An MDP- IFAD INTERNSHIP REPORT ON PROJECT RURAL INCOME THROUGH EXPORTS (PRICE)

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INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT (IFAD) PROJECT

EFFECT OF IFAD RURAL INCOME PROJECT ON SILK EXPORTS AND LIVELIHOOD OF SMALLHOLDER PRODUCERS IN RWANDA.

EVIDENCE FROM PRICE BENEFICIARIES IN GATSIBO DISTRICT

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

In 2005, sericulture was introduced in Rwanda to increase raw materials for the textile industry. Therefore, it has provided a new source of income, reduced unemployment and most likely to improve the livelihood status of poor silk smallholder producers by increasing their income earnings. The high yield in silk production has been favourable due to the favourable climatic conditions for mulberry cultivation, sericulture has been seen as a potential tool to reduce poverty and also to generate foreign exchanges from exportation.

This paper focuses on the impact of sericulture on the livelihood status of smallholder sericulture producers in Rwanda using the sustainable livelihoods framework. In particular, human factors, silk production, silk exportation and income. Thus, increasing agricultural productivity is critical in reducing rural poverty. Purposive and simple random sampling techniques were employed in selecting 286 sericulture households, farmers. Data for this study were obtained from a primary source using an interview schedule guided by a structured questionnaire and Key Informant Interviews (KII). Descriptive statistics such as frequencies, percentages, and charts, were used for data analysis.

The results of this study showed clearly a significant improvement in the livelihood of the farmers including physical and financial assets. It was gathered that 77% affirmed an improvement in their income status, while 58% of the farmers with inherited mulberry farmland reported an increase in cocoon production since joining PRICE. Similarly, 90% of the farmers with higher years of experience (11 – 20 years) in cocoon production reported more improvement compared with 69% of the farmers with 1 – 10 years of experience in cocoon production. The Government of Rwanda, IFAD and MINAGRI will do well to continue this program as its effect has a very positive impact on the livelihood status of the beneficiaries. Farmers should be provided with continuous education, training, information, improved extension services, access to credits and loans, agricultural inputs and improved storage facilities; existing policies and the programme framework modules should be enforced, if sustained properly it will resolve future challenges and springs more opportunities for farmers and likewise to the country through exports. All farmers should be mobilized and encouraged to form associations, cooperatives, loans and savings societies that will assist all members to have equal and fair opportunities. A lot can still be done to assist the farmers to overcome their challenges in terms of vulnerability context.

Keywords: Sericulture, livelihood, smallholder producers, silk export

LIST OF ACRONYMS

FAO: Food Agriculture Organization

GDP: Gross Domestic Product

GoR: Government of Rwanda

KSEZ: Kigali Special Economic Zone

MINAGRI: Ministry of Agriculture and Animal resources

NAEB: National Agricultural Export Board

NCS: National Sericulture Centre

NES: Rwanda National Export Strategy

NISR: National Institute of Statistics of Rwanda

NISR: National Institute of Statistics Rwanda

PDCRE: Smallholder Cash and Export Crops Development Project

RAB: Rwanda Agriculture Board

RWF: Rwandan Franc

SSC: Sericulture Support Centre

USAID: US Agency for International Development

WFP: World Food Programme

CHAPTER ONE

1.1 INTRODUCTION

Agriculture is the most important sector of the Rwandan economy; the economy is still largely agrarian contributing 32-34% of the National Gross Domestic Product (GDP) of the country generating about 70% of the total export. It also provides 90% of national food needs (RAB, 2013). More than 80% of the population depend largely on agriculture creating job employment opportunity, the agricultural total land area of 24,700 sq. kilometres with a population density of 416 persons per sq. km. GDP contributions from exports of agricultural commodities in Rwanda increased to 505 RWF Billion in the first quarter of 2019 from 490 RWF Billion in the fourth quarter of 2018 (Trading Economics., 2019). The top exports of Rwanda are Coffee, Tea, Niobium, Tantalum, Vanadium and Zirconium Ore, Tin Ores and Tungsten Ore, leather. Agricultural arable land takes up to 91% of the land – 2,294,390 Ha (Mbonigaba, 2013).

In Rwanda, the government has good governance and political will to develop the agricultural sector as it is being the economic backbone of the country by employing about 80% of the population and generating about 70% of the total export. It also provides 90% of national food needs. Since 2010, the average annual agricultural growth rate sector has been over 5%, fortified by strong growth in the production of staple food crops (RAB, 2013). Therefore, agriculture has been identified to play a major role in tackling rural poverty and also contribute to an improvement in the livelihood of smallholder producers' farmers. Sericulture can be used as a means of generating income for the smallholder farmers and a means of exportation which will contribute to the National GDP. Agriculture is the backbone of the economy in Rwanda, 89% of the rural households are practising small-scale farming (WFP 2019). Nevertheless, poor rainfall, famine, floods and the limited amount of land that is suitable for agriculture, alongside pests and diseases, continue to pose risks to food security.

Agriculture has an important role for sustainable development, poverty reduction, and enhanced food security, and supplies over 90% of the food consumed in the country, while manufacturing accounts for only 13% of GDP (FAO, 2008). Promoting agriculture is very essential in achieving the Millennium Development Goals (World Bank, 2008). Hence, it is paramount to continuously practise sustainable agriculture in attaining the Sustainable Development Goals. Sericulture has been introduced with IFAD support as a way to promote diversification and is still in an infancy stage. Although there are market opportunities, farmers' cooperatives established are yet to make a profitable business out of sericulture, due

to lack of capacity, lack of quality silk eggs, insufficient extension services and poor organisation of the value chain.

These challenges have led to intervention projects from the International Fund for Agricultural Development (IFAD) in partnership with the Government of Rwanda through Ministry of Agriculture and Animal Resources, to see how the smallholder producers' livelihoods can be improved towards achieving the Sustainable Development Goals by 2030. One of the interventions is the Project Rural Income through Exports (***PRICE***), which involves the establishment of pro-poor cash crop value chains involving smallholder production and early transformation in partnership with private operators. It is mainly been based on the proven export crops of coffee and tea, the export of silk, and horticultural crops predominately for local and regional markets. This project will be working with 128,700 farming households, including some 72,400 coffee farmers, 14,300 tea farmers, 1,600 farmers producing raw silk and about 7,200 horticultural producers in 12 districts and the Kigali city in Rwanda. The project is built on the Smallholder Cash and Export Crops Development Project (PDCRE) which ended in September 2011.

During the most recent years, Rwanda has been acclaimed as a good example in terms of developmental growth in Central Africa, having a robust growth rate for many years in a row despite a host of critical conditions which has affected the country. Sericulture has since remained an excellent agro-based cottage industry, the end product being raw silk, the most precious textile fibre produced by the silk gland of the silkworm, a fabric so exquisite that even today; no other fabric can match its lustre, softness and exquisite natural colour. Sericulture is of great importance so far as rural development, socio-economic development, industrial application, silk-export potential, environmental conservation measures, and eco-friendly nature is concerned. Sericulture development in Rwanda has been constrained due to lack of sufficient technological expertise, silk manufacturing factories in the silk production processes and cocoon processing requirements. Sericulture is a forest-based and agro-based cottage industry confined to rural areas whereas marketing of sericulture products largely depends on urban populations (Lalit K. Dash et al., 2008). The high suitability of the Rwandan pedologic and climatic conditions for mulberry cultivation also make sericulture an environmentally friendly method of income generation for Rwandan farmers. Thus, silk production is therefore of utmost importance as farmer's income, livelihoods, and ultimately the survival of entire populations and cultures relying on silk production.

Rural poverty is mostly associated with the smallholder producers which has many forms such as insufficient access to market, education and social services inadequacies, lack of infrastructure and is considered a more complex phenomenon. Poverty alleviation requires

suitable policy interventions and appropriate technological options that can increase agricultural productivity without adversely affecting the productive capacity of natural resources (Dewangan et. al. 2011). Poverty can be reduced because sericulture is capable of generating more income, compared to the other crops like paddy wheat, rice, sorghum etc. because most of these crops mentioned are cultivated once or twice in a year but sericulture can be practised 4-5 times in a year.

1.2 BACKGROUND OF THE STUDY

The *PRICE's* programme aims are to promote sustainable increased returns to farmers from key export-driven agricultural value chains through increased volumes and quality of production, access to market, experience extension agents and effective farmer organizations. Through the progressive set-up of a cost-effective business model for sericulture and basic processing in Rwanda, allowing cooperative members to gain sustainable income, the project will assist farmers in starting household-based production, and set up decentralized support services which will provide inputs and advisory services to farmers and their cooperatives. The services provided by the PRICE intervention include Training, Seedlings, Matching Grants, Loan/Guarantee, Plantation and Maintenance. Furthermore, technical assistance will support the National Sericulture Centre and the Rwanda Silk Farmers Federation (IFAD 2011).

Specifically, the programme focuses on:

(i) Achieving sustainable increased returns to farmers from key export-driven agricultural value chains, through increased volumes and quality of production, improved marketing, and effective farmer organizations.

(ii) Strengthen producer cooperatives as full-fledged economic partners of the private sector.

(iii) To sustainably improve and raise smallholder farmers' income.

(iv) The possibility of intercropping mulberry with food crop, which has the potential for poverty reduction and it is targeted towards the poor smallholder farmers.

(v) Increase production of silk cocoons; and increased income from sericulture

Since 1981, IFAD has supported 16 programmes in Rwanda with a total of US$525.8 million, benefiting 634,300 poor rural households, the poverty rate is highest in rural areas, where 71.2 per cent of the country's population lives (IFAD 2015). The percentage of people living in poverty in rural areas is 49 per cent compared with 22 per cent in urban areas. Rwanda is the most densely populated country in Africa, with 416 inhabitants per square kilometre (NISR, 2012). Further support is provided by IFAD who alluded to the fact that smallholder producers and their institutions can be powerful drivers to scaling up, but they

need to be empowered so that they can take charge and sustain the scaling-up process (IFAD 2015). These are all done to improve cash crop production and livelihood of the beneficiaries. Given that agriculture plays a significant role in the major earnings for Rwanda, it is expected that there will be a significant improvement in the livelihood status of the smallholder producer farmers that are venturing into the agricultural activities through the increase in income generation, however, this is not the case. The major challenges facing the export value chains are primarily related to developing production volume and quality, little or no value addition, low efficiency and profitability of farmers' cooperatives, and low access to the high-target market. Also, it is hindered by various factors like use of outdated manufacturing technology, primitive and unscientific "reeling" and "weaving" techniques, use of poor quality seeds, low production of bivoltine seeds, use of non-graded and diseased seeds, huge unorganized and decentralized sector, high production cost, recurring droughts, price fluctuation, long-distance to market, lack of transport facilities, absence of storage facilities.

Additionally, silk exportation still only represents a very small percentage of Rwanda's exports. Therefore, this does not generate as much revenue as expected. Besides, smallholder producers live in precarious conditions, threatened by lack of income, shelter and food, medical services, education of their children and other basic needs. To overcome poverty and be able to improve their livelihoods, they need to borrow money, making savings to protect their families against risks. ***PRICE*** intervention project, in particular, is targeting the intention in addressing these key constraints in maximum production and to mitigate the huge risks to maximize the benefits for the poor smallholder producer farmers in Rwanda. If the entire sections of the sericulture industry; mulberry cultivation, silkworm seed production, silkworm rearing, reeling and weaving of silk and collection of by-products, processing and silk exportation is properly harnessed this will surely provide large-scale employment, thereby a source of livelihood for the rural smallholder producers will be improved.

The agricultural sector accounts for 33% of the national GDP. In general, Rwanda's GDP has been growing at a rate of 7% since 2014. Tea and coffee are the major exports while plantains, cassava, potatoes, sweet potatoes, maize, and beans are the most productive crops. Rwanda exports dry beans, potatoes, maize, rice, cassava flour, maize flour, poultry and live animals within Eastern Africa. (FAO, 2019).

Rwanda is a low-income country with 4,363 Billion Rwanda franc (RWF) gross domestic product (GDP) and US $644 per capita GDP (NISR 2013). Nevertheless, numerous challenges remain for sustainable and inclusive development of Rwanda's economy. The poverty rate of Rwanda in 2013 was 44.9 per cent and that of extreme poverty was 24.1 per cent. Majority of the households residing in the rural areas are vulnerable in Rwanda,

notwithstanding about 90 per cent of the population is engaged in mainly subsistence agriculture and the proportion of agriculture to national GDP is 33 per cent (NISR, 2013). In Rwanda, the proportion of females is higher than that of males, with a 92.9 gender ratio of population. In particular, the percentage of households headed by a female is high in rural areas than in urban areas (NISR, 2013). Also, females were predominant 54 per cent among the working-age population (NISR, 2014). The number of agricultural cooperatives in the country has expanded very rapidly during the past couple of years, from 645 in 2008 to 2,400 in 2013 (USAID, 2013).

The National Sericulture Centre (NCS), the unit of the Rwandan Ministry of Agriculture in charge of stimulating sericulture adoption, reported to be operating only four provincial centres and to have piloted sericulture activities in 40 cooperatives across the country, with the membership of more than 2,000 farmers (Rwanda Development Board, 2013). Rwandan agricultural policies and strategies focus on intensification and increased market orientation of the smallholder agricultural sector, and cooperatives are seen as an important vehicle to achieve this (GoR, 2011).

With the high value to volume ratio of silk, sericulture adoption would give the land-locked country a handy advantage, enabling it not only to avoid the constraints of high transportation costs that have long hampered Rwanda's exports and made them uncompetitive in world markets but also to diversify export revenue beyond traditional cash crops. Because of its low financial gestation period and high returns, the adoption of sericulture was also identified as an adequate way to more efficiently use scarce land resources and cheap labour to increase household income. Given the high labour intensity of the sericulture industry, its adoption in Rwanda carried high expectations of employment creation, with hopes to reduce youth unemployment and offer rural women a suitable opportunity to improve household incomes.

1.2.1 VISIT TO THE RWANDA SILK FACTORY

I visited The HEworks Rwanda Silk Ltd which is a private limited company located in Kigali Special Economic Zone (KSEZ), Kigali City. The company operates a sericulture business by promoting mulberry plantation, producing silkworm eggs and cocoons, purchasing all the cocoons produced in Rwanda, and processing them into raw silk (yarn) and silk fabrics mainly to export to the international market. Apart from supporting livelihoods and providing employment, sericulture waste (mulberry waste, silkworm excreta, and dried silkworms) are collected by livestock farmers which serves as nutritional value to cattle, also it serves as a means to improves soil health through nutrient recycling and reduces the use of chemical fertilizers. Nutrient recycling along with changes in agronomic practices and water-saving

measures proved to be effective in controlling soil degradation and reducing the use of precious water. Rwanda Silk Processing Factory is a result of a partnership between HEworks Rwanda Silk Ltd which is a subsidiary of Korean firm HEworks, and the National Agriculture Exports Development Board (NAEB).

Presently, the factory major international market targets are Japan and Korea, but still have a potential opportunity to penetrate the European markets, with a country like Italy which is known for the manufacturing of high-quality silk cloths. Thus, this exportation generates income revenue to the government of Rwanda through taxation and directly improves the economic growth and economic development. Thereby, indirectly this improves the livelihood status of the sericulture farmers and generates more income for the ***PRICE*** sericulture beneficiaries.

I also visited the National Sericulture Training Centre to know the capacity training that has been made in place for the sericulture farmers. Also, it was made known to me that the centre also engages in mulberry plantation, silkworm rearing and cocoon harvesting.

The HEworks Silk Company and the National Sericulture Training Centre has positively been of advantage in giving training to the IFAD ***PRICE*** beneficiaries, rearing of silkworms, and cocoon and silk production.

1.3 OBJECTIVES OF THE STUDY

The broad objective of this study is to evaluate the effect of silk exports and livelihood of smallholder producers in Gatsibo which is located in the Eastern province using *PRICE* beneficiaries as evidence.

The specific objectives of the study are as follows:

2. To access the impact of rural income project (*PRICE)* on the level of cocoon production among smallholder sericulture farmers.
3. To determine the impact of rural income project (*PRICE)* on silk exports.
4. To determine the income level of smallholder sericulture farmers in rural income project (*PRICE).*
5. To determine the livelihood status of smallholder sericulture farmers in rural income project (*PRICE)*.

1.4 RESEARCH QUESTIONS

1. What is the impact of rural income project (*PRICE)* on the production of cocoons among smallholder farmers in Rwanda?
2. How has the rural income project (*PRICE)* programme improved silk exportation among smallholder sericulture farmers in Rwanda?
3. What is the income level of smallholder sericulture farmers in rural income project (*PRICE)* in Rwanda?
4. How has the rural income project (*PRICE)* programme improved the livelihood of smallholder sericulture farmers in Rwanda?

1.5 JUSTIFICATION OF THE STUDY

The significance of this study cannot be overemphasized. Goal one of the Sustainable Development Goals is 'NO POVERTY'. Poverty is still a major feature of most developing economies, especially rural poverty, in which Rwanda is no exception. The government of Rwanda is focusing on economic growth, economic development and poverty reduction through the long-term goal 'vision 2020'. Therefore, ensuring that only 30% of the population should still live under the poverty line by the year 2020. Rural economic transformation through modernization of the agricultural sector, agricultural production should have tripled, exports should have multiplied by five and the total population depending solely on agricultural practices should have been reduced to 50%.

These days, spinning and knitting of silk thread are carried out in more than 30 countries, generally by smallholder farmers. Whereby, the main producers are China and India, who possess more than 50% of worldwide production, followed by Japan, Korea, and Thailand. The main producers in Europe are Italy and Spain. Zambia, Kenya, Egypt, and Uganda in Africa, while in Latin America, Brazil is the largest producer, with Bolivia and Colombia as smaller producers (Giselle *et al.,* 2018). The government of Rwanda has over the years made policies to improve the livelihoods of the rural inhabitants with numerous intervention projects such as ***PRICE*** being one of the interventions to increase rural income. It is, therefore, necessary to review the impact of this project intervention over the past few years in evaluating how sericulture development has helped to reduce the incidence of poverty condition through capacity interventions of all level of the beneficiaries.

Furthermore, it appears that there has been no sufficient study on sericulture carried out in Rwanda, to evaluate the effect, the importance of silk rearing, cocoon processing and silk exportation produced by the available *B. Mori* silkworms. Consequently, the purpose of this study is to assess and critically analyse the possibility of increasing the value of sericulture which could be used to improve silkworm rearing, silk production and silk exportation, which

could later be among the top exported agricultural commodities in Rwanda and in other way this study will also see on how to increase the value to national exports.

Hence, this study will assist policymakers and stakeholders in mainstreaming of silk production in Rwanda by understanding the livelihood systems and the significant role that silk production plays among smallholder producers. It is imperative to proffer solutions to these problems to ensure optimal capacity development of smallholders and ensure a long-term solution for silk production development that can be adopted by international organizations and countries in Central/Eastern Africa. There is little silk exportation from Rwanda to neighbouring countries and the international market despite its huge production.

CHAPTER 2

MATERIALS AND METHODS

2.1 INTRODUCTION

This chapter highlights the specific methodologies and procedures that were used in the study. The methodologies include the description of the study area, sampling criteria, data collection methods and study instruments used.

2.2 STUDY AREA

This research was conducted in Gatsibo, this district is located in the North-eastern province of Rwanda, it lies between Kayonza and Nyagatare, on a coordinate: 1°36′S 30°27′E. The population of Gatsibo district according to the 2012 population census is 433,020. The majority are aged 15 years to 64 years with 53%; age 0 to 14 years make up 44%, people aged 65 years and above make up a small part (3%). More than a half (52%) of the population is constituted of female individuals, while the male individuals constitute 48% of the population and the population is predominantly young, with about 80% still under 40 years of age. In terms of urbanization, 94.5% (409,106) of the entire population are rural dwellers while 5.5% (23,914) of the population are urban dwellers (*citypopulation.de*). This district covers a total density of 270/km^2, the total area covered is 1,578 km^2 (609 sq. mi). The capital of this district is called Kabarore. Gatsibo district is known for bumper yield in beans, maize, coffee, rice, and bananas.

This research location was selected because it has the facilities to carry out the necessary experiments efficiently, making this selection the most suitable for this research study. Mulberry is currently grown in about 26 districts of Rwanda, with Gatsibo being the main producer. The German post of Gatsibo was located here, as is the present-day Gabiro military camp. The eastern part of the district is in Akagera National Park, with the Kagera River forming the border with Tanzania. Gatsibo district is divided into 14 sectors (*imirenge*): Gasange, Gatsibo, Gitoki, Kabarore, Kageyo, Kiramuruzi, Kiziguro, Muhura, Murambi, Ngarama, Nyagihanga, Remera, Rugarama, and Rwimbogo.

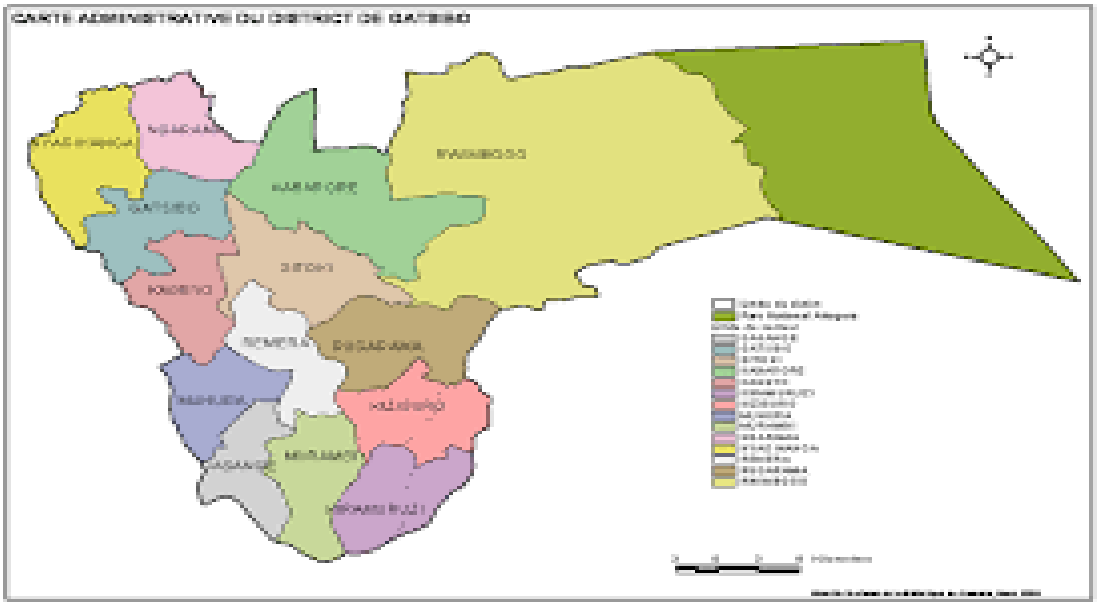

Figure 1: ***Map showing Gatsibo district province (source therwandan.com)***

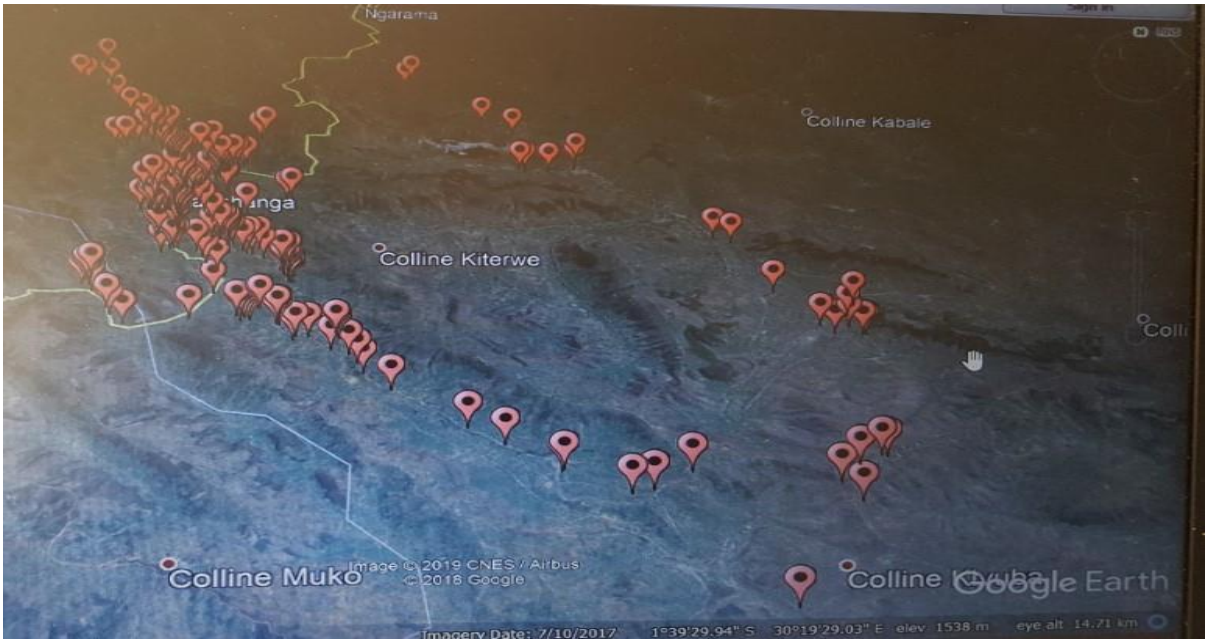

Figure 2*: Map location showing where the questionnaire was administered in Gatsibo District*

2.1 DATA COLLECTION AND SOURCE OF DATA

The Primary form of data collection was done using Key Informant Interviews (KII) with one respondent; Mrs Gakumba Rugwiro Marie Bonne (Ag. National Sericulture Centre Manager) and quantitative survey methods (structured questionnaire administration) were employed for this study. The questionnaire was administered in a survey conducted among the ***PRICE*** beneficiaries in the Gatisbo district. A total of 286 sericulture households' farmers was sampled.

The sericulture farmers were provided with free young silkworm depending on the rearing houses capacity provided by the sericulture farmers. The National Sericulture Centre in

Nyanza is responsible for the production of eggs and hatching of young silkworms that were distributed to the farmers in Rwanda. The farmers ordered for silkworm seeds through cooperative technicians before they were distributed to the farmers.

There is a new intervention plan for the farmers where the number of days for cocoons production is reduced by 10days in the factory before been distributed to the farmers to rear the silkworm for a period of 20 -25 days. This will increase cocoon production and also, reduce farmers' loss. The harvested cocoons are sent to the collection centres, weighed and classified accordingly to the cocoon grades. Payments are made to farmers individual accounts depending on the Kilogram and the grades of the cocoons supplied.

The Cocoon buying stations bought the cocoons to reduce the cost of cocoon transportation and raise farmers' income. Cocoon buying stations were built by interested processing companies at the provincial level. They were established close to SSCs and includes drying and storage facilities. To facilitate companies' investments, ***PRICE*** subsidised the cost of drying chambers installed in the buying stations.

CHAPTER 3

RESULTS AND DISCUSSIONS

3.0 DATA ANALYSIS AND INTERPRETATION

This presents a summary of the analysed data from the study. The results from the administered questionnaires are presented to reflect the socio-demographic characteristics of respondents.

3.1 SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Two hundred and eighty-six participants were enrolled in the study; information on their socio-demographics is presented in Table 1. Averagely, each of the participants was aged 49 years; 33% were below 45 years, 35% were aged 45 – 54 years, approximately one-fourth (24.5%) were aged 55 – 64 years, while not more than 8% are aged 65 years or more. Most of the participants had just the primary school education, 16% had a secondary school education, 12% had no form of education at all, while only one respondent indicated having a higher education. Predominantly, the respondents practised the Christian religion (96%), while the remaining practised the Islam religion. Two-thirds of the respondents were males, while the remaining one-third were females; 66% and 34% respectively.

The study also revealed many of the farmers have male persons as their head of households (88%), with 12% indicating they had a female person heading their households. Averagely, the household size observed from the entire respondents has about six persons per household; also, revealed was that each household had about 3 females and 3 males averagely. A very large proportion of the participants had at least 5 persons in their household (72%), a quarter (24%) had a household size of 3 to 4 persons, 4% had a household size of not more than 2 persons.

3.2 SILK PRODUCTIVITY

From this study two-third of the farmers reported that mulberry leaves were sparsely available, while the remaining one-third reported they had their mulberry leaves readily available. 79% of the farmers indicated they practised sericulture on a small scale while 21% practised a large scale. 5% of the farmers stored part of their produce at home. 92% of the respondents cultivated other agricultural commodities apart from sericulture. As shown in Figure 3, other forms of occupation included beans cultivation (41%), maize cultivation (41%), banana cultivation (22%), livestock (12%), sorghum cultivation (10%), potatoes

cultivation (6%), vegetable farming (5%), other farming activities (10%) and non-farming activities such as businesses, consultation and teaching (2%).

Table 1: Socio-demographic information

	Frequency (n = 286)	Percentage
Age [49.0 ± 10.9]		
Below 45 years	94	32.9
45 – 54 years	99	34.6
55 – 64 years	70	24.5
65 years & above	23	8.0
Level of Education		
Non-formal	35	12.2
Primary school	203	71.0
Secondary school	47	16.4
HND/University degree	1	0.4
Religious Affiliation		
Christianity	274	95.8
Islam	12	4.2
Gender		
Male	189	66.1
Female	97	33.9
Head of Household		
Male	251	87.8
Female	35	12.2
Female Household Size [3 ± 1.5]		
Zero	1	0.3
1 – 2	116	40.6
3 – 4	122	42.7
5 or more	47	16.4
Male Household Size [2.8 ± 1.3]		
Zero	4	1.3
1 – 2	116	40.6
3 – 4	136	47.6
5 or more	30	10.5
Total Household Size [5.9 ± 2.1]		
1 – 2	11	3.8
3 – 4	69	24.1
5 or more	206	72.0

Eighty-four per cent of the farmers claimed they harvested their cocoons monthly, 13% indicated they had their harvests annually, while 3% reported waiting for over a year to

harvest their cocoon produces. 53% of the respondents had experience of about 1 to 10 years in cocoon production, 47% have had experiences of 11 – 20 years in cocoon production. 67.5% reported they purchased their farmlands, 22% reported having inherited their farmlands while 10.5% made use of leased farmlands.

Before the intervention of PRICE, 70% of the respondents had a self-owned farm, 18% inherited mulberry farmlands and 8% reported having a jointly owned mulberry farmland, 2% indicated they owned a rented mulberry farmland prior joining PRICE; 73% reported self-ownership of mulberry farm during PRICE, 16% still used inherited farmlands, 7% reported jointly owned farmlands, while 2% claimed they still used rented farmlands during PRICE.

This study revealed that 44% of the respondents claimed farm ownership affected their cocoon production before PRICE intervention while 40% indicated their farm ownership currently has an effect on cocoon production during PRICE. Before PRICE intervention program, 49% of the farmers were cooperative members, 75% of them belong to a savings and loan group and 39% had finance assistance from a savings and loan group, while 62% had access to the market. Since their engagement with the PRICE program, 57% belonged to a cooperative group, 83% were members of a savings and loan group, and 41% had access to financial assistance, while 77% reported having access to the market.

On the average, it was evaluated that a farmer-owned a mulberry farmland of 4 plots; the most mulberry farm size cultivated among the farmers was up to 120 plots. Arranging in order, farmers in the 25% positioning owned 2 plots of the mulberry farm, while those in the 75% positioning cultivated 24 plots of the mulberry farm. Averagely, cocoon production before PRICE was about 80kg per farmer, ranging from 25kg to 200kg; during PRICE an average production of 120kg was observed ranging from as low as 30kg to 3600kg. Amount of loan accessed from the savings and loans group before PRICE was about 155,000 RWF for a farmer, during PRICE, an average of 174,000 RWF was obtained as loan for a farmer.

Further enquiry from those who received loans revealed that loan accessed before PRICE were commonly used for solving personal problems (24%), purchase a farm asset (17%), to enhance production generally (11%), to improve other farm activities (8%) and to improve cocoon production (5%). A similar evaluation of the purpose of loan accessed during PRICE revealed that the most of the farmers had accepted loans to improve their cocoon production (36%), to enhance production generally (19%), to purchase a farm asset (3%).

Table 2: Information on cocoon productivity

	Frequency	Percentage
Availability of food (Mulberry Leaves)		
Readily available	96	33.6
Sparsely available	190	66.4
The scale of production of sericulture		
Small scale	227	79.4
Large scale	59	20.6
Keep part of produce at home		
Yes	15	5.2
No	271	94.8
Cultivate other agricultural commodities		
Yes	264	92.3
No	22	7.7
Frequency of harvest		
Monthly	240	83.9
Yearly	37	12.9
More than a year	9	3.1
Years of experience in cocoon production		
1 – 10 years	152	53.1
11 – 20 years	134	46.9
Land acquirement		
Inherited	63	22.0
Purchased	193	67.5
Lease	30	10.5
Farm ownership before PRICE		
Self-owned	199	69.7
Inheritance	51	17.8
Rent	7	2.4
Jointly owned	22	7.7
Other forms	7	2.4
Effect of farm ownership on cocoon production Before PRICE		
Yes	125	43.7
No	161	56.3

Table 3: Information on cocoon productivity

	Frequency (n = 286)	Percentage
Farm ownership during PRICE		
Self-owned	208	72.7
Inheritance	45	15.7
Rent	5	1.7
Jointly owned	20	7.0
Other forms	8	2.8
Effect of farm ownership on cocoon production during PRICE		
Yes	114	39.9
No	172	60.1
Member of Farmer's Cooperative before PRICE		
Yes	139	48.6
No	147	51.4
Member of Farmer's Cooperative during PRICE		
Yes	164	57.3
No	122	42.7
Member of savings and loan group before PRICE		
Yes	215	75.2
No	71	24.8
Member of savings and loan group during PRICE		
Yes	238	83.2
No	48	16.8
Accessing finance assistance from savings and loan group before PRICE		
Yes	112	39.2
No	174	60.8
Accessing finance assistance from savings and loan group during PRICE		
Yes	118	41.3
No	168	58.7
Access to market before PRICE		
Yes	177	61.9
No	109	38.1
Access to market during PRICE		
Yes	221	77.3
No	65	22.7

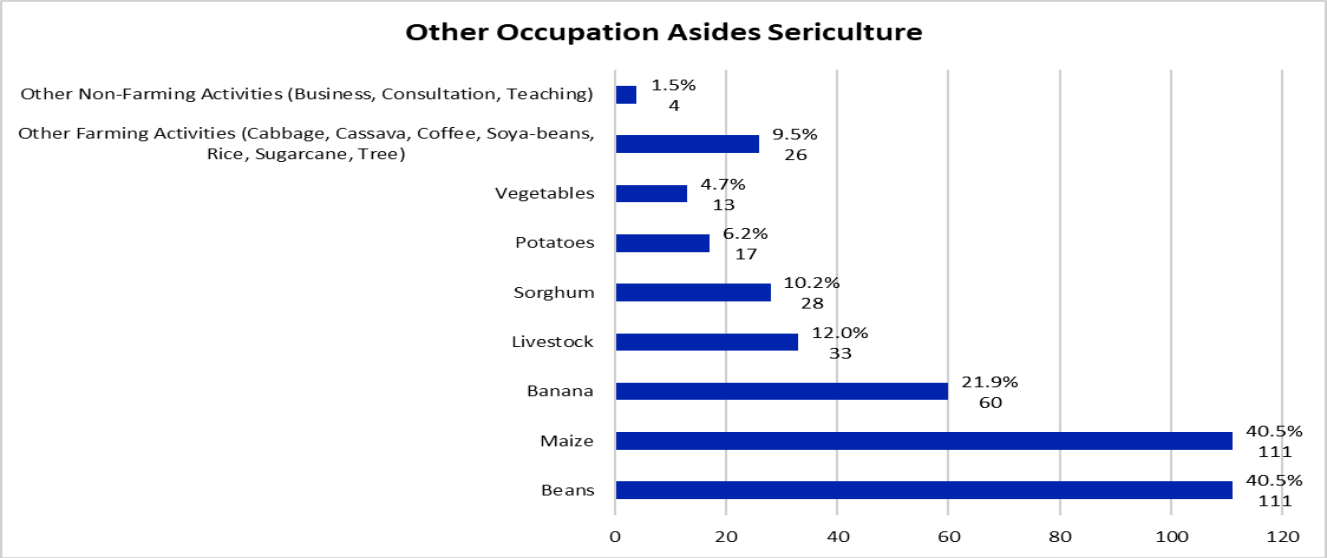

Figure 3: Other occupation among farmers

Table 4: Information on farm size, production and access to finances

	Min.	Max.	Average	25th Percentile	75th Percentile
Current farm size (plots)	1	120	4	2	24
Yearly cocoon production before PRICE (*kg*)	25	200	80	60	80
Yearly cocoon production during PRICE (*kg*)	30	3600	120	108	160
Amount received from savings and loan group before PRICE (*RWF*)	10,000	1,000,000	155,000	60,000	155,000
Amount received from savings and loan group during PRICE (*RWF*)	3,000	1,080,000	174,000	108,000	174,000

The level of production of the farmers during PRICE was distributed by various background characteristics, with a view to understanding if production differs across categories of some variables. Result showed that the cocoon production level of the farmers did not significantly vary across age group ($p = 0.290$), level of education ($p = 0.555$), household size ($p = 0.783$), gender ($p = 0.667$), cultivating other agricultural commodities ($p = 0.701$), years of experience ($p = 0.411$), farm ownership ($p = 0.756$), awareness of an organized market for silk ($p = 0.840$) and access to market ($p = 0.531$). Conversely, production level differed by land acquirement status of the farmers ($p = 0.007$); farmers who produced mulberry on a leased land had the highest production (391kg per year), while those who produced mulberry on purchased land had a production of about 164kg per year, and those with inherited land produced the least (114kg per year).

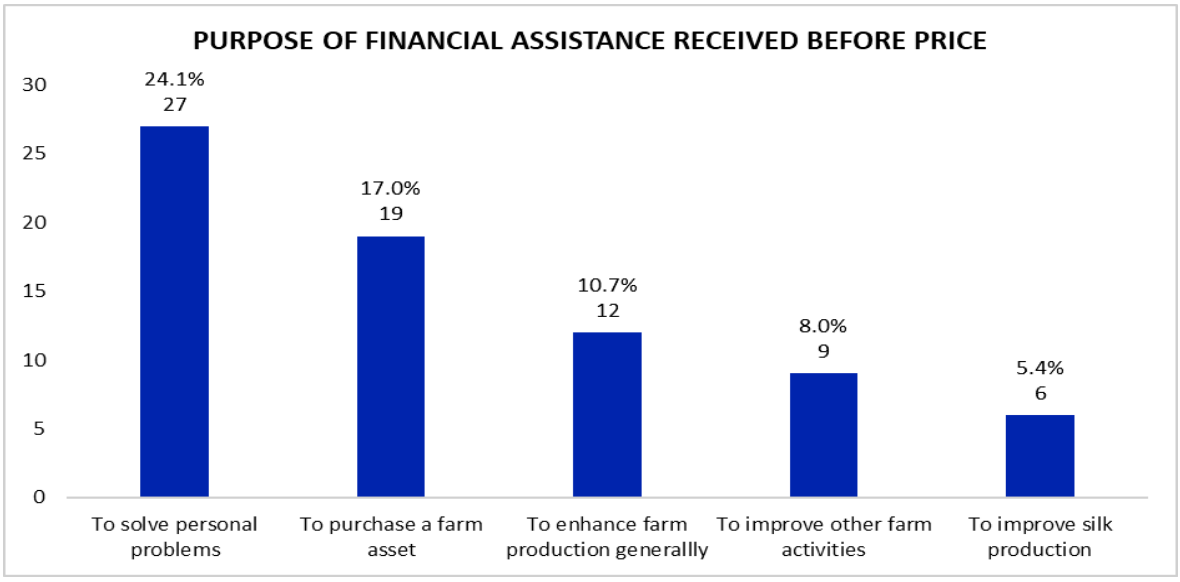

Figure 4: Purpose of finance assistance (before PRICE)

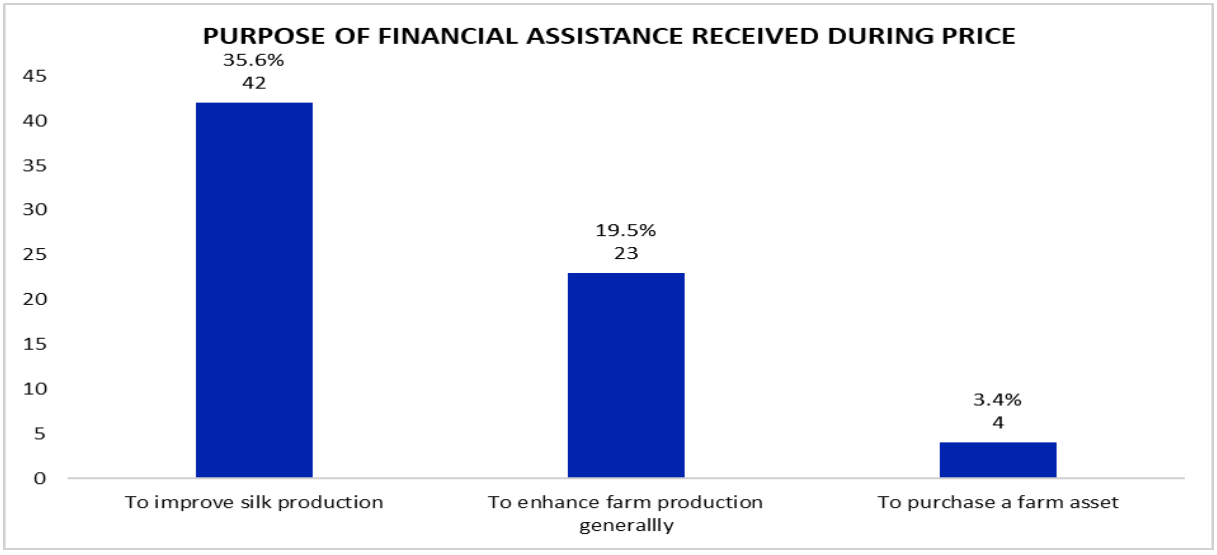

Figure 5: Purpose of finance assistance (during PRICE)

3.3 SILK EXPORTATION

It was also revealed that 95% of the respondents reported price for silk was determined by National Agriculture Exports Development Board (NAEB), while 5% reported price was set by the co-operatives. The preponderance of the respondents stated that 87% lived in a house they owned, 2% lived in a rented apartment, 2% reported living in a mortgaged house, while 9% reported dwelling in a house from other sources. 82% of the respondents affirmed there is organized marketing available for silk exportation.

Table 5: Distribution of production level during PRICE by background information

		Average Quantity Produced (*in kg*)	p-value
Age	Below 45 years	124.4	0.290
	45 – 54 years	195.9	
	55 – 64 years	239.2	
	65 years & above	135.5	
Level of Education	Non-formal	126	0.555
	Primary	180.5	
	Secondary	222.7	
Total Household Size	1 – 2	152.8	0.783
	3 – 4	208.2	
	≥ 5	171.2	
Gender	Male	186.7	0.667
	Female	165.0	
Cultivate other commodities	Yes	177.1	0.701
	No	217.5	
Years of experience	1 – 10 years	156.1	0.411
	11 – 20 years	195.9	
Land acquirement	Inherited	114.1	0.007
	Purchased	163.9	
	Lease	391.0	
Farm ownership	Self-owned	195.6	0.756
	Inheritance	108.4	
	Rent	102.0	
	Jointly owned	121.9	
	Others	130.0	
Aware of an organized market for silk	Yes	179.9	0.840
	No	143.8	
Access to market during PRICE	Yes	182.5	0.531
	No	110.7	

Table 6: Information on silk exportation

	Frequency (n = 286)	Percentage
Who sets the price for produce		
NAEB	272	95.1
Co-operatives	14	4.9
House Dwelling Unit		
Owned	248	86.7
Rented	5	1.7
Mortgaged	6	2.1
Others	27	9.4
Organized marketing available for silk		
Yes	235	82.2
No	51	17.8

3.4 INCOME LEVEL FROM COCOON PRODUCTION

The average level of income per year from cocoon production among the farmers was estimated to be 214,000 *RWF*; while some farmers reported annual income from cocoon production is as low as 1,000 *RWF*, others reported annual income from cocoon production rising to 3,472,000 *RWF*.

Table 7: Annual income from cocoon production

	Min.	Max.	Average	25th Percentile	75th Percentile
Yearly Income (*RWF*)	1000	3,472,000	214,000	47,125	282,500

3.5 DISPARITY IN INCOME LEVEL OF SERICULTURE FARMERS BY BACKGROUND FACTORS

The income level from cocoon production was dispersed across various background factors, to determine if the income level varies by categories of any of the factors. Results from the analysis revealed that income level of the farmers was significantly different by the level of education ($p = 0.01$), cultivation of other agricultural commodities ($p = 0.01$), and years of experience ($p < 0.001$). Notable from the result was that sericulture farmers with no formal education had the highest annual income (338,206 *RWF* per year), farmers with secondary education averaged an annual income level of 307,053 *RWF*, while those with primary education had the least income with 166,093 *RWF* per year; farmers who cultivated the only mulberry had a higher income level than those who cultivated other agricultural commodities with their mulberry, about 384,872 *RWF* per year and approximately 200,000 *RWF* per year

respectively; farmers with years of experience, not more than ten years had a higher annual income level than those who had experience over ten years, about 278,895 *RWF* and 140,250 *RWF* respectively. The annual income level from sericulture was not statistically different by age (p = 0.552), household size (p = 0.849), gender (p = 0.258), land acquirement status (p = 0.207), farm ownership (p = 0.588), awareness on organized market for silk (p = 0.095), and access to market (p = 0.922).

Table 8: Distribution of income during PRICE by background information

		Average Annual Income (*RWF*)	p-value
Age	Below 45 years	199,068	0.552
	45 – 54 years	248,925	
	55 – 64 years	202,461	
	65 years & above	159,013	
Level of Education	Non-formal	338,206	0.001
	Primary	166,093	
	Secondary	307,053	
Total Household Size	1 – 2	234,318	0.849
	3 – 4	195,197	
	≥ 5	219,123	
Gender	Male	229,445	0.258
	Female	183,715	
Cultivate other commodities	Yes	199,690	0.010
	No	384,872	
Years of experience	1 – 10 years	278,895	< 0.001
	11 – 20 years	140,250	
Land acquirement	Inherited	177,214	0.207
	Purchased	236,711	
	Lease	144,527	
Farm ownership	Self-owned	232,287	0.588
	Inheritance	177,280	
	Rent	166,660	
	Jointly owned	127,345	
	Others	189,000	
Aware of an organized market for silk	Yes	199,075	0.095
	No	282,412	
Access to market during PRICE	Yes	212,914	0.922
	No	217,408	

3.6 PARTICIPANT LIVELIHOOD DURING PRICE

The study also revealed that 21% of the sericulture farmers received a loan in the previous year; averagely, each of the loan beneficiaries received about 200,000 *RWF*; while some received not more than 10,000 *RWF*, others received as much as 1,000,000 *RWF*. While 79% indicated they had household savings at the time of the study. Purpose of loan obtained include: buying land (33 farmers), children education (22 farmers), buying agricultural equipment (20 farmers), purchasing a household asset (6 farmers), repayment of old loans (4 farmers), and housing (3 farmers). Most of the recent loan beneficiaries stated they opted-in for monthly repayment (98%), only 1 of the recent loan beneficiaries claimed repayment weekly.

Table 9: Livelihood during PRICE

	Frequency (n = 286)	Percentage
Receipt of the loan in the last year		
Took loan	59	20.6
No loan	227	79.4
Purpose of loan obtained in the last year (n = 59)		
Buying land	33	55.9
Children education	22	37.3
Buying agricultural equipment	20	33.9
Purchasing household asset	6	10.2
Repayment of the old loan	4	6.8
Housing	3	5.1
Mode of repayment (n = 59)		
Weekly	1	1.7
Monthly	58	98.3
Household savings		
Yes	225	78.7
No	61	20.3

It was discovered that several social services were made available to the farmers; this includes; healthcare services (94%), quality education (88%), availability to clean and portable drinking water (72%), information and communication (66%), and electricity (58%).

In Figure 6, most of the farmers confirmed their income level, production level, and quantity of silk exported have been on the improving side since they joined the PRICE program; most of them also indicated improvement in social amenities such as access to drinking water, access to school, access to healthcare services, and access to information and communication system, while only half affirmed improvement in the state of electricity since they joined PRICE.

In figure 8. Generally, it was evaluated that 70% of the farmers have had an improvement in their farming outputs and access to social amenities since they joined PRICE. 28% of the respondents remarked there was generally no change, with 2% who remarked the situation had worsened.

Table 10: Information on loans received

	Min.	Max.	Average	25th Percentile	75th Percentile
Amount of loan taken	10,000	1,000,000	200,000	100,000	200,000

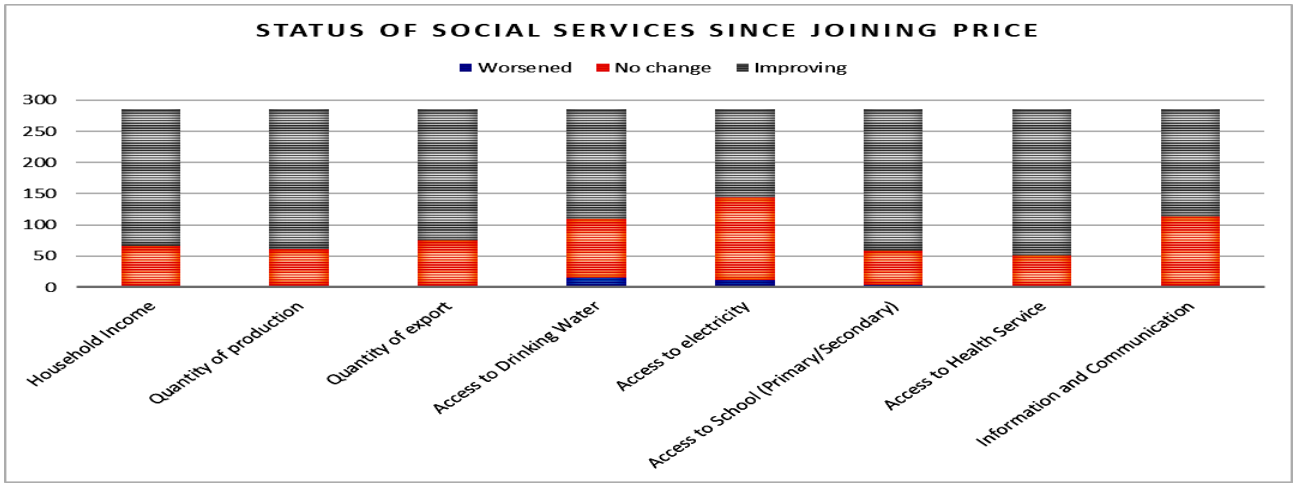

Figure 6: Social services available to farmers

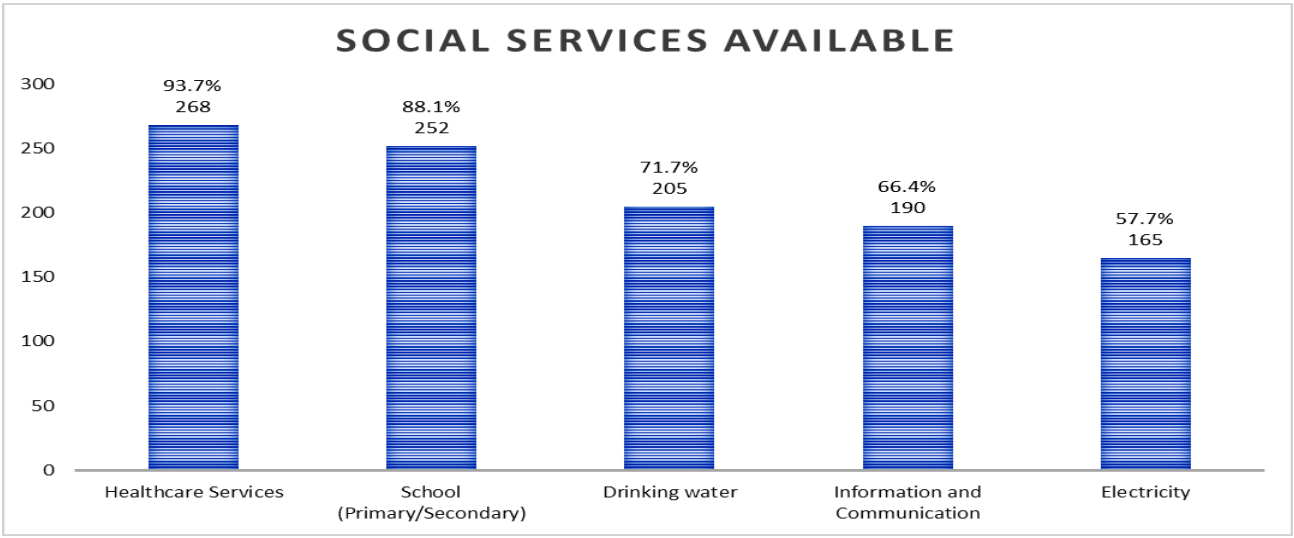

Figure 7: Status of amenities and farm outputs since joining PRICE

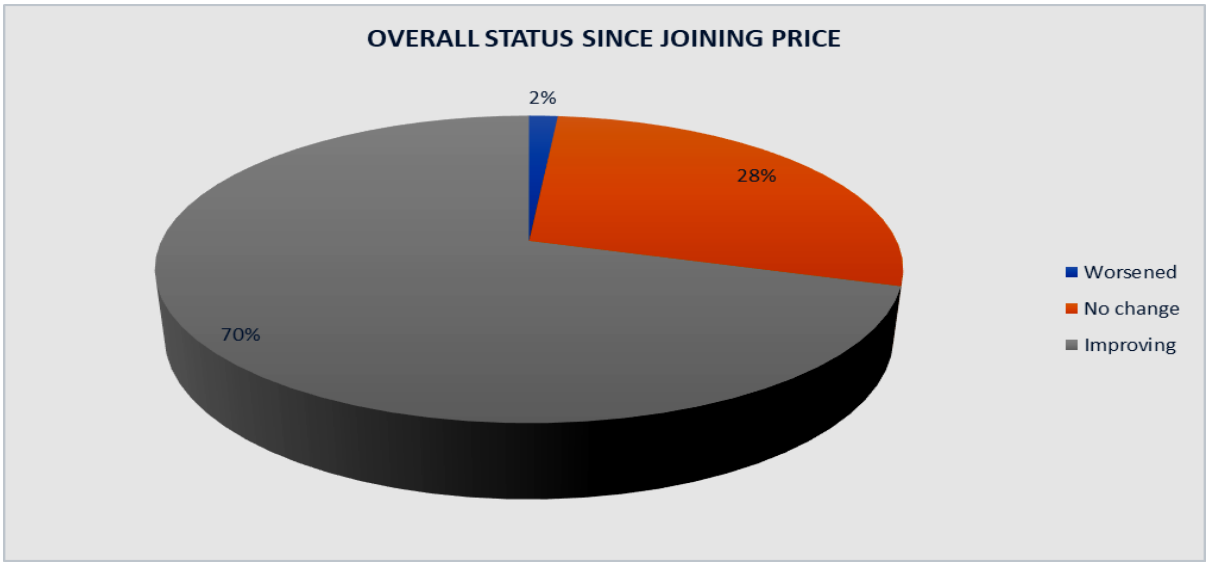

Figure 8: Overall assessment of farm outputs and social services since joining PRICE

3.7 DISPARITY OF INCOME LEVEL DURING PRICE BY BACKGROUND FACTORS

Dispersion in the self-assessed income status during PRICE was carried out, using various background information of the farmers. Improvement in income status, as indicated by the farmers, was found to be associated with years of experience in cocoon production ($p < 0.001$), the form of land acquirement ($p < 0.001$), the form of farm ownership ($p < 0.001$) and awareness of organized market ($p < 0.001$). Notable was that while 88% of those with 11 – 20 years of experience in cocoon production remarked improvement in their income status since joining PRICE, only 67% of those with experience, not more than 10 years indicated an improvement in their income status. 59% of the sericulture farmers with inherited farmlands reported an improvement in their income status, 81% and 87% of those with purchased and leased farmlands respectively reported improvement in their income status. All the farmers with rented farmlands reported improvement in their income status since joining PRICE, 83% and 80% of those with self-owned and jointly owned farmlands respectively stated they have had improvement in their income status, half of those who had their farm through inheritance claimed they had an improvement in their income, while 37% of those who owned their farmlands through other means stated an improvement. 89% of the sericulture farmers hinted they were aware of an organized market for silk claimed they have had an improvement in their income status, while 31% of those who had no awareness of the organized market for silk had an improvement in their income status. Level of education of the farmers ($p = 0.842$), gender ($p = 0.909$), age of the farmers ($p = 0.384$), household size ($p = 0.537$) and growing of other agricultural commodities asides mulberry ($p = 0.124$) were not significantly associated with improvement in their income status.

Table 11: Distribution of income level since joining PRICE by background information

	No change	Improving	P-value
Level of Education			
Non-formal	7 (20%)	28 (80%)	
Primary	47 (23.2%)	156 (76.8%)	0.842
Secondary	12 (25.5%)	35 (74.5%)	
Gender			
Male	44 (23.3%)	145 (76.7%)	0.909
Female	22 (22.7%)	75 (77.3%)	
Age			
Below 45 years	23 (24.5%)	71 (75.5%)	
45 – 54 years	25 (25.3%)	74 (74.7%)	0.384
55 – 64 years	16 (22.9%)	54 (77.1%)	
65 years & above	2 (8.7%)	21 (91.3%)	
Household Size			
1 – 2	4 (36.4%)	7 (63.6%)	
3 – 4	15 (21.7%)	54 (78.3%)	0.557
≥ 5	47 (22.8%)	159 (77.2%)	
Grow other agricultural commodities			
Yes	58 (22%)	206 (78%)	0.124
No	8 (36.4%)	14 (63.6%)	
Years of experience in sericulture			
1 – 10 years	50 (32.9%)	102 (67.1%)	< 0.001
11 – 20 years	16 (11.9%)	118 (88.1%)	
Form of land acquirement			
Inherited	26 (41.3%)	37 (58.7%)	
Purchased	36 (18.7%)	157 (81.3%)	< 0.001
Lease	4 (13.3%)	26 (86.7%)	
Farm ownership			
Self-owned	36 (17.3%)	172 (82.7%)	
Inheritance	23 (51.1%)	22 (48.9%)	
Rent	0	5 (100%)	< 0.001
Jointly owned	2 (10%)	18 (80%)	
Others	5 (62.5%)	3 (37.5%)	
Aware of an organized market			
Yes	31 (13.2%)	204 (88.6%)	< 0.001
No	35 (68.6%)	16 (31.4%)	

3.8 DISPARITY OF PRODUCTION LEVEL DURING PRICE

Distributing self-assessed cocoon production level of the farmers, since their time on the PRICE program, by background factors, it was revealed that improvement in quantity was not significantly associated with level of education (p = 0.204), gender (p = 0.196), age (p = 0.408), and household size (0.694).

Improvement in production level since joining PRICE was significantly associated with cultivation of other agricultural commodities ($p = 0.017$), years of experience in cocoon production ($p < 0.001$), form of land acquirement ($p = 0.002$), farm ownership ($p < 0.001$), and awareness of an organized market ($p < 0.001$). Results from the analysis showed that 81% of those who grew other agricultural commodities reported improvement in their level of production, not more than 59% of those not growing other agricultural commodities stated improvement in the production of the cocoon. Farmers with higher years of experience in cocoon production, 11 – 20 years, reported more improvement in cocoon production than those with 1 – 10 years of experience in cocoon production; 90% and 69% respectively. 83% of the respondents with purchased and leased lands indicated an improvement in their cocoon production, not more than 63% of those with inherited lands reported they had personally improved in their production level. In terms of farmland ownership, all farmers who cultivated their mulberry on rented lands claimed they had improved in their production level since joining PRICE; a majority of those with self-owned mulberry farmlands and jointly owned mulberry farmlands, 83% and 95% respectively, stated an improvement in production has emerged since they joined PRICE; 58% of those with an inherited mulberry farmland reported increase in cocoon production since joining PRICE, while 37% of those who owned their mulberry farmlands through other means reported improvement in production level since joining PRICE. A higher proportion of the farmers who were aware of an organized market for silk remarked improvement in cocoon production level since PRICE emerged than those who were not aware of an organized market, 86% and 47% respectively.

3.9 STATUS OF PHYSICAL AND FINANCIAL ASSETS, AND ACCESS TO MARKET

Concerning the physical and financial assets owned by the sericulture farmers such as lands, means of transportation, electrical appliances, farm types of machinery and savings, many of the farmers indicated an improvement in most assets they owned. Specifically, 86% remarked improvement in household savings; improvement in land under management was also mentioned by 83%; improvement in the number of landed properties owned was indicated by 68%, improvement in electrical appliances such as fridge, television and radio were remarked by 52%.

Table 12: Distribution of production level since joining PRICE by background information

	No change	Improving	P-value
Level of Education			
Non-formal	5 (14.3%)	30 (85.7%)	
Primary	41 (20.3%)	161 (79.7%)	0.204
Secondary	14 (29.8%)	23 (70.2%)	
Gender			
Male	44 (23.3%)	145 (76.7%)	0.196
Female	16 (16.7%)	80 (83.3%)	
Age			
Below 45 years	23 (24.5%)	71 (75.5%)	
45 – 54 years	22 (22.2%)	77 (77.8%)	0.408
55 – 64 years	13 (18.6%)	57 (81.4%)	
65 years & above	2 (9.1%)	20 (90.9%)	
Household Size			
1 – 2	2 (18.2%)	9 (81.8%)	
3 – 4	12 (17.6%)	56 (82.4%)	0.694
≥ 5	46 (22.3%)	160 (77.7%)	
Grow other agricultural commodities			
Yes	51 (19.4%)	212 (80.6%)	0.017
No	9 (40.9%)	13 (59.1%)	
Years of experience in sericulture			
1 – 10 years	47 (30.9%)	105 (69.1%)	< 0.001
11 – 20 years	13 (9.8%)	120 (90.2%)	
Form of land acquirement			
Inherited	23 (37.1%)	39 (62.9%)	
Purchased	32 (16.6%)	161 (83.4%)	0.002
Lease	5 (16.7%)	25 (83.3%)	
Farm ownership			
Self-owned	35 (16.9%)	172 (83.1%)	
Inheritance	19 (42.2%)	26 (57.8%)	
Rent	0	5 (100%)	< 0.001
Jointly owned	1 (5%)	19 (95%)	
Others	5 (62.5%)	3 (37.5%)	
Aware of an organized market			
Yes	33 (14.1%)	201 (85.9%)	< 0.001
No	27 (52.9%)	24 47.1%)	

While majority of the farmers remarked no change in their means of transportation, a few of them still indicated an improvement since joining PRICE, 65% and 34% respectively; up to 89% had not experienced an improvement in their farm machinery owned, but 3% claimed they have owned more farm types of machinery since joining PRICE.

In terms of access to modern storage facilities, 73% of the farmers remarked an improvement, while 71% stated their cost of transportation had improved too, and 85% affirmed access to market information had also improved. The farmers' perception towards fairness of the opportunities made available to any farmer by PRICE, Figure 9, exposed that 90% affirmed they equally had access to mulberry tree seedlings; 68% remarked equal access to matching grants and training on cocoon production; not more than 28% affirmed all the farmers had equal opportunities to loans.

Table 13: Improvement level of physical assets, financial assets and access to market

	Worsened	No Change	Improving	Not Applicable
Number of landed properties owned	1 (0.3%)	91 (31.8%)	194 (67.7%)	-
Means of transport (bicycle, motorcycle, car)	1 (0.3%)	185 (64.7%)	98 (34.3%)	2 (0.7%)
Electrical appliances (fridge, television, radio)	1 (0.3%)	132 (46.2%)	150 (52.4%)	-
Size of land under improved management	-	48 (16.8%)	238 (83.2%)	-
Farm machinery	6 (2.1%)	254 (88.8%)	8 (2.8%)	18 (6.3%)
Household savings	-	40 (14.0%)	245 (85.7%)	1 (0.3%)
Access to modern storage facilities	4 (1.4%)	71 (24.8%)	210 (73.4%)	1 (0.3%)
Cost of transportation	3 (1.0%)	78 (27.3%)	203 (71.0%)	2 (0.7%)
Access to market information	1 (0.3%)	41 (14.3%)	242 (84.6%)	2 (0.7%)

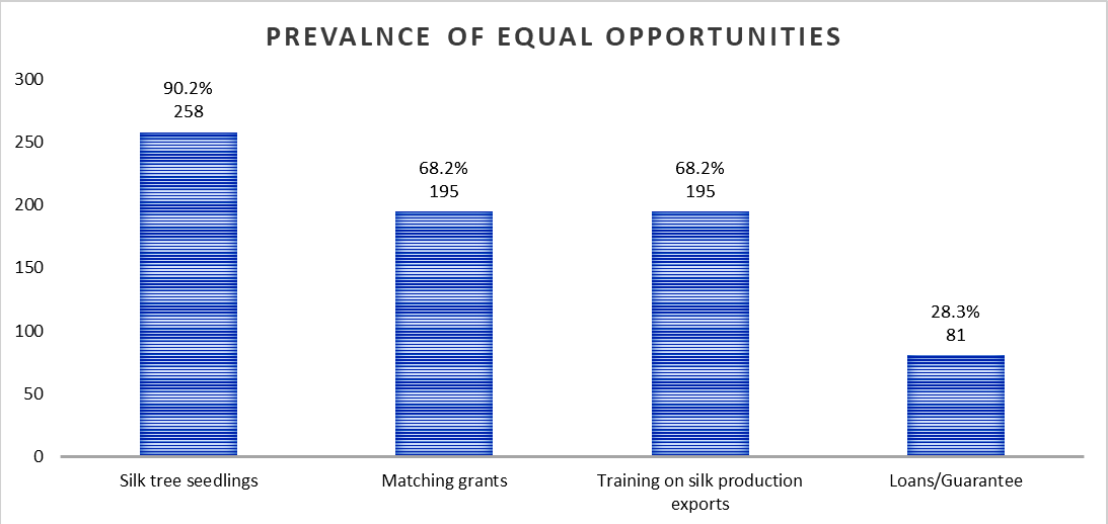

Figure 9: Report on equality in opportunities during PRICE

3.10 VULNERABILITY CONTEXT AND ADAPTABILITY STRATEGIES

Results from the study also revealed that about 70% of the farmers had experienced a loss in their cocoon production, within the past 2 years, although not an often experience. Among the farmers with reported cases of loss in production; about 54% traced their losses to the

inadequacy of storage facilities, 46% traced their losses to poor seedlings, a few traced their losses to transportation problems (14%) while 12% traced their losses to flood happening.

Strategies adopted by the farmers in the period of produce loss were a reduction in farm expenditure (61%), borrowing funds from friends (44%), and taking cooperative loans (14%). Other strategies adopted by the victimized farmers in sustaining livelihoods also encompass borrowing from friends/family (68%), reduction in household expenditures (39%) and selling of assets (13%). Approximately 52% the farmers who participated in the study, PRICE offered livelihood sustenance in periods of shock in production; common interventions by PRICE in periods of shock were provision of seedlings (48%), offering pieces of training (40%), provision of loan facilities (9%), and provision of healthcare (2%).

Table 14: Vulnerability and adaptability of the sericulture farmers

	Frequency (n = 286)	**Percentage**
Produce loss over the past 2 years		
Not often	199	69.6
Never	87	30.4
Causes of loss of production (*MR*: n = 199)		
Storage facilities	107	53.8
Poor seedlings	92	46.2
Transportation	27	13.6
Flood	24	12.1
Strategies adopted during produce loss (*MR*: n = 199)		
Reduction in expenditure	121	60.8
Borrowing of funds from friends	87	43.7
Cooperative loans	27	13.6
Strategies to sustaining livelihoods (*MR*: n = 199)		
Borrowing from friends/family	136	68.3
Reduction of expenditures	77	38.7
Sell assets	26	13.1
Does PRICE sustain livelihoods in the period of shocks		
Yes	149	52.1
No	137	47.9

MR indicates Multiple-response choices; hence, cannot sum up to 199 as respondents choose to belong to more than one category

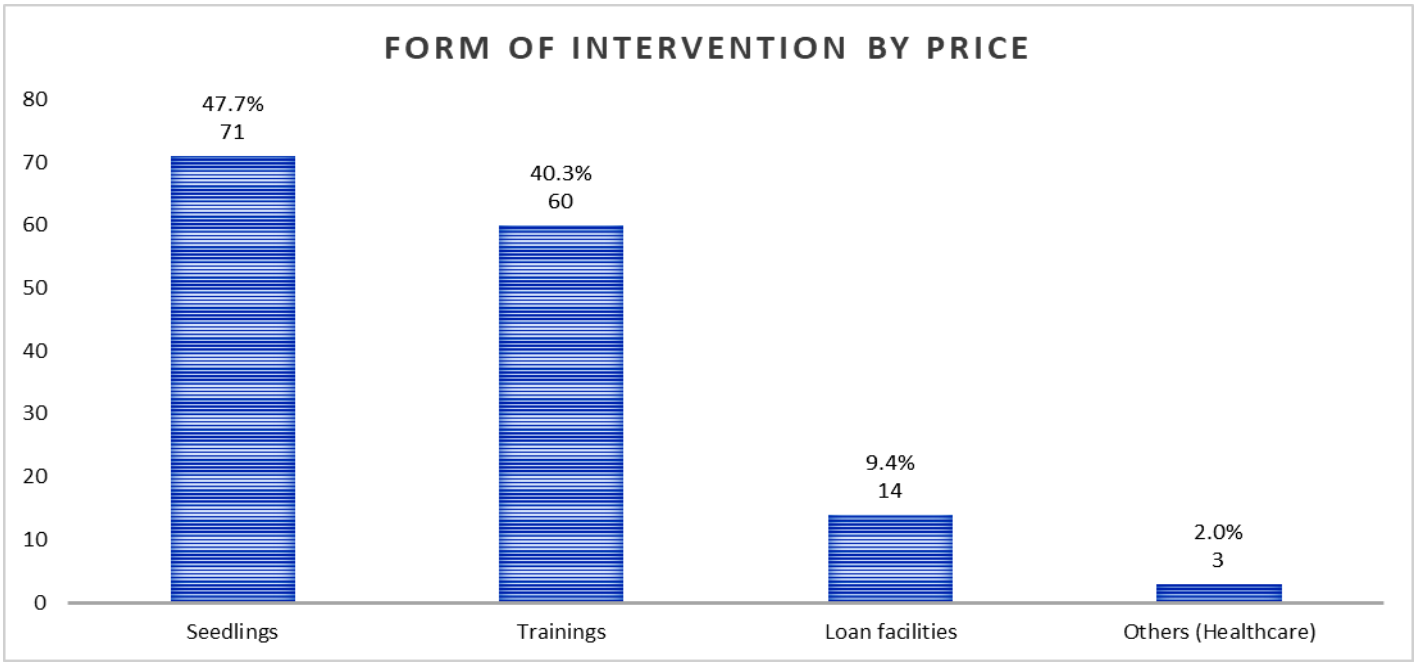

Figure 10: Forms of intervention by PRICE

3.11 GENERAL COMMENTS BY PARTICIPANTS

Reports from the farmers with regards to various limitations facing the PRICE programme were little or no technical support from PRICE (43%), lack of good seedlings to ensure quality produce (30%), lack of adequate farm input (28%), lack of storage facility (22%), lack of information on training (21%), lack of funds to enhance production on larger scale (13%), unavailability of lands to farm (10%), and a few others presented in Figure 11.

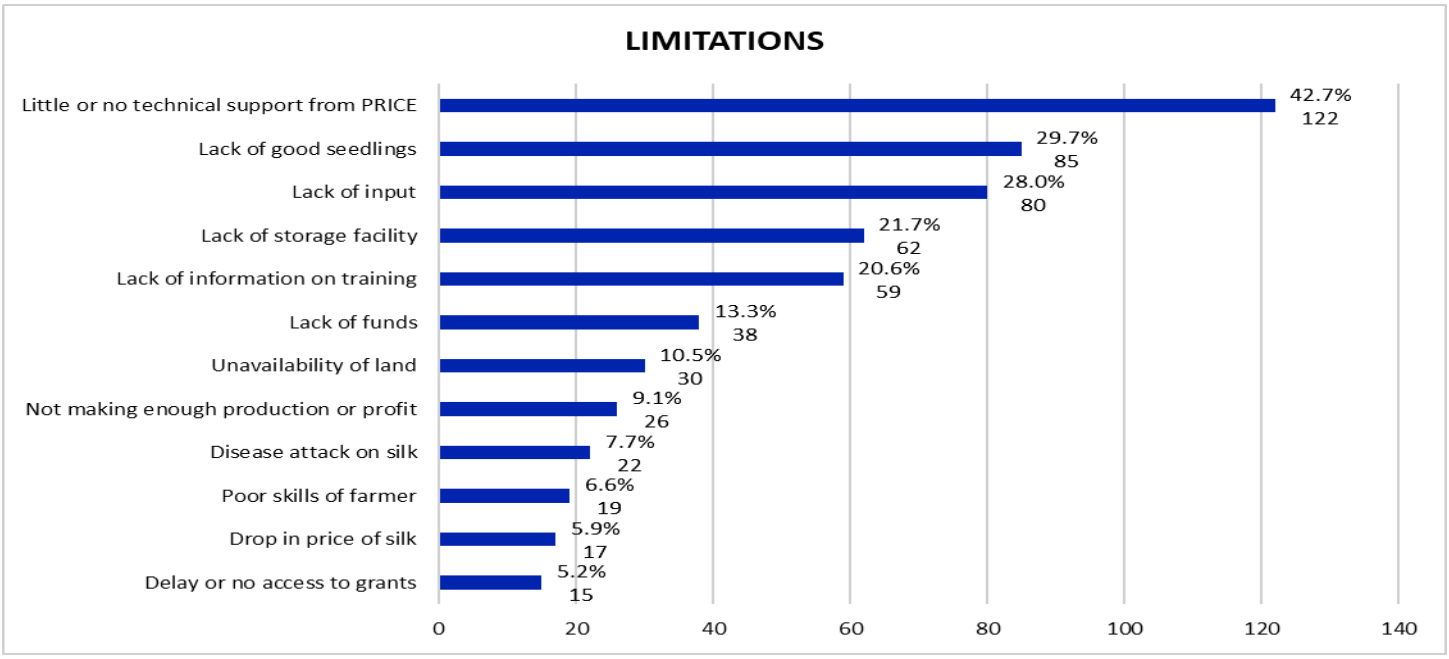

Figure 11: Reported limitation of the impact of PRICE programme

HYPOTHESIS: There is no significant difference in the proportion of beneficiaries indicating no change and improvement in income level during the rural income exports intervention program. Equally, no significant difference in the level of cocoon production before and during the rural income exports intervention program.

It was obtained that 77% affirmed an improvement in their income status, while 23% claimed they had not experienced a change in income since joining PRICE. The production of cocoon for farmers per year was 80kg before PRICE but surged to 120kg during PRICE.

Table 15: Hypothesis

	No change	Improving	p-value
Level of Income	66 (23.1%)	220 (76.9%)	< 0.001
Production of Cocoon (kg)	80	120	

4.0 FINDINGS

- The sericulture farmers who are just beginning this practice are finding it difficult to join the existing cooperative societies because they believe they won't be accepted into the social group.
- The new sericulture farmers also believe that they won't have equal rights with those members of the cooperative societies who have been a member of the society for a long time.
- The new sericulture farmers are also grouping up and planning to form their cooperative society.

5.0 LESSONS LEARNT

- The Project for Rural Income through Exports (***PRICE***) on sericulture has impacted and improved the livelihood of those farmers who have been benefiting from this project over the years.
- The impact and improvement from the ***PRICE*** sericulture project gave reasons for new farmers to enrol and decided to participate in this activity.
- It was observed that there were several government policies and agenda set aside by the government of Rwanda to support and encourage smallholder farmers to form cooperative societies and financial groups especially those in the rural areas, to assist themselves to perform better and improve their means of livelihood.

6.0 RECOMMENDATIONS

- There is a need to encourage and harmonize all the sericulture farmers to belong to a cooperative society or financial groups to improve their productivity and means of livelihood.
- More training centres should be established closer to the rural farmers to improve the technical know-how and technical support essential for the sericulture farmers. Also, to continually improve the training capacity and skills required by the farmers for adequate sericulture management.
- There is a need to engage in capacity building activities to support and strengthen the farmers as a priority for turning traditional agriculture into a market-oriented and revenue-generating activity.
- Appropriate provisions should be provided for farmers who are experiencing shocks and vulnerability for them to be reinvigorated.
- More efforts should be put in place to effectively promote the value chain process, to provide more job opportunities and value-added services to the sericulture industry.

7.0 CONCLUSION

There is a need for the Project for Rural Income on Exports (***PRICE***) to enrol more sericulture farmers into this initiative program to ensure that poverty reduction is reduced to the minimal consideration, also to generate more income revenue for the country. This will adversely contribute to the sustainability of livelihood of the workers at the HEworks factory because this factory also depends solely on the cocoons produced by the rural farmers. Sericulture can be another alternative to the land-based production system, which improves land productivity, increases the income of smallholder farmers, improves livelihood status and concurrently, improves soil health. Therefore, the involvement of more beneficiaries for this ***PRICE*** project will also create more opportunity for income generation to the sericulture farmers and also boost the GDP of the Republic of Rwanda. Thus, improving and strengthening the economic potential of the country through exportation of silk product and other agricultural commodities.

Inclusive, the farmers' participation in **IFAD *PRICE*** agricultural interventions programme has a significant impact in Rwanda which has scaled up a sustainable agricultural system and has helped reduce poverty and also, improved the livelihood and social status of the smallholder sericulture farmers. Poverty can be reduced because sericulture is capable of generating more income, compared to the other crops like paddy wheat, rice, sorghum etc. because most of these crops mentioned above can be grown once or twice in a year but sericulture can be practised 4-5 times in a year.

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APPENDIX B: QUESTIONNAIRE
CENTRE FOR SUSTAINABLE DEVELOPMENT

RESEARCH QUESTIONNAIRE FOR RESPONDENTS

This survey is aimed at assessing the effect of ***IFAD Rural Income Project on Silk Exports and Livelihood of Smallholder Producers in Gatisbo of the eastern province of Rwanda.*** This questionnaire is, therefore, designed to elicit information from beneficiaries of the project on possible changes contributed by the project. Whatever information obtains from you will be treated with strict confidentiality. Thank you for your cooperation.

Introduction **Questionnaire Number: _____**

GPS Position: Latitude _____ Longitude _____ Altitude_____(metres)
Date: _____District_____Sector_____ Village_____

SECTION A: Socio-Demographic characteristic

S/N	QUESTIONS/ STATEMENTS	RESPONSE			CODING
1	What was your age at last birthday?	_____ year			
2	What is your highest educational qualification?	1. No Formal Education 2. Primary 3. Secondary 4. HND/University degree 5. Other, specify/ _____			1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
3	Marital Status	1. Single/ 2. Married 3. Widow 4. Divorced			1 ☐ 2 ☐ 3 ☐ 4 ☐
4	Religious Affiliation	1. Christianity 2. Islam 3. Other, specify _____			1 ☐ 2 ☐ 3 ☐
5	Gender	1. Female 2. Male			1 ☐ 2 ☐
6	Head of Household	1. Female 2. Male			1 ☐ 2 ☐
7	Household Size	Female	Male	Total	

SECTION B: SILK PRODUCTION

8. Other occupation apart from Sericulture? _____

9. Availability of food (Mulberry Leaves) ☐

1. Readily available 2. Sparsely available

10. The sericulture farming the household is engaged in? ☐

1. Small scale production 2. Large scale production

11. Do you keep part of your produce at home? ☐

1. Yes 2. No

12. Do you grow any other agricultural commodity? ☐

1. Yes 2. No

13. How often do you harvest the cocoon? ☐

1. Weekly 2. Monthly 3. Yearly 4. Others _____

14. Years of experience in sericulture production ☐

1. 1-10 2. 11- 20 3. 21- 30 4. 31>

15. Farm size (tick as applied and fill in the space in figures) ☐

1. Local Units (Plots)_____
2. Hectares (Ha)_____
3. Acres_____

16. How was the land acquired? ☐

1. Inherited 2. Purchased 3. Lease

S/N	QUESTIONS/ STATEMENTS	BEFORE PRICE Intervention	DURING PRICE Intervention
17	What is your form of farm ownership	1. Self-owned ☐ 2. Inheritance ☐ 3. Rent ☐ 4. Jointly owned ☐ 5. Other, specify _____	1. Self-owned ☐ 2. Inheritance ☐ 3. Rent ☐ 4. Jointly owned ☐ 5. Other, specify _____
18	Does this ownership pattern have any effect on your cocoon production?	1. Yes ☐ 2. No ☐	1. Yes ☐ 2. No ☐
	If Yes, explain		
19	What quantity of cocoon do you produce per year? In kg.	_____	_____
20	Are you a member of any farmers' cooperative?	1. Yes ☐ 2. No ☐	1. Yes ☐ 2. No ☐
21	Do you belong to any savings and loans group?	1. Yes ☐ 2. No ☐	1. Yes ☐ 2. No ☐
22	Have you been accessing financial assistance from your savings and loans group?	1. Yes ☐ 2. No ☐	1. Yes ☐ 2. No ☐
	If No, where else have you received financial assistance?		
23	How have you used the assistance given to you? Explain		
24	How much were you given at that time? (RWF)	_____	_____
25	Do you have access to the market?	1. Yes ☐ 2. No ☐	1. Yes ☐ 2. No ☐

SECTION C: **SILK EXPORTATION**

26. Who sets the price for produce? ☐
    1. NAEB 2. Co-operatives 3. Self 4. Others _____
27. Size of land? ☐
    1. Below 0.25 ha 2. 0.25-0.50 ha 3. 0.50-0.75 ha 4. 0.75-1 ha 5. > 1 hectare
28. Currency of payment ☐
    1. Rwanda Francs 2. US Dollars 3. Others _____
29. Household income from cocoon production? _____ ☐
30. House/dwelling unit ownership? ☐
    1. Owned 2. Rented 3. Mortgaged 4. Others, (specify) ……
31. Is there organized marketing available for silk? ☐
    1. Yes 2. No

SECTION D: LIVELIHOOD

32. What is the amount of loan (RWF) that you have taken in the last year? _____
33 How did you make a repayment? ☐
    1.Weekly 2. Monthly 3. Yearly 4. Others _____
34. Do you or members of your household save money? ☐
    1. Yes 2. No

D1. State the purpose of taking loan:

For question 35 tick as appropriate

S/N	Variable	Yes	No
35	Buying land		
36	Children education		
37	Buying agricultural equipment		
38	Housing		
39	Repayment of an old loan		
40	Health care		
41	Festivals/social obligations		
42	Purchasing household asset		

SECTION D: SOCIAL SERVICES

D2: Kindly tick appropriately to determine the status of the social services available to you.

S/N	Variable	Yes	No
43	Access to Drinking water		
44	Access to electricity		
45	Access to Primary/secondary school		
46	Access to Healthcare services		
47	Means of Information and communication		

D3: Kindly indicate nature of improvement in the variables in the table below that is due to your participation in *PRICE* project

		Before Price				During Price			
S/N	Variable	Improving (3)	No change (2)	Worsened (1)	Not applicable (0)	Improving (3)	No change (2)	Worsened (1)	Not applicable (0)
48	The income of your household								
49	Quantity of production								
50	Quantity of export (kg)								
51	Access to Drinking water								
52	Access to electricity								
53	Access to Primary/secondary school								
54	Access to Healthcare services								
55	Means of Information and communication								

SECTION E: PHYSICAL AND FINANCIAL ASSETS

E1: Kindly indicate improvement in ownership/access to physical/financial assets as listed in the table below in the last 2 years (2016 to 2018) that is due to your participation in *PRICE* project.

S/N	Variable	Improving (3)	No change (2)	Worsened (1)	Not applicable (0)
56	Number of landed properties owned				
57	Means of transport (bicycle, motorcycle, car)				
58	Electrical appliances (fridge, television, radio)				
59	Size of land under improved management				
60	Farm machinery				
61	Household savings				

E2: Please indicate whether you have equal opportunities concerning access to the following services provided by *PRICE* program

S/N	Variables	Yes	No
62	Silk tree seedlings		
63	Matching Grants		
64	Loans/Guarantee		

65	Training on cocoon production/ silk exports		

SECTION F: Market Access

Kindly indicate improvement in the following aspect as a result of your participation *PRICE* programme in the past 2 years (2016 to 2018)

S/N	Variable	Improving (3)	No change (2)	Worsened (1)	Not applicable (0)
66	Access to Modern storage facilities				
67	Cost of Transportation				
68	Access to Market information				

SECTION G: VULNERABILITY CONTEXT AND ADAPTABILITY STRATEGIES

69	How often have you experienced produce loss over the past 2 years?	1 Often 2 Not Often 3 Never	1 ☐ 2 ☐ 3 ☐
70	What was the cause of the loss of productivity?	1 Poor Seedlings 2 Floods 3 Storage facilities 4 Transportation 5 Other, specify _____	1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐
71	In the period of produce loss, what strategies did you adopt to survive?	1 Reduction in expenditure 2 Borrowing of funds from friends 3 Cooperative loans 4 Others _____	1 ☐ 2 ☐ 3 ☐ 4 ☐
72	In periods of shocks or hazards, how do you sustain livelihoods?	1 Sell assets 2 Borrowing from friends/family 3 Reduction of expenditures 4 Others _____	1 ☐ 2 ☐ 3 ☐ 4 ☐
73	Does ***PRICE*** help sustain livelihoods in the period of shocks?	1 Yes 2 No	1 ☐ 2 ☐
74	If Yes, what form of intervention was given by ***PRICE***?	1 Loan facilities 2 Seedlings 3 Trainings 4 Others_____	1 ☐ 2 ☐ 3 ☐ 4 ☐

SECTION H: General Comments

List the most important factors that affect the limitation of the impact of *PRICE* program

i. ……
ii. ……
iii.……

Name of Enumerator_____

Signature & Date_____