaluation found that the program in Tanzania did not have any notable effect on most of these outcomes in a Tanzanian setting. The study by Card et al. (2007) as mentioned above showed no impact on the participant employment rate but a positive, though insignificant impact on the individuals' earnings, which may be driven by more educated workers i.e. secondary compared to primary graduates.

Hypothesis 3: Entrepreneurs with higher income have higher Minimum Dietary Diversity Score (MDD-S) compared to those with lower income.

Whereas other studies have shown increased income for the participants (Buehren et al., 2017; Card et al., 2007), some studies have shown improved dietary diversity among agricultural production households. For households that practice agriculture, the production diversity may have a direct influence on their nutrition, not only through the incomes generated from the agricultural production but also through the possibility of household consumption (Malapit et al., 2013). Therefore, Malapit et al. (2013) also argue that if households consume a large share of the food commodities they produce, the diversity in the agricultural production may increase the availability of different types of foods for their household consumption, which in turn improves the household member's dietary

¹⁷ The study in both countries (Uganda and Tanzania) examined the Empowerment and Livelihood for adolescents (ELA), which consisted of vocational and life skills training (Buehren et al., 2017).

quality. This means that the income generated from the sale of food the household produces may be less and the effect of income may be positive or negative.

Hypothesis 4: Households where women make more decisions on income have higher MDD-S compared to those that do not.

I hypothesized that increase in income and women's empowerment through decision making affect dietary practices (for example quality and quantity of diets consumed) and nutrition status of the household members. Hoddinott and Haddad (1995) also find out through their research in Cote D'Ivoire that when women's share of cash income is raised, it increases the budget share of food, and reduces budget share (of alcohol and cigarettes). Although it is difficult to quantify the linkage between women's empowerment and nutrition due to the difficulty of measuring empowerment (Malapit et al., 2013), there is a link between women's control of resources and allocation of resources to food with empirical studies coming from Sub-Saharan Africa (Hoddinott and Haddad 1995; Duflo and Udry 2004; Malapit et al., 2013). For example, Hoddinott and Haddad (1995) as well as Duflo and Udry (2004) find that increasing women's share of cash income significantly increases the share of the household budget which is allocated to food.

In relation to women in decision making and increase in income, Meinzen-Dick et al. (2020) argue that a key element linking programs to improved outcomes is the "dimension of gender roles and gender equity" (Meinzen-Dick et al., 2020, p.135). Meinzen-Dick et al. (2020) also insinuate that it is more likely for women to spend their income which they control on food, healthcare and education for their children. When household income is increased and this income is controlled by men, this does not necessarily improve the nutritional and health status of both women and children (Meinzen-Dick et al., 2020). There is also empirical evidence that when women's control over land, physical assets, and financial assets is increased, this serves to raise agricultural productivity, improve the health and nutrition of children, and (increase expenditures on education), therefore contributing to overall poverty reduction (World Bank 2001 and Quisumbing 2003). Case studies of cotton contract farming in Zambia have shown that when female participants are targeted and gender-friendly enterprises are promoted, contract farming can be profitable for female farmers (Meinzen-Dick et al., 2020).

I, therefore, conceptualized as shown in Figure 3 below that participation in the Business Loop program was influenced by gender, education, age, agricultural business and business sole proprietorship. Recent youth programs have shown that youths are at high risk of unemployment compared to adults due to marginalization, and this is one of the reasons why youth programs are implemented in developing countries (Adoho et al. 2014; Card et al. 2017; Chakavarty et al. 2016; Honorati 2015; Buehren et al. 2017). Compared to the Business Loop indicators (e.g. one had to be a youth and have

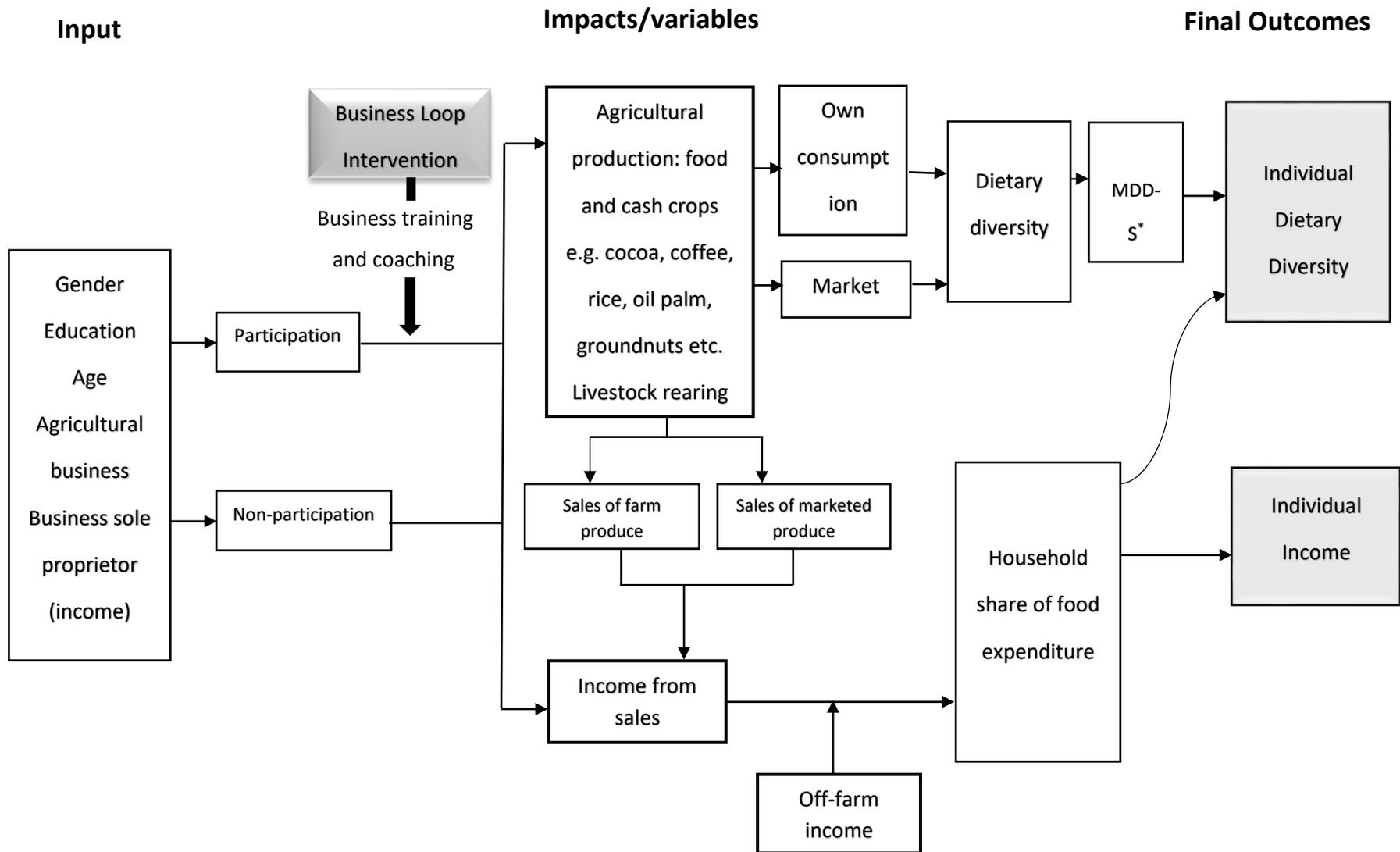
at least primary education), these studies used age, education and gender as a criterion to select participants in their programs.¹⁸

The conceptual framework conceptualizes the relationship between agricultural entrepreneurship incomes (and off-farm incomes) and household share of food expenditure. I expected agricultural production to improve income and individual dietary intake either by a) increasing the sales (in case for the participation) and b) contributing to the household income which is used for purchase of food (e.g. from markets, neighbours etc.). This in turn improves the food intake which provides various macro- and micronutrients (Chung, 2012) required for an individual's well-being. Meinzen-Dick et al. (2020) also identify ways in which agriculture influences nutrition 1) by increasing the agricultural workers' income and 2) by affecting women's level of control exercised over household income (based on the authors' 2020 Conference Brief). An example given by Meinzen-Dick et al. (2020) is the Fairtrade¹⁹ export of flowers from Kenya and Tanzania to Norway where both women and men received an equal contract. Agricultural entrepreneurs are either involved in trade or crop production. Other than these two sources of income, differences may emerge because some entrepreneurs engage in off-farm activities which also contribute to the individual's cash flow. Households with higher income may therefore have an increased share of household budget for food, which in turn influences their final income.

From the study, I expected that entrepreneurs either consume the food crops that they produce or choose to only sell (a case also for traders who are not crop producers). Those that do not produce food on their farms can purchase these foods from the market. Dietary diversity of these individuals (intervention and control group) will therefore differ based on whether they consume the food crops produced or they purchase them from the market. The dietary diversity is therefore determined by MDD-S, which is a 10 scale-score.

¹⁸ See Adoho et al. (2014); Card et al. (2007); Chakavarty et al. (2016); Honorati 2015; and Buehren et al. (2017)

¹⁹ Fairtrade provides a connection among consumers, companies and producer organisations and changes trade through better prices for small farming families, such as well as humane working conditions for employees on plantations in developing and emerging countries. Available in <https://www.fairtrade-deutschland.de/was-ist-fairtrade.html> (Accessed on 12.08.2020)



*Minimum Dietary Diversity Score

Figure 3: Impact Evaluation Conceptual Framework

Source: Author's own conceptualization adapted from Gross et al. (2000), Chung (2012) and Adom et al. (2018)

4. Research Methodology

4.1 Study Area Description

Sierra Leone lies on the western part of Africa and is bounded in the north and northeast by the republic of Guinea, in the south and southeast by the republic of Liberia. Sierra Leone is a small country that is a member of the Economic Community of West African States (ECOWAS) with a population of just over 7.09 million whereby the country has 14 districts and 149 chiefdoms. Figure 4 shows the map of Sierra Leone and its districts. The country has large regional differences by distribution of many social demographic and economic indicators of the population that is living in Sierra Leone.²⁰ Average rainfall ranges from 1,900 mm in the northwest to over 4,000 mm on the coast, making Sierra Leone the wettest country in West Africa. There is a large plain that extends inland which transitions into wooded hills and an interior plateau with forested high mountains in the east. Sierra Leone has vegetation that is highly complex and characterized by matrix of patches of forest, woodland, savannahs and cropland.²¹

Kailahun has an area of 3.85 km², while Kono has an area of 5.64 km² and Koinadugu 12.2 km². The study districts each have an administrative office and they have an estimated population of 526,379 in Kailahun, 506,100 in Kono and 409,372 in Koinadugu, which is approximately 1.44 million.²² In Sierra Leone, the climate is tropical, which is hot all around the year, with a dry season in winter and a rainy season, which runs from May to November in the north and from April to November in the south. The eastern part is mostly covered with hills and mountains while the western part is flat.²³



Figure 4: Map of Sierra Leone

Source: https://commons.wikimedia.org/wiki/File:Sierra_Leone_in_Africa.svg and
https://d-maps.com/carte.php?num_car=66061&lang=en

²⁰ Census atlas of Sierra Leone (2015)

²¹ West Africa: Land Use and Land Cover Dynamics: <https://eros.usgs.gov/westafrica/country/republic-sierra-leone>

²² City population. Republic of Sierra Leone (2015): <https://www.citypopulation.de/en/sierraleone/cities/>

²³ Climate Sierra Leone: <https://www.climatestotravel.com/climate/sierra-leone>

Religious Affiliation

Spirituality is an important part of living in Sierra Leone and according to the Sierra Leone Gender 2015 Population and Housing Census Thematic Report on Gender [United Nations Population Fund (UNFPA)], 98.9 percent of the population indicated that they were affiliated to one religion or another. The main regions were mostly Islam (77.0 percent), while 21.9 percent were Christian.²⁴

Size of labour force in Sierra Leone

People that engage in economic activities are referred to be economically active, or simply the labour force of Sierra Leone. The 2015 Census indicates that the economically active increased from 2.6 million (2004 Census) to 3.97 million which is at 50.18 percent and the proportion of economically active of the working age population has fallen from 86.5 percent to 65 percent. The unemployment rate in Sierra Leone increased by a percentage of 72 percent compared to the period between 2004 and 2015. The working age is until 64 years consisting of 3,937,595 people, the highest unemployment rates are seen for these age groups: 20-24, 25-29 and 30-34 years.²⁵ See table 2 below.

Table 2: Employment Rates of Economically Active People in Sierra Leone

Age group	Percentage of economically active		Total (%)
	Employed (%)	Unemployed (%)	
15 – 19	10	11	22
20 - 24	13	20	17
25 – 29	17	24	15
30 – 34	14	15	11
35 – 39	14	11	11
40 – 44	10	7	8
45 – 49	8	5	6
50 – 54	6	4	5
55 – 59	10	0	3
60 – 64	6	0	2
TOTAL			100

Source: Sierra Leone, 2015 Population and Housing Census (in UNFPA Economic Report, 2015)

4.2 Program Selection Criteria

The study assessed whether income and improvement of food and nutrition security status was associated with participation in the intervention or not²⁶. Through this, the study determined if the income of the Business Loop participants increased in comparison to the non-participation. The inclusion criteria for the EPP III Business Loop program included active employment and whether the interested entrepreneurs were sole proprietors of their enterprises. Information collected in the baseline also included how long the business existed, whether the business was agricultural or contributed to rural development.

²⁴ Sierra Leone 2015 Population and Housing Census Thematic Report on Gender

²⁵ Sierra Leone Economic Report (2015)

²⁶ Data was collected primarily during the Business Loop study

GIZ in Sierra Leone carried out a face-to-face baseline survey of the program participants for the intervention group in 2018 and 2019. Given the importance of the endline survey i.e. for comparison with the baseline and constrained time to collect data for the endline (February – March 2020), thorough supervision was done to ensure that there was less attrition (missing participants in endline survey). To minimize the risk of attrition during data collection, contact information (cell phone numbers and youth's physical address e.g. district, chiefdom and village) collected at the beginning and during the project implementation was used in the endline survey to trace survey participants that were difficult to get in touch with. Most of the participants interviewed in the endline had working cell phones, whereby there were follow-up telephone calls made to keep track of the validity of the respondents and refer to anything that needed to be clarified especially during the endline survey. The project also used community multipliers for any additional contact information to get in touch with the component participants, especially during the endline survey when some of them were either in their farms or could not be traced. Even though the attrition rates of the endline survey were very minimal, there were a few cases when cell phones were switched off also due to the high mobility of youths to the urban areas (e.g. Freetown). Also, there were a few cases where interviews had to be postponed to the next day because participants were either engaged in other activities such as farming and trading, attendance of an occasion e.g. funeral or wedding.

4.3 Randomization and Sampling

The Business Loop population consisted of 1037 participants while this study sampling consisted of 136 participants. Ninety-three respondents were the intervention group, while 43 were not in the intervention. Two participants in the intervention were not included in the data analysis because they could not be traced in the baseline data which was used as a comparison with the survey. Therefore, the total sample size for the survey consisted of 91 intervention and 43 non-intervention groups. The baseline participants therefore only consisted of 91 participants who are in the Business Loop intervention.

I selected intervention study individuals at regular intervals from the sampling frame using the systematic sampling. This was to ensure an adequate sample size. From the 1037 population, I selected every $1037/93 = 11^{\text{th}}$ individual for the sample. Because the study's sample size was to be 120 (90 in intervention and 30 non-intervention), I chose until the 946th intervention participants. I pre-selected non-intervention group using the purposive random sampling since there was need for the non-intervention to have similar characteristics like the intervention group. Such characteristics included being a sole proprietor, engaging in an agribusiness or rural development and being within the age group of the intervention group (Aliard, 1970).

4.4 Data Type and Collection Methods

The impact evaluation integrated quantitative and qualitative analyses also known as mixed methods, which I conducted to provide perspectives and insights of the program's performance (adapted from Gertler et al., 2016) towards the end of its implementation (i.e. July 2020). I used primary quantitative and qualitative data sources collected using three semi-structured questionnaires and Focus Group Discussions. I obtained baseline data from the program collected from an earlier field survey by GIZ. The period for data collection was within three weeks which involved traveling within the three districts. Quantitative data collection was done using Kobotool Box, whereas the Minimum Dietary Diversity Score (MDD-S) data was recorded on hard copy and later entered into MS Excel for transfer to Statistical Package for Social Sciences (SPSS) and later STATA. Data cleaning and management for quantitative data was done in MS Excel and IBM SPSS Statistics, while data analysis was performed using STATA software, version 15.0. Analysis for the quantitative data for MDD-S was done by using MS Excel and, SPSS and STATA. For the focus group discussions, flipcharts were reviewed including transcribed and translated notes taken during each focus group meeting in every district. Questionnaires were administered in English and the research team sought oral consent from each participant before administering the study. A total of nine pre-tests (in the three districts) for both quantitative and qualitative data collections were administered because each district had a new research team due to the remoteness of these districts from one another. The focus group analysis was done by listening to all six audiotapes to transcribe the direct quotations from the program's participants. The study used numbers (that is 1 to 8) as identity-concealing labels for each participant to conserve their identity so that only their gender and study region were indicated. The information recorded was used to back up the collected quantitative data. The summary of the transcribed focus group discussion data was done in Word document.

Quantitative Data

I conducted the endline survey with Business Loop agricultural entrepreneurs in Koinadugu, Kono and Kailahun districts, whereby most participants grew rice, groundnuts, cocoa, coffee, oil palm, cassava and yams including vegetables (cabbages, green leafy vegetables e.g. *crain crain*, carrots etc.). I collected data in twenty-eight villages in thirteen chiefdoms in all these three districts, whereby some of the chiefdoms were sampled in the control group. Both men and women entrepreneurs were interviewed by male and female enumerators. Forty-five participants were interviewed in Kono district, while 43 were interviewed in Kailahun and 46 in Koinadugu district. This shows almost an equal distribution of the sample size in each district.

Qualitative Data

The study used a quantitative list-based open recall as described by the FAO and FHI 360 (2016) to collect individual data on the food intake of distinct food groups over a 24-hour period. I conducted

three men-only and three women-only Focus Group Discussions in different chiefdoms.²⁷ The selection of the FGD participants was done randomly whereby each of the groups consisted of beneficiaries that finished their Business Loop training in the years 2018 and 2019. A total of 39 men and women participated in the six FGDs, whereby three for each male and female FGD were conducted. There was a total number of twenty men and nineteen women in all three districts.

The Focus Group Discussions gathered views and opinions of the Business Loop participants to understand why certain results have or have not been achieved. This is why the research study used an explanatory sequential mixed-method approach. The explanatory sequential method was used to provide context and explanations for the quantitative results, to explore outlier cases of success and failure, and also to develop systematic explanations of the program's performance as it is found in the quantitative results.

Dietary Diversity Score Questionnaire

Women of reproductive age (WRA)²⁸ are more nutritionally vulnerable because of their physiological demands of pregnancy and lactation (FAO and FHI 360, 2016). The Minimum Dietary Diversity for WRA (MDD-W) indicator described and defined by FAO (2016) is a food group diversity indicator that reflects one key dimension of diet quality: micronutrient adequacy summarised across 11 micronutrients (Martin-Prével et al., 2015).²⁹ The Minimum Dietary Diversity for Women indicator was endorsed in 2014 (FAO, 2014) and is validated as a proxy indicator that reflects the micronutrient adequacy in the diet of women in reproductive age as mentioned before (FAO and FHI 360, 2016). It is therefore defined as “a proxy dichotomous indicator of whether or not women aged between 15 and 49 years” (FAO and FHI 360, 2016) have consumed at least five out of ten defined food groups the previous day or night. The questions for the MDD-W were used to measure the impact of the program on the nutrition outcomes of both men and women participants. Questions used in the MDD-W were grouped into ten food groups to determine the score of the foods consumed by a respondent the previous day and night, all foods eaten by the respondent of interest, consumed inside or outside the home, irrespective of where they were prepared are recorded (Kennedy et al., FAO 2010). For the inclusion of male respondents in this study, the MDD-W scale was renamed Minimum Dietary Diversity Score (MDD-S)³⁰.

For this study, the MDD-S questionnaire was designed into fourteen food groups:

- A. Foods from grains
- B. White roots and tubers, and plantains

²⁷ Sakuta, Folosaba Dembelia, Gbense and Luawa chiefdoms in Koinadugu, Kono and Kailahun districts.

²⁸ FAO and FHI 360 (2016) defines WRA as those 15 – 49 years of age.

²⁹ The 11 micronutrients were vitamin A, thiamine, riboflavin, niacin, vitamin B6, folate, vitamin B12, vitamin C, calcium, iron and zinc.

³⁰ See Appendix 1 to see the MDD-S Questionnaire

- C. Pulses (beans, peas and lentils)
- D. Nuts and seeds
- E. Milk and milk commodities
- F. Organ meat
- G. Meat and poultry
- H. Fish and seafood
- I. Eggs
- J. Dark green leafy vegetables
- K. Vitamin A-rich vegetables, roots and tubers
- L. Vitamin A-rich fruits
- M. Other vegetables
- N. Other fruits

The optional and required categories that were also included for this study include:

- O. Red palm oil
- P. Condiments and seasonings
- Q. Other beverages and foods

The food groups were then regrouped into ten food groups including the optional and required as shown in table 3 below.

Table 3:10-Scale Food Groups including optional and required food groups

Food Group	Question
1. Grains, white roots and tubers, and plantains	A + B
2. Pulses (beans, peas and lentils)	C
3. Nuts and seeds	D
4. Dairy	E
5. Meat, poultry and fish	F + G + H
6. Eggs	I
7. Dark green leafy vegetables	J
8. Other vitamin A-rich fruits and vegetables	K + L
9. Other vegetables	M
10. Other fruits	N
(Red palm oil)	O
(Condiments and seasonings)	P
(Other beverages and food)	Q

Source: author's compilation adopted from FAO and FHI 360 (2016)

The reason for including the optional and required categories as defined by FAO and FHI 360 (2016) is because some of the categories are of interest in the context of the nutrition transition, while others are included to provide a place where the interviewer would mark each food and also to avoid falsely classifying items into one of the ten MDD-W and IDDS groups (FAO and FHI 360, 2016). The “Condiments and seasonings” category which contains diverse foods and ingredients is designed to avoid foods that have been consumed in very small quantities to be counted in the indicator.

The indicators based on ten groups has a stronger relationship to micronutrient adequacy than other candidate indicators with different groupings (Martin-Prével et al., 2015). The MDD-W is based on a recall period of a single day and night, and because the data is collected from individuals, the indicator cannot be used to describe diet quality for individual because of the variability of individual intakes day-to-day (FAO and FHI 360, 2016). For this quantitative open 24-hour recall, enumerators asked a series of probing questions for main ingredients to help the respondent recall all foods and beverages he or she consumed the previous day and night.³¹ Below are the descriptions of each of the ten food groups including the optional and required food groups used for this study:

Group 1 – Grains, white roots and tubers, and plantains

Also called “starchy foods” which provide energy, varying amounts of micronutrients e.g. B vitamins provided by grains and varying amounts of anti-nutrients such as phytates (FAO and FHI 360 2016).

Group 2 – Pulses (beans, peas and lentils)

This group includes the family of legumes that are harvested at maturity and dried and used as food or processed into a variety of food commodities. The group is high in protein and B vitamins, which therefore act as a very important protein source which is in plant-based diets and among populations where animal-source foods are mostly not affordable.

Group 3 – Nuts and seeds

The group comprises mostly tree nuts and includes groundnut (peanut) and may also include certain seeds when consumed in considerable quantities. Nuts and certain seeds are mostly rich in unsaturated fatty acids, fibre, minerals and vegetable protein, tocopherols, phytosterols and phenolic compounds.

Group 4 – Dairy

Dairy foods are important sources of high-quality protein, potassium and calcium and also vitamin B12 (available only in animal-source foods) and other micronutrients. Butter, crema and sour cream, sweetened condensed milk and processed or packed yoghurt drinks are not included here.

Group 5 – Meat, Poultry and Fish

³¹ The open recall was used where enumerators did not read predefined foods or food groups to the respondent.

Includes meat, organ meats, poultry and other birds and fresh and dried fish and seafood or shellfish. Flesh foods are important sources of high-quality protein and bioavailable micronutrients e.g. iron, zinc and vitamin B₁₂.

Group 6 – Eggs

Here, eggs from any type of bird for example domesticated poultry and wild birds are included. Eggs are a good source of protein, vitamin B₁₂ and bioavailable micronutrients.

Group 7 – Dark green leafy vegetables

This group includes medium to dark green leafy vegetables are vitamin A-rich, also rich in folate and several other micronutrients. Commonly consumed green leaves include cassava leaves, bean leaves, amaranth leaves including many others.

Group 8 – Other Vitamin A-rich fruits and vegetables

Here, both vitamin A-rich fruits and a small although diverse group of vitamin A-rich vegetables other than the leafy greens are included. Foods under this groups may also be good sources of vitamin C and/or folate. The most common vitamin A-rich fruits are ripe mango and ripe mango, red palm fruit/pulp, passion fruit, apricot and melon.

Other vitamin A-rich vegetables are orange-fleshed sweet potato, carrot, pumpkin and deep yellow or orange-fleshed squash.

Group 9 – Other vegetables

This group includes vegetables not counted above as dark green leafy vegetables or as other vitamin A-rich vegetables. This group includes stems, fruits and flowers of plants consumed in dishes or example cucumber, tomato, okra, etc.

Group 10 – Other fruits

Most fruits excluding vitamin A-rich fruits are included here.

Red palm oil – optional

Is normally consumed as an ingredient in mixed dishes and is extremely high in vitamin A. It is included in regions that consume it to know the proportion of individuals consuming it. The survey included palm oil as an optional category since the oil is highly consumed in the area of study.

Condiments and seasonings – required

In this category, minor ingredients in mixed dishes are included, that primarily provide flavour and are consumed in very small amounts in any individual serving of a dish. This category includes any items added at any stage of cooking or when serving food e.g. sprinkled on the dish to add flavour and have a visual appeal. This category includes fresh or dried herbs, chili peppers, spices e.g. Maggi cubes that act as a food thickener in Sierra Leone, ginger, garlic, tomato paste and seeds that add more flavour to the dish. The items that are added to flavour dishes may be nutritious although they are consumed in small amounts and therefore, they do not contribute substantially to micronutrient adequacy. In

addition to this argument, these items are placed in this category to avoid false inflation of the respondent's dietary diversity (FAO and FHI 360, 2016).

Other beverages and foods – required

In this category, beverages such as unsweetened tea, unsweetened coffee, clear broth, herbal infusions and alcohol and miscellaneous foods e.g. pickles and olives are included. This category was included in the questionnaire to enable enumerators to avoid false classification of foods elsewhere (FAO and FHI 360, 2016).

Field testing of Dietary Diversity Score

Enumerators were trained for two days to make sure that they understood all the names in the local languages (for foods that could not be translated) and also other local food groups were added in the questionnaire using their correct names. The questionnaire was tested in all three districts with nine respondents to make sure that the examples of foods indicated in the food groups were complete and so that the enumerators understood the script well.³²

There is also a presumption that nutrition status is expected to improve as a result of increases in own food consumption or income (from the enterprises and off-farm activities).

Translation and Adaptation of the Questionnaire

Sierra Leone is a country where the inhabitants speak English and Krio (kind of a broken English with some local ascent). Some of the foods in the MDD-S questionnaire were written in the local languages for deeper understanding and to avoid the enumerators making mistakes. The survey included locally available and commonly used foods in the Sierra Leonean context.³³

Field Testing and Piloting

Before finalizing the foods to be included for this study, a pre-test was conducted in each district whereby three respondents were interviewed in each district, adding to a total of nine pre-test respondents. This was also done to ensure that the respondents understood the questions and in necessary the foods that they consumed. Enumerators were then trained in each district for two consecutive days to ensure a deeper understanding of the MDD-S questionnaire.

The research design described above is summarized in figure 5 below.

³² See the FAO FANTA document (FAO, 2016)

³³ See the FAO FANTA document (FAO, 2016)

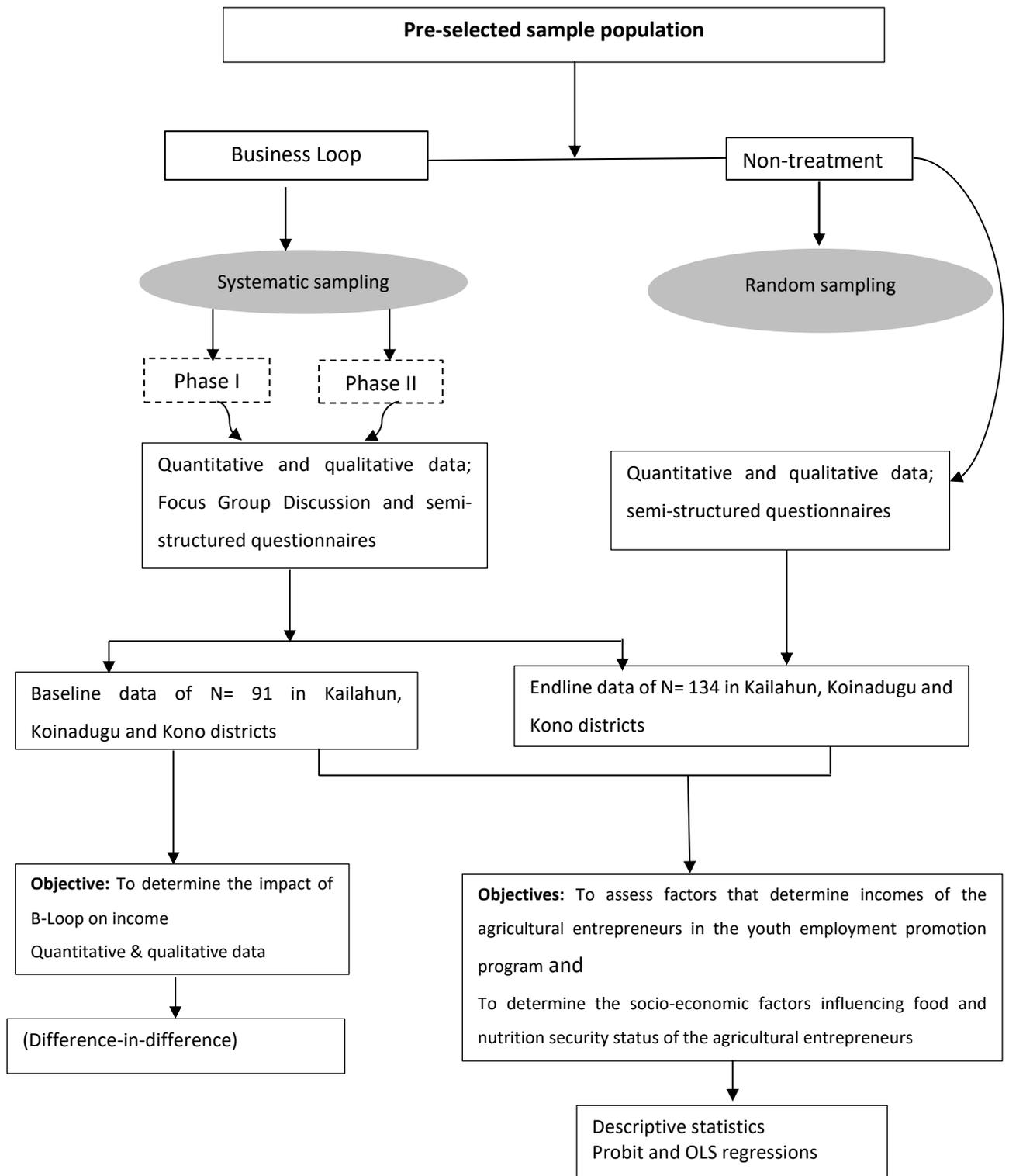


Figure 5: EPP III Business Loop Research

Source: Author's own conceptualisation (Business Loop Survey, 2020)

4.5 Empirical Framework and Structure Model Specification

Impact Evaluation Design

The study randomly assigned eligible youths to two participation groups and one control group. Two different groups were randomly selected from the pool of eligible B-Loop participants. The first participation group i.e. EPP III Phase I was given trainings and coaching in the year 2018 while the second participation group (EPP III Phase II) was offered training and coaching in 2019, the third group represents the control group. The participation received an overall package of services i.e. trainings and two coaching sessions to improve their business strategies (GIZ Sierra Leone, 2017). I collected the endline data for these three groups, but I only obtained baseline data for the two participation groups from GIZ collected in 2018. Randomised assignments ensure that the participation and control groups are similar along with a broad range of the characteristics they have (Honorati, 2015). This therefore makes it easier for an unbiased estimate of the counterfactual to be obtained by measuring the outcomes of the control group, and an unbiased estimate of the impact of the project which is obtained by comparing the difference between the outcomes of both groups (participation and non-participation) (Honorati, 2015). The research estimated the counterfactual outcome for program participants i.e. the Phase I of participation and the Phase II of participation; meaning the outcome that would have prevailed for the Phase I participation had it not received participation in the year 2019.

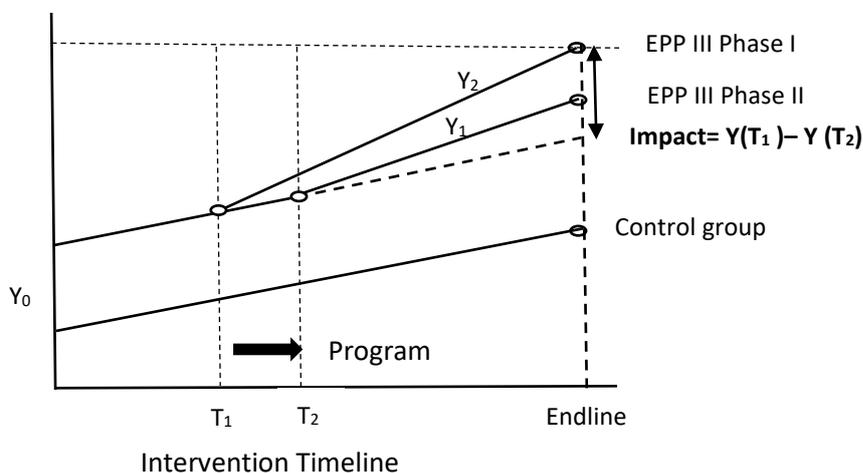


Figure 6: Impact Evaluation Ideal Experiment with an Equivalent Control Group
Source: Adapted from Khandker et al. (2010, p.23)

Impact = $\Delta Y_2 - \Delta Y_1$, whereby ΔY_2 is for Phase I participation group and ΔY_1 is Phase II participation group

The two groups (Phase I and Phase II) were hypothesized to have the same characteristics in the sense that both were agricultural entrepreneurs, with the exception that Phase II participating later in the program. First, the average characteristics of both phases are identical in the absence of intervention period. Second, Phase I treatment did not affect the comparison group (Phase II) either directly or

indirectly. Third, the outcomes of variables in Phase I should change the same way as outcomes in Phase II, if both phases started treatment the same time (adapted from Gertler et al., 2016, p.52).

The first main question considered in this thesis was which socio-economics factors influenced participation in the Business Loop program. The second question was whether Business Loop training and coaching received by participants increased their income (also indirectly improving the employment situation) and thirdly, to what extent the income earned influenced their food and nutrition security.

The Business Loop program aimed to target 30 percent of women and enable registration of 20 percent of the enterprises. The study found out that the program had achieved to reach 46.2 percent females in all the three districts, while only 18.7 percent of the enterprises were registered.

To determine the level of effect of the program on the intervention group, the research considered a scenario where a unit participates in the first and the second phases of the program under study. The unit's value of β in each of the worlds and the label of the value in the world where the Phase I participates is β_{1i} and the value in the world where the Phase II participates in the program is β_{0i} , and "i" represents a particular unit.

Using this notation, the effect of a program on unit "i" is given by $\Delta_i = \beta_{1i} - \beta_{0i}$, whereby this study defined the effect of a program on unit "i" as the difference in outcomes between the two participation groups (Phase I and Phase II). This phenomenon is described by Smith (2004) as the Average Participation Effect on the Treated (ATET). In short, this indicates the average effect of the program on the Business Loop program participants. This is defined by the following notation:

$$\Delta^T = E(\Delta_i | D_i = 1) = E(\beta_{1i} - \beta_{0i} | D_i = 0),$$

where D_i is a dummy variable for the participation, so that $D_i = 1$ for participation in the first intervention (Phase I) and $D_i = 0$ for participation in the second intervention (Phase II). Letter E denotes the expectations operator, where the expectations are conditional on the right of the vertical bar ("|") (adapted from Smith, 2004).

Objective 1: To assess the socio-economic factors that influence agricultural entrepreneurs' participation in the Business Loop Program

The study employed a Probit regression model which was run in STATA/SE 15.0 to analyse a set of factors that influence participation in the program as follows:

$P_i = 1$ if a respondent participated in the program and $P_i = 0$ if otherwise. An individual will participate in a program if the utility of participation is higher than non-participation i.e. $\mu_1 > \mu_0$. Utility is influenced by individual, socio-economic and institutional characteristics i.e.

$$\Pr(Y = 1 | X) = \delta(X^T \beta), \tag{1}$$

$$Y^* = X^T \beta + \varepsilon \tag{2}$$

where, Pr is the dummy for program participation,

Y is a latent variable,
 β is the estimate of the parameters,
 δ is the cumulative distribution function,
 X^T represents the individual, socio-economic and institutional characteristics and
 ϵ is the error term.

I hypothesized that age influenced participation into the program since it can be linked to experience and hence judgement on project's potential benefit. Also, the schooling status and years of business would influence participation because this increases the level of understanding of how one is likely to gain from participating. Gender can also determine participation because the program is likely to benefit men differently from women.

Explanatory variables used for this regression were either continuous or dummy variables. These include age of respondents, land size (in acres), income increase (during participation in the program), months of selling agricultural commodities, number of household dependants, age of enterprises, registration of the enterprise, business types respondents were involved in and the location.

Objective 2: To assess factors that determine incomes of the agricultural entrepreneurs in the youth employment promotion program

An ordinary least square (OLS) regression model was run to determine how the commodities sold by the respondents influenced their incomes. Other than Business Loop Program, income is likely to be influenced by other social economic and enterprise characteristics.

$$\Pi = \beta_0 + \beta_1 \chi_i + \dots + \beta_j \chi_k + \epsilon \tag{3}$$

Where, Π is the income of the participants,
 β_0 is the intercept,
 $\chi_i \dots \chi_k$ are factors that influence income,
 $\beta_1 \dots \beta_j$ are parameter estimates and
 ϵ is the error term accounting for variance unexplained by the model.

Objective 3: To determine the socio-economic factors influencing food and nutrition security status of the agricultural entrepreneurs

The study estimated the factors that are likely to influence the dietary diversity of the respondents using the following OLS regression model:

$$\delta_{ij} = \gamma_0 + \gamma_1 \phi_i + \dots + \gamma_1 \phi_i + \epsilon \tag{4}$$

where, δ_{ij} is the minimum dietary diversity score i of respondent j ,
 γ is the estimate of the parameters,
 γ_0 is the intercept of the slope
 ϕ_i represents the socio-economic, demographic and farm production characteristics of individual i and
 ϵ is the error term.

5. Descriptive Statistics

The total sample size of survey respondents (both participation and non-participation) was 134. Participation was 67.7 percent while non-participation was 33.1 percent. Women represented 47.8 percent of the sample size, which was a total of 64. Men were 52.2 percent which added to a total of 70. Two program participants were dropped from the study since they were missing in the baseline data. Figure 7 below describes the aspects of the personal profile of gender of the survey (consisting of both participation and non-participation).

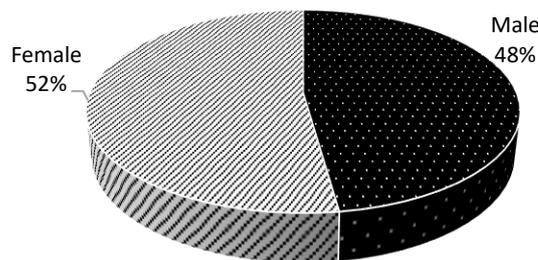


Figure 7: Gender of Respondents

Source: Author's own compilation (GIZ, 2020)

The study had 53.9 percent male and 46.2 percent females from the participation group, while had 48.8 percent male and 51.2 percent females were from the non-participation.

In Sierra Leone, the age for youth is defined between 18 and 35 years old, also a requirement for participation in the EPP III programme (GIZ, 2017). The mean age of the participation was 29.9 years while that of the non-participation was 27.8 years, although the difference was not statistically significant ($P_v = 0.1390$).

There was also difference in education levels between the participation and non-participation. Sierra Leonean schooling system operates a 6-3-3-4 education system (n.a., 2020). To attain primary education, a respondent must have attained six years of education, whereas for junior secondary, participants must have three additional years of schooling. Additional years of attendance at the senior secondary education is three years, summing up to a total of twelve years of schooling (primary, junior and senior secondary). To graduate with a tertiary certificate, a participant must have acquired an additional three to four years of either attending a college or university.

Respondents with tertiary education in the participation group was 25 percent while those in the non-participation was 7.1 percent. Respondents who had attained senior secondary education in the intervention were 34.8 percent compared to 38.1 percent in the control group. Junior secondary education was attained by 25 percent of respondents in the intervention compared to 30.9 percent in the control group. The percentage of the primary education was 15.2 and 19 percent for participation

and non-participation respectively. The non-participation had 4.8 percent respondents with non-completed primary education.

Figure 8 shows the education background of respondents in the survey (both participation and non-participation).

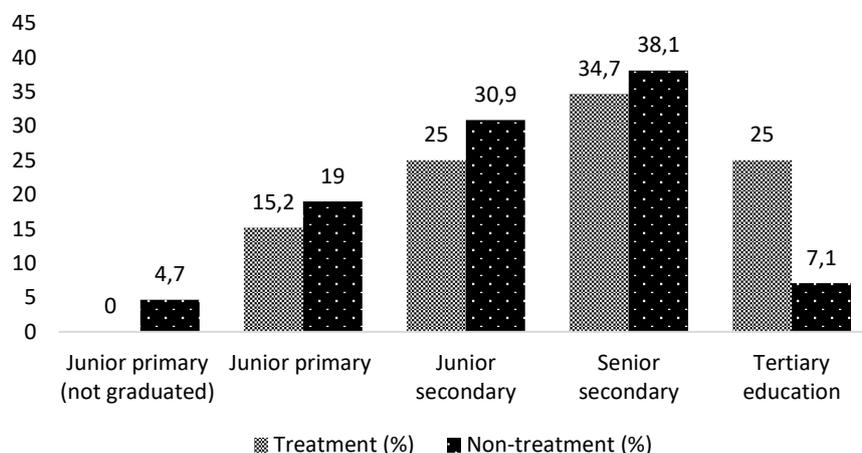


Figure 8: Respondents' Education Background

Source: Author's own compilation (2020)

Overall, the Business Loop program reached mostly respondents with junior and senior secondary education including those with tertiary education. Graduation with a tertiary education was highest among the participation group compared to the control group. Nevertheless, the non-participation seemed to have attained higher education compared to the participation within the senior and junior secondary and junior primary school.

To evaluate the Business Loop respondents' literacy in writing, the program issued a test where respondents wrote either two sentences about themselves and or few general sentences (GIZ, 2017). The oral literacy was tested by asking the respondents to read three sentences (GIZ, 2017).

Table 4: Literacy and Numeracy Levels of Participation and Non-participation

Variable	Participation (%)			Non-participation (%)		
	Reading	Writing	Numeracy	Reading	Writing	Numeracy
None	1	2.1	0	9.5	11.9	7.14
Very poor	6.5	6.5		7.1	11.9	
Poor	9.7	10.9	14.1	9.5	9.5	21.4
Average	20.6	26	16.3	7.1	7.1	33.3
Good	26	8.7	60.8	11.9	7.1	33.3
Very good/ excellent	35.8	45.6	8.7	54.8	52.4	16.7

Source: Author's own compilation (B-Loop survey, 2020)

Also, the numeracy test was done by asking respondents to solve some mathematical problems. Reading and writing literacy and numeracy had six scales while the evaluation for the numeracy skills had five scales. The numeracy scaling was five because a qualitative evaluation was done unlike for the writing and reading literacy which were evaluated quantitatively. This insinuates that the writing and reading literacy scaling had a larger scale to evaluate compared to the numeracy evaluation. The study also determined the differences of education among the female and male participants as this could have implications on the food and nutrition outcomes. Results showed that males had a higher education compared to the females as shown in table 5.

Table 5: Education Levels of female and male participants

Years of schooling	3	6	9	12	16
Female respondents (Percent)	3.13	21.88	37.5	31.25	6.25
Male respondents (Percent)	-	11.43	17.14	40	31.43

Source: Author’s own compilation (B-Loop survey, 2020)

Most of the respondents had household dependants ranging from three to ten, while a few had either one or two dependants. Other respondents had household dependants ranging from eleven to fifteen.

5.1 Nature and Types of Business and Employment generated in the Enterprises

Survey respondents were asked how they started their own businesses. Figure 9 below reveals that 79 percent MSE operators sourced start-up cash from their own savings. 14 percent of respondents started businesses using loans obtained from family members, while only 3 percent obtained loan from a financial institution. The remaining 4 percent established their businesses through external investors.

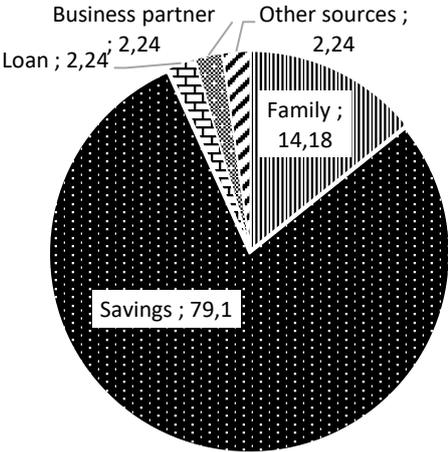


Figure 9: Contribution to business start of respondents

Source: Author’s compilation (Business Loop Survey, 2018/2020)

Results also show that only 26.8 and 11.2 percent of participation and non-participation groups respectively accessed loan from formal institutions such as banks.

According to the FGD respondents, women entrepreneurs obtained their loans informally from *Osusu* women group and Village Savings Loan Association (VSLA). Some women borrowed cash from formal banks e.g. Finance Sierra Leone in Kono district. However, most male participants obtained their loans from micro-finance institutions, while others also obtained from informal institutions such as VSLA. Previous studies have shown that 75 percent of their sampled MSE operators obtained their initial capital from informal financial sources such as own savings and loan or assistance from relatives or friends (Tegegne and Mulat 2005; Etsegenet 2000; Gebreeyesus 2007).

Fiala (2013) also insinuates that family members can help increase the investment in a business through providing household assets, for example cash, tools and labour. Other studies have shown that MSEs in African countries rarely receive credit facilities from formal banks which makes them rely on other types of credit such as informal sources (Weldeslassie et al., 2019 and Bigsten et al., 2003). Respondents included reasons for not obtaining loans from financial institutions as follows: 1) application procedure for loans was too complex; 2) there are high interest rates that are not favourable for SME businesses; 3) high collateral requirements to acquire loan; 4) the size of loans are insufficient to help boost the business and finally 4) others did not think their loan application would be approved for various reasons.

Focus Group Discussions also revealed that respondents were reluctant to acquire loans from financial institutions because to the long distance from their respective villages. Most entrepreneurs in Koinadugu district lived in rural areas where they could only easily access loans informally either through VSLA or *Osusu* women's group). From the women groups, the participants revealed that they keep their savings in the VSLA, which also enables them to easily borrow money from to expand on their business and engage in other things.

Female FGDs also revealed that payment of loans from VSLA and *Osusu* was more flexible which was an incentive to use the borrowed cash sparingly while monitoring performance of their businesses. Evidence from other authors show that women prefer to use informal ways to save their earnings where they can borrow from. Buvinic and Furst-Nichols (2014) show that in urban Ghana, more than half of the women micro-entrepreneurs use a *susu* collector (a vehicle used for informal mobile savings), while in western Kenya, women tend to use village cooperatives for their savings compared to men (Dupas and Robinson 2009).

5.1 Registration and Establishment year of Enterprises

In relation to the establishment of enterprises, most enterprises had been established for three and five years while 9 percent and 9.7 percent of the enterprises have an age of two and six years respectively. 13.4 percent of the enterprises have been existing for four years. While 20.2 percent enterprises are within the age range of seven to fifteen years of existence, 4.5 percent of the

enterprises are within sixteen and nineteen years. Less than four percent are within thirty-one and fifty age range.

Agricultural entrepreneurs were engaged in the following businesses as shown in figure 10: 1) annuals (rice, vegetables), 2) food processing and selling food crop e.g. *garri*, fufu, 3) livestock rearing, 4) marketing of processed agricultural commodities, 5) marketing raw agricultural produce, 6) producing and marketing processed food e.g. oil palm, 7) crop production and marketing of raw agricultural produce; 8) repairing manufacturing agricultural tools (black smith); 9) tree crop/perennials (cocoa, coffee, oil palm); 10) agro-input dealer (seeds, fertilizers) and 11) other activities such as soap making.

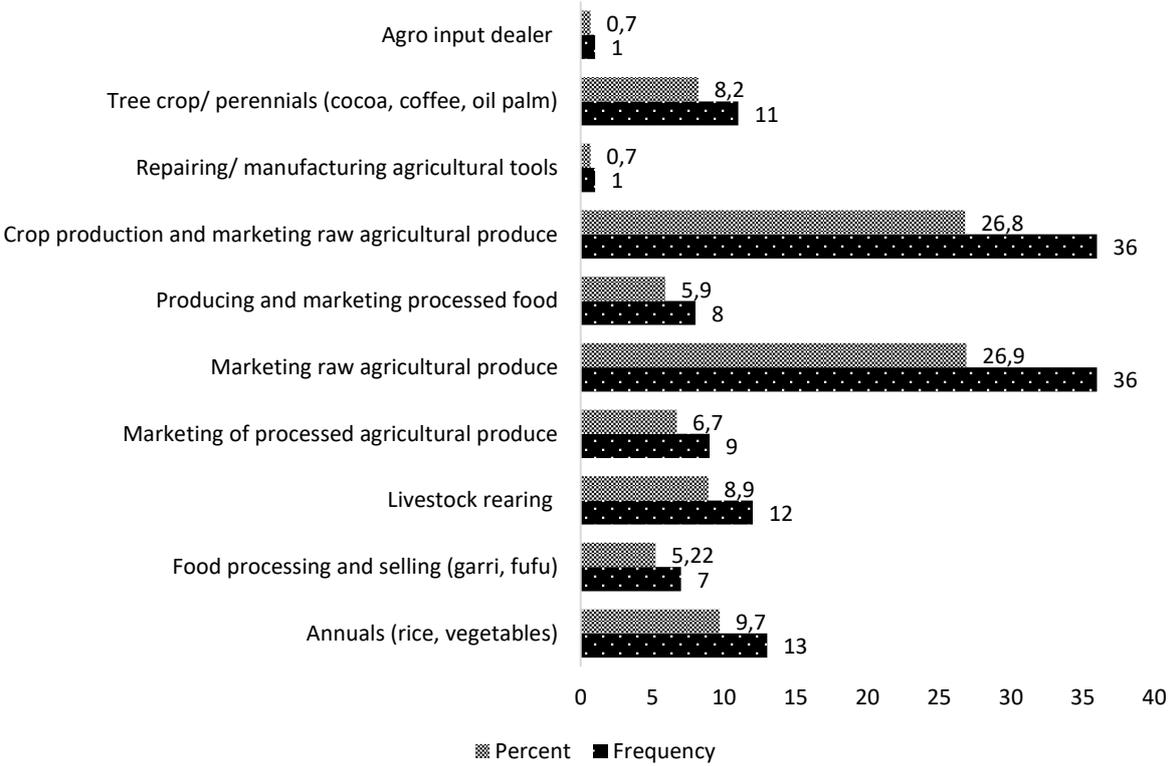


Figure 10: Types of Businesses among agricultural entrepreneurs

Source: Author’s calculation based on the Business Loop Survey (2017/2020)

Figure 10 above indicates that entrepreneurs were mostly involved in marketing of raw agricultural produce and crop production and marketing of raw agricultural produce.

In regard to labour, results show that control group had no permanent employee, while 93 percent of participation had no permanent male employee. Only 2 percent of the participation group had one permanent male employee, while 1 percent had two permanent male workers. Three percent of the participation had each employed three permanent male workers. Further results showed that 96.7 percent of intervention group and 97.6 percent of non-participation had no permanent female employees. About 3 percent of the participation had one permanent female employee, while only 2 percent of the non-participation had two employees.

Although a few enterprises employed permanent employees, more enterprises engaged employees on temporary basis. 52.2 percent of the surveyed enterprises (both participation and non-participation) employed temporary workers. While 71.4 percent of the participation group had temporary workers, only 11.6 percent of the non-participation had temporary staff. 28.5 and 88.37 percent of both participation and non-participation respectively did not employ any temporary staff. The employment created in the enterprises differ according to business sectors.

Temporary employment featured mainly in marketing raw agricultural produce and crop production and marketing of raw agricultural produce. A few temporary staff were employed in sectors such as food processing, marketing of processed agricultural produce while perennials (cocoa and coffee) took up only 9 percent. Annuals took up 46 and 37.5 percent of the total employment created in the production and marketing of processed food sectors. Results from a t-test found a statistically significant difference (P -value = 0.0001) between participation and non-participation for employment of temporary workers. This shows that the type of sector an entrepreneur was engaged is a determinant factor of employment.

Women owned enterprises showed less employment of both permanent female and male employees. Household labour participation in the enterprises was further qualitatively evaluated. Results revealed that enterprises had fewer permanent workers as most of the work force was sourced from within the household. Household labour helps enterprises to minimize the cost of operation as observed by (Tegegne and Mula 2005). Unpaid labour helps small enterprises to minimize the cost of their operation, although this might be a challenge because the firms cannot have the best talents from the labour market (Tegegne and Mula 2005).

Businesses contribution to individual income (revenue) was also determined among participants. Results showed the business was the main source of income among 76.8 percent of participants. 20 percent of businesses contributed to more than half of participants' income. Only 3 percent from the non-participation indicated their businesses not as their main source of income.

The study investigated reinvestment of saving from sales into business expansion among entrepreneurs. 98 percent of participation and 88 percent of the non-participation indicated make savings from their enterprises. Those who were able to reinvest their savings used the cash to purchase more raw materials (expansion of their businesses), buy new equipment and hire new or more staff to work in their farms. The participation group reinvested profit by buying new equipment for packaging food product and purchasing more tree seedlings. Some intervention participants used their profits to restock livestock such as goat and sheep.

5.2 Asset Ownership and Decision making on Crops

Asset ownership is an important determinant of program participation. In this study it was defined as ownership and access to land and access to credit.³⁴ Crop production demands ownership and/ or access to land. Rights and claims are mechanisms used by agents to negotiate access and control (Orr et al., 2016), whereby the right as “an enforceable claim” (Ribot & Peluso, 2003) is recognised either by law, customs or a popular opinion (Orr et al., 2016). Information on land ownership or access over land and savings accounts were obtained quantitatively. To distinguish land ownership between men and women, ownership and access rights over land where food was produced was evaluated by gender. Figure 11 shows land ownership in all three districts.

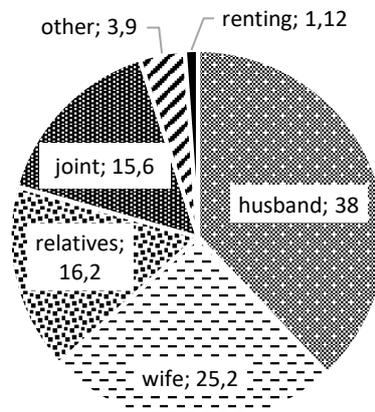


Figure 11: Land ownership in Kono, Koinadugu and Kailahun districts

Source: Author's own compilation (B-Loop Survey, 2020)

As shown in figure 11, 38 percent of men reported to own land compared to 25.2 percent women. This is lower compared to neighbouring Burkina Faso, where 32 percent of land is owned by women compared to 54 percent by men (FAO, 2017). 16.2 percent of land was owned by relatives, while 15.6 percent was jointly owned. Only 3.9 percent of land was owned by others, while 1.12 percent did not own land but rented from other villagers. The FGDs revealed that land is leased mostly over a short-term and the agreement is done in a way that the landowner receives part of the harvest as payment for use of the land. Because Sierra Leone lies closer to Burkina Faso, comparison on land ownership was done between these two countries.

Land ownership is further linked to growth of cash crops, which has an implication on incomes. Results as shown in figure 12 revealed that 30.7 percent made joint decisions between husband and wife.

³⁴ Adapted from Doss (2005) definition

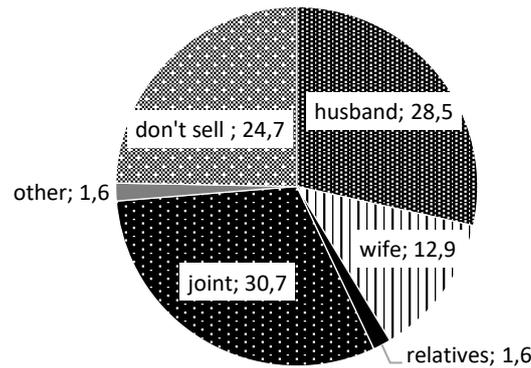


Figure 12: Decision on growth of cash crops

Source: Author's own compilation (B-Loop Survey, 2020)

28 percent of men and 12.9 percent of women made decision on growing cash crops respectively. Only 1.6 percent decision on cash crops was made by other villagers. A percentage of 24.7 did not grow cash crops; they either rented land or were cash crop traders. Doss (2002) who conducted a study in Ghana sought to examine the gender patterns of cropping in Ghana and concluded that men are often viewed to be responsible for producing cash crops.

5.1 Gender and Dietary Diversity

Gender influenced dietary diversity whereby MDD-S of females was lower compared to male respondents. This could also be attributed to the fact that most women did not have more access to land compared to men. Survey data showed that 38 percent of men compared to 25 percent of women owned land, while some owned land jointly with their spouses (15.6 percent). This is also quite similar to the neighbouring region like Burkina Faso (FAO, 2017). Women's share of farmland attributes to increase in household budget share for food hence improving their dietary diversity (Doss, 2005). Women account for two thirds of food production in Sierra Leone, whereby they are also responsible for feeding, nutrition and health (Stringer 2000) of many families which was also observed during the study's focus group discussions. Access to food by an individual is linked to control over household income and household resources (S. Maxwell 1994; Evans 1991; Reutlinger 1985; Sahn 1989; Sen and Senguta 1983, cited in Stringer 2000). FAO (2020) reports that women in Sierra Leone represent 70 percent of the agricultural labour force, emphasizing their important role in the natural resource management and production of food. This shows the important role women play in the food production value chain which makes it necessary for women to own land compared to men.

6. Factors that influence Participation in the Business Loop Program

It is stipulated from the International Labour Organization (ILO, 2012) that the youth are not a homogenous group and that age, gender, schooling status and business ownership may influence participation in a youth employment program in developing countries. Based on this background, it was hypothesized that the following factors were likely to influence the probability of choice to participate in the Business Loop program.

6.1 Description of Explanatory Variables in the Analysis

Age of participants

Age is one determinant factor for participation in the Business Loop program. In order to participate in the program, an individual had to be between the ages of 18 and 35 years. The program also had a leniency of recruiting individuals of years up to 40 years.

Gender of participants

Gender is likely to influence participation in the program depending on the type of business an individual is involved in. Male respondents are expected to participate more than women since they are involved in planting and selling of cash crops (Doss 2002 & Orr et al. 2016).

Land size

Respondents who have larger land sizes are likely to participate more than those with much lesser land size. This would be because men have more land rights compared to women (Ribot and Peluso 2003 & Orr et al. 2016) and higher crops yields obtained from large farms may correspond to higher incomes. Land size was therefore likely to positively or negatively influence participation.

Household dependants

The number of household dependants (spouse, children and other relatives) of a respondent is likely to influence participation in the program either positively or negatively. A household with higher dependency has a higher demand for diversified income. A respondent with higher dependency is likely to participate due to access to free labour from household members (Hoddinott and Haddad 1995, & Duflo and Udry 2004).

Number of months for selling

The number of months an entrepreneur sells his/ her commodities are likely to positively or negatively influence their participation. It is expected that respondents are more likely to participate in the program when the number of months increase due to more income earned and vice versa.

Experience in business

Experience in crop enterprises was likely to influence participation as it translates to more knowledge on market intelligence, customer service and market linkages among others. It is therefore expected that participants with more years in the business are more likely to participate in the program.

Types of business enterprise

Entrepreneurs were engaged in different types of businesses which are likely to influence participation differently. Since capacity building and training were key components of the program, a respondent was more likely to participate in the program for example if he/ she is involved in marketing raw agricultural produce. This could be due to the need to gain more skills on marketing of processed agricultural produce.

Location dummies

The location of a respondent's enterprise is also likely to influence their participation due to the closeness to the market and type of crop being grown in the particular district/ region. From this research, it is hence expected that the location of an enterprise may influence participation positively or negatively.

Table 6 above shows the descriptive statistics of variables determining participation in the program.

Table 6: Descriptive Statistics of variables used in regression

Variable	Obs	Mean	Std. Dev.	Min	Max
Participation in B-Loop program	134	0.679	0.469	0	1
Gender of respondent	134	0.478	0.501	0	1
Age of respondent	134	29.284	6.892	18	47
Household dependants	134	5.739	3.219	0	20
Land size (acres)	134	4.164	6.084	0	50
No. of months of selling commodities	134	7.866	3.922	0	12
Years of being in business	134	6.381	4.438	1	20
Marketing of processed agric. produce	134	0.067	0.251	0	1
Marketing of raw agric. produce	134	0.269	0.445	0	1
Crop production & marketing of raw agricultural produce	134	0.269	0.445	0	1
Annual crops (rice, vegetables)	134	0.097	0.297	0	1
Producing and marketing processed food	134	0.06	0.238	0	1
Livestock rearing	134	0.09	0.287	0	1
Tree crop perennials	134	0.082	0.276	0	1
Kono district	45	0.667	0.476	0	1
Kailahun district	43	0.721	0.453	0	1
Koinadugu district	46	0.652	0.482	0	1

Source: Author's calculations based on the Business Loop Survey (2020)

The variables described above were regressed against participation in the Business Loop program.

Table 7 represents the results of Probit analysis as shown below.

Table 7: Factors that influence choice of participation in the Business Loop Program

Dependent variable: Participation in the Business Loop Program					
Explanatory variable	Unit	Coefficient	Std. Error	P-value	Sig.
Entrepreneur characteristics					
Gender of entrepreneur	Female=1	0.13	0.35	0.715	
Age of entrepreneur	Continuous	0.03	0.03	0.366	
Household dependants	Continuous	0.001	0.05	0.985	
Land size	Acres	0.17	0.07	0.024	**
Number of months of selling products	Continuous	0.24	0.05	0.0001	***
Years of experience in business	Continuous	0.08	0.04	0.065	*
Types of business enterprise (omitted=agro input and repairing agric. tools)					
Marketing of processed agric. produce	Yes=1	0.61	0.72	0.398	
Marketing of raw agricultural produce	Yes=1	1.09	0.59	0.068	*
Crop production and marketing of raw agricultural produce	Yes=1	1.19	0.67	0.075	*
Annual crops (rice, vegetables)	Yes=1	1.28	0.69	0.066	*
Producing and marketing processed food	Yes=1	1.89	0.93	0.041	**
Livestock rearing	Yes=1	1.47	0.76	0.052	*
Tree crop perennials (coffee, cocoa)	Yes=1	0.67	0.78	0.393	
Location dummies (omitted=Koinadugu)					
Kono	Yes=1	-0.95	0.44	0.029	**
Kailahun	Yes=1	0.77	0.46	0.093	*
Constant		-4.01	1.07	0.0001	***
Mean dependent var	0.679	SD dependent variance			0.469
Pseudo r-squared	0.350	Number of observations			134
Chi-square	58.893	Prob > chi2			0.000

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Author's calculations based on the Business Loop Survey (2020)

Results in table 7 indicate that participation in the Business Loop program was significantly influenced by land size (in acres), number of months of selling their various commodities, number of years of being in business, being involved in businesses such as marketing raw agricultural produce, crop production and marketing of raw agricultural produce, annual crops (rice, vegetables), producing and marketing of processed food, selling livestock and being an entrepreneur in Kailahun and Kono districts. The likelihood of participation in the program was not significant with gender and age of respondent, number of household dependants, marketing of processed agricultural produce and growing crop perennials (cocoa, coffee, oil palm) as a business.

An increase in land size increased the probability of participation by 0.17. Similar to findings by Nahayo et al. (2017), farmland size in Rwanda was found to significantly increase participation of farmers in a crop intensification program (CIP). The number of months an entrepreneur sold his/ her commodities and years of experience in the business also increased probability of participation in the program by 0.24 and 0.08 respectively. Engagement of agricultural entrepreneurs in businesses such as marketing of raw agricultural produce and crop production and marketing of raw agricultural produce more than proportionately increased the probability of participation by 1.09 and 1.19 respectively. Similarly, farmers involved in businesses such as annuals, producing and marketing processed food including livestock ownership had more than proportionate probability of 1.28, 1.89 and 1.47 to participate in the program respectively. Nahayo et al. (2017) and Sithole et al. (2014) indicate that market access (comparison to number of months of selling in this study) and livestock ownership significantly influenced farmers' participation in smallholder irrigation schemes in Swaziland.

Nwaobiala (2014) also revealed that farm size and experience in farming statistically influenced participation in an IFAD/Community based Natural Resource Management program in Nigeria. Similar findings by Rikitu et al. (2019) indicate that factors affecting households' market participation include family size, land size ownership and farming experience. Martey et al. (2013) showed that farm size was positively associated with the probability of rice farmers to participate in the program.

The FGDs also revealed that entrepreneurs sold raw commodities such as coffee and cocoa beans and oil palm to exporters, who later sell to other countries. According to Temu E. and Temu A. (2006), SSA economies have heavily depended on the traditional fast selling high-value agricultural commodities (HVAP) such as coffee and cocoa are mainly grown for cash values in the domestic and export markets. Therefore, agricultural entrepreneurs selling these commodities, are at more advantage of earning more revenue when selling to other Sierra Leonean exporters increasing the probability of participation. Participation of entrepreneurs producing and selling annuals (rice and vegetables) was also found to be statistically positively significant. Rice is a staple food in Sierra Leone and therefore constitutes a major part of the diet in the country (Conteh et al., 2012). In the past three decades, rice has increased in demand whereby its growing importance is evident in the strategic food security planning policies of Sierra Leone. Sierra Leoneans consume more than 200 kilograms per capita rice (Conteh et al., 2012) which explains why rice is well established in the agriculture and diets of Sierra Leone. Income obtained from rice sales could be an incentive for participation in the program.

Similarly, the study found that vegetables (dark green vegetables) are highly consumed in Sierra Leone which are mainly included in meals (see MDDS chapter) leading to high consumer demand. Increase in consumer demand for commodities in market could lead to high product sales, which could be a motivation for entrepreneurs to join the program to learn more entrepreneurial skills. Livestock rearing was positively significant to participation in the program. Male FGDs revealed that livestock

yields higher income per unit compared to other agricultural commodities, hence the motivation to join the program.

If an entrepreneur was based in Kono district, the probability of participation in the program decreased by 0.95, compared to an increase by 0.77, if an entrepreneur was from Kailahun district. This is expected because Kailahun district had the highest distribution of enterprises compared to Kono district as shown in table 8 below. Results in table 8 further show that 41.7 percent of entrepreneurs were engaged in crop production and marketing raw agricultural produce in Kailahun district. Around 52.8 percent and only 5.6 percent of entrepreneurs in Kono and Koinadugu districts respectively were involved in crop production and marketing raw agricultural produce. Also, 27 percent of entrepreneurs in Kailahun were engaged in tree crops (cocoa, coffee and oil palm), while 73 percent were from Kono district. In addition to these two types of businesses, 75 percent of entrepreneurs from Kailahun were involved in producing & marketing processed food, while only 25 percent were from both Kono and Koinadugu districts. These three business categories seemed to generate some income for the entrepreneurs which could be a contributing factor to their participation in the program.

Table 8: Percentage Distribution of Business Type across Districts

District	Annua ls	Food process ing & selling	Livest ock	Market ing raw agri. produc e	Market ing process ed agri. produc e	Produci ng & market ing process ed food	Crop product ion & marketi ng raw agricult ural produce	Repai ring agri. tools	Tree crop	Agr o inp ut	Tot al
Kailahun	38.5	14.29	33.3	33.3	36.3	12.5	41.7	0	27	0	34
Kono	30.7	14.3	0	11.1	8.3	75	52.8	100	73	0	32
Koinadug u	30.7	71.4	66.7	55.6	55.6	12.5	5.6	0	0	10 0	34
Total	100	100	100	100	100	100	100	100	100	100	100

Source: Author's own compilation, B-Loop Survey (2020)

The effect of Kailahun location on participation could further be explained by its proximity to other main markets in districts such as Bo and Kenema. Good proximity from Kailahun provides entrepreneurs easy channels to bigger markets whereby they can obtain higher sales compared to markets in Kono district. Kailahun district is also closer to Guinea border which provides easy accessibility to other outside markets. Kailahun district produces oil palm and provides Sierra Leone with oil palm commodities.³⁵ Because of higher income obtained from oil palm, entrepreneurs would be motivated to join the program and learn better technical skills provided by the program.

³⁵ Note that during the data collection for this study (02.2020 – 04.2020), the production of oil palm was not high because oil palm production season is between April and July/August of each year.

7. Socio-economic Factors influencing Income

To determine the socio-economic factors that influenced income, the study first compared the mean crop yields between participation and non-participation. Agricultural yield is an important determinant of revenue among rural households in majority of developing economies as observed by Delgado (1999). The estimated harvested crop yields grown by participants who were farmers was recorded during survey and later, the average yields of these crops were calculated in MS Excel. Crop yields from participation and non-participation groups was compared to determine whether the program had influence on crop production and incomes (sales revenue). The estimated crop prices were converted to Euros as shown in table 9 below. A t-test was run to determine the statistical difference in harvest between participation and non-participation groups. The study found a statistically significant difference in the harvest of the following crops: coffee, groundnuts, pepper (dried), husk rice (50 kg bag), cassava, sweet potato, eggplant, maize and cabbage.

The mean of rice (70-kilogram bag), Irish potato and pineapples for the non-participation was higher than that of the participation, however the means were statistically not significant. The study observed more farm crop diversification among the participation group compared to the control group. Program participants grew crops such as yam, cucumber, cocoa yam, onion leaves, pigeon pea, bitter ball, ginger, kola nuts, oranges, avocado, sweet potato, plantain and coconut which were not grown by the control group. The price for rice of a 50-kilogram bag costs 13€ while that of a 70-kilogram bag was 17€. On the other hand, groundnuts were sold at 0,89€ per kilogram while oil palm for 0,70€ per litres. Although the harvest of oil palm as shown in table 10 was not high due to seasonality, oil palm contributed to higher sales revenue since it was one of the most sold crops by the entrepreneurs (see table 11 above). Similarly, crops such as coffee, cocoa and pepper that have higher market prices such as 1,02€, 0,60€ and 1,36€ per kilogram respectively show indicating higher incomes among the respondents.

Table 9 also shows that more crops were grown and harvested by the participation group than the non-participation group. Crops such as cocoa, coffee, cabbage, carrots and Irish potatoes were prominently grown by both groups. These crops fetch higher prices in the market, and this could be attributed to their significant influence on program participation (see table 7). FGDs demonstrated that participants obtained market information from the program through capacity building, which could be an incentive by the program participants to grow more of such crops. In the male focus group discussion, participants revealed that they were motivated to obtain higher yields because they sold their crops much faster and easily due to the program's business training and coaching. Cocoa and coffee are export crops traded in foreign markets from exporters based in Sierra Leone that could also form an incentive to grow and/or trade them.

Table 9: Comparison of Crop harvest between Participation and Non-participation

Participation							Non-participation						
Crop	Units	No. of obs.	Absolute mean yield	SD	Min	Max	Absolute mean yield	No. of obs.	SD	Min	Max	P-value	Market price per unit (€)
Cocoa	Kilograms	16	306.25	339.55	50	1500	241.67	9	178.54	0	500	0.309	1,02
Coffee	Kilograms	9	150	143.61	50	500	93.75	6	63.12	63.12	12.5	0.081	0,60
Groundnuts	Kilograms	29	444.83	437.79	100	2200	190	10	139.04	50	500	0.0003	0,89
Pepper	Kilograms	19	676.59	1008.68	5	4000	300	2	70.71	250	350	-	1,36
Runner beans	Kilograms	3	183.33	115.47	50	250	6	1	-	6	6	-	0,85
Husk Rice	Kilograms (50 kg bag)	24	775	673.57	50	2500	216.67	9	141.42	50	500	0.0001	12,75
Husk Rice	Kilograms (70 kg bag)	18	9.56	10.49	4	50	420	4	420	210	1050*	0.146	17,01
Cassava	Kilograms	16	520.94	504.63	60	1750	900	4	0	900	900	0.0001	0,68
Yam	Kilograms	2	250	212.13	100	400	0	-	-	-	-	-	1,28
Sweet Potato	Kilograms	7	250	152.75	100	500	30	2	28.28	10	50	0.058	0,43
Irish potato	Kilograms	2	150	141.42	50	250	550	2	636.39	100	1000*	0.537	0,43
Carrot	Kilograms	3	916.67	144.34	750	1000	250	1	-	250	250	-	17,1
Cucumber	Kilograms	4	550	389.44	200	100	0	-	-	-	-	-	0,43
Cocoa yam	Kilograms	4	175	64.55	100	250	0	-	-	-	-	-	0,85
Tomato	Kilograms	7	149.29	95.19	15	300	58	5	40.87	10	100	0.008	0,85
Egg plant	Kilograms	3	39.67	35.50	4	75	82.5	2	95.46	15	150	0.640	0,43
Bulb onion	Kilograms	1	50	-	50	50	475	2	388.91	200	750	0.366	0,68
Onion leaves (10 Ties = 1kg)	Kilograms	1	90	-	70	140	0	-	-	-	-	-	0,85

Table 9 continued: Comparison of Crop harvest between Participation and Non-participation

Participation							Non-participation						
Crop	Units	No. of obs.	Mean yield difference	SD	Min	Max	Absolute mean yield	No. of obs.	SD	Min	Max	P-value	Market price per unit (€)
Pigeon pea	Kilograms	2	105	49.49	70	140	0	-	-	-	-	-	0,51
Maize	Kilograms	11	363.64	337.71	50	1000	150	3	100	50	250	0.002	0,51
Okra	Kilograms	6	1025	1659.44	100	4400	49.33	3	78.53	3	140	0.185	0,43
Cabbage	Kilograms	8	2968.75	1277.82	2000	6000	683.33	6	191.49	500	1000	0.0001	15,39
Bitter ball	Kilograms	2	750	0	750	750	0	-	-	-	-	-	0,34
Ginger	Kilograms	1	280	-	280	280	0	-	-	-	-	-	0,34
Kola nuts	Kilograms	3	283.33	76.37	200	350	0	-	-	-	-	-	0,77
Oranges	Kilograms	1	1000	-	1000	1000	0	-	-	-	-	-	0,68
Avocado	Kilograms	1	1250	-	1250	1250	0	-	-	-	-	-	0,51
Sweet banana	Kilograms	3	173.33	116.76	70	300	0	-	-	-	-	-	0,68
Plantain	Kilograms	4	462.5	309.23	200	900	0	-	-	-	-	-	0,43
Pineapple (1 piece = 1kg)	Kilograms	3	800	1255.83	60	2250	5	1	-	5	5	0.387*	0,85
Coconut	Kilograms	2	262	336.58	24	500	3	-	-	-	-	-	0,85
Crain crain (dark-green veg.)	Kilograms	1	50	50	-	50	59.63	1	-	3	3	-	0,43
Oil palm	Litres	1	27	27	-	27	59.63	4	92.47	9	198	0.531	0,70

Source: Author's calculation based on the Business Loop Survey (2017/2020)

Market prices were converted to Euros using XE Currency Währungsrechner on the date of 06.08.2020³⁶

³⁶ XE Currency Währungsrechner: <https://www.xe.com/de/currencyconverter/>

Although commercial crops are a source of high income in the Sierra Leonean context, some entrepreneurs also sell subsistence crops such as cabbages and carrots which are mostly sold in big markets e.g. in Freetown. Crops such as rice, cassava, yam, cocoa yam, groundnuts and pepper are highly consumed among Sierra Leoneans, resulting to higher domestic consumer demand.

Rice as a staple food in Sierra Leone was among the crops that had a high average yield i.e. 775 and 216.67 kilograms among the participation and control group respectively. Among the participation, the average yield for groundnuts was 444.83 kilograms while only 190 kilograms was harvested by the control group. The agricultural entrepreneurs also cultivated other crops such as oil palm that are normally harvested between the periods between March/ April and July/ August which are highly consumed in Sierra Leone. The harvest for oil palm was not high in both research groups although from research data, oil palm counted as one of the most sold commodities by agricultural entrepreneurs. Cocoa recorded an average yield of 306.25 kilograms and 241.67 kilograms among the participation and non-participation respectively. Coffee correspondingly yielded on average of 150 kilograms in the participation group and 93.75 kilograms among non-participation. In the participation group, pepper had an average yield of 676.59 kilograms and 300 kilograms in the control group. These crops as described above are considered high value crops in the Sierra Leonean market hence contributing to higher sales revenue in the market (Temu E. and Temu A., 2005).

To establish whether the mean difference in crop yield observed translated to increase in sales revenue, on-farm incomes among the three study groups (Phase I and II and control) was determined. Since the mean is affected by extreme values or outliers, the outliers in Phase II and control group were truncated while computing the mean sales revenue.

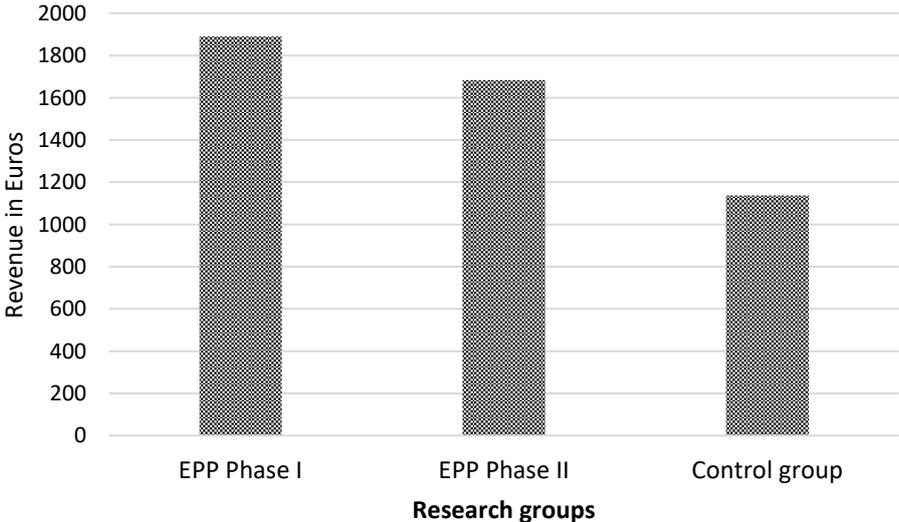


Figure 13: Sales revenue obtained from commodities sold
Source: Author’s calculation based on the Business Loop Survey (2017/2020)

In figure 13 above, there is an observed higher income among the Employment Promotion Programme III Phase I respondents compared to the EPP III Phase II, although not statistically significant ($P_v = 0.739$). Correspondingly, Phase II respondents had higher sales revenue compared to the control group. Participation therefore had higher incomes compared to non-participation ($P\text{-value} = 0.0001$). The higher crop income among participation could be linked to the higher yields as observed in table 9 above. The difference in income between Phase I and Phase II could further be explained by the difference in intervention period.³⁷

To further support the link between crop yields and income, market access by agricultural entrepreneurs was assessed. In this study, market access was measured by the quantity of commodities transacted in the market. Business Loop program participants sold more agricultural commodities compared to the non-participation and this explains the income difference. However, most of the transactions are local irrespective of the groups. The study found that 44.5 and 47.6 percent of participation and non-participation respectively sold commodities to customers from the same village they operated. This explains the challenge of competition cited by all program respondents during the FGDs.

Swaminathan and Chinnadurai (2012) imply that agriculture needs a well-functioning market to drive growth, employment and economic prosperity. They therefore suggest having market intelligence to collect, interpret and disseminate information relevant to make marketing decisions. Through market intelligence, one becomes competitive through improving strategic decisions which may lead to a better performance against their competitors (Swaminathan and Chinnadurai, 2012).

Another marketing problem could be the change in demand and being unable to modify the commodities according to the customers' demand (Weldeslassie et al., 2019).

Program participants supplied 69.6 percent of commodities demanded in the market compared to 45.2 percent from the non-participation. Focus Group Discussions revealed that incapacity in cooling equipment such as refrigerators acts as a hindrance for storage and longer shelf-life of fresh agricultural commodities such as vegetables.

7.1 Descriptive Statistics of Factors influencing Income

Income in this study was hypothesized to be influenced by participation in the Business Loop program, gender and age of respondent, number of household dependants, experience in business, standardized price of commodities and location of business.

³⁷ Sum of the income was determined for each treatment group i.e. EPP III Phase I, Phase II and control group. Income determined was in Euros whereby, the Sierra Leones (SLL) was converted to Euros by dividing all incomes by 1000.000. This was done since the SLL was too large to obtain good results when run in STATA.

Participation in the B-Loop program

Business Loop program delivered business trainings and coaching on entrepreneurial knowledge and skills, which is likely to improve decisions on resource use in businesses. This has the effect on improvement of efficiency and hence income. It is therefore hypothesized that the income of the B-Loop participants is higher than that of the non-participation.

Gender of respondent

Gender is likely to influence income based on the choice of crops enterprises. It emerged in the focus group discussions that certain crop enterprises are labour intensive and therefore likely to influence enterprise choice between gender as also observed by (Hoddinott and Haddad, 1995) who researched about allocation of intra-household income. Based on the value of these crops, it's expected that gender may influence income either positively or negatively.

Experience in business

Experience in crop enterprises is likely to influence incomes as it translates to more knowledge on crop husbandry, social networks and market linkages among others. It is therefore expected that participants with more years in the business have larger sales revenue and therefore a positive effect on income.

Location dummies

The location of a participant's enterprise is also likely to influence the income due to the closeness to the market as mentioned earlier, type of crop being grown in the particular district/ region. From this research, it is hence expected that the location of an enterprise may increase or decrease the income of a participant.

Age of respondents

Age was one of the determining factors for participation in the Business Loop Program. The study therefore expected age to influence the incomes of the participants. Expectation is that the older a participant is, the more experienced he/ she is and hence this could lead positively to increase in income. Alternatively, young entrepreneurs are expected to not have a lot of entrepreneurial experience which could negatively have an effect on their incomes. To conclude, the age of the participants is therefore likely to positively or negatively affect their incomes.

Types of business

Entrepreneurs are engaged in different types of businesses which most likely influence their incomes differently. The type of business that a respondent is engaged in is therefore likely to either positively or negatively influence their income.

Standardized price of commodities

Standardized price of commodities depends on market demand (Fowowe, 2016), seasonality and availability of commodities in the market. Increase in standardized price of commodities is therefore

likely to influence the income positively or negatively. Demand also differs by type of commodity and ultimately income.

To determine the standardized price of commodities, respondents were asked to name the product (in units) that they sold the most commodity. The unit of product measurement varied from one agricultural entrepreneur to another, for example units were given in batta, bottle, cup, dozen, joint-hand, piece, pint, plate, t-pan and kilogram as units. All these units of measurements were converted to kilograms and therefore, to obtain a uniform measurement, the price of each product was then divided by the unit kilogram equivalent.

For example,

$$1 \text{ batta} = 4.5 \text{ Litres} = 150000 \text{ Sierra Leones}$$

$$\text{Therefore, } 1 \text{ Litre} = 150000 / 4.5 \text{ Litres}$$

Also, market prices (in SLL) of these commodities were given by each participant. To obtain the final revenue sales, commodities (crops, livestock etc.) were recorded and then multiplied by the market price given by each respondent. Each product for example cocoa had its own market including the number of respondents that sold it. Therefore, to obtain the price, in this case of cocoa, the actual mean price was determined, for example:

$$\text{Mean cocoa price} = \text{Total cocoa market price per unit} / \text{Number of respondents}$$

$$\text{Mean cocoa price} = 141.33 / 9$$

$$\text{Mean cocoa price} = 15.70 \text{ SLL}$$

The aggregate price of commodities (crops, livestock etc.) sold was then standardized to obtain one price (log of price). Variables used in the regression are described in table 10 below.

Table 10: Description of variables used in the OLS income regression

Variable used in OLS regression	Observations	Mean	Std. Dev.	Min.	Max.
Log of income	128	15.629	2.208	9.341	22.518
Participation in B-Loop program	134	0.679	0.469	0	1
Gender of respondent	134	0.478	0.501	0	1
Age of respondent	134	29.284	6.892	18	47
Household dependants	134	5.739	3.219	0	20
Experience in business	134	6.381	4.438	1	20
Livestock rearing	134	0.09	0.287	0	1
Koinadugu district	46	0.652	0.482	0	1
Kono district	45	0.667	0.477	0	1
Kailahun district	43	0.721	0.454	0	1
Standardized price of commodities (log)	128	12.803	2.467	5.394	22.109

Source: Author's compilation based on the Business Loop Survey (2020)

To determine factors that influenced income, an OLS regression was run with monthly income as dependent variable regressed against a list of independent variables as shown in table 13. Independent variables used in the OLS regression included participation, age and gender of participants, household

dependants, experience in business, location dummies, age of participants, types of business participants were involved in and the standardized price of commodities.

After testing for multicollinearity using the variance inflation factor (VIF)³⁸, OLS (log-linear model) was used in the analysis. Table A in the appendix shows VIF of variables used in the regression, ranging between 1 and 5 (Glen, 2015), indicating no or moderate correlation among variables.

The OLS regression for income is therefore elaborated as follows:

$$\Pi = \beta_0 + \beta_1 \text{ Participation} + \beta_2 \text{ Gender of respondent} + \beta_3 \text{ Age of respondent} + \beta_4 \text{ Household dependants} + \beta_5 \text{ Business years} + \beta_6 \text{ Price of commodities} + \beta_7 \text{ Business enterprise} + \beta_8 \text{ Location dummies} + \epsilon \quad (5)$$

Table 11 below shows the results from the OLS regression.

Table 11: Influence of Business Loop Program on Incomes of Participation and Non-participation

Dependent variable: Log of monthly income (Leones)						
Explanatory variable	Expected sign	Unit	Coeff.	St.Error	P-value	Sig.
Participation in the B-Loop program	+	Yes=1	0.92	0.33	0.006	***
Gender of respondent	+/-	Female=1	0.56	0.33	0.093	*
Age of respondent	+/-	Continuous	0.01	0.03	0.75	
Household dependants	+/-	Continuous	0.06	0.05	0.214	
Years of business	+	Continuous	-0.03	0.04	0.407	
Standardized price of commodities	+	Log	0.56	0.06	0.0001	***
Type of business enterprise						
Livestock rearing	+	Yes=1	1.74	0.59	0.004	***
Crop perennials (cocoa, coffee, oil palm)	+	Yes=1	0.30	0.59	0.612	
Location dummies (Koinadugu=omitted category)						
Kono	+	Yes=1	-0.16	0.41	0.697	
Kailahun	+	Yes=1	-0.12	0.41	0.765	
Constant			7.17	1.07	0.0001	***
Mean dependent variance	15.629	SD dependent var		2.208		
R-squared	0.476	Number of observations		128		
F-test	10.644	Prob > F		0.000		

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Author's calculations based on the Business Loop field Survey (2020)

Income was significantly influenced by participation, gender of respondent, standardized prices of commodities and livestock rearing. The probability that an entrepreneur was likely to participate in the Business Loop program significantly increased income by 91.9 percent as shown in table 11. This can be linked to higher mean income of crop enterprises among the participation than for the non-participation as shown in table 9 above. If a respondent was female, income increased by 55.6 percent. This is contrary to findings by Doss (2002) and Orr et al. (2016), who observed higher income among male compared to female respondents. Their results were based on the types of crops grown according

³⁸ A Variance Inflation Factor "detects multicollinearity in a regression analysis" (Glen, 2015).

to gender, where males grew mainly cash crop which fetch higher income. During the FGDs, the Business Loop study also found that more men than women grew cash crops but the differences in incomes by gender can be explained by access to loans.

Income increased by 55.5 percent with a unit increase in the standardized price of commodities. The average income also did not differ in marketing processed agricultural produce, marketing raw agricultural produce, crop production and marketing of raw agricultural produce and food processing and selling enterprises. This means that these enterprises have equal returns to income. However, the standardized price of commodities for participation was higher than that of non-participation. This explains why participation had a positive significant effect on income.

Income increase with the probability of being female can be explained by the role of women in the decision on access to loans. As shown in figure 14 below, 43.2 percent of female respondents made more decision on access to loans compared to 34.9 percent male respondents. Women were reported to have more access to loans compared to owning land. Results show that 19.7 percent of the decision on access to credit was made jointly, while only 2.3 percent was made by relatives.

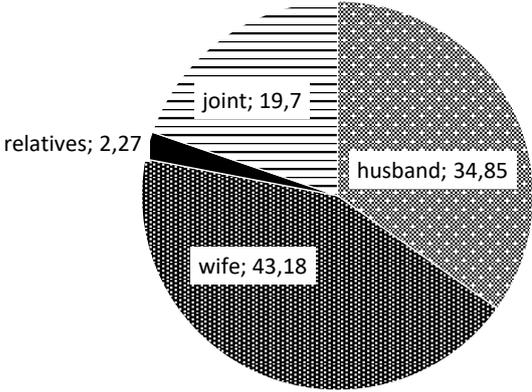


Figure 14: Decision on access to loans

Source: Author’s own compilation (B-Loop Survey, 2020)

The focus group discussions revealed that women accessed more credit through informal institutions such as VSLA and *Osusu* compared to males. The majority of members in informal credit institutions are women. According to Kimuyu and Omiti (2000), the widespread distribution of informal financial institutions such as rotating savings and credit associations (ROSCAs), enable ease of borrowing by micro and small sized businesses mostly owned by women. Likewise, income increased by 174.3 percent with per unit increase in livestock. The average income with respect to livestock did not differ with participation and non-participation. The average income for respondents who owned livestock was higher than those who did not. The livestock per unit prices is high compared to other commodities in the markets and respondents with livestock can be expected to earn more incomes.

8. Minimum Dietary Diversity Score

The study measured dietary diversity in terms of dietary diversity scores (DDS), which is a common indicator that counts the number of food groups consumed the previous day over a certain period of time (Koppmair et al., 2016), in this case a 24-Hour recall. MDD-S indicator was chosen for this study because it is designed for settings where other dietary diversity assessment methods are unfeasible in developing countries (Hanley-Cook et al. 2020; Adubra et al. 2019).

In this study MDD-S is defined as a proxy dichotomous indicator of whether or not an individual aged between 15 and 49 years (adopted from FAO and FHI 360, 2016) has consumed at least five out of ten defined food groups the previous day or night. MDD-S responds to several needs e.g. gathering accurate data on the quality of diet of individuals at national and subnational levels. This makes it possible for the researcher to target risk groups, track their progress and also measure impact of programs (Adubra et al., 2019).

Although the MDD-S was used to determine the dietary diversity of the respondents, one limitation for using a 24-Hour recall is that it is unable to capture day-to-day variation in dietary intakes (Koppmair et al., 2016). Although the variation of MDD-S is often low among poor rural households, it is not possible to ignore it when making nutritional assessments at individual or household level (Koppmair et al., 2016). A 10-scale score is more feasible to use compared to other dietary assessment methods, although there are other advantages and disadvantages for using the list-based or open recall methods when measuring dietary diversity (Hanley-Cook et al., 2020).

Using the list-based method requires less enumerator capacity with a much shorter training time, although there is a likelihood of misclassification of foods and beverages into the given food groups and also, food groups might be misreported. Although the open recall method has disadvantages such as longer enumerator training time, requirement of a reasonable knowledge by enumerators of local foods, recipes and beverages consumed, it was used in this study because it is often proposed due to its accuracy and production of complete recall of all drinks and foods consumed within the 24-hours (Hanley-Cook et al., 2020).

The questionnaire consisted of fourteen compulsory and three optional food groups. Appendix 1 includes the different dietary food items within the 14 different food groups used in the questionnaire according to FAO and FHI 360 (2016) adapted to local food items during the survey. The minimum dietary diversity score was transferred from the hard copies to MS Excel, then generated in SPSS. Analysis was done in STATA which was used to construct the food group diversity scores (1 – 10) for the MDD-S, with score 10 being the highest score a respondent can obtain.

To attain the MDD-S, all ten food groups were added in the STATA as follows:

MDD-S = Grains, white and tubers, and plantains + pulses (beans, peas and lentils) + nuts and seeds + dairy + meat, poultry and fish + eggs + dark green leafy vegetables + other vitamin A-rich fruits and vegetables + other vegetables + other fruits.

A respondent with an MDDS below five (< 5) has not achieved the required minimum dietary diversity score which is at least five out of ten defined food groups. An MDD-S of 10 is the best score that a respondent can have. Figure 15 shows the distribution of MDD-S among the participation and non-participation groups.

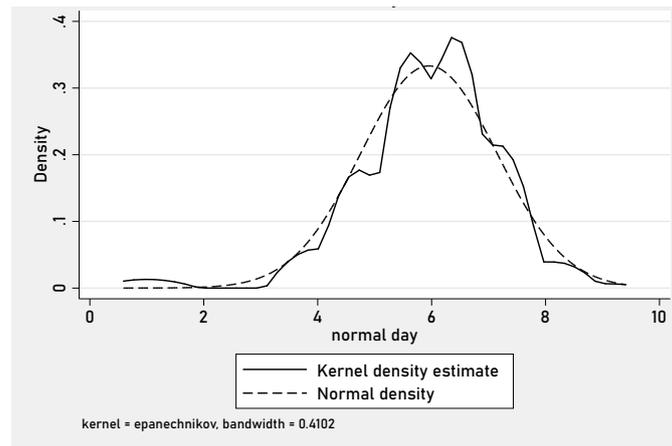


Figure 15: Normal day MDD-S Kernel Density estimate

Source: Author's own compilation (B-Loop Survey, 2020)

The distribution is a negatively skewed histogram (left skewness) which indicates that the mass of the distribution is concentrated on the right side of the figure. The respondents were asked during the interview whether the previous day was a normal day of consumption, meaning they did not attend any function (wedding, school or sports function), or they were not sick on that day. It was necessary to ask this question because there is a tendency to eat more during an occasion compared to what a person eats daily. Also, when a respondent was sick the previous day, the individual tends to eat less which is not considered feasible to record (FAO and FHI 360, 2016).

The mean MDD-S was 5.95 with a standard deviation of 1.2 indicating that the whole study population achieved the minimum dietary diversity score. However, 5 percent of the study population had an MDD-S score below 5 meaning they did not achieve the minimum dietary diversity and therefore are more likely to have less micronutrient intakes (FAO and FHI 360, 2016). Four percent of respondents achieved the highest score of 9, while only 1 percent achieved the lowest score of 1.

The study hypothesized the difference between the mean MDD-S of women and men. A two-sample t-test showed that the mean MDD-S score was 5.97 and 5.93 for the male and female respondents respectively, although the difference was not statistically significant. The null hypothesis was therefore supported.

Table 12: Means Minimum Dietary Diversity Score (MDD-S) across Gender and Program Participation

	Gender (pooled data)			Program participation		
	Male	Female	P-value	Participation	Non-participation	P-value
MDD-S Score (mean)	6.05	5.85	0.128	6.01	6.07	0.703

Source: Author’s own compilation (B-Loop Survey, 2020)

On average, 29 percent of the female population achieved higher minimum dietary diversity (between 7 and 8), indicating higher micronutrient intake, while 61 percent had a moderate MDD-S between 5 and 6. The remaining 10 percent of the female population achieved an MDD-S between 1 – 4 showing a lower micronutrient intake. This was expected because male respondents had higher food and nutrition knowledge compared to females as revealed in the focus group discussions. This could be further linked to the higher years of education among male than female survey participants.

Other than gender, the study also determined whether the MDD-S score differed by program participation, whereby the means of the participation and the non-participation were compared, considering the two phases of the participation group. Results indicate that Phase I had a mean MDD-S of 6.06 compared to 6.00 and 6.07 for Phase II and control group respectively. The mean MDD-S was not statistically significant across these three groups. Based on these results however, this study cannot conclude that the Business Loop Program had no implication on dietary diversity because the effect of a program on dietary diversity requires more time to manifest (Kennedy and Peters, 1992) compared to the two years of program implementation. The distribution of the dietary diversity score among the three intervention groups is shown in figure 16 below.

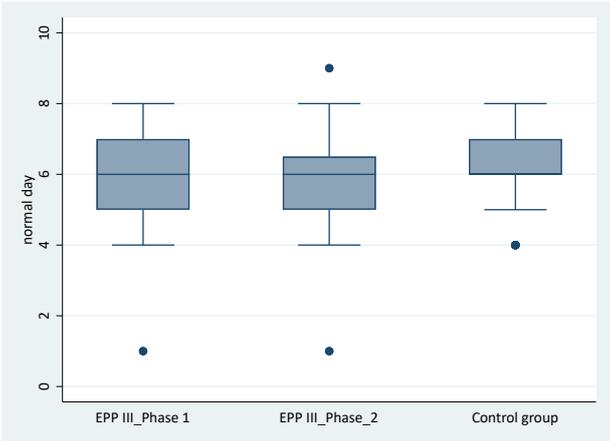


Figure 16: Box plot of MDD-S score among intervention and control groups

Source: Author’s own compilation (B-Loop Survey, 2020)

Since program participation differed by location, the study further evaluated the differences in MDD-S across the three study districts. The mean score was highest in Kono district at 6.14 and lowest in

Kailahun at 5.74 as shown in table 13. Analysis of variance (ANOVA)³⁹ test showed that the means were significantly different.

Table 13: Means Minimum Dietary Diversity Score (MDD-S) across Program Participation in Districts

	Research respondents in Districts		
	Kono	Kailahun	Koinadugu
MDD-S Score (mean)	6.14	5.74	5.95
P-value	0.13	0.41	0.47

Source: Author’s own compilation (B-Loop Survey, 2020)

8.1 Diversity in Food Groups

MDD-S quantitative analysis showed that households generally consumed two meals during the day (either breakfast and lunch/ dinner). The minority households that consumed the third meal typically served some remains from the lunch and added some fish for enrichment.

Figure 17 shows consumption of food groups among respondents. Among all ten food groups, meat, poultry and fish were mostly consumed with 95.5 percent, followed by grains with 80.6 percent and then other vegetables (okra, eggplant, cabbage etc.) with 54.5 percent. Compared to the SLNNS, grains (90.8%), dark green leafy vegetables (76.7) and nuts & seeds (75.5%) were the most consumed food groups among interviewed women (SLNNS 2017, p. 36 – 37).

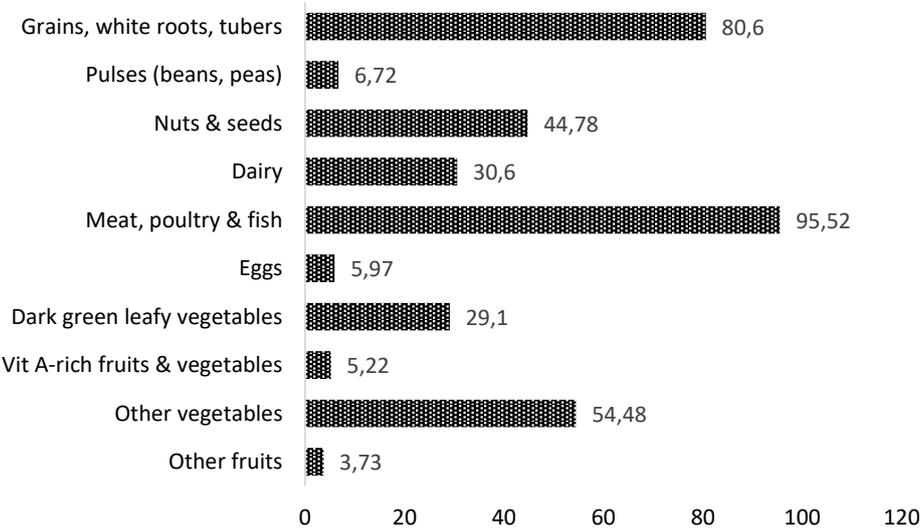


Figure 17: Consumption of food groups among survey participants

Source: Author’s own compilation (B-Loop Survey, 2020)

The least consumed foods in this study were eggs, vitamin A-rich fruits and vegetables and other fruits. Consumption of fruits and vegetables, dark green leafy vegetables were determined due to their importance in micronutrient supply. The average number of fruits/ vegetable groups consumed out of

³⁹ The ANOVA test enables the researcher to test for the difference in means over more than two groups.

the four groups (dark green leafy vegetables, other vitamin A-rich fruits and vegetables, other fruits and other vegetables) in the three districts was determined. Figure 18 shows that Koinadugu district had the highest consumption of fruits and vegetables compared to the other two districts.

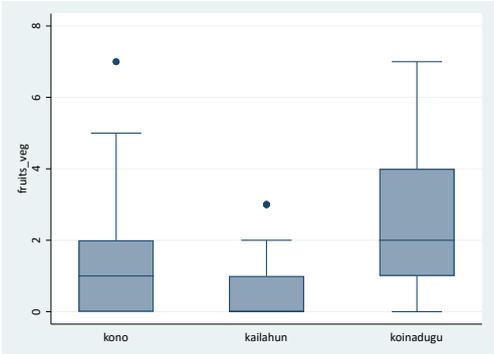


Figure 18: Fruits/ vegetable consumption by region

Source: Author’s own compilation (B-Loop Survey, 2020)

This means that Koinadugu had the highest variety of fruits and vegetables, followed by Kono district. This consumption pattern is contrary to the SLNNS (2017, p.37) which recorded high consumption of fruits and vegetables in Kailahun district, followed by Kono and Koinadugu districts. Among all fruits and vegetables, vegetables such as okra, cabbage were the most consumed compared to dark green leafy vegetables. Vitamin A-rich fruits and vegetables and fruits such as cantaloupe and citrus were consumed with a percentage of 5.2 and 3.7 respectively. Also, animal source foods such as meat, fish and poultry were consumed by 95.5 percent respondents, 30.6 percent consumed dairy products, while only 5.9 percent consumed eggs. Fish was the most consumed animal product compared to meat and poultry, due to the geographical location of Sierra Leone along the Atlantic Ocean. Comparison among the food groups was done between the participation and non-participation as shown in figure 19 below.

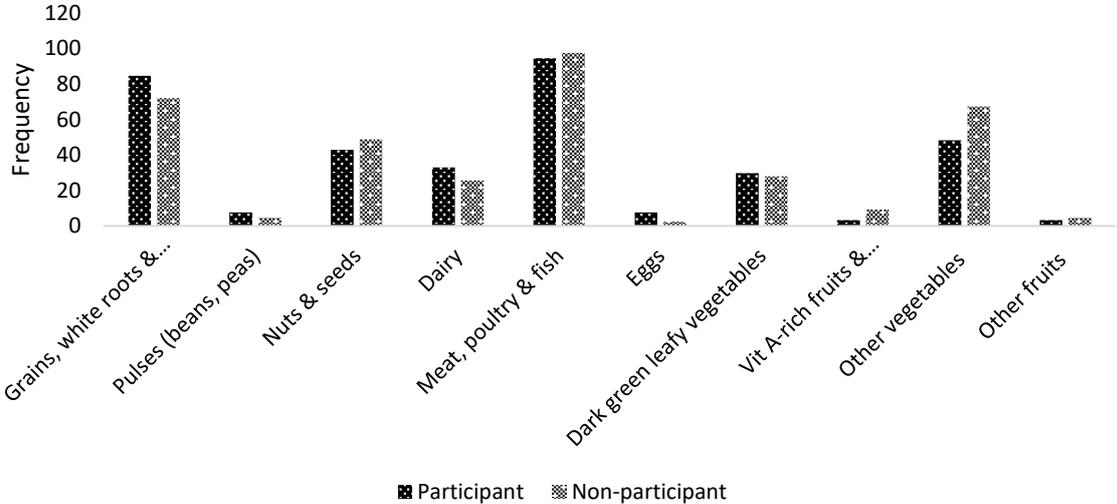


Figure 19: Consumption of food groups among participation groups

Source: Author’s own compilation (B-Loop Survey, 2020)

The participation consumed more grains, white roots, tubers and plantain, pulses, dairy and eggs, while for the non-participation consumed mainly nuts and seeds, dark leafy vegetables, vitamin A-rich fruits and vegetables. Meat, poultry and fish and fruits (avocado, citrus) were equally consumed between both groups as shown in figure 19 above.

Consumption of red palm oil and seasonings were recorded because they are highly consumed in most households in Sierra Leone. Seasonings mainly consumed in Sierra Leone households include Maggi cubes, herbal leaves. The consumption of these low-density foods was almost equal compared to beverages as shown in figure 20. Palm oil was mainly used to cook most foods and was also used to enrich soups (*peppe* soup), dishes made of fish and beans, green leafy vegetable dishes such as *crain crain*, cassava leaves.

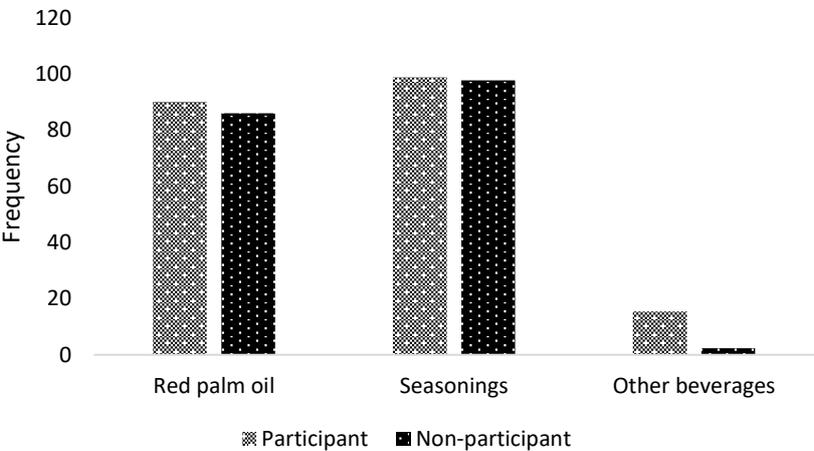


Figure 20: Consumption of low-density foods among participation and control groups

Source: Author’s own compilation (B-Loop Survey, 2020)

Beverages such as soft drinks were consumed in low levels among both groups.

8.2 Factors influencing Minimum Dietary Diversity Score of Study Respondents

Description of variables used in the MDD-S Analysis

MDD-S was hypothesized to be influenced by income, gender of respondent, gender of household head, education and farm production diversity.

Since the individual’s dietary diversity is positively associated with production diversity (Koppmair et al., 2016), the production diversity score which is an indicator for production diversity was determined. During the survey, the respondents were asked whether they consume the foods that they produce in their farms. 92.5 percent reported to consume the foods they produce in their farms, while only 3 percent reported otherwise. About 4.5 percent of the respondents did not grow food crops. Consequently, the respondents were asked to list the food crops that they produce and consume in their household, where 59 percent of the respondents produce rice as a main staple food in Sierra Leone. In addition, many households grow other food crops such as pulses (runner beans, pigeon pea),

nuts and seeds (groundnuts, kolanuts), dark green vegetables (cassava/ potato leaves, *crain crain*), fruits and vegetables (cabbages, eggplant) and vitamin A-rich fruits and vegetables (OSP, carrot).

To construct the production diversity score, the same ten food groups that were used for the MDD-S were considered. Different crop species count similar to those in the MDD-S score were used to construct the production diversity score. If a respondent produced several species that were in the same food groups, the production diversity score would be smaller compared to the simple species count (adopted from Koppmair et al., 2016).

Income is likely to influence dietary diversity either positively or negatively. Respondents with a higher income are more likely to supplement farm production with markets. This means they can access food that they do not produce from the market. Gender of respondent and that of the household head are likely to influence MDD-S positively or negatively. When women make more decisions on income, the share of household food expenditure increases compared to men (Doss, 2005).

Education may be linked to knowledge on dietary diversity. Higher education is correlated to more knowledge on dietary diversity practices (Kennedy & Peters, 1992). Individuals with a higher education may have more knowledge on nutritional value hence more rational in food choices.

Farm production diversity is likely to positively influence an individual’s dietary diversity. More crop diversification on farm provides a household with more food varieties for consumption (Koppmair et al., 2016). Age of respondents is likely to influence dietary diversity either positively or negatively, due to differences in physical activity (Morseth et al., 2017). Table 14 shows descriptive statistics of variables used in the OLS regression.

Table 14: Description of variables used in MDDS regression

Variable	Observations	Mean	Stand. Dev.	Min.	Max.
Participation in program	134	0.679	0.469	0	1
Gender of respondent	134	0.478	0.501	0	1
Gender of household head	134	0.187	0.391	0	1
Age of respondent	134	29.284	6.892	18	47
Household dependants ⁴⁰	134	5.739	3.219	0	20
Production diversity score	133	3.594	1.409	1	8
Land size (acres)	134	4.164	6.084	0	50
Monthly income (log)	128	15.629	2.208	9.341	22.518
Years of schooling	134	10.851	3.377	3	16
Kono district	45	0.667	0.477	0	1
Koinadugu district	46	0.652	0.483	0	1
Kailahun district	43	0.721	0.454	0	1

Source: Author’s own compilation (Business Loop Survey, 2020)

The structural form of the regression is described as follows:

$$\delta_{ij} = \gamma_0 + \gamma_1\text{participation} + \gamma_2\text{gender} + \gamma_3\text{gender of HH head} + \gamma_4\text{age} + \gamma_5\text{HH dependants} + \gamma_6\text{farm_pd} + \gamma_7\text{land size} + \gamma_8\text{log of income} + \gamma_9\text{years of schooling} + \gamma_{10}\text{Location dummies} + \epsilon \dots\dots\dots (6)$$

⁴⁰ Household dependants are the B-Loop respondent’s spouse, children including other relatives

where δ_{ij} is the Minimum Dietary Diversity Score

γ_0 is the intercept

γ_1 γ_n is the dependent variables influencing Minimum Dietary Diversity Score and

ε is the error term

Table 15: Factors that influence Minimum Dietary Diversity Score (dependent variable is MDD-S)

Agricultural entrepreneur characteristics and explanatory variables						
Explanatory variables	Expected sign	Unit	Coeff.	Std. Err.	P-value	Sig.
Participation in B-Loop program	+	Yes=1	-0.23	0.24	0.336	
Gender of respondent	+/-	Female=1	-0.51	0.25	0.042	**
Gender of household head	+/-	Female=1	0.58	0.32	0.072	*
Age of respondent	+/-	Continuous	-0.04	0.02	0.063	*
Household dependants	+/-	Continuous	0.02	0.03	0.653	
Production diversity score (no. of crop species)	+/-	Score	0.23	0.08	0.002	***
Land size	+/-	Acres	0.02	0.02	0.422	
Monthly income of participant	+	Log	0.09	0.05	0.052	*
Years of schooling	+	Continuous	-0.02	0.04	0.627	
Location dummies (omitted=Kono)						
Koinadugu district	+/-	Yes=1	-0.53	0.31	0.089	*
Kailahun district	+/-	Yes=1	-0.72	0.30	0.020	**
Constant			5.35	1.06	0.0001	***
Mean dependent var	5.975	SD dependent variance			1.209	
R-squared	0.211	Number of observations			118	
F-test	2.575	Prob > F			0.006	

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Author's own compilation (Business Loop Survey, 2020)

Dietary diversity was significantly influenced by gender of participant, gender of household head, age of respondent, production diversity score, monthly income of respondent and location. MDD-S increased by 0.052 and 0.063 with a unit increase in monthly income and age respectively. This is consistent with findings by Hoddinott and Haddad (1995). They observed that income influences individual (or household) dietary diversity because the share of household income for food expenditure is higher especially in developing countries among poor households. Koppmair et al. (2016), observed that income from crop sale in markets was used to supplement other diversified food crops that were not grown. Focus Group Discussions revealed that respondents spend between 33 and 50 percent of their household income on food. Some of the participants spend between 20 and 25 percent while very few only spend between 7 and 15 percent of their income on food expenditure. It

is important to note that respondents were also engaged in off-farm activities such as teaching and working in organizations. In low-income countries, people spend a high proportion of their income on food, which means that a slight food price increase can be detrimental to their well-being both of the rural and urban poor (Stringer, 2000). This means that the percentage household income spent on food explains why income is an important factor for the dietary diversity among the population.

From the female focus group discussions, it emerged that increase in income was linked to dietary diversity as noted by one of the female respondents: *“When you have money, you know what to buy for example beans which is a substitute for other proteins. I also buy fish for Le 2000 and prepare some sauce to eat with my children. When you consume nutritious foods, there are certain diseases that are prevented since the food has all the nutrients the body needs”*.

Another FGD participant made the following remark explaining how their diets have changed over the past few years due to income increase: *“Before, when my husband gave me money to buy rice. Rice would be the only food we would consume in the household. Now I can use my money to buy fish and make sauce for the rice that I buy. We can now eat a more balanced diet in the family due to increased food expenditure.”* Further discussion in the male FGDs confirmed that dietary diversity improved with increase in income from the sales in their respective enterprises: *“We have now managed to diversify our food since the project started because we can now purchase some food we never had before for example bananas, maize, more fish, meat, avocado, mangoes. These food commodities tend to be quite expensive compared to the traditional local foods. Some of us used to eat once a day but we can now afford to eat twice or thrice a day,”* said a participant.

The male FGDs further revealed that most of them purchased protein foods (fish, meat from grass cutter) and vegetables (*crain crain*, cassava leaves, sweet potato leaves, okra, etc.) for household consumption from the markets due to income increase. For agricultural entrepreneurs who grew starchy foods such as rice, varieties of cassava and yams, the allocation of household food budget was reduced because they could obtain them from own farms. Although income has had more influence on dietary diversity, MDD-S was tested to determine whether it also influenced income of participation and non-participation groups. MDD-S was found to have no effect on incomes of the participation, while it had significant effect on the income of the non-participation group.

Table 16: Effect of Minimum Dietary Diversity Score on Income of Participation

Log of monthly income				
Explanatory variable	Coefficient	St.Err.	P-value	Sig.
MDD-S	0.153	0.169	0.367	
Constant	15.171	1.016	0.0001	***
Mean dependent var	16.070	SD dependent var		1.949
R-squared	0.011	Number of obs		79
F-test	0.822	Prob > F		0.367

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Author’s own compilation (Business Loop Survey, 2020)

MDD-S may have had no effect on income for the participation group because the MDD-S for the non-participation was slightly higher than that of the participation.

Table 17: Effect of Minimum Dietary Diversity Score on Income of Non-Participation

Log of monthly income				
Explanatory variable	Coefficient	St.Err.	P-value	Sig.
MDD-S	0.706	0.408	0.092	*
Constant	10.47	2.523	0.0001	***
Mean dependent var	14.774	SD dependent var		2.633
R-squared	0.073	Number of observations		40
F-test	2.988	Prob > F		0.092

*** $p < .01$, ** $p < .05$, * $p < .1$

Source: Author’s own compilation (Business Loop Survey, 2020)

Table 17 above shows these results, where an increase in MDD-S by 0.71 led to a unit increase in income of the non-participation group. Also, the study found that the non-participation was engaged more in growing food crops, while the participation was involved in growing cash and food crops, which compromised their own dietary diversity.

MDD-S decreased by 0.04 with a unit increase in age of the respondent. This is because household dependency was positively correlated with age, leading to higher household food demand.

MDD-S increased by 0.23 with unit increase in production diversity score. This means that an increase in production diversity led to an increase in the variety of food consumed by a respondent, consistent with findings by Jones et al. (2014), who observed a strong positive association between farm production diversity and MDD-S. This is further supported by the significant role of women, who are the main producers in decision on growth of food crops. Figure 21 below shows that 41.3 and 37.7 percent of men and women respectively decide on which food crops to grow in their farms. Only 21 percent made joint decision on growth of food crops.

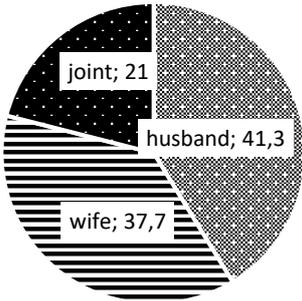


Figure 21: Decision on growth of food crops

Source: Author’ own compilation (B-Loop Survey, 2020)

Further results from Focus Group Discussions revealed that men and women both grew different food crops. This may have further effect of production diversity on MDD-S based on the shared decisions on growth of food crops. for example, in Koinadugu district, crops mainly grown by men included

banana, cassava, runner beans, rice, oranges, white sweet potatoes, mangoes, ginger, cassava yam, oil palm, sweet and green bananas, avocado, pineapple, kola nuts etc. Crops mainly grown by women included bitter ball (*mokabi*), garden egg, green leafy vegetables, pigeon pea, okra, millet, groundnuts, pigeon-pea beans (*konsho beans*), coconut, cocoa yam and maize. Crops grown by both men and women included orange and white fleshed sweet potatoes, rice, pepper, ginger, yams and bananas. Similarly, MDD-S decreased by 0.51 with the probability that the respondent was female. This could be linked to decision making on income based on gender. As earlier mentioned, women FGDs revealed that they contribute to the household share of food when income increases. Women participated less in decision making on income compared to men. The study found out that 39 percent of males compared to 28 percent females made decisions on how to use household income, while 28 percent made joint decisions with their spouses as shown in figure 22.

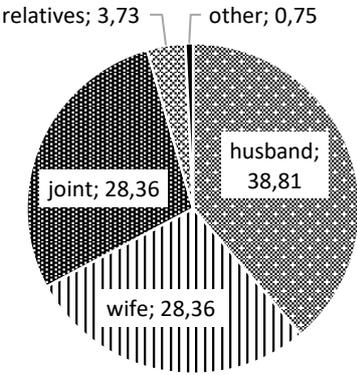


Figure 22: Decision on household income use

Source: Author’s own compilation (B-Loop Survey, 2020)

However, MDD-S increased by 0.58 with the probability that the household head was female. This is consistent with findings by Kennedy and Peters (1992), who observed better school performance among pre-school children from female-headed households compared to male-headed households based on long-term measures of the children’s nutritional status (height-for-age and weight-for-age). Likewise, Ochieng et al. (2017) also observed higher household dietary diversity in households that were headed by women. Hoddinott and Haddad (1995) report that increase in the share of women’s income in Cote D’Ivoire raised the household budget share of food. Doss (2005) writes that the share of women’s assets⁴¹ have an impact on the household budget shares for particular expenditures for example budget share on food.

MDD-S decreased by 0.53 and 0.72 with the probability that the respondent was based in Koinadugu and Kailahun districts respectively. As mentioned earlier, Kailahun district is closer to major towns such as Kenema, Bo and Freetown including countries like Guinea and Liberia. The demand for food from

⁴¹ Assets here are defined as land, savings and business assets (Doss, 2005).

these big towns is served mainly by Kailahun. It is therefore likely that the agricultural entrepreneurs sell their agricultural products in a way that compromises their own household food requirement as also revealed in the male FGDs. Similarly, Koinadugu district supports the food crop demand in Freetown which is the capital city including other big towns like Makeni. This is consistent with findings from Sibhatu et al. (2015) who observed that participation in the market reduces influence of production diversity on dietary diversity of the sellers. They also noted higher dietary diversity among buyers closer to these markets. Other factors such as land size, participation in the program, household dependants and years of schooling had no significant effect on MDD-S.

9. Average Participation Effect on the Treated

The study conducted a difference-in-difference which referred to the difference in the differences between the two intervention groups (Phase I and Phase II). Since there was no baseline data collected for the control group, the differences between mean incomes of the two participation groups was determined. This considered the income at baseline and endline with this time period being the indicator for these differences [adapted from Puhani (2012)].

$$\Delta^{TT} = E(\Delta_i | D_i = 1) = E(\beta_{1i} - \beta_{0i} | D_i = 0),$$

As earlier mentioned, D_i is a dummy variable for the participation, so that $D_i = 1$ for participation in the first intervention (phase I) and $D_i = 0$ for participation in the second intervention (phase II). Letter E denotes the expectations operator, where the expectations are conditional on the right of the vertical bar (“|”) (adapted from Smith, 2004).

The study obtained income of both intervention groups during field study while empirical baseline data of income was taken from the program. For each intervention group, the study determined the difference in their incomes i.e.

$$\bar{Y}_{\text{endline_Phase I}} - \bar{Y}_{\text{baseline_Phase I}}$$

and

$$\bar{Y}_{\text{endline_Phase II}} - \bar{Y}_{\text{baseline_Phase II}}$$

As mentioned before, EPP Phase I group received intervention before the EPP Phase II. It was hypothesized that incomes of Phase I was higher than of Phase II since Phase I had received participation earlier. The study then determined the difference in incomes of these two groups i.e.:

$$\text{Difference-in-difference} = \text{Difference in income}_{\text{Phase I}} - \text{Difference in income}_{\text{Phase II}}$$

Table 18 shows the calculations obtained from the difference in incomes of both intervention groups.

Table 18: Computing Difference-in-difference of income between Intervention Groups

	EPP Phase I	EPP Phase II
Average baseline income (EUR)	1289.42	1195.10
Average endline income (EUR)	1889.66	1683.39
Average income _{endline} - income _{baseline} (EUR)	600.24	488.29
Difference-in-difference (EUR)	111,95	

Source: Author's own compilation (Business Loop Survey, 2020)

The study found that EPP Phase I had obtained a higher monthly income of 111,95€ compared to EPP Phase II. This monthly income difference is equivalent to 1,119,500 Leones⁴² and the null hypothesis was therefore rejected.

⁴² Conversion rates during field study was 1 Euro ≈ 10.000 Leones

10. Conclusion

The Business Loop program as a component of the Employment Promotion Programme III aimed at promoting entrepreneurship and skill development among youths between ages of 18 and 35 years in Sierra Leone. The program targeted entrepreneurs in Kailahun, Koinadugu and Kono districts of Sierra Leone. This study assessed the factors that influenced participation in the program, socio-economic factors that influenced income and determinants of respondent dietary diversity using the Minimum Dietary Diversity Score (MDDS).

The Business Loop program had targeted 30 percent women and aimed at registering 20 percent of the businesses. The study found out that the program had achieved to reach 46.2 percent females, while only 18.7 percent of the enterprises were registered.

The sample size for the study was 134 of which 53.9 percent male and 46.2 percent females from the participation group and 48.8 percent male and 51.2 percent females from the non-participation were interviewed. The mean age of participation was 29.9 years while that of the non-participation was 27.8 years. Overall, the Business Loop program reached mostly respondents with junior and senior secondary education including those with tertiary education. Graduation with tertiary education was highest among the participation group compared to the non-participation group. Most enterprises had been in existence for three to five years with 79 percent sourcing start-up cash from own savings and family members. Only 26.8 and 11.2 percent of participation and non-participation groups respectively accessed loan from formal institutions. Agricultural entrepreneurs were mostly involved in the marketing of raw agricultural produce and crop production and marketing of raw agricultural produce.

Determinants of Participation in the Business Loop Program

A Probit regression was run to determine the factors that influence participation. Results showed that participation was influenced by land size, the number of months of selling products and years of experience in business. Other factors that influenced participation included location, entrepreneur's engagement in business such as marketing of raw agricultural produce, crop production and marketing of raw agricultural produce, annual crops, producing and marketing processed foods and livestock rearing. An entrepreneur based in Kailahun district had a higher probability of participating in the program, while the probability was negative for Kono district. The majority of respondents were mainly engaged in businesses such as marketing of raw agricultural produce, crop production and marketing of raw agricultural produce. Others were involved in businesses e.g. livestock rearing, annual crops, tree crops (cocoa, coffee and oil palm) and marketing of processed agricultural produce.

Factors influencing income

Average Treatment Effect on the Treated approach showed that Phase I intervention group had higher income compared to Phase II.

Ordinary Least Square regression showed that income of entrepreneurs in the youth employment promotion program was influenced by participation in the program, gender, standardized price of agricultural commodities and livestock rearing. The probability that an entrepreneur was likely to participate in the Business Loop program significantly increased income by 91.9 percent. Income increased by 55.6 percent with probability that the respondent was female. This can be explained by women's access to loans through informal institutions. Income increased by 55.5 percent with a unit increase in the standardized price of agricultural commodities. However, the standardized price of agricultural commodities for participation was higher than that of non-participation. This is because they sold their agricultural commodities outside the village markets, therefore more likelihood to get higher prices.

Income increased by 1.74 with per unit increase in livestock. The average income with respect to livestock did not differ with participation and non-participation. However, average income was higher among respondents who owned livestock. This is because the livestock per unit price was higher compared to other agricultural commodities in the markets. Gender effect on income can be explained by the role of women in decision on access to loans. More women than men made more decision on access to loans through informal institutions such as Village Savings Loan Association and *Osusu*. Some of decisions on access to credit were made jointly, while a few decisions were made by other relatives. This means that women could contribute more to income if they access credit.

Socio-economic factors determining food and nutrition security

Socio-economic factors that were hypothesized to influence dietary diversity of agricultural entrepreneurs was determined using OLS regression. The research found gender, age of respondent, gender of household head, farm production diversity and monthly income to influence Minimum Dietary Diversity Score. Location in Koinadugu and Kailahun districts had a positive effect on MDD-S. Koinadugu district had the higher consumption of fruits/ vegetables than Kailahun, hence higher MDD-S. The research also found no statistical difference between the Minimum Dietary Diversity Score between the males and females. Age was negatively correlated with Minimum Dietary Diversity Score. This is because a lower MDD-S may reflect poorer appetite among older respondents due to decreased appetite linked to lack of physical activity as also observed by Morseth et al. (2017).

Income was also found to positively influence MDD-S. Income is important determinant of individual dietary diversity because the share of household income for food expenditure is higher especially in developing countries among poor households.

Zusammenfassung

Als Bestandteil des Beschäftigungsförderungsprogramms III zielte das Business-Loop-Programm darauf ab, das Unternehmertum und die Entwicklung von Fähigkeiten unter Jugendlichen im Alter von 18 bis 35 Jahren in Sierra Leone zu fördern. Das Programm richtete sich an Unternehmer*innen in den Bezirken Kailahun, Koinadugu und Kono in Sierra Leone. Diese Studie untersuchte einerseits die Faktoren, die die Teilnahme am Programm beeinflussten, andererseits die sozioökonomischen Faktoren, die das Einkommen beeinflussten und weiterhin den Einfluss der Ernährungsvielfalt der Befragten unter Verwendung des „Minimum Dietary Diversity Score“ (MDDS).

Das Business-Loop-Programm hatte einen Frauenanteil von 30 Prozent angestrebt und zielte auf die Registrierung von 20 Prozent der Unternehmen ab. Die Studie fand heraus, dass das Programm 46,2 Prozent Frauen erreicht hatte, während nur 18,7 Prozent der Unternehmen registriert wurden.

Die Stichprobengröße für die Studie betrug 134, von denen 53,9 Prozent Männer und 46,2 Prozent Frauen aus der Teilnehmergruppe und 48,8 Prozent Männer und 51,2 Prozent Frauen aus der Kontrollgruppe befragt wurden. Das Durchschnittsalter der Teilnehmenden lag bei 29,9 Jahren, das der Kontrollgruppe bei 27,8 Jahren. Insgesamt erreichte das Business-Loop-Programm vor allem Befragte mit mittlerer und höherer Schulbildung, darunter auch solche mit Hochschulabschluss. Der Anteil der Absolventen mit tertiärem Bildungsabschluss war in der Teilnehmergruppe im Vergleich zur Gruppe der Kontrollgruppe am höchsten.

Die meisten Unternehmen bestanden seit drei bis fünf Jahren, wobei 79 Prozent das Startkapital aus eigenen Ersparnissen und von Familienmitgliedern bezogen. Nur 26,8 bzw. 11,2 Prozent der Teilnehmenden- und Nichtteilnehmergruppen nahmen Kredite von formellen Institutionen in Anspruch. Die landwirtschaftlichen Unternehmer*innen waren hauptsächlich in der Vermarktung von landwirtschaftlichen Rohstoffen und in der Ernteproduktion und Vermarktung von landwirtschaftlichen Rohstoffen tätig.

Einflussfaktoren der Teilnahme am Business Loop Programm

Eine Probit-Regression wurde durchgeführt, um die Faktoren zu bestimmen, die die Teilnahme beeinflussten. Die Ergebnisse zeigten, dass die Teilnahme durch die Landgröße, die Anzahl der Monate, in denen Produkte verkauft wurden, und die Jahre der Erfahrung im Geschäft beeinflusst wurde. Andere Faktoren, die die Teilnahme beeinflussten, waren der Standort, das Engagement des Unternehmers im Geschäft, wie z.B. die Vermarktung von landwirtschaftlichen Rohstoffen, die Produktion und Vermarktung von landwirtschaftlichen Rohstoffen, einjährigen Kulturen, die Produktion und Vermarktung von verarbeiteten Lebensmitteln und die Viehzucht. Ein(e) Unternehmer*in mit Sitz im Distrikt Kailahun hatte eine höhere Wahrscheinlichkeit am Programm teilzunehmen, während die Wahrscheinlichkeit im Distrikt Kono negativ war. Die Mehrheit der Befragten war hauptsächlich in Geschäften wie der Vermarktung von landwirtschaftlichen Rohstoffen,

der Pflanzenproduktion und der Vermarktung von landwirtschaftlichen Rohstoffen tätig. Andere waren in Unternehmen wie der Viehzucht, einjährigen Kulturen, Baumkulturen (Kakao, Kaffee und Ölpalme) und der Vermarktung von verarbeiteten landwirtschaftlichen Produkten involviert.

Faktoren, die das Einkommen beeinflussen

Der durchschnittliche Behandlungseffekt auf den behandelten Ansatz zeigte, dass die Interventionsgruppe der Phase I im Vergleich zur Phase II über ein höheres Einkommen verfügte.

Die Ordinary Least Square Regression zeigte, dass das Einkommen der Unternehmer*innen im Jugendbeschäftigungsförderungsprogramm durch die Teilnahme am Programm, das Geschlecht, den standardisierten Preis für landwirtschaftliche Güter und die Viehzucht beeinflusst wurde. Die Wahrscheinlichkeit, dass ein(e) Unternehmer*in am Business-Loop-Programm teilnahm, erhöhte das Einkommen signifikant um 91,9 Prozent. Das Einkommen stieg um 55,6 Prozent mit der Wahrscheinlichkeit, dass der Befragte weiblich war. Dies kann durch den Zugang von Frauen zu Krediten durch informelle Institutionen erklärt werden. Das Einkommen stieg um 55,5 Prozent pro Einheit Anstieg des standardisierten Preises für landwirtschaftliche Güter. Allerdings war der standardisierte Preis für landwirtschaftliche Güter bei der Teilnahme höher als bei der Kontrollgruppe. Dies ist darauf zurückzuführen, dass sie ihre landwirtschaftlichen Produkte außerhalb der Dorfmärkte verkauften und daher eine höhere Wahrscheinlichkeit hatten, höhere Preise zu erzielen.

Das Einkommen stieg um 1,74 Prozent mit der Zunahme des Viehbestands pro Einheit. Das durchschnittliche Einkommen in Bezug auf den Viehbestand unterschied sich nicht zwischen den Teilnehmern und der Kontrollgruppe. Allerdings war das durchschnittliche Einkommen bei den Befragten, die Vieh besaßen, höher. Dies ist darauf zurückzuführen, dass der Viehpreis pro Einheit im Vergleich zu anderen landwirtschaftlichen Gütern auf den Märkten höher war. Der geschlechtsspezifische Effekt auf das Einkommen kann durch die Rolle der Frauen bei der Entscheidung über den Zugang zu Krediten erklärt werden. Mehr Frauen als Männer trafen Entscheidungen über den Zugang zu Krediten durch informelle Institutionen wie „Village Savings Loan Association“ und *Osusu*. Einige der Entscheidungen über den Zugang zu Krediten wurden gemeinsam getroffen, während einige wenige Entscheidungen von anderen Verwandten getroffen wurden. Das bedeutet, dass Frauen mehr zum Einkommen beitragen könnten, wenn sie Zugang zu Krediten hätten.

Sozioökonomische Faktoren, die die Ernährungssicherheit beeinflussen

Die sozioökonomischen Faktoren, von denen angenommen wurde, dass sie die Ernährungsvielfalt von landwirtschaftlichen Unternehmer*innen beeinflussen, wurden mit Hilfe einer OLS-Regression ermittelt. Die Untersuchung ergab, dass das Geschlecht, das Alter des Befragten, das Geschlecht des Haushaltsvorstands, die landwirtschaftliche Produktionsvielfalt und das monatliche Einkommen den Mindestwert für die Ernährungsvielfalt beeinflussen. Der Standort in den Bezirken Koinadugu und Kailahun hatte einen positiven Effekt auf den MDD-S. Der Koinadugu-Distrikt hatte einen höheren

Obst-/ Gemüsekonsum als der Kailahun-Distrikt und damit einen höheren MDD-S. Die Untersuchung ergab keinen statistischen Unterschied zwischen dem Minimum Dietary Diversity Score von Männern und Frauen. Das Alter war negativ mit dem „Minimum Dietary Diversity Score“ korreliert. Dies ist darauf zurückzuführen, dass ein niedrigerer MDD-S einen geringeren Appetit bei älteren Befragten widerspiegeln kann, der auf einen verminderten Appetit in Verbindung mit mangelnder körperlicher Aktivität zurückzuführen ist, wie auch von Morseth et al. (2017) beobachtet.

Es wurde auch festgestellt, dass das Einkommen einen positiven Einfluss auf MDD-S hat. Das Einkommen ist ein wichtiger Einflussfaktor für die individuelle Ernährungsvielfalt, da der Anteil des Haushaltseinkommens für Lebensmittelausgaben insbesondere in Entwicklungsländern bei armen Haushalten höher ist.

11. Recommendations for the Business Loop of Employment Promotion

Programme IV

The standardized price of commodities among the participation influenced income more than non-participation. However, most of the entrepreneurs sold their agricultural commodities within the villages. They therefore lose the opportunity to capture high value markets. The Business Loop program should therefore focus on expansion of market areas to enable its target group to access high value markets.

Livestock enterprises fetched the highest price per unit indicating a huge market potential. However, only a few Business Loop program respondents kept livestock. I therefore recommend the program to focus on integrating livestock in the supported enterprises.

Since program participants were observed to sell own produce in a way that compromises their consumption, I recommend introduction of a food and nutrition security module in training programs for agricultural entrepreneurs. This is would be more important to women since they are the primary caregivers and their active role in in agricultural activities.

Enterprise characteristics differed by location and gender. For example, in Koinadugu district, food crops were mainly grown and sold compared to the other two districts. Gender differences within the enterprises was also observed. I therefore recommend that the future program is tailored to suit these specific characteristics.

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13. Appendix

Appendix 1

Name of Enumerator: _____

Participant Name: _____

Participant No. _____

I would like to ask you what you ate in the last 24 Hr from the moment you woke up until the time you went to bed yesterday. (HINT: Include all the foods eaten while at home and outside the household)

What was the first thing you ate after you woke up?

Can you recall the ingredients of the dish you ate?

Name of the dish	Ingredients

What did you eat after that? Can you recall the ingredients of the dish?

Did you eat anything else? (HINT: Please probe for any snacks/fruits eaten during the day)

Name of the dish	Ingredients

What did you eat after that? Can you recall the ingredients of the dish?

Did you eat anything else?

Name of the dish	Ingredients

Did you go outside yesterday?

1= Yes 2 = No

If yes, what did you eat there?

Name of the dish	Ingredients

Was yesterday a normal day or did you attend an occasion (or were you sick)?

(HINT: Occasion here could be a school function, funeral, wedding, community event, or other function or celebration. Also ask if the interviewee was sick the previous day!)

1 = Yes, it was a normal day

0 = No, there was a celebration/occasion OR I was sick

Required		
Food group	Description/examples to be adapted	Consumed Yes = 1 No = 0
1. Foods made from grains	Any food such as, porridge, pap, bread, rice, boiled whole maize grain (<i>agidi</i>), cake, doughnuts, maize, banana (green/unripe), plantain, <i>garri</i> , pan cake, or any food made from finger millet, sorghum, bulrush millet, millet (<i>puteai</i>), macaroni, biscuits and wheat	Yes = 1; No = 0
2. White tubers and roots	Irish potatoes, <i>chinese yam</i> , special bush yam (<i>fooli</i>), white sweet potatoes, white yams, coco yams, bush yams, cassava (manioc), or any white roots and tubers or foods made from these	Yes = 1; No = 0
3. Pulses (Beans, Peas and Lentils)	Beans (black, kidney, pinto), lentils, cow peas (black-eyed pea), pigeon peas, peas, ground beans, soya beans, chick peas	Yes = 1; No = 0
4. Nuts and Seeds	ground nuts, melon seeds (<i>egusi</i>), <i>benni</i> (sesame), pounded groundnut/peanut butter, cashew nut	Yes = 1; No = 0
5. Milk and milk commodities (Dairy)	milk, cheese or other milk commodities	Yes = 1; No = 0
6. Organ meat	liver, kidney, gizzard, heart or other organ meats or blood- based foods including from wild game	Yes = 1; No = 0
7. Meat and poultry	bush meat, beef, pork, lamb, mutton, goat, rabbit; chicken (<i>tey</i>), duck, guinea fowl, goose, or other birds; insects larvae, lake fly, ants, termites, grasshopper. Squirrel (<i>Kaikue</i>), monkey (<i>kawah</i>), ground pig (<i>kewei</i>), grass cutter (<i>sewei</i>), snail (<i>kulie</i>), frog (<i>Jibel</i>), porcupine (<i>seijay</i>)	Yes = 1; No = 0
8. Fish and seafood	Fresh or dried fish, shellfish, shrimps etc.	Yes = 1; No = 0
9. Eggs	Eggs from chicken, ducks, guinea fowl or any other eggs	Yes = 1; No = 0
10. Dark green leafy vegetables	relish of dark green leafy vegetables as well as the indigenous vegetables including, Amaranthus leaves, Cassava leaves, sweet potato leaves, Crain crain, mustard, rape, local rape, pumpkin leaves, cow peas leaves, bean leaves, bitter leaves, Gogodi, Kalami, Farn (<i>Gbohein</i>)	Yes = 1; No = 0
11. Vitamin A rich vegetables	Pumpkin, carrots, deep yellow- or orange-fleshed squash, orange-fleshed sweet potatoes + <i>other locally available vitamin-A rich vegetables (e.g. sweet pepper)</i> Red palm fruit/pulp or palm nut pulp sauce	Yes = 1; No = 0
12. Vitamin A rich fruits	Ripe pawpaw, ripe mangoes, melon (cantaloupe), plum (<i>Gbogie</i>), Apricot, passion fruit + <i>other locally available vitamin A-rich fruits</i>	Yes = 1; No = 0
13. Other vegetables	Other vegetables (e.g. tomato, onion, garden egg (eggplant), any kind of relish from leafy vegetables e.g. Chinese cabbage, okra, cabbage, green pepper and green beans including wild vegetables, mushroom, Borboy, Tolaa	Yes = 1; No = 0
14. Other fruits	Other fruits, including wild fruits, e.g. oranges, lemons, tamarind, <i>tombe</i> (local tamarind), elephant fruits, avocado (pears), sweet white bananas, <i>bunie, pui, fofoie</i> , bread-fruit, and baobab fruits, jackfruit	Yes = 1; No = 0
Optional		
15. Red palm oil	Red palm oil	Yes = 1; No = 0
Required		
16. Condiments and Seasonings	Ingredients used in small quantities for flavour such as Maggi cubes (flavour cubes), dried chilli pepper (peppe), red fresh pepper, green fresh pepper, ginger, canned tomato paste, garlic, yeast, herbal leaves (.....)	Yes = 1; No = 0
17. Other beverages and foods	Tea or coffee if not sweetened, alcohol (<i>rum</i>)	Yes = 1; No = 0

Signature of B-Loop interviewee: _____

Signature of Enumerator (interviewer): _____

Appendix 2: Business entrepreneurship Questionnaire

A. GENERAL INFORMATION		
A1. Name of entrepreneur/owner:	A2. Sex: M <input type="checkbox"/> F <input type="checkbox"/>	A3. Year of birth:
A4. Number of household dependents:		
A5. Telephone number(s):		
A6. What level of education did you attain? None <input type="checkbox"/> Finished primary <input type="checkbox"/> Finished junior secondary <input type="checkbox"/> Finished senior secondary <input type="checkbox"/> Tertiary <input type="checkbox"/> Other		
A7. What is your level of reading? (two sentences to be read by interviewed person, only if finished primary) English: None <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/> Krio: None <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>	A8. What is your level of writing? (two sentences to be written by interviewed person, only if finished primary) English: None <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/> Krio: None <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>	
A9. What is your level of basic numeracy (simple test, only if finished primary school)? None <input type="checkbox"/> Poor <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>		
A10. Profession -----		
A11: Do you have a private business? Yes <input type="checkbox"/> No <input type="checkbox"/>		
B. SPECIFIC INFORMATION		
B1. Name of manager :	B2. Sex: M <input type="checkbox"/> F <input type="checkbox"/>	B3. Year of birth:
B4: Telephone number(s) of manager / operator:		
B5. Name of Enterprise (if any):	B6. Year of Establishment:	
B7. What type of business are you engaged in? Crop production: annuals <input type="checkbox"/> Crop production: tree crop / perennials <input type="checkbox"/> Livestock rearing <input type="checkbox"/> Food processing (gari/fufu) <input type="checkbox"/> Marketing raw agric. produce <input type="checkbox"/> Repairing / manufacturing of agric equipment /farm tools (e.g. black smith) <input type="checkbox"/> Agro input dealer (e.g. seeds and fertilizers) <input type="checkbox"/> Other <input type="checkbox"/>		
B8. How much does your business contribute to your income? Not the primary source of income <input type="checkbox"/> More than half of the source of income <input type="checkbox"/> Main source of income <input type="checkbox"/>		
B9. Nature of business: Sole proprietorship <input type="checkbox"/> Partnership or Joint venture <input type="checkbox"/> Group or Association <input type="checkbox"/> Cooperative <input type="checkbox"/>		
B10. If partnership, association, cooperative, does your business have a board? Yes <input type="checkbox"/> No <input type="checkbox"/>		
B11. If a board exists, is it functioning? Yes <input type="checkbox"/> No <input type="checkbox"/>		
B12. How many people are part of the board? _____		
B13. How often do you meet (please provide records of last meeting)? _____		

B14. How did you start your business? Obtained from other family members <input type="checkbox"/> Established using own savings <input type="checkbox"/> Obtained loan from a financial institution <input type="checkbox"/> Established with another business partner <input type="checkbox"/> Others (specify) -----		
C. FORMAL REGISTRATION		
C1. Is your business registered? Yes <input type="checkbox"/> No <input type="checkbox"/>		
C2. If yes, where? National level (Roxy or Corporate Affairs Commission) <input type="checkbox"/> Ministries <input type="checkbox"/> District Council <input type="checkbox"/>		
C3. If yes, when was your business registered? Year: -----		
D. STAFF ISSUES		
D1. Do you have any paid staff/employees (staff receiving salary, if no skip to question D4)? Yes <input type="checkbox"/> No <input type="checkbox"/>		
D2. If yes, please specify the number of staff / employees and salary:		
Paid Fix-term (permanent)	Men: ---- Women:----	Monthly salary range: Le -----
Paid Temporary labour (seasonal)	Men:----- Women:-----	Wage per day (range): Le -----
D3. Is the turn-over of permanent staff a problem for your business? Yes <input type="checkbox"/> No <input type="checkbox"/>		
D4. Do you lack qualified staff to operate your business? Yes <input type="checkbox"/> No <input type="checkbox"/>		
E. COSTUMERS PROFILE		
E1. Where are the majority of your customers coming from (multiple choice possible)? Same village/town <input type="checkbox"/> Same chiefdom, different village <input type="checkbox"/> Same district, diff. chiefdom <input type="checkbox"/> Different District <input type="checkbox"/> Neighboring Country <input type="checkbox"/>		
E2. Who are your main costumers? Individuals <input type="checkbox"/> Traders <input type="checkbox"/> Small Stores <input type="checkbox"/> City wholesalers <input type="checkbox"/> Others (specify).....		
E3. How is your average weekly flow of costumers (different costumers)? Between 1 and 5 <input type="checkbox"/> Between 6 and 10 <input type="checkbox"/> Between 11 and 50 <input type="checkbox"/> Over 50 <input type="checkbox"/>		
E4. Compared to the past year (3 months in case the business is more recent), what has been the flow of your costumers: Decreased <input type="checkbox"/> Remained the same <input type="checkbox"/> Increased <input type="checkbox"/>		
E5. Do you have same costumers coming back again? Yes <input type="checkbox"/> No <input type="checkbox"/>		
E6. If yes, how many? Few <input type="checkbox"/> Some <input type="checkbox"/> Many <input type="checkbox"/> All of them are new <input type="checkbox"/>		
F. SALES AND PROFITS		
F1. Can you calculate your sales? Yes <input type="checkbox"/> No <input type="checkbox"/>		
F2. If yes, what are your average monthly sales / turnover (range)? Le -----		
F3. Can you calculate your profits? Yes <input type="checkbox"/> No <input type="checkbox"/>		
F4. If yes, how much is your average monthly profit (range)? Le -----		
F5. Please name your top 3 selling products or services including Price per unit and selling volume per week:		
1. Name of product:	2. Price per Unit (unit in brackets)	3. Selling volume per week
1. Name of product:	2. Price per Unit (unit in brackets)	3. Selling volume per week
1. Name of product:	2. Price per Unit (unit in brackets)	3. Selling volume per week
F6. How much did your business grow compared to last year (3 months in case the business is more recent)? Declined (decreased) <input type="checkbox"/> Has remained the same <input type="checkbox"/> Increased <input type="checkbox"/> Don't know <input type="checkbox"/>		
F7. What are the main reasons for the changes in the sales:		

Increase in demand of products Decrease in demand of products More competition Introduction of new products
 Better/more competitive pricing New markets Relationship with clients have improved External Event (e.g. Ebola) Others

F8. Are you able to make savings from the sales? Yes No

F9. Have you ever re-invested the profits for expanding your business? Yes No

F10. If yes, how have you re-invested the profits? (multiple choice possible):
 Buying new equipment Hiring new / more staff Buy more raw materials Others (specify) -----

G. ACCESS TO FINANCE

G1. Do you have a bank account? Yes No

G2. Has the business had access to loans from any financial institution (if no, go to question G5)? Yes No

G3. If yes, please specify (if more than 5 please specify the most recent):
 Amount: Le ----- Year: ----- Institution: ----- Final Payment by:-----
 Amount: Le ----- Year: ----- Institution: ----- Final Payment by:-----
 Amount: Le ----- Year: ----- Institution: ----- Final Payment by:-----
 Amount: Le ----- Year: ----- Institution: ----- Final Payment by:-----
 Amount: Le ----- Year: ----- Institution: ----- Final Payment by:-----

G5. Has the business received financial support or equipment from any agency? Yes No

G6. If yes, which type of support: _____ Which Institution: _____
 Year: _____

G7. What is the main reason why the enterprise would not apply for any line of credit or loan from a formal financial institution (multiple choice possible)?
 Application procedures for loans or lines of credit are complex
 Interest rates are not favorable
 Collateral requirements are too high
 Size of loan is insufficient
 Did not think it would be approved
 Don't know
 Others, specify -----

H. TRAINING

H1. Have you received any training? Yes No

H2. If yes, which type of training (multiple choice possible)?
 Training in management/leadership skills
 Basic accounting
 Marketing
 Business planning
 Sector specific training (any sector)
 Functional adult literacy (FAL) training
 IT/computer training
 Others (specify)

Yes, but does not remember which training I attended <input type="checkbox"/>
I. MARKET ENVIRONMENT
I1. What is the demand of your product/service in the market? Low <input type="checkbox"/> Moderate <input type="checkbox"/> High <input type="checkbox"/>
I2. Do you face strong competition in your sector? Yes <input type="checkbox"/> No <input type="checkbox"/>
I3. How is your supply of raw materials? Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>
I4. How is the physical condition of your store? (through observation by interviewer) Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>
I5. How is the condition of your equipment? (through observation by interviewer) Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>
J. RECORD KEEPING (all records to verified and ranked by interviewer)
J1. Do you keep record of your business (if yes go to J2 to J5, if no proceed to J7)? Yes <input type="checkbox"/> No <input type="checkbox"/>
J2. How is the record of stock/supply? Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>
J3. How is the record of costs of your business? Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>
J4. How is the record of sales? Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>
J5. Do you keep records of credits/debts? Yes <input type="checkbox"/> No <input type="checkbox"/>
J6. How is the record of repayment of loans? Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>
J7. Does the business have a business plan (if no go to section k)? Yes <input type="checkbox"/> No <input type="checkbox"/>
J8. If a business plan is available, what is the quality? Very Poor <input type="checkbox"/> Poor <input type="checkbox"/> Medium <input type="checkbox"/> Good <input type="checkbox"/> Very Good <input type="checkbox"/>
K. BUSINESS ATTITUDES (Assessment given by the interviewer)
M1. How do you see your enterprise in the next 5 years? No idea <input type="checkbox"/> Some idea <input type="checkbox"/> Very clear <input type="checkbox"/>
M2. What are the major changes you observed in your sector in the past 5 years? (e.g. changes in competition, in number of products, introduction of new products etc.) No idea <input type="checkbox"/> Some idea <input type="checkbox"/> Very clear <input type="checkbox"/>
M3. How do you solve problems that can happen in your business? Learnt from past personal experience <input type="checkbox"/> Consult / seek advice from others <input type="checkbox"/> Others <input type="checkbox"/>
M4. What creative ideas do you plan to introduce in your business in the near future? None <input type="checkbox"/> Developed new products <input type="checkbox"/> Increased outreach / new markets <input type="checkbox"/> Introduced new technology <input type="checkbox"/> Others (specify) <input type="checkbox"/>
ANY OTHER REMARKS (what are any other challenges, excluding access to finance, in your sector?):

Appendix 3: Individual respondent interview

About interview location					
TOPIC 1: HOUSEHOLD DEMOGRAPHICS					
1. Category of farmer 1) EPP III phase 1 2) EPP III phase 3 3) Control group 2. Name of the respondent: _____ 3. Age of respondent (years): _____ 4. What is the sex of household head? 1) Male 2) Female 5. What is the education level of the household head? 1) Not gone to school, 2) Primary, 3) Secondary, 4) University 6. What is the primary occupation of the household head? 1) Farmer, 2) Business 3) Civil servants 4) Casual laborers 7. How many people live in this household?					
QUESTION			RESPONSE		
TOPIC 2: PRODUCTION					
8. What is the size of your land? 9. Did the size of your land increase after the Business Loop intervention? 10. If yes, why did you increase the size of your land? 11. What crops do you grow? Cocoa, Coffee, Cabbage, Carrots, Tomato, Pepper, Eggplant, Ground nuts, Runner beans, cassava, White Sweet potato, Rice, Bitter ball, Okra, Orange sweet potato (OSP), Pigeon pea, Cucumber, Maize, Green leaves, Lettuce, Cocoa yam, Coconut, Orange, Pineapple, Onion, Ripe (sweet) banana, Green banana/plantain, Kola nuts, Water melon, avocado, Palm tree (oil palm), Others 12. What kind of other crops did you start growing after the intervention? Cocoa, Coffee, Cabbage, Carrots, Tomato, Pepper, Eggplant, Ground nuts, Runner beans, Cassava, White Sweet potato, Rice, Bitter ball, Okra, Orange sweet potato (OSP), Pigeon pea, Cucumber, Maize (corn), Green leaves, Lettuce, Cocoa yam, Coconut, Orange, Pineapple, Onion, sweet banana, Green banana, Kola nuts, Water melon, Pear (avocado), Palm tree (oil palm), others 13. What kind of crops were you selling before the intervention? Cocoa, Coffee, cabbage, Carrots, Tomato, pepper, Eggplant, Ground nuts, Runner beans, Cassava, Rice, Sweet potato, others 14. What kind of crops do you now sell? Cocoa, Coffee, Cabbage, Carrots, Tomato, Pepper, Eggplant, Ground nuts, Runner beans, Cassava, Rice, Sweet potato, Others			1) Yes 2) No		
15. How much land did you allocate to these crops before the intervention and after?					
No.	Crop	Size of land allocated to crop before intervention	Size of land allocated to crop after intervention		
1	Cocoa				
2	Coffee				
3	Cabbage				
4	Carrots				
5	Tomato				
6	Pepper				
7	Egg plant etc.				
16. Did you ever get training on how to plant the crops? 1) Yes 2) No					
17. If yes, from who? 1) EPP III Programme 2) Government extension agent 3) NGOs 4) Others					
18. Before the B-Loop intervention, how much were you harvesting and how much do you harvest now?					
No.	Crop	Harvest before intervention	Price/kg before intervention	Harvest after intervention	Price/kg after intervention
1	Cocoa				
2	Coffee				
3	Cabbage				
4	Carrots				
5	Tomato				
6	Pepper				
7	Egg plant				

8	Groundnuts				
9	Runner beans				
10	Cassava				
11	Rice				
12	Sweet potato				

*Prices are in Leones (SSL)

19. Do you hire labour to work in your farms?	1) Yes 2) No
20. If yes, for what kind of activities do you hire labour?	
21. Do you have any off-farm income generating activities?	1) Yes 2) No
22. If yes, which ones?	

TOPIC 3: ACCESS TO INFORMATION

23. Who has been attending the agricultural trainings by EPP?	1) Husband 2) Wife 3) Child
24. What kind of trainings did you receive?	1) Business 2) Post-harvest handling 2) Nutrition 4) Savings 5) Others
25. Do you have VSLA groups in this village?	1)Yes 2) No

26. Do you have any income generating activities that you are involved in?

1) Yes 2) No

27. If yes, which income generating activities are you involved in and how much did you earn from them in the **previous year?** (derive activities from the FGD)

No.	Activity	Amount earned (in SSL)
1		
2		
3		

TOPIC 3: FOOD AND NUTRITION SECURITY

28. Have the trainings impacted on your income and food and nutrition security?	1) Yes 2) No
29. If yes, how has it impacted your income, food and nutrition security?	
30. Do you eat the food crops that you plant in your farms?	1) Yes 2) No
31. If yes, what kind of crops do you eat? Cabbage, Tomato, Pepper, Eggplant, Ground nut, Carrots, Runner beans, Cassava, Rice, Sweet potato, Others	
32. If not, where do you get other food crops?	1) Yes 2) No
33. Has your household food consumption increased since the program started? (EXPLAIN)	
34. If yes, which kinds of food crops do you now consume since your income increased?	
35. If no, why do you think your HH food consumption has not increased?	
36. Have you increased your food diversity due to rise in income from the sale of crops? -Let them list the different kinds of food they used to eat and the new kinds of food they have started eating	1) Yes 2) No
37. What kind of foods do you think make us healthy? Dark green leafy vegetables, Meat (cow, pig, goat, chicken), Rice, Cassava, Garri, Tomato, Runner beans, Pepper, Sweet potato, Cabbage, Carrots, Others....	
38. Do you eat such kinds of food?	1) Yes 2) No
39. If no, why don't you eat them? -Let them give reasons why they don't eat such foods	

TOPIC 4: HOUSEHOLD DECISION MAKING

40. Who decides which kind of crops are grown in the farms? Husband, Wife, Relatives (Grandparents, aunt, uncle, sister-in-law, brother-in-law), Farmer group, Others....	
41. a) Who decides which kind of farm crops are sold? b) Who decides how much of the crop produce is sold?	1)Husband, Wife, relatives, Farmer group, Others...
40. Who decides how to use the household resources (e.g. income) in the household?	

Appendix 4: Focus Group Discussion Questionnaire

Name of Moderator: _____

Name of Note taker: _____

Focus group: Male Female

District: _____ Chiefdom: _____

Community: _____ Total participants: _____

Start time of discussion: _____ End time of discussion: _____

TOPIC 1: PRODUCTION, INCOME, LEADERSHIP AND CONTROL OVER RESOURCES

- 1a. Which crops are mainly grown in this village?
- 1b. Which kind of crops are mainly grown by men and which ones by women?
- 1c. Do women and men both have land ownership on the land where the crops you sell are grown?
- 1d. How is the land ownership in this village?

- 2a. What is the time allocation for working in your enterprise?
- 2b. Who has control over the assets of the enterprise?
 PROBE: how about when the owner of the enterprise is a female owner?
- 3a. Have you ever had access to credit? Form where?
- 3b. Who makes decision on access to credit (from bank, VSLA, community banks, MFIs, FSAs)?
- 3b. How much? Who borrows the money?

TOPIC 2: FOOD AND NUTRITION SECURITY

1. How was your food and nutrition security status **before** your started the Business-Loop?
 - **After** the project started?
 - How much of your income do you spend on the purchase of food in the household?
 2. Why do you think your food and nutrition security has increased?

 3. Have you diversified your food due to increase in income from your Business enterprise?
- PROBE: Probe for the types of foods and how increase in PROFIT has affected their consumption

TOPIC 3: PERCEPTION ON THE B-LOOP

4. What is your general perception on the Business-Loop?
 Probe for examples of what they benefitted from.
 - What do you think can be improved about the Business-Loop intervention?

Appendix 5

Tables for determined Variance Inflation Factor

Table A: Variance Inflation Factor for variables used OLS regression for Factors influencing Income

	VIF	1/VIF
Kailahun	1.69	0.593
Kono	1.76	0.569
Livestock rearing	1.24	0.803
Age of participant	1.49	0.671
Years of business	1.49	0.804
Gender of participant	1.24	0.804
Household dependants	1.13	0.883
Participation in B-Loop program	1.09	0.919
Standardized price of commodities (log)	1.09	0.920
Mean VIF	1.35	

Source: Author's calculations based on the Business Loop field Survey (2020)

Table B: Variance Inflation Factor of variables used in MDDS OLS regression

	VIF	1/VIF
Koinadugu	2.059	0.486
Kailahun	1.765	0.567
Gender of household head	1.537	0.651
Age of respondent	1.529	0.654
Gender of respondent	1.456	0.687
Years of schooling	1.389	0.72
Land size (acres)	1.329	0.753
Participation in the B-Loop program	1.204	0.83
Production diversity score	1.142	0.876
Monthly income (log)	1.125	0.889
Household dependants	1.104	0.906
Mean VIF	1.422	

Source: Author's own compilation (Business Loop Survey, 2020)