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LIVELIHOODS IN THE EASTERN PROVINCE OF RWANDA

Impact evaluation of the Enterprise Development Programme's support to Tuzamurane cooperative

Effectiveness Review Series 2019/20

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OXFAM GB

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Cover image: Photo: A pineapple growing at Tuzamurane cooperative farm in Eastern Rwanda, Kirehe District. Credit: Aurelie Marrier d'Unienville / Oxfam

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EXECUTIVE SUMMARY

EDP AND TUZAMURANE COOPERATIVE

The Enterprise Development Programme (EDP)[1] started in 2008 in Rwanda. The core objectives of EDP are to:

- Build sustainable agricultural enterprises, providing them with grants and loans.
- Improve the lives of smallholder farmers, support women's empowerment and seek wider systemic change.
- Involve supporters in governance of the programme, through an investment committee and board.

In working toward these objectives, EDP in Rwanda supported four enterprises in different value chains, with a total investment of £532,499 (64% of which was loans). This evaluation focuses on one of these enterprises – the Tuzamurane cooperative of organic pineapple growers, which processes and exports organic-certified dried pineapple to European markets. EDP began supporting the cooperative in 2015 and continues supporting it today.

Tuzamurane is located in the Eastern Province of Rwanda. It was created in 2005, formally registered as a cooperative in 2006, and its members have continued improving the quality of their produce. The idea of drying pineapple, organic-certified pineapple in particular, emerged in 2009. The cooperative and Oxfam began working together in 2010, and it obtained organic certification in 2013. In 2015, Oxfam in Rwanda worked with Tuzamurane to develop and submit a proposal for EDP support (funding and accompaniment). Support was approved in September 2015 and grants and loans were disbursed at the beginning of 2016.

At enterprise level, EDP's support is expected to bring about an increase in production, diversification of production (resulting in risk mitigation and value-addition) and improvement in management. This should result in improved access to markets and job creation. This in turn is expected to bring about changes in the lives of the smallholder farmers involved with the enterprise – members of the cooperative and its suppliers, in the case of Tuzamurane. In particular, EDP's support aims to bring about increased income and economic empowerment for women.

Finally, EDP's support is expected to bring about a diversification of investors, in particular from the formal sector. Sustainability of the initial investment is reached when further investments can be accessed through banks, without EDP being guarantor for the loans.

This evaluation is part of Oxfam's Effectiveness Review series, a series of impact evaluations of completed or mature projects, randomly selected each year for an evaluation of their impact. The Effectiveness Review series is part of Oxfam GB's Strategic Evidence Framework and is part of the organization's effort to better understand and communicate its effectiveness, and to enhance learning across the organization.

During the 2019/20 financial year, EDP in Rwanda was one of the projects selected for an Effectiveness Review. The decision to focus on one enterprise, Tuzamurane, was made in consideration of the available resources and in order to maximize learning.

EVALUATION APPROACH

This impact evaluation was undertaken primarily to evaluate the impact of EDP's support to Tuzamurane on household income of cooperative members and suppliers (collectively known as 'contractors'). Cooperative members are pineapple producers who supply pineapples to the cooperative based on contracts; they have also joined the cooperative through the payment of a membership fee, and as a result, are entitled to a share of the cooperative profits and to participate in the cooperative's decision making through its General Assembly. Suppliers are also pineapple producers who have transactional supply contracts; however, they have not joined the cooperative and are not entitled to any of the broader cooperative profits (although they can access some of the same services as members, such as loans). The evaluation also sought to answer:

1. Why and how did the project impact household income?
2. Is there any evidence of impact on women's empowerment?
3. Did the project have any impact on job creation at household level?
4. As Tuzamurane has grown, has the socio-economic profile of the cooperative members and suppliers changed? Who has been reached, and who has been left behind?
5. Did the project benefit men and women differently? Did the project benefit cooperative members and suppliers differently?
6. To what extent has Tuzamurane considered its social responsibility, and what policies have been put in place in this regard?

A quasi-experimental impact evaluation design was used, which aims to find the best estimate possible of 'What would have happened to project participants in the absence of the project?'. This design helps us understand the impact that can be attributed to EDP's support between 2016 and 2019. The evaluation carried out a quantitative survey with individuals and their households, as well as qualitative interviews with leaders of cooperatives and enterprises. Every member and supplier of Tuzamurane cooperative was invited to be part of the evaluation (the 'intervention' group), and a similar group of farmers who were producing either pineapples or other produce in 2015 were invited to participate in the evaluation as part of the 'comparison' group.

In total, 650 farmers took part in the survey: 251 in the intervention group and 399 in the comparison group. This allowed us to measure the impact of EDP support at household and individual levels. The evaluation was designed to make evident any differences in impact for women and men, as well as for suppliers and cooperative members. Leaders of another pineapple cooperative, the Koubumu cooperative, and a pineapple processing enterprise, Natural Fruits Drier Company LTD, took part in qualitative interviews to enable better understanding of differences at an enterprise level. Three qualitative interviews were conducted. Data gathering for this evaluation was carried out in September and October 2019.

RESULTS

This Effectiveness Review investigated the impact of EDP's support to Tuzamurane cooperative from 2016 to 2019, after disbursement of the funds (the 'investment phase') for pineapple suppliers and cooperative members. The review adopted a gender lens throughout. The key findings are as follows:

Tuzamurane has grown significantly in size and in profits

Since its creation, the cooperative has grown substantially, both in membership and supplier numbers. As a result, the volume of production has increased. Revenues from sales increased eightfold between 2014 and 2019. While the cooperative was making losses in 2014, it was profitable as of December 2019. Tuzamurane has also been able to purchase land, has increased its employees and owns more assets such as processing machines. Both the shareholding and the membership fee have increased substantially over the years as a result, as the former is calculated based on profits and the latter is based on assets owned by the cooperative. Tuzamurane has the ability to access and finance support from various formal institutions. Initially, Tuzamurane financed and repaid a loan given by EDP; this was an achievement, particularly given challenges the cooperative faced in 2013–2014 due to a loan taken during a bad agricultural year. In addition, in 2018, Tuzamurane was able to access support from the Ministry of Agriculture to expand processing capacity and diversify into juicing in future.

Tuzamurane's growth and size, as well as its ability to access support from various formal institutions, are very different to those of similar actors involved in pineapple farming and processing. The other cooperative and small enterprise interviewed were set up more recently and haven't yet acquired key processing assets, or are still awaiting organic certification (obtained in 2013 by Tuzamurane). Organic certification has the potential to open access to an export market, as in Tuzamurane's case; without this, the comparative cooperative and enterprise remain reliant on a domestic market.

The socio-economic profile of cooperative members and suppliers is not strongly affected by Tuzamurane's growth

In 2015, in general, Tuzamurane cooperative members were better off than other (pineapple) farmers, and as the cooperative grew it attracted members who were also relatively better off. This reflects the membership fee paid to join the cooperative, which is high relative to that of other cooperatives. On average, farmers who have contracts to supply the cooperative, but are not members, have a lower socio-economic profile than members. Half of them were not yet growing pineapple in 2015. Tuzamurane's growth attracted new suppliers; however, it is possible that the high price of membership, which in part is due to the cooperative's regular reinvestment of profits and asset purchases, now acts as a barrier to entry for less well-off farmers.

Tuzamurane has not increased membership among women

Like the above finding, the gender makeup of membership is the same for new cooperative members and suppliers as it is for cooperative members in 2015: a third are women. The incentive for women of being able to pay the entry fee in instalments over three years does not seem to have increased membership among women. Notably, among women members, there has been no increase in membership of single women.[2]

Similar impact on household income for cooperative members and suppliers

There is indicative (but not strong) evidence of an increase in household income for Tuzamurane members and suppliers (measured by household consumption, through a record of expenditures).

One element to highlight here which suggests a positive impact on household income for cooperative members is that the cooperative made a decision to reinvest dividends into cooperative assets and growth. Only once in the life of the project were dividends shared with members. This represents additional income that cooperative members made a decision about at the time (reinvestment), but that would not show up in records of household expenditure. It would be useful to see in future if this reinvestment strategy leads to higher returns and therefore more income for cooperative members.

Differential impact for women and men on household income

Overall, the Tuzamurane cooperative had a positive impact on household income for households where men were involved with the cooperative (as cooperative members or suppliers), but not on household income where women were involved as the main contractor.

This gender difference seems to be driven by a few key features. First, both men and women have improved the yields from their pineapple fields, which has resulted in an overall increase in pineapple production and revenue. However, revenue from pineapple increases more for men contractors than for women contractors, as a result of the project. While men contractors on average had more land to farm pineapples when they began supplying the cooperative, there is also evidence that men contractors have invested in additional agricultural land as a result of the project, while women contractors have not done so. This perpetuates and strengthens the differences in production capacity, and therefore revenue, between men and women farmers.

Second, in households where women held the contract with the cooperative, achieving an increase in pineapple production was enabled by reducing other productive activity and therefore other income sources. This means that pineapple production replaced other income sources rather than providing an additional income source. This was not found to be the case in households where the contract holder was a man.

Third, the evaluation found that where men held the contract, there were usually multiple people from the household involved in pineapple farming, leading to greater production capacity. In cases where women held the contract with the cooperative, the farming was, on average, undertaken by fewer people within the household. This means that while both women and men within one household can be involved in pineapple farming, in most of these cases men are more likely to be the contract holder.

These effects highlight the structural barriers that are faced by women in general, and by women in different positions of vulnerability in particular. First, women's access to land is constrained in Rwanda, in spite of legislative reforms over the last 20 years. This is particularly important, as pineapple farming requires large areas of land. Second, women are disproportionately responsible for unpaid care and domestic work, which limits the time they have to participate in pineapple production and other income-generating activities. Third, women contractors are more likely to be in households in which they are the key person generating income and contributing to pineapple farming. This is because

they are more likely to be living without a partner and in many cases supporting other household members, such as their children and/or parents or in-laws.

Positive impact on job creation

The evaluation found that Tuzamurane enabled a positive impact on job creation in the farms of men contractors, but not in those of women contractors. Men hired on average an additional 2.5 workers, while the number of workers on women's farms remained unchanged. The gendered difference is related to the finding outlined above that men contractors increased land ownership during the life of the project. The number of casual workers hired correlates with the area of land owned.

At the cooperative level, the growth of the cooperative led to greater employment capacity. The cooperative grew from one staff member when it was formed to 31 in 2019, which is substantially higher than in the enterprise and other cooperative interviewed.

Tuzamurane has a strong commitment to social responsibility

Tuzamurane is providing several services to its members and suppliers – and more so than other cooperatives and enterprises growing or processing pineapple. These services include loans, health insurance, pension contribution, agricultural training and advances for education expenses. This reflects the cooperative's strong commitment to its social responsibility, as well as its access to a market for its produce that enables the cooperative to fund such services. Access to services of this kind was not evident to the same extent among the other cooperative and enterprise interviewed.

Similar levels of women's participation in governance as found in other cooperatives

Three-quarters of cooperative members consider themselves to be involved in important decisions taken by the cooperative, which is similar to the rates of participation found in other cooperatives. Women's participation in Tuzamurane's decision making is at the same level as that of other cooperatives, suggesting it is not significantly impacted by the project.

These results raise questions about the policies and practices that could be put in place to enable women cooperative members to participate in and benefit fully from the cooperative.

A mixed impact on women's empowerment at personal and relational levels

The evaluation shows that contractors' involvement in Tuzamurane has had a positive impact on social norms related to violence within the household, with 67% of interviewed Tuzamurane contractors considering domestic violence unacceptable (vs 50% in the comparison group). However, with regard to other indicators of empowerment at the personal level, the evaluation found no impact on women's leadership skills or self-confidence as a result of participation in Tuzamurane.

Within households, the evaluation shows some positive changes in decision making. Men contractors who are part of Tuzamurane are less likely to take decisions alone regarding the selling of crops. Women contractors appear to be more likely to take decisions alone

regarding how income is spent, and less likely to take decisions with other household members.

Some evidence of impact on gender norms (environmental level)

There is evidence that the project has increased the acceptability of men's participation in care and domestic work. When asked, more women and men believe that a large share of men within their community would consider it acceptable to care for others, including children, or to do cooking, cleaning the house or washing clothes. These beliefs were stronger among women. Men contractors involved in Tuzamurane were more likely than those in the comparison group to believe that a large share of men in their community would consider it acceptable to collect water or firewood. However, it is important to note that the evaluation did not find an actual increase in men's participation in these activities.

High levels of reporting of and response to problems of contractors

Tuzamurane cooperative members and suppliers are more likely to report having experienced a problem with Oxfam or Tuzamurane than their counterparts involved in other cooperatives and to have contacted either organization regarding the issue. 15% of participants in Tuzamurane said that they had experienced an issue, which is significantly higher than among members of other cooperatives or farmer groups, at 7%. As the relationship between contractors and Tuzamurane is a commercial one, it is unsurprising that issues would arise through the life of the contracts.

78% of those stating they had experienced an issue with Oxfam or Tuzamurane had reported the issue. This high rate demonstrates that they know how to go about reporting problems and feel comfortable doing so. When comparing levels of response and satisfaction, members of Tuzamurane were more likely than members of other cooperatives to have received a response and to be satisfied with the response received (88% of those who raised an issue were satisfied with the response, compared to 80% among other cooperatives or farmer groups).

Among all Tuzamurane contractors, 60% said they know how to provide feedback or make a complaint (compared to 56% among other cooperatives or farmer groups). This shows that communication about existing feedback mechanisms could be improved.

The impact of COVID-19

While this review focuses on 2015–2019, at the time of finalizing this report in 2020, the cooperative had been affected by the COVID-19 pandemic. A review of secondary evidence, along with a rapid assessment undertaken by Oxfam, suggests that lockdown measures placed businesses under significant stress, especially small and medium enterprises involved in the agricultural sector and actors in the horticulture value chain.[3] The negative impact of the pandemic on Tuzamurane was confirmed by the rapid assessment, although the full impact will not be known for some time. At the height of the COVID-related restrictions, Tuzamurane's ability to export was significantly hampered.

By the end of 2020, the cooperative had resumed processing and exporting organic-certified dried pineapples. Staff have been re-employed, although the cooperative had fewer staff members at the end of 2020 than it did in 2019 (18, down from 31), reflecting lower levels of production. In the longer term, the pandemic and associated restrictions are likely to have a negative impact on the growth and overall positive trajectory found by this evaluation.

PROGRAMME LEARNING CONSIDERATIONS

Based on the results and conversations with Oxfam and EDP staff, we identified the following key learning recommendations.

Strengthen strategies to overcome barriers to women's income generation

First, these results highlight the need to understand specific systemic barriers to women's income generation. Key barriers found to be limiting project impact for women include access to land, time poverty resulting from responsibility for care and other unpaid work, and norms around whose name is on the production contract.

On a project-specific level, it is recommended that there is more focus on exploring strategies to counteract such systemic barriers for women's equitable engagement with the cooperative and women's income generation. Different women will face these barriers differently. For example, women living alone with their children, widows, or those whose husband is away due to migration, will face specific constraints. It is particularly important is to consider whether different strategies are needed for women in these situations, as well as for women living with their partner.

At a broader level, many of these same barriers are important factors hampering women's income generation. In the case of land ownership, this is despite progressive national laws and policies. This suggests that the change needed is around social norms and practices, rather than policy change. In some cases, national laws and policies around gender equality have also made the topic harder to openly discuss in a setting of closed civic space. We suggest that any future work targeting women's income generation incorporates an element around shifting social norms and practices, and public campaigning.

Consider joint contracts in both men and women's names within one household

The evaluation has shown that women living with a partner often work in pineapple production under a contract in their husband's name (or do other household work, making production possible).

Tuzamurane could explore further whether joint contracts could be a useful mechanism to make the work of women more visible in their household and increase women's access to income and influence in economic decision making. Women and men from the same household could be jointly contracted as suppliers of the cooperative. EDP could link Tuzamurane to another enterprise supported by EDP in Ethiopia, which introduced contracts that are jointly owned by women and men when they are producing together, to share experience.

Explore different policies to build an inclusive business model, particularly in relation to the membership fee

The cooperative membership fee is high and prevents less well-off suppliers from becoming members. Cooperative members who joined in the past four years are relatively better-off, which is similar to those who were already cooperative members in 2015. At the

moment, only a third of cooperative members are women, and the policy of allowing women to pay the membership fee in instalments has not affected the cooperative's gender composition.

The entry membership fee currently reflects the cooperative's assets, which have increased over the years as Tuzamurane has grown. Shareholdings and potential dividends from membership have also increased; however, in all but one instance to date these have been reinvested, not impacting household income. The cooperative could explore calculating the fee differently. Options could include taking into account annual asset growth or the assets of new members. These options would have to be linked to a discussion around how to calculate and share dividends in an equitable manner, and be voted on at the cooperative's General Assembly, in accordance with the national law on cooperatives.

Building an inclusive business model is also about the internal processes and procedures around employment and governance practices. While the evaluation did not specifically look at these, exploring current processes and procedures to identify barriers preventing some people from participating in and contributing to the cooperative would highlight changes needed to strengthen inclusivity.

Work with the government to support the building of inclusive cooperative models across Rwanda

Oxfam and EDP could also consider advocating for the government to publish guidelines around inclusive cooperative practices, highlighting the role of membership fees as a barrier to entry. This would be in line with the Government of Rwanda 2018 National Cooperative Policy Review, which identifies as an area of policy intervention the need to

> 'Promote cooperative membership for special groups of people such as youth, people with disabilities, women, and Rwandans living in the diaspora.'

The cost of registering a cooperative with the government is also high. Reducing this cost could also enable lower membership fees and would help in building a more inclusive business model.

Reflect on the return on investment from organic farming to producers, and see how the price premium could be further transferred to producers

Organic farming is expensive (and labour intensive); however, the general assumption is that organic produce sells at a higher price than non-organic, in an international market. For Tuzamurane, drying organic pineapple opens up access to an international market, which has a higher return. In addition, selling in an international market and selling dried products reduces seasonal price fluctuations, creating a more stable profit than is possible in the domestic market. The findings from this evaluation confirm that the cooperative is selling the dried organic pineapple internationally at higher rates than fresh, non-organic pineapple sells domestically. It was therefore assumed that for producers, growing organic pineapple and supplying Tuzamurane would lead to a higher price for their fresh produce.

However, while the evaluation highlights an increase in yields for contractors as a result of the project, leading to an overall increase in income, there is no impact on the price the

contractors receive per kg of pineapple. We estimate that the price received is approximately 130 Rwandan francs (RWF) per kg. This seems to be the same as the price received by the comparison farmers – both those who grow organically and those who do not.

While supplying Tuzamurane can bring its contractors price stability over time, and other benefits, the finding that price per kg has not increased challenges an important assumption behind the project's theory of change. The cooperative and EDP could investigate further the reasons behind this result: do the costs associated with organic production, such as inspection and certification, negate the benefits of selling on an international market, as previous studies have shown?[4] What would enable a higher price to be paid to the producers?

The cost of certification is certainly high, and the transaction costs associated with its annual renewal are significant too. At the moment, Tuzamurane pays the cost of certification on behalf of its suppliers. If this is what is driving the lack of a price benefit for contractors, EDP and Oxfam could consider advocating for certification agencies to implement multi-year certification schemes, as a way to reduce transaction costs.

Strengthen awareness of feedback mechanisms to enhance accountability

Feedback mechanisms are critical to enhance accountability and improve programme effectiveness. In the setting of EDP, the relationship between smallholder farmers and the cooperative is a commercial one, especially as Tuzamurane supports producers to obtain and maintain organic certification. This has consequences for the power dynamics between the cooperative (or enterprise) and the producers. While reporting and response rates are high among those who have experienced a problem, a little under half of the contractors involved with Tuzamurane are not aware of how to provide feedback or report an issue. We recommend that accountability systems are clearly advertised and that all contractors are made aware of their rights and informed about how to report an issue. Given the power dynamics, feedback systems could also be reviewed to explore whether any other channels and features should be put in place to ensure that feedback mechanisms are accessible and safe, and that contractors feel comfortable using them when they experience an issue.

Continue advocacy for a sector-specific COVID-19 recovery plan

In light of the highly disruptive effect of the pandemic on the horticulture value chain, it is recommended that Oxfam continues its existing advocacy work calling for the development of a sector-specific recovery plan led by the National Agricultural Export Development Board of Rwanda, in coordination with stakeholders and with attention to the specific needs of farmers, aggregators, processors and exporters.

EVALUATION LEARNING CONSIDERATIONS

Revise Oxfam's livelihood outcome indicator to value the critical role of unpaid care and domestic work in income generation, and to reflect a more holistic understanding of enhancing livelihoods

The current focus of the livelihood outcome indicator used by Oxfam in its Effectiveness Review series (and other impact evaluations) does not take into account the critical contributions of feminist economists in understanding and analysing income generation. The indicator has a narrow understanding of what enhancing livelihoods means: improving household income, measured through consumption. In addition, it relies on a tedious data collection process of going through different types of expenditures, which may feel disempowering and intrusive for the people being interviewed. The new indicator should reflect the gendered nature of income generation and value the critical role of unpaid care and domestic work in household income generation. It should also reflect the importance of women's access to their own income and control over income within the household.

In the same way as Oxfam highlights the need to change the way in which we measure economic success in light of the climate crisis,[5] the Effectiveness Review livelihood indicator should be revised to reflect a wider understanding of livelihood – one that takes into account wellbeing and what 'living a good life' means for different people, in a given context.

1 INTRODUCTION

The Enterprise Development Programme (EDP)[6] started in 2008. The core objectives of EDP are to:

- Build sustainable agricultural enterprises, providing them with grants and loans.
- Improve the lives of smallholder farmers, support women's empowerment and seek wider systemic change.
- Involve supporters in governance of the programme, through an investment committee and board.

In its first phase, from 2008 to 2013, EDP supported 23 projects in 18 countries, including Rwanda. EDP entered its second phase in 2015, to support businesses in Bangladesh, Ethiopia, Honduras, Nepal and Rwanda. EDP in Rwanda was selected as part the Effectiveness Review series for the thematic area of building livelihoods, in the 2019–2020 financial year. The Effectiveness Review series is a series of impact evaluations of completed or mature projects, randomly selected each year for an evaluation of their impact. The Effectiveness Review series is part of Oxfam GB's Strategic Evidence Framework and is part of the organization's effort to better understand and communicate its effectiveness, and to enhance learning across the organization.

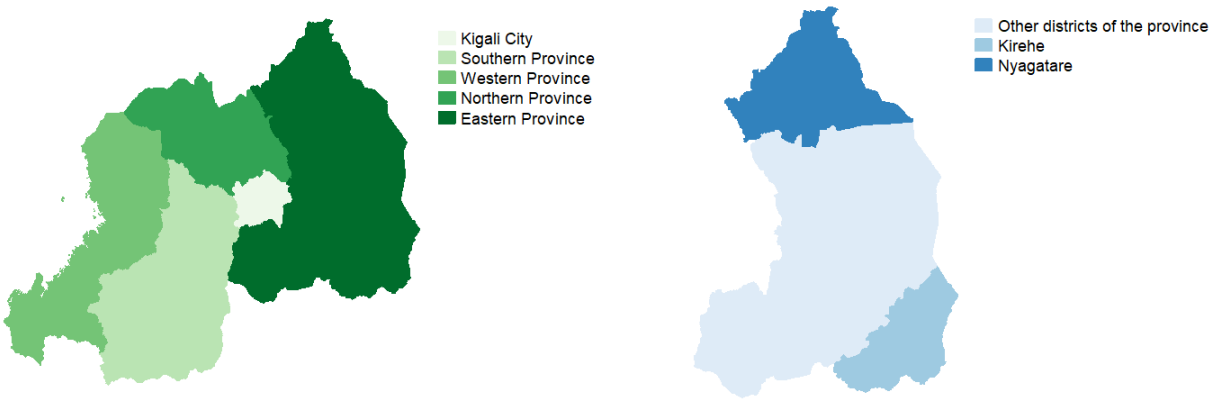
At the time when the project was selected for the Effectiveness Review, EDP in Rwanda was supporting four enterprises in different value chains, for a total investment of £532,499 (64% of which was loans to the enterprises or cooperatives). This evaluation focuses on one of these enterprises – Tuzamurane, a cooperative of organic pineapple growers which processes and exports organic-certified dried pineapple to a European market. EDP began supporting the cooperative in 2015 and continues to support it today.

The resources available for the Effectiveness Review were insufficient to cover the four enterprises supported through EDP, each one of them in a different province of Rwanda. Given that the primary question of interest of this evaluation is to assess the impact for the people EDP works with, at the household level, a quantitative impact evaluation design was considered. To maximize precision of the analysis, and hence potential for learning, it was decided to focus on one enterprise. Three more aspects were considered in reaching the decision to focus on Tuzamurane cooperative:

- Duration of EDP support by the time of data collection (two enterprises had been supported since 2014 or 2015, one since 2017 and one since 2018).
- The potential for impact to be detectable at household level (pineapple production has the potential to make a major income contribution for smallholder farmers – the programme estimated a contribution of £190 yearly income per person – compared to cassava leaves production, with an estimated yearly income per person of £52[7]).
- EDP in Rwanda is integrated with other programmatic activities and the overall country strategy; the work carried out in the pineapple value chain in the Eastern Province was considered particularly strategic for Oxfam in Rwanda.

Tuzamurane cooperative was created in 2005 when 35 pineapple producers came together in the Eastern Province of Rwanda, in the Kirehe District and Gahara Sector. It was formally registered as a cooperative in 2006, and its members have continued improving the quality of their produce. The idea of drying pineapple, and producing organic-certified dried pineapple in particular, emerged in 2009.

Figure 1.1: Location of Kirehe District and Nyagatare District (right) in the Eastern Province (left) of Rwanda (OCHA, 2017)



The Tuzamurane cooperative and Oxfam began working together in 2010. The cooperative obtained organic certification in 2013 and bought its first dryer in 2014. In 2015, Oxfam in Rwanda worked with Tuzamurane to develop and submit a proposal for EDP support (funding and accompaniment). Support was approved in September 2015, and grants and loans were disbursed at the beginning of 2016: £75,804, of which 51% was through a loan, with the remainder provided through grants and business development services.

The Effectiveness Review investigates the impact of EDP's support between 2016 and 2019 among Tuzamurane cooperative members and suppliers, and on household income. Cooperative members are pineapple producers who supply pineapples to the cooperative based on contracts; they have also joined the cooperative through the payment of a membership fee, and as a result, are entitled to a share of the cooperative profits and to participate in the cooperative's decision making through its General Assembly. Suppliers are also pineapple producers who have transactional supply contracts; however, they have not joined the cooperative and are not entitled to any of the broader cooperative profits (although they can access some of the same services as members, such as loans). Members and suppliers are referred to collectively as 'contractors'.

The following set of evaluation questions were identified:

1. What is the impact of EDP support on household income?
2. Why and how did the project impact household income?
3. Is there any evidence of impact on women's empowerment?
4. Did the household have any impact on job creation at household level?
5. As Tuzamurane has grown, has the socio-economic profile of the cooperative members and suppliers changed? Who has been reached, and who has been left behind?

By design, this evaluation places a gender (and equity) lens at its core, which led the evaluation to investigate the following cross-cutting question:

6. Are different people benefitting differently from EDP support, depending on their socio-economic profile? In particular, did women and men producers benefit differently from the project? Did cooperative members and suppliers benefit differently from the project?

At enterprise level, a question emerged around the social responsibility of the enterprise:

7. To what extent has Tuzamurane considered its social responsibility, and what policies have been put in place in this regard?

These evaluation questions were identified with Oxfam staff and Tuzamurane cooperative members through various preparatory discussions and a workshop in Kigali on 23–24 September 2019.

Finally, as part of Oxfam GB's Strategic Evidence Framework, this evaluation also investigates Oxfam and partners' accountability to the people we work with.

2 PROJECT DESCRIPTION

EDP's model focuses on providing finance and technical assistance to early-stage agricultural enterprises to enable them to become sustainable businesses. The supported enterprises create opportunities for smallholder farmers in two ways. First, the enterprises ensure a sustainable market for farmers to sell their products. Second, the enterprises aim to create jobs that support the local economy. Finally, EDP contributes to wider changes in the market system that will support more favourable policies, increased investments from national institutions, and replication of small and medium enterprises. This section focuses on Tuzamurane cooperative and the support it received through EDP.

2.1 THE TUZAMURANE COOPERATIVE

Tuzamurane cooperative was created in 2005 by 35 pineapple producers – 18 women and 17 men – in the Gahara Sector.

> 'At that time, we had a lot of production but no market. The main purpose of the creation of the cooperative was hence to get together to sell collectively and identify a market. Most of the production could go to Kigali market. The cooperative was created to look into improvement in production in order to increase sales.'
>
> Jean Damascéne Hakuzimana, cooperative president[8]

The cooperative was formally registered in 2006, and its members have continued improving the quality of the produce. The cooperative began collecting the pineapples and selling to Kigali market. 'They were also looking into processing methods [pineapple has a shelf life of five days] – producing pineapple juice was considered. But they also wanted to think big: what other products could they bring into the market?' recalls the cooperative president.[9] The idea of drying pineapple, and organic-certified pineapple in particular, emerged in 2009, following the visit of a cooperative member to Belgium. The cooperative and Oxfam began working together in 2010.

The cooperative obtained organic certification in 2013, bought its first dryer in 2014 and started selling organic dried pineapple in 2015. By the end of 2015, the cooperative was selling 2.8 tonnes of dried pineapple.[10]

Tuzamurane appears to have been pioneer in (organic) pineapple drying in Rwanda and in targeting international markets. The 2013 Rwanda Horticulture Organisations Survey (RHOS)[11] shows that in the Eastern Province, where the first horticultural crop was tomato and the second crop pineapple, only 0.7% of total horticultural production was exported (0.3% to African countries and 0.4% to Europe or the Middle East – national shares were 1.8% and 0.2%). Among fruits, pineapple production accounts for the largest volume (12.8% of national horticultural production), and this share is even higher in the Eastern Province (22.5%). Note that a baseline report (AGRER Consortium, 2014) highlighted that pineapple is a relatively 'low-value fruit': in the Eastern Province, pineapple production represented 18.1% of the total value of sales (compared to 6.2% nationally). The same report also shows that processing of horticultural products was low overall in 2013; it was dominated by juice making,[12] which mainly took place in Kigali and to a lesser extent in the Northern Province.

Since its creation, the Tuzamurane cooperative has grown substantially. This is reflected by a large increase in the number of cooperative members and suppliers, which is discussed in more detail in Section 5.6. As a result, the volume of production has also drastically changed: in September 2019, the cooperative was processing two tonnes of

pineapple per month.[13] Revenues from sales increased eightfold between December 2014 and December 2019. While the cooperative was making losses in 2014, it was profitable as of December 2019.[14] Both the shareholding and the membership fee have increased substantially over the years as a result, as the former is calculated based on profits and the latter based on assets owned by the cooperative.

2.2 EDP'S SUPPORT TO TUZAMURANE

Pre-investment phase

As mentioned above, the relationship between Oxfam and Tuzamurane, which began in 2010, pre-dates EDP's support. In particular, Oxfam introduced Tuzamurane to Shekina, another enterprise supported by EDP at the time, which dries cassava leaves; this led to Tuzamurane buying its first dryer in 2014. Oxfam also facilitated the link with Tuzamurane's first European buyer.

This relationship building was critical and led to Oxfam in Rwanda and Tuzamurane working on a proposal for EDP support.

Support to Tuzamurane was approved by EDP's board in July 2015, subject to some changes to strategy; in particular:

- When Tuzamurane applied for EDP's support, the cooperative was considering selling non-organic fresh pineapples. The board raised concerns about this strategy (including risk of contamination of fresh produce and lack of clarity regarding the value-added in terms of sales).
- Strengthening the technical support available to farmers, to make sure that organic certification would not only be obtained but sustained over the years (with production meeting quality standards).

In response, Tuzamurane revised its strategy to focus on drying organic pineapples, leading to the approval of EDP support in September 2015.

Investment phase

This review focuses on assessing the impact of EDP's support between 2016 and 2019. EDP's investment started in 2016 (actual disbursement of funds): £75,804, of which 51% was through a loan.[15] The remainder comprised two grants (31%) and business development services (18%). An example of support in the form of business development services was the contracting of a consultant to support the identification of new markets in 2017–2018.[16]

In addition to financial support, the EDP manager and the officer of Oxfam in Rwanda provided direct support as required (e.g. technical support, and facilitating linkages with other projects and opportunities).

At the time of Tuzamurane's application for EDP support, EDP's board highlighted the potential for further diversification (juice and pulping). While Tuzamurane focused first on pineapple drying, another opportunity to diversify arose in 2018 when the cooperative received support from the Ministry of Agriculture to build two new processing buildings. One building will enable Tuzamurane to increase its drying capacity (with room for up to three dryers, although it will start operating with one dryer) and one building to start juice

making (in part with pineapple hearts left over in the drying process). The buildings were under construction at the time of this evaluation (see Figure 2.1).

Figure 2.1: New building for pineapple drying under construction in 2019

2.3 PROJECT LOGIC AND EXPECTED OUTCOMES

At cooperative level, EDP's support is expected to bring about an increase in production, a diversification of production (leading to risk mitigation and value-addition) and improvement in management. This will result in improved access to markets and job creation (see Figure 2.2). EDP's support is also expected to bring about a diversification of investors, in particular from the formal sector. Sustainability of the initial investment is reached when further investments can be accessed through banks, without EDP being guarantor for the loans.

The organization of farmers as a cooperative creates opportunities, which EDP's support will enhance. First, it creates marketing and processing opportunities, as well as facilitating the organic certification process, which have been at the core of the Tuzamurane model since its creation. But the cooperative model also enables other opportunities: in particular, it provides loans and cash advances (for school tuition fees or building costs) to cooperative members and suppliers, which are paid back with the harvest. The cooperative provides health insurance to its contractors and supports its members' pensions.[17]

When prompted about the social responsibility of Tuzamurane, the cooperative's president said: 'When one looks at Tuzamurane's profitability, one may think it is not that high, but this is because the cooperative does all of this for their suppliers (members or not) [loans, health insurance, cash advance]. Profitability may be lower, but sustainability is higher. The purpose of the cooperative is indeed to contribute to local development, to lift one another up!'[18] In fact, 'Tuzamurane' translates as 'to lift each other up', and it is a core value of the cooperative to give people an opportunity to be together and support each other.

Figure 2.2: Reconstructed project theory of change at enterprise level

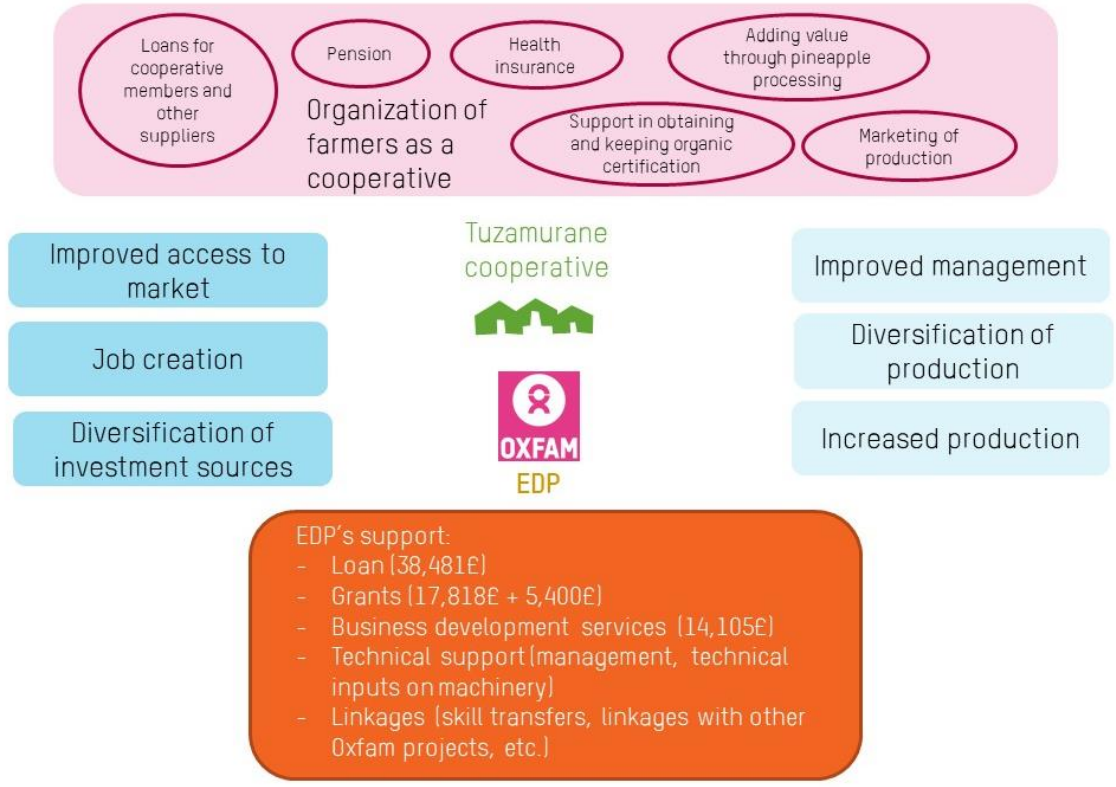
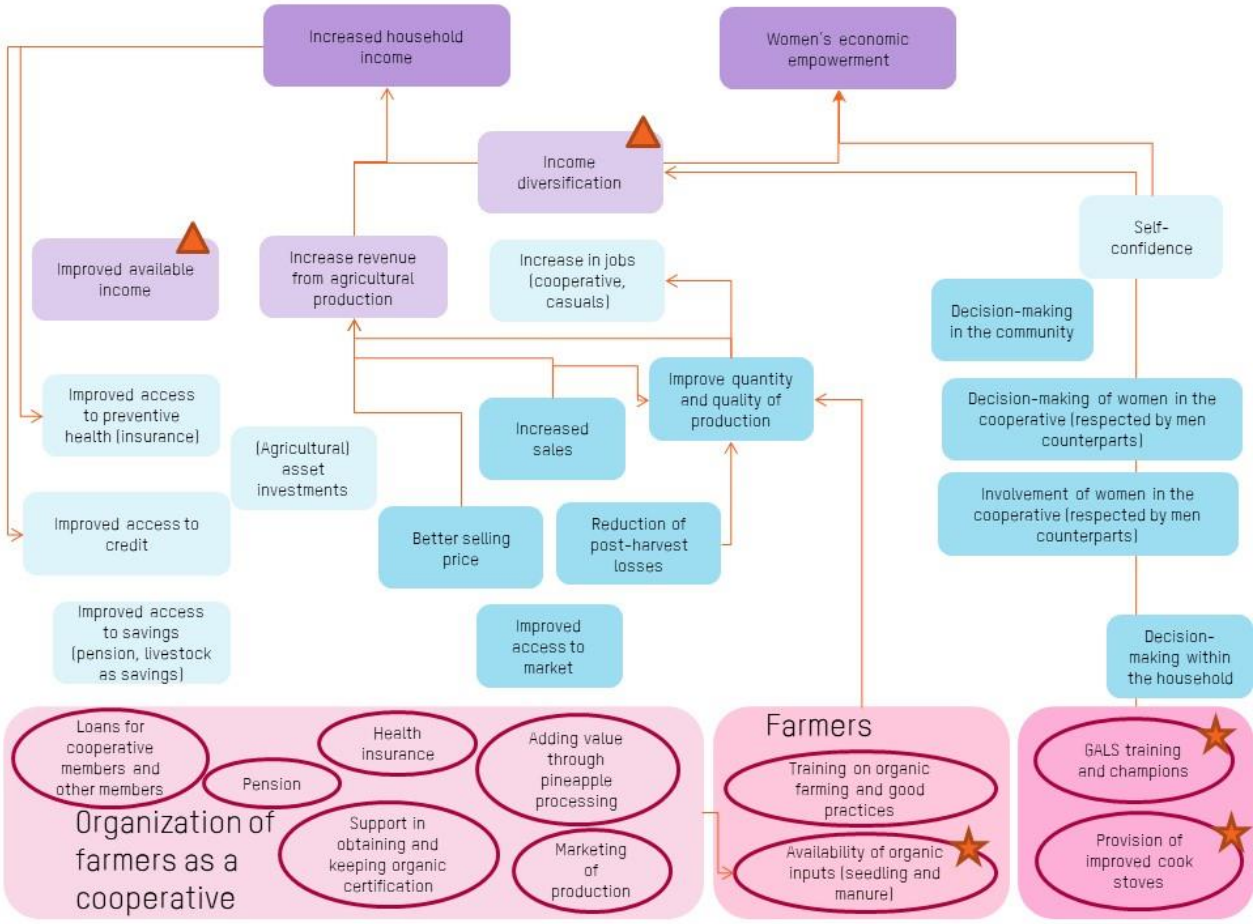


Figure 2.3 presents a reconstructed theory of change of the project for the contractors of Tuzamurane (cooperative members and suppliers). It focuses on household income and women's economic empowerment as the core areas of expected impact identified by the team involved in this review.

Figure 2.3: Reconstructed project theory of change at cooperative member and supplier level



For the farmers involved with Tuzamurane, the cooperative supports organic farming through trainings and availability of organic seeds and fertilizer. It also supports farmers who would like to switch to organic pineapple farming, by providing the seeds as an advance on the harvest. As pineapple takes 18 months from seedlings to the first harvest, Tuzamurane also supports new growers by providing an advance on their first harvest if needed.

The triangles on this figure flag the areas of change where differential impacts for cooperative members and suppliers could be expected. For example, cooperative members are shareholders, hence they benefit from a share of the cooperative profit in addition to their main source of revenue (pineapple sales, for example, for those who are suppliers to the cooperative), leading to income diversification. Becoming a cooperative member is an investment, and cooperative members have to meet the following criteria: farming pineapple on more than 0.5 hectares; farming pineapple organically; and paying a membership fee (in 2019, the fee was 209,200 RWF a year).

The stars on this figure flag the gender lens adopted in the project logic. One important constraint to women's involvement in pineapple farming in Rwanda is time. Women have a disproportionate responsibility for unpaid care and domestic work within the household and family. The Gender Action Learning System (GALS, see Oxfam Novib 2014) was implemented as part of EDP. This consists of visioning, analysis, change planning and tracking of gender relations by women and men, involved in the pineapple value-chain. The GALS approach is also about peer learning (through 'gender champions'). It is expected to enable men and women to define the steps they want to take towards gender equality,

which in turn will lead to more equal task distribution around care and domestic work in particular. GALS is also expected to bring more equal decision-making power over income.

Participation of women in the cooperative and its decision-making fora is also expected to contribute to women's empowerment,[19] as is the assumption that women will access additional revenue from pineapple farming as a result of EDP's support. It is important to highlight that the cooperative does not have any particular policy related to gender equality but tries to lift financial barriers that women farmers could face to buying organic inputs, by offering them the opportunity to buy in instalments. Similarly, while not shown on the above figures, women who want to join the cooperative as members are given the option to pay the entry fee in instalments over three years.

Note that overall, the assumption behind the expected increase in household income, through increased revenue from agricultural production and an increase in total available income, is that there will be no substitution effects. Time constraints of all household members could in reality lead to crop substitution or substitution of different sources of revenue. In addition, as mentioned above, women face specific time constraints due to their unequal responsibility for unpaid domestic and care work.

2.4 SELECTION OF PROJECT SITES AND PARTICIPANTS

At the time of the evaluation in 2019, the cooperative had 183 registered suppliers, some of which are farmer groups – hence estimated at 238 individuals. 138 individuals were cooperative members. All suppliers had farms in Gahara Sector.

3 EVALUATION DESIGN

At the core of the evaluation design lies a gender and equity lens. This led to specific attention being paid to three key questions in making methodological choices. First, whose experience and material conditions are reflected in the data? The sampling approach (Section 3.2) ensures that women and men are represented in the data. Second, what is considered a key indicator? The data collection tools investigate different aspects related to gendered experiences and living conditions (Section 3.3). Third, the evaluation design enables the analysis to systematically assess gender differences as well as gender-differentiated impacts (Section 5.2).

This evaluation focuses on a binary conceptualization of gender. This contributes to the invisibilization of non-binary identities and is a limitation of this work. We want to acknowledge that such evaluative work needs to go further (see Barakat, Pretari and Vonk, 2021).

3.1 QUASI-EXPERIMENTAL APPROACH

This Effectiveness Review uses a quasi-experimental approach, aiming to find the best estimate possible of 'What would have happened in the absence of the project?'. It applies mixed methods to answer the evaluation questions, including those at the household and individual level as well as the enterprise level.

Impact at the household and individual levels is assessed through surveys. Propensity score matching (PSM) is used to see if any differences between the project group and the comparison group are attributable to the project. This method takes into account any observable differences at baseline (using recalled baseline data).[20] For example, farmers who were already doing pineapple farming in 2015, among Tuzamurane cooperative members or suppliers, are only compared to farmers in the comparison group who were also farming pineapple in 2015 (while also matching based on various other characteristics such as age, gender, wealth quintile, etc.).

To better understand the added-value of EDP support at enterprise level, qualitative interviews were conducted with:

- The Tuzamurane cooperative (project group);
- The Koubumu cooperative, another cooperative of pineapple producers (comparison group);
- Natural Fruits Drier Company LTD, a small enterprise processing pineapple and bananas (comparison group).

The interviews were analysed qualitatively, following the themes used to structure the interviews.

3.2 SAMPLING APPROACH

The sampling approach prioritized two different areas:

1. To maximize comparability of the intervention and comparison groups before EDP support for Tuzamurane began, and isolate EDP support from other activities conducted by Oxfam as much as possible.

2. To ensure representation of women and men within households and enable systematic analysis on outcomes at the household and individual levels, for different social groups in different positions of power.

All cooperative members and suppliers of Tuzamurane (project group) were invited to take part in the survey. Lists of cooperative members and suppliers (collectively referred to below as 'contractors') working with Tuzamurane as of September 2019 were provided by the cooperative.[21] This allows assessment of impact among the whole group of suppliers and cooperative members, taking into account the growth of the cooperative, and the investigation of differential impacts. It also allows assessment of how the socio-economic profile of suppliers and cooperative members has shifted over time as Tuzamurane has grown.[22]

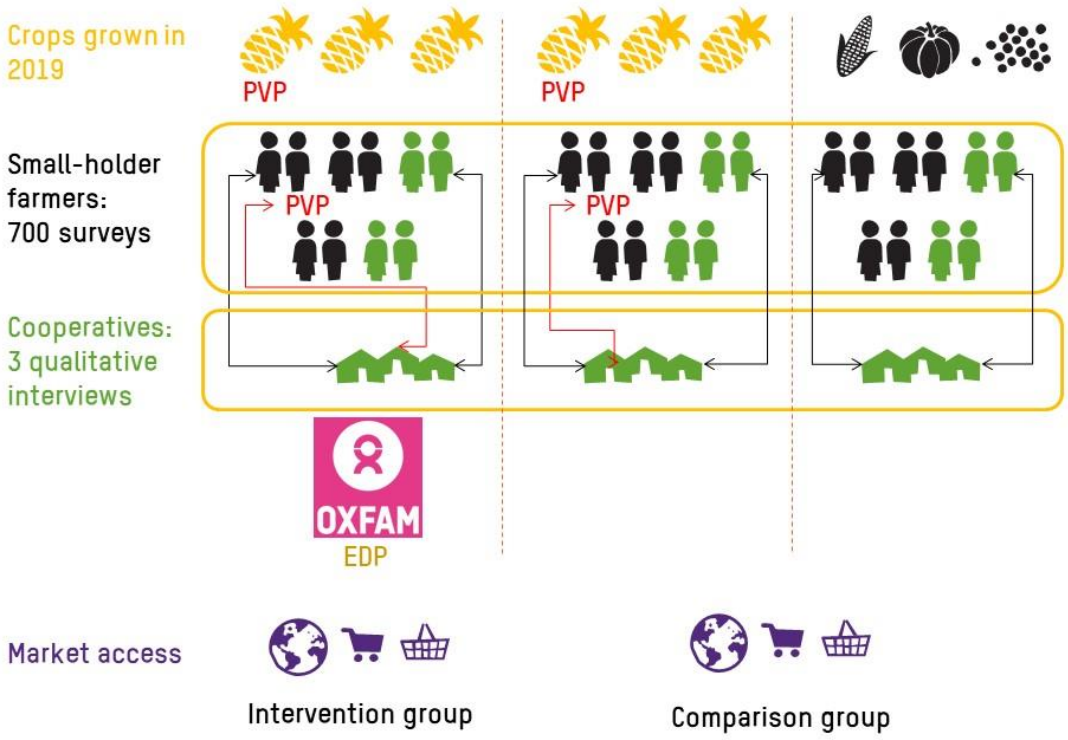
Note that there are sometimes several contractors per household. Because the primary focus of this review is at the household level, in the case of different members of the same household being registered as suppliers or cooperative members, the aim was to survey only one household member, and the ideal scenario would have been to randomly pick this member. However, we could not identify in advance which contractors belonged to the same household. When the survey team did identify such cases, they did their best to randomly pick on the spot one household member with whom to conduct the survey. This was difficult in practice, and is a limitation of the data.

Men and women forming the comparison group were identified following two key factors.

- First, between September 2016 and June 2019, Oxfam and its partner Duterimbere[23] implemented a separate but related project, the 'Pineapple Value Chain Promotion' project (PVP), aimed at promoting organic farming in pineapple production and market linkages for smallholder farmers (especially women). PVP activities included the GALS methodology, training on record keeping for village savings and loans associations, and providing capital for these associations. PVP also provided some training on organic pineapple farming through demonstration plots, and supported the organic certification process for farmers. In Gahara Sector, as part of PVP, Duterimbere promoted ties between Tuzamurane and individual farmers, farmer groups and cooperatives of pineapple producers. Hence, as Tuzamurane grew, some pineapple farmers (or farmer groups) may have joined the cooperative or started supplying it, as a result of the PVP project. Farmer groups or pineapple cooperative members (50% women) working with Duterimbere in the same project but in another sector or district were therefore included to form the potential comparison group. For practical reasons, the villages in which the farmers identified as part of PVP formed the village-level sampling frame for the comparison group. Note that this approach aims at isolating the impact of EDP's support from the impact of PVP.
- Second, based on conversations with Oxfam and Tuzamurane staff, it was identified that some farmers switched to pineapple farming as a result of the growth of Tuzamurane (and its support to enable farmers to do so). In other words, in the absence of the intervention these farmers would have been growing crops other than pineapple. For this reason, the survey also targeted women and men farmers who were not necessarily growing pineapple in 2015. In the villages identified above, the survey team used random walk and a screening question: only households whose members were involved in cultivating and selling crops in 2015 were to be included in the survey. The main respondent was identified as any person aged above 18 involved in farming activities. The survey programme did random selection of the gender of the respondent: in cases where the household had several adult members involved in farming activities, the survey team followed the random variation to select who to invite to participate in the survey.

Figure 3.1 presents an overview of the impact evaluation design.

Figure 3.1: Overall impact evaluation design



3.3 DATA COLLECTION TOOLS

A quantitative survey questionnaire and a qualitative interview script were designed to answer the evaluation questions.

The quantitative survey was developed using previously tested questions as much as possible (e.g. from previous evaluations and published indicators). Questions were adapted as required for this evaluation and the specific context, based on preparatory interviews conducted in Gahara Sector on 26 and 27 September 2019 and inputs from the Oxfam in Rwanda team and the survey team.

Household consumption was measured as a proxy for income (see Lombardini, 2017). The survey explores expenditures related to both food and non-food items, over the last seven days, one month or 12 months, depending on the item. Non-food consumption covers a range of items such as transportation and energy costs, savings, donations, clothes, school fees and other educational expenditures, and health costs, to name a few. Household consumption is then converted into a daily equivalent estimate per adult.[24] Finally, this estimate is expressed on a logarithmic scale to reduce the influence of outliers and express differences in terms of percentages. Note that this measure requires a lot of detailed data to be gathered related to consumption, and that both interviewers and interviewees in the pilot found this exercise tedious, with some finding it disempowering and intrusive.

An alternative measure (see Lombardini, 2017) is household wealth, estimated through household asset ownership (e.g. livestock, agricultural land, productive equipment and household goods), characteristics of the house (e.g. building materials, water and energy sources) and inversed distance to the nearest market. For this evaluation, 25 indicators were used to construct a wealth index, for both 2019 (the time of the survey) and for 2015.[25] A data reduction technique called principal component analysis (PCA) was used to produce the two indices of overall wealth.[26]

For different indicators of women's empowerment, we drew from the 'How to' guide to measuring women's empowerment (Lombardini, Bowman and Garwood, 2017). We also followed recent developments around how to measure intra-household decision making by using vignettes. This approach was also used in an Effectiveness Review carried out in Ethiopia in 2018/19, which was specific to women's empowerment (see Lombardini et al., forthcoming). It was inspired by a blog post by Rachel Glennerster and Claire Walsh, dated 6 September 2017, about the need to rethink how decision-making power within the household is measured.

The gender lens adopted in this evaluation led us to look into indicators related to unpaid care and domestic work, as well as perceptions of acceptability of domestic violence. The gender lens also led us to try to unpack the use of 'female-headed households' as a category. While the idea of headship is widely used, it appears in large-scale surveys as an organizing principle.[27] 'Gender of the household head' has since been used as an analytical category, as part of efforts to bring a gender lens to various analyses. Kathleen Beegle and Dominique Van de Walle discuss how useful this is in a blog post published on 6 June 2019, and call for 'going beyond simple male- and female- headship comparisons, and toward a richer typology of households, taking account of marital status, demographics [...] income sources, and (as much as possible) individual well-being'. We argue that 'female-headed household' hides a variety of situations that women and household members of all genders face, and that this category was created as a proxy for specific positions of vulnerability that some women face (which will depend on the social context). In the Rwandan context, households comprising women living alone with their children, those who were widowed, for some as a result of the genocide or whose husband is away due to migration, are identified as being in a more vulnerable position than other households. In this survey, we trialled a different way to capture such information, departing from the idea of headship. We later refer to such households as 'households whose structure relies on a single woman'.

The qualitative script explored the following themes: history and growth of the enterprise; the relationships between the enterprise and its suppliers; challenges and opportunities faced over the past 10 years; and the relationship of the enterprise with Oxfam and partners.

4 DATA

4.1 RESPONDENTS INTERVIEWED

Data collection was led by Clement Mukuralinda and a team of 12 interviewers and was carried out intermittently between 7 October and 6 November 2019. The main challenges faced by the team were linked to a heavy rainy season, the wide scope of the survey (multiple locations, very scattered) and availability of respondents at their homestead (with many working on their farms at time of the visit from the interviewers).

650 surveys were carried out in total: 251 in the intervention group and 399 in the comparison group. Table 4.1 shows a breakdown of survey participants by intervention and comparison groups, and district. The qualitative interviews were conducted in parallel.

Table 4.1: Description of the survey sample

		Nyagatare District	Kirehe District	Total
Intervention group	Tuzamurane cooperative members or suppliers	0	251	251
Comparison group	Pineapple farmers supported by PVP (farmer group or cooperative members)	158	24	182
	Representative sample of individuals involved in farming activities	165	52	217
	Total	323	327	650

4.2 ANALYSIS OF BASELINE CHARACTERISTICS

Tuzamurane contractors

Tuzamurane suppliers and members ('contractors') were on average 45 years old[28]; 35% were women, 23% did not have any formal education[29] and 62% had some primary education. Households had five members on average, and two below 15 years old. 9% of the households relied on a single woman.

Women and men contractors of Tuzamurane have different socio-economic profiles.[30] Women were more likely to have never received any formal education (33% vs 18% among men[31]), more likely to be widowed or divorced (20% and 3% respectively among women, vs 2% and 0% among men). Women also participated in slightly fewer groups than men in 2015 (2.7 vs 3.0 on average).

For 20% of the women contractors' households, the household structure relied on a single woman, compared to only 2% among men contractors' households. Women contractors' households were poorer than men's in 2015, based on the wealth index described in Section 3.3: women contractors' households were less likely to be in the fourth and fifth quintile of the wealth distribution in 2015 than men's (17% and 23% respectively for

women, vs 30% and 34% for men). This difference is also reflected by the average agricultural land area owned: 1 ha for women vs 1.4 ha among men contractors' households. Finally, it is important to highlight that only 60% of women contractors grew pineapple in 2015, compared to 78% of men contractors.

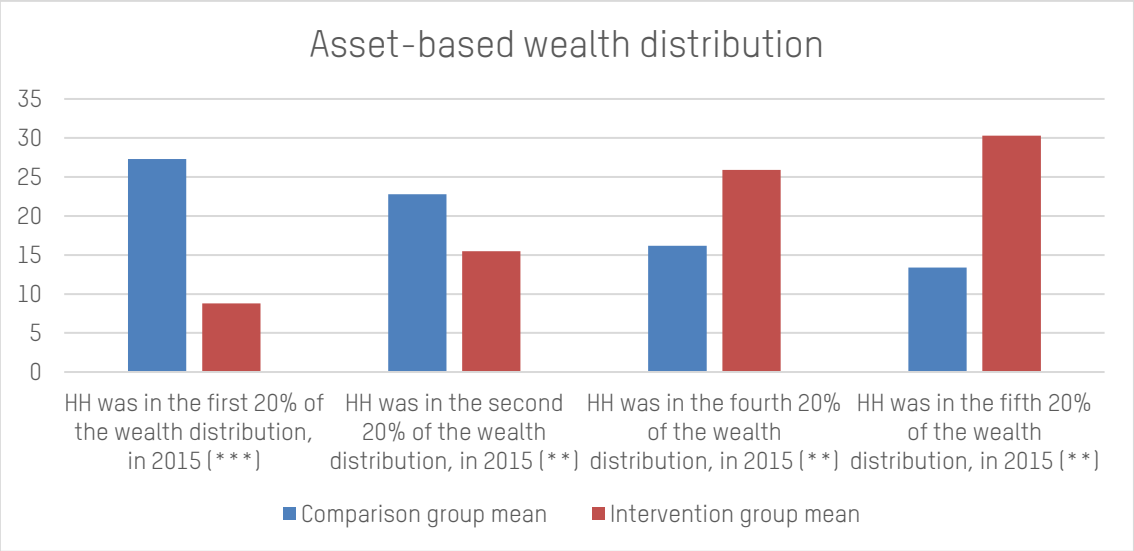
Survey participants' representativeness of the general population

This review focused on people involved in farming activities, and the sample is therefore not representative of the general population in the areas surveyed. Almost everyone who participated in the review declared that they owned some agricultural land in 2015, while according to the 2017 Demographic and Health (DHS) survey, this was the case for only 42% of households in rural areas (Malaria and Other Parasitic Diseases Division of the Rwanda Biomedical Center Ministry of Health [Rwanda] and ICF, 2017). Similarly, 77% of survey participants owned some farm animals in 2015 (household-level ownership). This was 60% in rural areas in 2017, according to the DHS survey. This suggests that the location, involvement in farming activities and other criteria used to identify survey participants described in Section 3.2 tend to over-represent wealthier households relative to the general rural population of Rwanda.

Differences between project participants and comparison group

Table A1.1 in Appendix 1 presents descriptive statistics of all the baseline characteristics and the test of equality of means between the intervention and comparison groups. Key differences are discussed here. Overall, the current suppliers and members of the cooperative were wealthier in 2015 than people in the comparison group; see Figure 4.1. While only 9% of Tuzamurane suppliers and members were in the first (poorest) quintile of the wealth distribution in 2015, this was 27% in the comparison group. At the other end of the distribution, Figure 4.1 shows that 30% of the Tuzamurane suppliers and members were in the fifth (wealthiest) quintile of the wealth distribution in 2015, while this was only 13% in the comparison group.

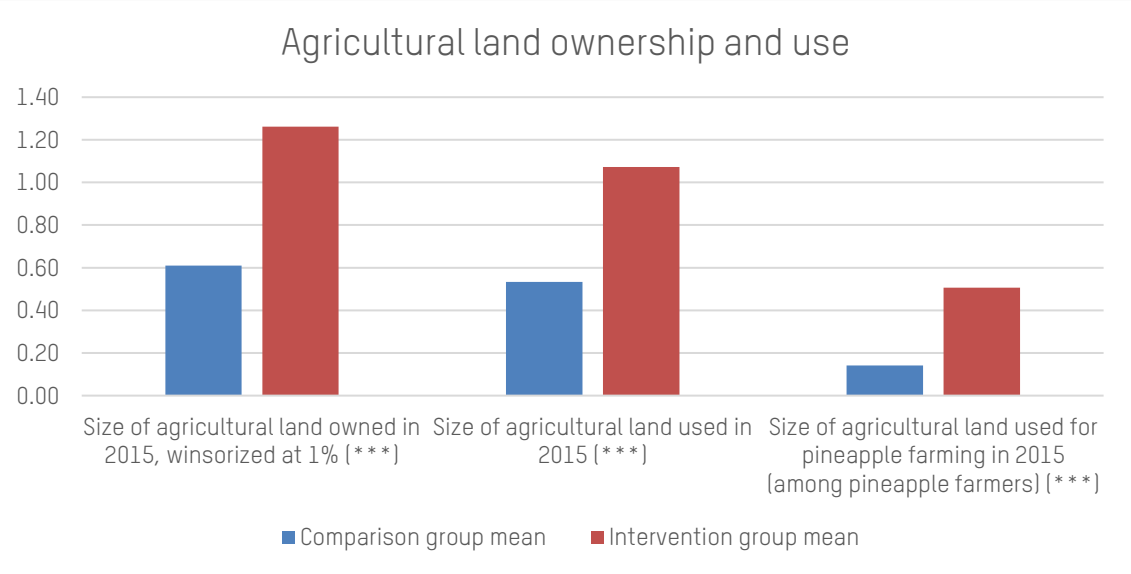
Figure 4.1: Difference in wealth distribution between intervention and comparison groups in 2015



* p < 0.1, ** p < 0.05, *** p < 0.01

While the measure of wealth used in Figure 4.1 includes agricultural land ownership, it is important to dig deeper into the differences between intervention and comparison groups in agricultural land ownership and use, as this is critically related to the analysis carried out in this review. Figure 4.2 shows that the Tuzamurane contractors owned and used more land in 2015 than those in the comparison group (1.3 ha vs 0.6 ha). The area used for growing pineapple, among pineapple growers, was also significantly different (0.5 ha vs 0.14 ha) between the two groups in 2015.

Figure 4.2: Difference in agricultural land ownership and use between intervention and comparison groups in 2015



* p < 0.1, ** p < 0.05, *** p < 0.01

Tuzamurane members and suppliers had more experience in pineapple farming in 2015 than the farmers in the comparison group (72% vs 44% were growing pineapples in 2015) and more had been doing it for longer (30% of the intervention group started growing pineapple in 2007 or before, vs 6% of the comparison group). They were also more likely to have already attained organic certification (21 vs 2%).

The demographic composition of the two groups is also different: 34% of Tuzamurane contractors are women, compared to 50% in the comparison group. Tuzamurane contractors were also more likely not to have received any formal education (23% vs 14%).

Note that these differences do not seem driven by differences in district.

4.3 MATCHING PROCESS OVERVIEW

An overview of the most pertinent information from the propensity score matching (PSM) process and other descriptive information is provided below. Further details on how we do PSM and full specifications for this evaluation are provided in Appendix 2. Appendix 2 also presents how differential impacts for different social groups are estimated in this report.

As mentioned in Section 4.2, we found several significant differences between intervention and comparison groups. By using PSM, we can adjust for these differences when estimating impacts. However, finding a good matching model was difficult, due to the strong differences between the intervention and comparison groups in 2015. This has

consequences for the representativeness of the impact analysis, which we discuss below. While the matching process reduces the differences between the two groups, some differences remain; this is also discussed below.

Representativeness of the impact analysis

To improve matching quality, we excluded the biggest landowners in the sample (those who owned above 3 ha of agricultural land in 2015) from both the intervention and comparison groups.[32] The matching process also led to excluding more observations, which fell outside of common support (11% overall, and 10% in the intervention group), as described in Appendix 2. This leads to estimating the impact of EDP's support on a subgroup of cooperative members and suppliers of Tuzamurane cooperative.

We looked at descriptive statistics comparing the subgroup of Tuzamurane contractors on which the impact analysis is carried out to those that are excluded from the analysis, to understand the subgroup's representativeness. It is clear that the subgroup with which the impact analysis is carried out over-represents women (39% in the subgroup vs 12% among the excluded subgroup) and younger individuals (44 years old on average vs 52 years old), and those who are divorced (1.4% vs 0%). Also excluded are the richest (57% of those who are excluded are part of the 20% top distribution of wealth, against 26% of those kept in the sample), and owners and users of larger areas of land (2.2 ha owned in 2015 vs 1.1 ha; 1.9 ha used in 2015 vs 0.9 ha). It also leads to excluding those with very high monthly employment rates (10 casual workers vs 4).

When looking at pineapple farming in particular, the matching process leads the analysis to focus on the farmers who started growing pineapple more recently (68% grew pineapple in 2015 vs 94% in the excluded subgroup) and who benefitted from Tuzamurane more recently. Indeed, the analysis focuses on a group of farmers who are less likely to have already been part of Tuzamurane cooperative in 2015 (32% of those kept in the sample vs 69% of those excluded). This group of farmers were also less likely to have started growing pineapple in 2007 or before (23% vs 77%) but more likely to have started in 2014–2015 (25% vs 3%). They were less likely to already have obtained organic certification by 2015 (12% vs 80%).

Acknowledging that Tuzamurane started its activity 10 years before EDP financial support, the matching process leads us to focus the analysis on Tuzamurane's recent growth and more recent members and suppliers.

Correction of baseline differences

The matching process reduces the differences between the two groups. Table A2.3 in Appendix 2 shows the averages in both groups for a range of baseline variables (or individuals' characteristics which we assume would not be affected by the project, such as age, education, literacy and marital status) after matching correction. For four variables, the difference in means is significant. These relate to respondents' education status, and agricultural land ownership and use in 2015. The variables on land ownership and use may affect the outcomes of interest in this review, and hence two additional steps were taken. First, impact analysis on agricultural land ownership or use focused on the change in the area owned or used since 2015. Second, a robustness check was run using another estimation strategy to control for this imbalance. Where the robustness check produced different estimates than the main PSM model, these are discussed in Section 5 and presented in Appendix 3.

5 RESULTS

As mentioned in Section 2.1, Tuzamurane has grown over the years, particularly since 2015. The president of the cooperative reported that 'the amount of land which the cooperative covers has increased from 36 hectares [in 2005] to 188.8 hectares – the provision of the EDP grant helped with this increase'.[33] The cooperative itself also owns land (on some of which pineapple is grown). The president highlighted that due to farmers receiving training and adopting good organic practice, including using manure (which all cooperative members have access to), production has increased, as has the number of employees at the cooperative (rising from one to 31). The president attributes the increased shareholding to strengthened partnerships with different organizations (including Oxfam since 2013, USAID, the organic-certified farmers – suppliers of the cooperative – who are not necessarily cooperative members) and also Tuzamurane's links with the government of Rwanda.

In particular, in addition to EDP's support, the cooperative has received the following assistance:

- The United States African Development Foundation provided management support, and capital – a truck for transportation and a storage facility – between 2016 and 2018.
- The USAID Private Sector Driven Agricultural Growth Project provided a second dryer and factory equipment in 2017.
- The Ministry of Agriculture provided funds to build new processing buildings (for drying and juice making) in 2018.

Such access to finance, alongside the repayment of the loan provided by EDP, is testament to the cooperative's growth and achievements in recent years. The president recalled that 'the biggest barrier which Tuzamurane cooperative has faced over the years was struggling to make a loan repayment to the bank'.[34] This was a loan taken in 2013, which was a bad agricultural year, but the loan was cleared in 2015.

Tuzamurane's growth, size, and the support it has received from various institutions are very different from those of other cooperatives and small enterprises involved in pineapple farming and processing. First, the other cooperative and small enterprise interviewed for this review were created later (2007 and 2013) than Tuzamurane. While the cooperative has no processing capacity, the enterprise acquired its dryer and other equipment in 2017 through a grant from the Local Competitiveness Facility of the Ministry of Local Government and a European Agency. The enterprise received funding from the National Agriculture Export Development Board in 2013, which helped its creation, but has not received further support.

There are two additional key differences between the enterprise interviewed and Tuzamurane. While Tuzamurane obtained organic certification in 2013, the enterprise is in the process of gaining certification. As a result, its main market is currently domestic. Gaining the certification will allow it to sign a contract with a buyer for export to the USA. Tuzamurane's president highlighted that 'getting the [organic] certification for the first time (and its renewal) was also a big challenge'.[35] Organic certification is critical as it opens up the opportunity to export, because organic certification is directed at and valued on export markets (currently there is no such certification targeted towards domestic markets). A higher price is hence expected from the export of organic pineapples than could be achieved in the domestic market, as highlighted by the enterprise we interviewed. On the other hand, discussions with people involve in the pineapple value-chain highlighted that organic production of pineapples is more labour intensive and expensive (due to the cost of seeds and manure) and thus the produce tends to be slightly

more expensive on the domestic market. However, domestic consumers cannot differentiate between organic and non-organic pineapples and are therefore less likely to pay more.

However, relying on one main export contract is risky – at the moment there is only one European buyer for Tuzamurane pineapples. The cooperative is currently looking for opportunities to expand its market.

5.1 HOUSEHOLD INCOME

What is the impact of EDP support on the household income of pineapple producers – women and men, cooperative members and suppliers? To answer this question, we first looked at household consumption in the past 12 months (see Table 5.1).

We observe a positive overall average impact of the project on food consumption, but this is driven by households of men contractors. Indeed, we see that the project had no impact among women contractors' households (small negative coefficient, not significant), but a significant impact among men contractors' households. We estimate that the daily food expenditure, per equivalent adult, increased from 573 RWF to 797 RWF as a result of the project.

When looking at non-food expenditures and total consumption, we find a positive but not significant average impact (of 279 RWF for total expenditure; see Table A3.1), after controlling for land size. The positive coefficient is driven by a significant impact among men contractors' households: being a contractor of the cooperative enabled an increase of 28% of their household's total daily consumption per equivalent adult, compared to households of men in the comparison group.[36]

Second, we don't find a significant impact on wealth, assessed through the asset-based composite measure. While Table 5.2 shows a differential impact among women and men contractors, Table A3.2 shows that impact among men contractors is positive but not statistically significant, and of reduced size when controlling for differences in agricultural land ownership in 2015.

Table 5.1: Household expenditures

	Total daily food expenditures per adult equivalent (EA) –RWF	Total daily non-food expenditures per EA – winsorized – RWF	Total daily food AND non-food consumption expenditures per EA – winsorized – RWF	Log transformation of total daily food AND non-food consumption expenditures per EA
Overall				
Intervention mean	687.1572904	1008.060002	1695.366118	7.103641929
Comparison mean	559.918492	750.9911998	1311.04922	6.9006128
Difference	127.24*** (46.33)	257.07* (155.74)	384.32** (174.53)	0.20* (0.11)
Observations (intervention group)	216	216	216	216
Observations (total)	568	568	568	568
Testing for differential impacts				
Gender effect in the comparison group – men compared to women	-16.03 (49.77)	67.16 (108.53)	62.66 (140.24)	0.03 (0.09)
Impact of the project among women	-25.75 (38.75)	118.46 (122.77)	99.13 (141.63)	0.04 (0.11)
Differential impact for women and men	251.47*** (55.51)	194.03** (90.04)	435.20*** (108.73)	0.26*** (0.08)

Standard errors in parentheses, clustered at the cell level; * p < 0.1, ** p < 0.05, *** p < 0.01; PSM estimates are bootstrapped with 1,000 repetitions; differential impacts are tested through PS-weighted regressions with robust clustering at the cell level. The cell is the administrative level above villages and below sectors.

Table 5.2: Asset-based measure of wealth

	Normalized wealth index
Overall	
Intervention mean	0.41
Comparison mean	0.21
Difference	0.19 (0.15)
Observations (intervention group)	216
Observations (total)	568
Testing for differential impacts	
Gender effect in the comparison group – men compared to women	0.01 (0.07)
Impact of the project among women	-0.03 (0.08)
Differential impact for women and men	0.25** (0.11)

Standard errors in parentheses, clustered at the cell level; * p < 0.1, ** p < 0.05, *** p < 0.01; PSM estimates are bootstrapped with 1,000 repetitions; differential impacts are tested through PS-weighted regressions with robust clustering at the cell level.

As mentioned in Section 4.2, access to land is different for women and men Tuzamurane contractors. We see that on average, women contractors owned 1 ha of agricultural land in 2015 and men contractors owned 1.2 ha.[37] Gender differences in ownership of agricultural land is not driving the differential impacts on household income: these hold when controlling for initial land size differences.

The household structure of women and men contractors is also different: women contractors were much more likely to be in households whose structure relies on a single woman (single parent or woman living without a partner) than men contractors. This is associated with land ownership. Women contractors in households whose structure relies on a single woman owned even less agricultural land in 2015 (0.9 ha on average, while this is 1.1 ha for women contractors in households whose structure is organized around a single man or around a couple). We investigated whether household structure was a driver of the gender differential impact and we found contradictory evidence. When restricting the sample to households whose structure does not rely on a single woman in 2015, the impact on total consumption among women contractors seems to increase, and the gender differential impact to decrease (although the difference is still important). This suggests that the project had a particularly low impact on income among the households of women contractors whose household structure relies on a single woman. However, the results are not consistent when looking at household wealth. We have to highlight here that sample sizes are shrinking when conducting the analysis this way, which gives less confidence in the results.

On a separate note, we do not observe differential impacts on household income, measured through expenditures or wealth, between the 2015 cooperative members and the new members or suppliers. One element to highlight here is that the cooperative shared dividends with its members only once, as the decision was otherwise taken to reinvest. This reduces the potential for differential impact, highlighted in Section 2.3, through income diversification.

This also means there is a positive – but not significant after controlling for land size – impact for both cooperative members in 2015 and suppliers and/or new cooperative members on household income measured through expenditures. This is an important difference from the results of the impact evaluation carried out in 2015, on EDP's support to Pavitra cooperative in Nepal (Caeyers, 2015): this evaluation focused on the cooperative members at the beginning of EDP's support, and does not find evidence of impact on a similar indicator of household income. Note that the evaluation carried out in Nepal covers a two-year timeframe (2011 to 2013) and the results should hence be considered interim results (Caeyers, 2015). The results on income measured through asset-based wealth are, however, consistent with the findings of this review.

Finally, we looked at a few indicators of quality of income (sufficiency of overall income, predictability and timeliness of income from pineapple) and we do not observe a measurable impact (Table not shown, available on request). This is surprising, as we would have expected the contract between the producers and the cooperative to bring about predictability and security for producers, thanks to the cooperative's contract with a foreign buyer, and compared to producers selling on domestic markets. Note that 80% of Tuzamurane contractors interviewed considered that the income from pineapple came at the time they expected.

5.2 WHAT ARE THE MECHANISMS (OR BLOCKERS) FOR CHANGE IN HOUSEHOLD INCOME?

Pineapple production

First, we observe that the proportion of households farming pineapple and having harvested it in the past 12 months is higher in the intervention group, as would be expected, but this difference is not statistically significant (80% vs 68% in the comparison group[38]). However, organic certification is significantly different between the two groups: 84% of the invention group is currently certified, against 35% of the comparison group.[39] This is 92% vs 74% when including farmers in the process of obtaining certification.

We observe a significant impact in produced and sold quantities of pineapple on average (an increase of 1.5 tonnes, and additional 176 000 RWF annual revenue[40]). This is for both women and men contractors, but the impact is stronger among men. Indeed, as a result of the project, women respondents produced and sold an additional one tonne of pineapple, giving an additional annual revenue of 132,000 RWF (production of the whole household). Men contractors produced and sold an additional two tonnes of pineapples, with an additional annual revenue of 230,000 RWF.

Note that the new members and suppliers of the cooperative have increased the produced and sold quantities of pineapple – as well as their revenue from it – significantly more than the 2015 cooperative members, as a result of the project.

We also observe a significant impact in the area farmed for pineapple and the yields (reported yields in the intervention group are almost twice that of the comparison group: 5.7 tonnes per ha, compared to 2.9 tonnes). While the impact on area farmed is driven by men contractors only, the impact on yields is observed for both women and men.

This impact on revenue from pineapple is thus driven by increased production, due to improved yields for both women and men contractors, and an increase in area farmed for pineapple for men contractors. We do not observe a significant impact on price per kg. 130 RWF is the median price per kg among Tuzamurane contractors and other pineapple growers. The median price is not associated with organic farming either.[41] This challenges an important assumption behind the theory of change: that organic farming would lead to a price premium through the cooperative having access to external markets.

A systematic review of agricultural certification schemes (Oya et al., 2018) highlights first that 'qualitative evidence suggests that increased costs of certified production, particularly when organic certification is involved, can offset price benefits and moderate the impact on household income'. We do not have evidence in this case of a price benefit. Second, 'inspection and certification costs can be significant and producer organizations may deduct them from price premium if no external financial support is available (Rueda and Lambin 2013, Dowdall 2012)'. In the setting of Tuzamurane, the cost of certification is certainly high and it is paid directly by the cooperative (and as such is not reflected in the price received by the producers). It also comes with a high transaction cost, as certification has to be renewed every year. In addition, the cooperative has faced losses due to exchange rate variation (over the last five years, the value of the Rwandan franc has decreased compared to the euro).

Crop substitution and investment in agricultural land

The number of crops has not significantly changed as a result of Tuzamurane's growth (seven crops on average). Men seem to have invested in land significantly more in the intervention group than in the comparison group (an additional 0.32 ha in land ownership and 0.17 ha in land use). There is no evidence of impact among women. Given the gender differences in access to land in the first place, such investment ability has increased differential access to land. Pineapple production is reliant on having access to a large area of land. This challenges one of the implicit assumptions behind the project logic: that pineapple is a value chain that is not too reliant on land.

Similarly, this change in agricultural land ownership and use is driven by new cooperative members and suppliers, rather than by contractors who were already cooperative members in 2015 (for the latter, the impact on change in land size is close to being null).

Substitution of income sources

We also observe an overall impact on total revenue from all crop sales as a result of the project (an annual increase of 166,000 RWF[42]). This hides gender differences: there is no significant impact among women, and the average impact is driven by an impact among men contractors.

Overall, we measure an impact on revenue from off-farm paid activities (an additional 82,090 RWF annually, significant at 10%[43]), but this also hides gender differences. We observe a negative impact among women contractors (-37,964 RWF, significant at 10%), and a positive one, significantly different, among men (165,688 RWF). This indicates potential substitution of activities in households of women respondents (after controlling for number of household members), which explains the difference in impact on household income.

Overall, we observe a positive impact on total revenue (251,104 RWF annually[44]). Again, we find no significant impact among women, but the positive impact is significantly different among men (412,313 RWF[45]).

Why do women and men contractors benefit differently from their collaboration with the cooperative?

Section 5.1 highlights that women and men contractors benefit differently from the Tuzamurane cooperative: while the household income of women is unchanged, the household income of men is significantly and positively impacted. As highlighted so far, this seems to be due to a lower impact on the quantity of pineapple produced and sold by women, a substitution of income stream at the household level, and the barriers women face to investing in additional agricultural land. What could explain these differences?

One aspect related to women contractors' ability to benefit from Tuzamurane activities and growth is whether they can free up time spent on care and domestic work, which women are largely responsible for. We looked at the number of activity categories in which men had participated in the last month, among the following three categories: being responsible for the care of children, elderly or disabled members of the household; cooking, cleaning the house, washing clothes; and collecting water or firewood. We don't find evidence that men are participating more in care and domestic activities as a result of their household being involved with Tuzamurane. Such participation would free up women contractors' time to participate more in pineapple production.

Note that measuring time spent on different care and domestic activities would have given a better measure, but we decided not to include it in order to manage the length of the interview.

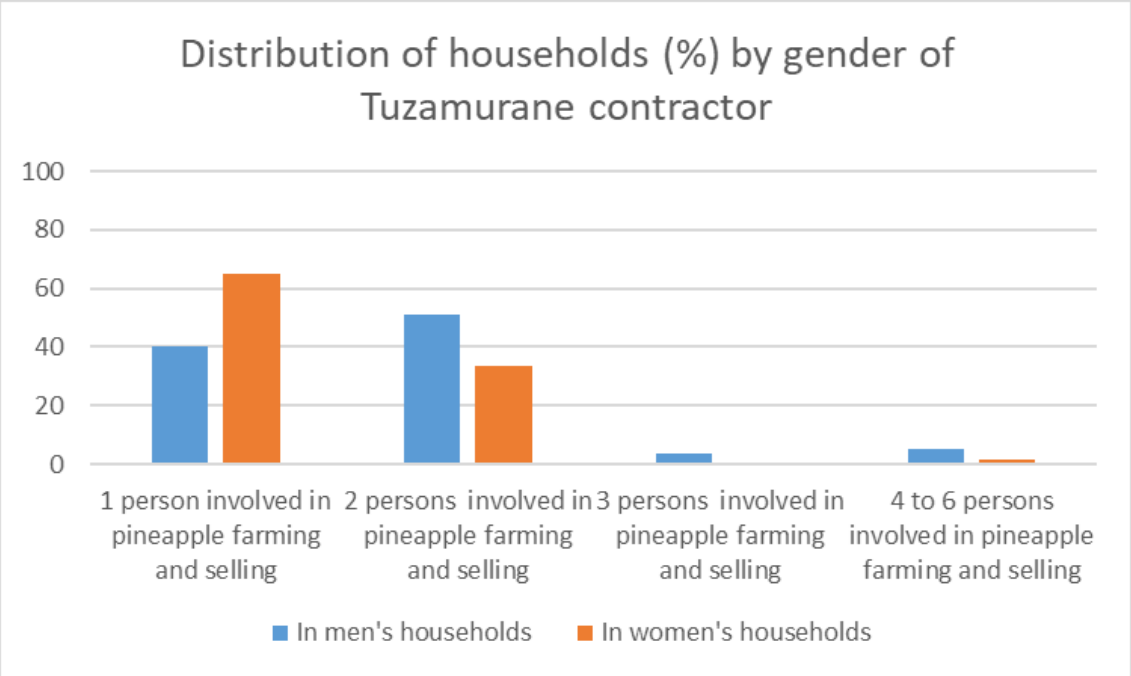
In addition, as mentioned in Section 4.2, the socio-economic profile of women and men contractors was slightly different at the outset (in 2015, men contractors belonged to richer households which owned more land). The matching model controls for these differences, as much as possible, so what could explain the substitution effects presented above?

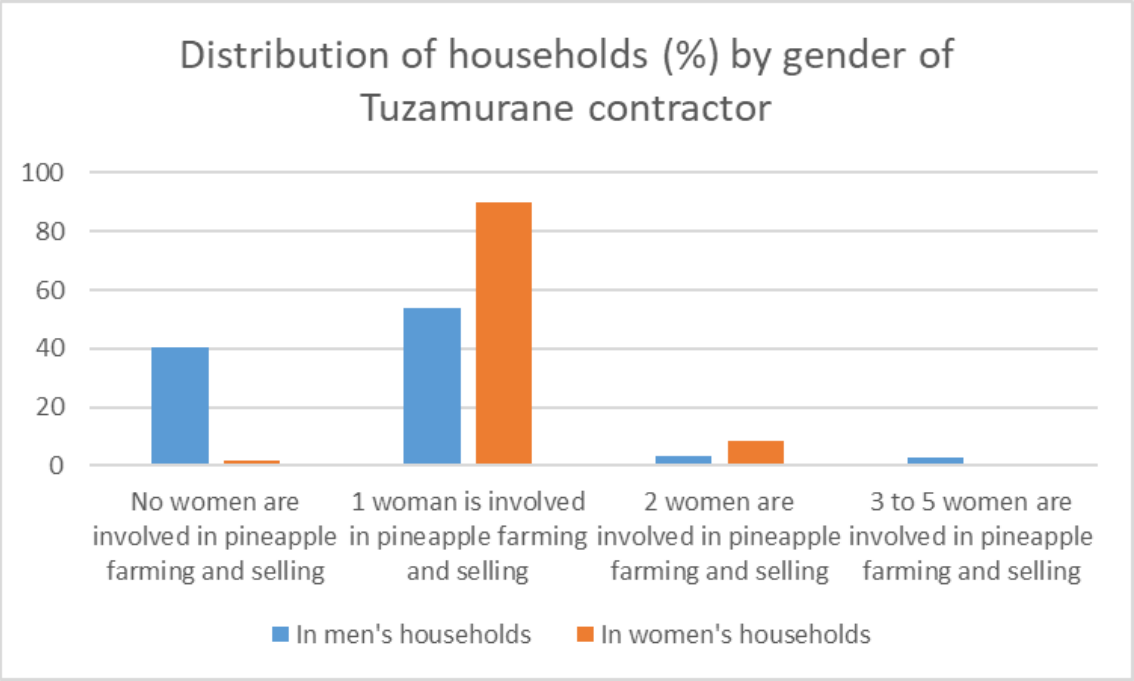
First, we notice that among the Tuzamurane contractors with whom the impact analysis was conducted[46], women contractors were more likely to have started growing pineapple in 2016 or later (21%, vs 13% among men contractors). Pineapple takes 18 months from seedlings to first harvest, so it may have been too early to measure impact on household income of the farmers who had started growing pineapple very recently. However, this is a small share of people, so while it could contribute to the gender differential impact, it would not be driving such big differential effects.

Second, as mentioned above, having access to a large area of land is key to growing pineapple, and land access is constrained for women. While Rwanda has undertaken legislative reforms in the past 20 years to secure equal access to land rights for women, there are still important gender differences in land access, both within the household and across households. Single women are particularly constrained in their access to land.

Third, the profiles of women and men contractors are very different when looking at the number of persons per household involved in pineapple farming and selling at the time of the survey, and their gender.[47] Figure 5.1 shows the distribution of households.

Figure 5.1: Number of persons per household involved in pineapple farming and selling, and number of women involved in pineapple farming and selling





Among the households of men contractors, 60% of households rely on several persons within the household being involved in pineapple farming and selling. This is at least one woman (and up to five). This contrasts with the findings for women contractors, with only 35% of their households relying on several household members being involved in pineapple farming and selling. While this is not represented on the graph, this is at least one man in 76% of the cases (and up to three).

This explains some of the differences in production observed (and capacity of production, as the labour force is very different) and some of the substitution effects mentioned above. It also raises a question around the role of contracts in reinforcing patriarchal norms: what could be done to enable more women to have access to contracts, when they contribute to farming and selling pineapples, as much as men do within the household? A team of researchers explored the role of men in changing these contract dynamics in the sugar cane value chain in Uganda; they found that most men were willing to allow their wives to register a contract with the company for a plot in their own name, particularly when they were already involved in farming sugar cane (Ambler et al., 2018). However, the question remains as to how having their own contract would affect women's empowerment and control over income (see forthcoming publications from the same research project).

This is a limitation of this report: results about income are focused on the household level, and do not tease out whether the share of income that women within these households have control over has been affected by their collaboration with Tuzamurane. Section 5.4 explores impacts on some aspects of women's empowerment, including control over some key decisions.

5.3 SOCIAL RESPONSIBILITY AND COOPERATIVE GOVERNANCE

The name 'Tuzamurane' translates as 'to lift each other up'; the cooperative president stressed that Tuzamurane gives both its members and suppliers an opportunity to be together and support each other: 'The main goal is to contribute and strengthen the capacity of the farmers who are not members, and motivate them to continue – monetary

profit is not a priority for the cooperative, but rather the sustainability of the cooperative and the provision of livelihoods for people in the community.' As mentioned earlier, when prompted about social responsibility, the president responded: 'When one looks at Tuzamurane's profitability, one may think it is not that high, but this is because the cooperative does all of this for their suppliers (members or not) [loans, health insurance, cash advance]. Profitability may be low, but sustainability is higher. The purpose of the cooperative is indeed to contribute to local development, to lift one another up!'[48] This commitment to social responsibility is the reason for the cooperative providing various forms of benefits, loans and advances to its members and suppliers. The cooperative is also certified as part of the Fair for Life programme.[49]

Benefits for members

Tuzamurane cooperative members are more aware than cooperative members in the comparison group of the cooperative benefits that are available to them (see Table 5.3).[50] In particular, 75% of Tuzamurane members are aware that the cooperative provides loans (vs 33% in the comparison group). 39% are aware that the cooperative contributes to pension insurance (vs 13% in the comparison group); the impact is stronger among women than men on this point. Note that the cooperative only started providing pension insurance to its members in 2019. 41% of Tuzamurane members are aware that the cooperative provides advances for education expenditures (vs 12% in the comparison group) and 85% know that the cooperative provides training on agricultural good practices (vs 71% in the comparison group). In addition, 71% of Tuzamurane members are aware that the cooperative provides health insurance (this percentage is similar in the comparison group).

Table 5.3: Cooperative members' awareness of the services available to them through the cooperative

	Loans (%)	Health insurance (%)	Contribution to your pension insurance (%)	Advance for education expenditures (%)	Training on agricultural good practices (%)
Overall					
Intervention mean	75.45	70.91	39.09	40.91	85.45
Comparison mean	32.75	72.18	12.99	11.67	71.38
Difference	38.2*** (7.9)	-3.0 (10.4)	27.3* (14.1)	28.9*** (8.8)	12.9** (6.4)
Observations (intervention group)	110	110	110	110	110
Observations (total)	249	249	249	249	249
Testing for differential impacts					
Gender effect in the comparison group - men compared to women	-1.9 (12.0)	-13.0 (11.7)	10.7 (8.9)	-0.7 (7.4)	-7.9 (12.3)
Impact of the project among women	41.1*** (8.4)	-0.9 (7.5)	35.8*** (12.7)	15.6* (8.7)	20.4*** (6.8)
Differential impact for women and men	3.0 (11.8)	5.5 (11.7)	-18.6** (7.2)	16.7 (11.7)	3.9 (13.9)

Standard errors in parentheses, clustered at the cell level; * p < 0.1, ** p < 0.05, *** p < 0.01; PSM estimates are bootstrapped with 1,000 repetitions; differential impacts are tested through PS-weighted regressions with robust clustering at the cell level.

These results confirm the differences observed through the qualitative interviews. The president of the Koubumu cooperative highlighted in an interview that the cooperative's main concern was to eradicate poor nutrition in the sector, and that it was contributing to

the district's development and alleviation of poverty.[51] The cooperative provides its members with health insurance, which is seen as a way to contributing to local development. Note that Koubumu cooperative also provides agricultural training to its members.

Governance

Among members of Tuzamurane cooperative, 60% consider themselves to be involved in taking important decisions about the cooperative to some extent, and 15% to a large extent. These proportions are not statistically different among cooperative members in the comparison group, and are not different by gender.

Among those involved in taking decisions, the governance practice in Tuzamurane seems to lead to differences in the area of decisions that members take part in, compared to the comparison group. In Tuzamurane, a larger share of people are involved in decisions around sales than in the comparison group (62% vs 39%), and the impact is stronger among men. It seems that within the cooperative, there is a substitution in who is involved in decisions related to marketing: women in Tuzamurane are less involved in marketing than women in the comparison group, but men in Tuzamurane are more involved. However, on average, the same proportion of people in Tuzamurane and the comparison group (51%) say they feel involved in marketing decisions.

At the time of the review, Tuzamurane did not have any particular policy or practice related to participation of women in its governance bodies. The cooperative's president highlighted that women are given equal voting rights and opportunities to express their ideas.[52] The president of Koubumu cooperative reported the same.[53] The managing director of the Natural Dried Fruit Company said that women contribute a lot in the company's decision making, which she explained by the fact that 'the managing director, chief accountant and store manager of the company are women. We work together, and the employees' thoughts and recommendations are taken into consideration. We also have a gender policy that contributes to women's empowerment and we employ more women in our business.'[54] The company was employing 3 women and 2 men in full-time positions, and 16 women and 8 men casual workers were involved in the processing at the time of the review. This compares to 4 women and 17 men in full-time positions in Tuzamurane, and 64 women and 48 men casual workers.

5.4 EMPOWERMENT, GENDER RELATIONS AND NORMS

During the design of this evaluation, we identified that a few key dimensions related to women's empowerment and gender justice were critical for the Rwanda programme and for EDP's overall theory of change. For this reason, we explored the project's impact on key aspects related to personal and relational levels, as well as social norms (environmental level).

Personal level

At the personal level, we do not observe any impact related to leadership skills or self-confidence, either for women or men.[55] Table 5.4 shows that overall, people agree with 2.4 of three statements of that are associated with leadership skills (regarding their comfort in handling new situations, bringing people together and speaking up in public). It also shows that overall, by the measure used in this review,[56] 91% of contractors of Tuzamurane feel self-confident. This represents a large percentage (and is larger in the parts of the comparison group and intervention group where Duterimbere and Oxfam have

been working on raising awareness related to gender inequality and fostering women's empowerment), which could suggest that these results reflect ongoing efforts to foster a sense of empowerment.

We observe high proportions of people in agreement with statements related to social norms about women's economic and political participation. Overall, 92% of survey participants agree that 'women can run a business just like men'; however, this compares to 96% in the comparison group, which suggests that the project had a negative impact among women and men. 76% of people agree that 'women can be leaders just like men', and this was not affected by the project.

While not directly related to EDP's theory of change, the data shows that 67% of survey participants consider domestic violence to be unacceptable, and this percentage increased as a result of the project (only 49% of the comparison group consider domestic violence to be unacceptable).

Table 5.4: Leadership skills, self-confidence and unacceptability of domestic violence

	Leadership skills - Number of statements the respondent agrees with	Self-confidence - Agrees with both statements (%)	Unacceptability of domestic violence (%)
Overall			
Intervention mean	2.43	90.57	67.13
Comparison mean	2.43	88.34	49.01
Difference	-0.00 (0.10)	2.3 (3.1)	18.1*** (6.8)
Observations (intervention group)	216	212	216
Observations (total)	568	562	562
Testing for differential impacts			
Gender effect in the comparison group - men compared to women	-0.01 (0.11)	-2.1 (4.3)	-4.3 (6.3)
Impact of the project among women	-0.10 (0.18)	1.5 (5.0)	10.1 (8.0)
Differential impact for women and men	0.14 (0.22)	0.7 (6.6)	10.2 (8.9)

Standard errors in parentheses, clustered at the cell level; * p < 0.1, ** p < 0.05, *** p < 0.01; PSM estimates are bootstrapped with 1,000 repetitions; differential impacts are tested through PS-weighted regressions with robust clustering at the cell level.

Relational level

The project does not seem to have had an impact on group participation, leadership of such groups and influencing within these groups, either for men or women (Table not shown, available on request).

Another aspect of empowerment at the relational level is related to agency and decision making within the household (Table 5.5). In this evaluation, we are particularly interested in control over decisions related to selling crops and spending money. Tuzamurane men contractors (cooperative members or suppliers) are significantly less likely to take decisions alone regarding selling crops (and more likely to take decisions with another household member – although this is not statistically significant). Among women, there is no evidence of a change on decision making in relation to selling crops as a result of their

interaction with Tuzamurane. Regarding spending, there seems to be a small effect, towards women being more likely to take decisions alone and less likely to take decisions with another household member.

Table 5.5: Decision making within the household

	Takes decision alone regarding selling crops (%)	Takes decision with other household member regarding selling crops (%)	Takes decision alone regarding spending (%)	Takes decision with other household member regarding spending (%)
Overall				
Intervention mean	69.08	25.60	80.56	13.89
Comparison mean	76.92	20.69	77.39	18.40
Difference	-7.9** (3.3)	5.0 (4.5)	3.2 (4.2)	-4.5 (3.1)
Observations (intervention group)	207	207	216	216
Observations (total)	551	551	568	568
Testing for differential impacts				
Gender effect in the comparison group - men compared to women	13.3* (6.8)	-12.4* (7.4)	6.7 (7.1)	-5.4 (6.5)
Impact of the project among women	0.9 (4.7)	-2.1 (4.4)	3.9 (5.3)	-6.9* (3.9)
Differential impact for women and men	-14.6** (7.0)	11.4 (7.3)	-1.5 (8.5)	3.6 (7.4)

Standard errors in parentheses, clustered at the cell level; * p < 0.1, ** p < 0.05, *** p < 0.01; PSM estimates are bootstrapped with 1,000 repetitions; differential impacts are tested through PS-weighted regressions with robust clustering at the cell level.

It is important to reflect on the fact that Oxfam implemented GALS activities both as part of EDP and part of the PVP project in collaboration with Duterimbere. We observe that around 60% of respondents had taken part in trainings on gender equality and women's economic empowerment in the past four years, both among contractors of the cooperative and among farmers involved in groups working with Duterimbere. Among a representative sample of people involved in farming activities in the areas where the survey took place, this is only 15%. We ran additional analyses which provide reassurance that the results in this section are not driven by GALS activities, through the sampling strategy.[57]

Social norms (environmental level)

Among Tuzamurane contractors, 32% believe that at least half of the men in the community would consider it acceptable to do care work, compared to only 19% in the comparison group. The impact among women and men is similar. 19% of Tuzamurane contractors believe that at least half of men in the community would consider it acceptable to do domestic work such as cooking, cleaning the house or washing clothes. This compares to only 11% in the comparison group (difference significant at 10%, which seems driven by women). 28% of Tuzamurane contractors believe that at least half of the men in the community would consider it acceptable to collect water or firewood, compared to 16% in the comparison group. While there is no impact overall, it seems that men are more likely to believe this as a result of the project, while this was not changed among women. In spite of the results presented in Section 5.2 showing that participation of men

in these activities has not changed, these results indicate potential changes in social norms.

Table 5.6: Social norms

	Half or more men in the community would consider it acceptable to do care work (%)	Half or more men in the community would consider it acceptable to do cooking, cleaning the house or washing clothes (%)	Half or more men in the community would consider it acceptable to collect water or firewood (%)
Overall			
Intervention mean	32.37	19.32	28.09
Comparison mean	18.59	11.06	15.81
Difference	13.7** (6.3)	8.1* (4.7)	12.1 (7.4)
Observations (intervention group)	207	207	210
Observations (total)	547	545	554
Testing for differential impacts			
Gender effect in the comparison group - men compared to women	9.8* (5.7)	10.8*** (4.2)	4.8 (4.9)
Impact of the project among women	9.4 (6.0)	11.9** (5.2)	2.1 (3.6)
Differential impact for women and men	5.6 (12.5)	-6.2 (11.1)	15.9* (8.6)

Standard errors in parentheses, clustered at the cell level; * p < 0.1, ** p < 0.05, *** p < 0.01; PSM estimates are bootstrapped with 1,000 repetitions; differential impacts are tested through PS-weighted regressions with robust clustering at the cell level.

5.5 JOB CREATION AT THE HOUSEHOLD LEVEL

One objective of the EDP is to foster job creation locally. At the household level, we do not find an average effect on job creation (positive effect, but not significant), through the hiring of casual workers on a monthly basis. As above, the picture is more complex when looking at differences by gender of contractors.

EDP's support to Tuzamurane enabled a positive impact on job creation at the household level among households of men contractors, as shown in Table 5.7. Because the number of casual workers hired is linked to the size of the area of land owned, the robustness checks are particularly important here. Appendix 3 shows that we estimate an impact of the hiring of an additional 2.5 workers on average after controlling for differences in land size (see Table A3.3, significant at 10%).

Impact among women contractors is not significant and close to 0 (although negative) (Table 5.7).

Table 5.7: Tuzamurane contractors' employment of casual workers

	Number of casual workers employed on contractors' agricultural land (all crops considered) on a monthly basis
Overall	
Intervention mean	4.53
Comparison mean	2.70
Difference	1.83 (1.13)
Observations (intervention group)	216
Observations (total)	567
Testing for differential impacts	
Gender effect in the comparison group - men compared to women	-0.84 (0.91)
Impact of the project among women	-0.42 (0.78)
Differential impact for women and men	3.43*** (1.26)

Standard errors in parentheses, clustered at the cell level; * p < 0.1, ** p < 0.05, *** p < 0.01; PSM estimates are bootstrapped with 1,000 repetitions; differential impacts are tested through PS-weighted regressions with robust clustering at the cell level.

At the enterprise level, the qualitative interviews highlight the growth of Tuzamurane and its employment capacity, which is substantively higher than in the other enterprise and cooperative interviewed. In comparison, they are much smaller in size and a few years behind Tuzamurane in terms of business development.[58]

5.6 SOCIO-ECONOMIC PROFILE OF NEW COOPERATIVE MEMBERS AND SUPPLIERS

Tuzamurane cooperative has grown substantially since its creation. When it started, the cooperative had 35 members, which had risen to 138 in September 2019. Note that the share of women cooperative members was initially around 50% and in September 2019 was around 40%. In 2014, the cooperative counted 98 suppliers. In September 2019, this was 183, but as some of these suppliers are farmers' groups the cooperative estimated the figure at 238 individuals.

The evaluation looked at the socio-economic profile of Tuzamurane cooperative members in 2015, cooperative members in 2019 who were not members in 2015 (hereafter referred to as 'new cooperative members') and suppliers in 2019 who were not cooperative members in 2015 (hereafter referred to as 'suppliers'[59]). The following analysis was carried out on the entire sample of cooperative members and suppliers of Tuzamurane, using means test.[60] The sample is made of 94 cooperative members involved in 2015 (37%), 55 new cooperative members (22%) and 102 suppliers (41%).

New cooperative members are not different from the 2015 cooperative members in terms of their wealth and agricultural land profile (in 2015 they were large agricultural landowners, with 1.3 ha on average). The new cooperative members were not necessarily involved in pineapple farming in 2015 (although 71% were), or organic certified (only 7% were). These points reflect Tuzamurane's membership criteria for pineapple production, including sufficient land, organic farming and payment of the membership fee.

Two other differences also need to be highlighted: the new cooperative members are younger on average (40 years old vs 52 years old).[61] They were less involved in community groups than the people who were already cooperative members in 2015 (2.4 groups vs 3 groups, not including the cooperative).

Suppliers are also younger than the 2015 cooperative members (42 years old on average); they were less likely to be growing pineapple in 2015 (only 50%) but had a similar profile to new cooperative members with respect to having organic certification when they did grow pineapple (5%). This reflects the requirement to grow pineapple organically to sell to Tuzamurane, as well as the role of the cooperative in supporting its members to switch to organic. Importantly, suppliers had a different wealth and land ownership profile to those who were cooperative members in 2015: on average they owned 1 ha of agricultural land (vs 1.5 ha for the 2015 cooperative members). This suggests that targeting activities to suppliers could be a strategy to ensure that the growth of the cooperative benefits the less well-off.

Note that the gender profile is the same across the three groups (cooperative members in 2015, new cooperative members, and suppliers): a third are women. The policy of allowing women to pay the entry fee in instalments does not seem to have affected the gender profile of new cooperative members.

Similarly, the share of households whose structure relies on a single woman is not significantly different across the three groups. This differs from the results highlighted in the evaluation of EDP's support to Pavitra cooperative, which are associated with the cooperative's 'efforts to reach out to female-headed households since EDP's intervention' (Caeyers, 2015).

5.7 OXFAM AND PARTNERS' ACCOUNTABILITY TO THE PEOPLE WE WORK WITH

Tuzamurane cooperative members and suppliers are more likely to say they have experienced an issue with Oxfam or Tuzamurane, than members of cooperatives or farmer groups involved in PVP (15% vs 7%). Of those who have experienced an issue and also reported it (76% overall), Tuzamurane cooperative members and suppliers are more likely to have received a response (90% vs 56%).

Table 5.8: Experiences of issues with projects

	PVP group mean	EDP group mean	p-value	Observations	Level of significance
Experiences of issues with projects implemented by Oxfam, Tuzamurane or Duterimbere					
Has experienced issues with the projects implemented by Oxfam, Duterimbere or Tuzamurane	0.073	0.150	0.015	426	**
Wished to report at the time	0.615	0.811	0.162	50	
Did report at the time	0.692	0.784	0.516	50	

Didn't feel safe to do so	0.000	0.167	0.447	10	
Didn't know who to approach	0.750	0.333	0.242	10	
Didn't know how to give feedback	0.000	0.167	0.447	10	
Don't trust that my feedback will be handled	0.000	0.167	0.447	10	
I didn't have time	0.250	0.000	0.242	10	
Other reason for not reporting	0.000	0.167	0.447	10	
Did receive a response	0.556	0.897	0.021	38	**
Was satisfied with the response received	0.800	0.885	0.619	31	

Overall, only 58% of Tuzamurane cooperative members, suppliers or PVP participants said they know how to provide feedback or make a complaint. A hotline would be the preferred way to give feedback (44%), followed by face to face (23%). PVP participants are more likely to prefer to do so via a community group or focus group discussion (24% vs 14%), while Tuzamurane cooperative members and suppliers are more likely to prefer to give feedback via an office visit (16% vs 3%).

Table 5.9: Knowledge of and preferences regarding feedback mechanisms

	PVP group mean	EDP group mean	p-value	Observations	Level of significance
Feedback mechanism					
Knows how to provide feedback or make a complaint	0.559	0.596	0.444	424	
Would prefer to give feedback face to face	0.278	0.201	0.063	429	*
Would prefer to give feedback through hotline	0.389	0.470	0.095	429	*
Would prefer to give feedback through community group/focus group discussion	0.244	0.137	0.004	429	***
Would prefer to give feedback at the partner or Oxfam office	0.039	0.161	0.000	429	***
Would prefer to give feedback through social media	0.000	0.000			
Would prefer to give feedback through feedback box	0.050	0.024	0.150	429	
Would prefer to give feedback through another channel	0.000	0.008	0.229	429	
Would feel safe providing feedback to Duterimbere or Tuzamurane	0.929	0.930	0.980	413	

Overall, less than 2% of respondents stated that they do not trust the partner at all, and 9% said that they trust the partner just a little. These percentages are similar to those regarding respondents' trust in Oxfam.

Table 5.10: Respondents' trust in Oxfam, Duterimbere or Tuzamurane

	PVP group mean	EDP group mean	p-value	Observations	Level of significance
Trust in Duterimbere or Tuzamurane					
Does not trust partner at all	0.006	0.021	0.213	404	

Trusts partner just a little	0.060	0.119	0.045	404	**
Somewhat trusts partner	0.268	0.292	0.591	404	
Trusts partner a lot	0.667	0.568	0.045	404	**
Trust in Oxfam					
Does not trust Oxfam at all	0.012	0.020	0.572	371	
Trusts Oxfam just a little	0.054	0.102	0.091	371	*
Somewhat trusts Oxfam	0.223	0.273	0.268	371	
Trusts Oxfam a lot	0.711	0.605	0.033	371	**

6 CONCLUSIONS

6.1 CORE CONCLUSIONS

This Effectiveness Review investigated the impact of EDP's support to Tuzamurane cooperative from 2016–2019, after disbursement of funds (the 'investment phase') for pineapple suppliers and cooperative members. The review adopted a gender lens throughout.

At the time of EDP support to Tuzamurane, the cooperative had already grown substantially. While the cooperative was created in 2005, the idea of drying pineapple, and organic-certified pineapple in particular, only emerged in 2009. Organic certification was obtained in 2013, and the connection with Oxfam was established that year. The first dryer was bought in 2014. Oxfam in Rwanda supported Tuzamurane to develop and submit a proposal for EDP support. Support was approved in September 2015, and grants and loans were disbursed at the beginning of 2016. In 2017 and 2018, the cooperative worked with a consultant in charge of identifying new markets as part of EDP support, and the EDP manager and officer of Oxfam in Rwanda provided direct support throughout the period investigated in this review.

Tuzamurane has grown significantly in size and in profits

Since its creation, the cooperative has grown substantially. Its president reported that 'the amount of land which the cooperative covers has increased from 36 hectares [in 2005] to 188.8 hectares – the provision of the EDP grant helped with this increase'. Growth is also reflected by a stark increase in the number of cooperative members and suppliers. As a result, the volume of production has drastically changed: in September 2019, the cooperative was processing two tonnes of pineapple a month.[62] Revenues from sales increased eightfold between December 2014 and December 2019. While the cooperative was making losses in 2014, as of December 2019 it was profitable.[63] Both the shareholding and the membership fee have increased substantially over the years as a result.

At the time of Tuzamurane's application for EDP's support, EDP's board highlighted the potential for further diversification (referencing juicing and pulping). While Tuzamurane initially focused on pineapple drying, in 2018 an opportunity arose which will allow for further diversification of the processed products in future. The cooperative received support from the Ministry of Agriculture to build two new processing buildings: one will increase the cooperative's drying capacity (with room for up to three dryers, although it will start operating with one dryer), and one to start juice-making (in part with pineapple hearts left over in the drying process).

Tuzamurane's growth, size, and the support it has received from various institutions, is very different from that of other similar actors involved in pineapple farming and processing. The cooperative and small enterprise interviewed as part of this review were both created later. Tuzamurane obtained organic certification in 2013, while the enterprise is in the process of obtaining certification. Organic certification gives Tuzamurane access to export markets, whereas the other enterprise's main market at the moment is domestic.

The socio-economic profile of cooperative members and suppliers is not strongly affected by Tuzamurane's growth

In 2015, the cooperative members were better-off than other (pineapple) farmers. The cooperative growth attracted new members, with a similar economic profile to the 2015 cooperative members; a quarter of the new members were not growing pineapple in 2015. The socio-economic profile of members reflects the membership fee paid to join the cooperative, which is relatively high (the entry fee was 209,200 RWF in 2019). Membership fees are a legal requirement for joining a cooperative and the membership fee is decided by the General Assembly (Law N° 50/2007 of 18/09/2007). Tuzamurane's growth also enabled it to attract new suppliers, who have a different economic profile on average to the members. They are less well-off, and half of them were not growing pineapple in 2015. Both the new cooperative members and the suppliers are younger than the people who were already cooperative members in 2015, which is not surprising.

Tuzamurane has not increased membership among women

The gender profile is the same for new cooperative members and new suppliers as it is for cooperative members in 2015: a third are women. The option for women to pay the entry fee in instalments over three years does not seem to have affected the gender profile of new cooperative members. Similarly, the share of households whose structure relies on a single woman is not significantly different across the three groups. This differs from the results highlighted in the evaluation of EDP's support to Pavitra cooperative, which were associated with Pavitra's 'efforts to reach out to female-headed households since EDP's intervention' (Caeyers, 2015).

Similar impact on household income for cooperative members and suppliers

There is evidence of a positive – but not significant, after controlling for land size – impact for both cooperative members in 2015, and suppliers and/or new cooperative members on household income measured through expenditures. This is an important difference the results of the impact evaluation carried out in 2015, on EDP's support to Pavitra cooperative in Nepal (Caeyers, 2015). The evaluation carried out in Nepal focused on the cooperative members at the beginning of EDP's support, and doesn't find evidence of impact on a similar income indicator, measured through expenditures. Note that the evaluation of Pavitra covers a two-year timeframe (2011 to 2013) and the results should hence be considered interim results (Caeyers, 2015). The results on income measured through asset-based wealth are, however, consistent between the two evaluations.

One element to highlight here is that the cooperative has only shared dividends with its members once, as the decision was otherwise taken to reinvest. At the time of the review, this reduced the potential for differential impact through income diversification which is highlighted in the theory of change. It would be useful to see in the future if this reinvestment strategy leads to higher income through income diversification for cooperative members.

Differential impact for women and men contractors on household income

Overall, Oxfam's support to Tuzamurane cooperative had a positive impact on the household income of men contractors (cooperative members or suppliers), but not among the household income of women contractors. This is the case for both food and non-food consumption.

This gender difference seems to be driven by a few key features. First, the project has a stronger impact on produced quantity and revenue from pineapple production for men than for women. This is driven by increased production, due to improved yields for both women and men contractors, and an increase in the area farmed for pineapple for men contractors. We also gathered evidence that men contractors have invested in additional agricultural land as a result of the project, while women have not.

Second, there is a substitution of income sources at the household level in the households of women respondents (after controlling for number of household members), between on-farm and off-farm activities.

These effects highlight the structural barriers faced by women in general, and by women in different positions of vulnerability in particular. First, women's access to land is constrained in Rwanda, in spite of legislative reforms over the last 20 years. This is particularly important, as pineapple faming requires large areas of land.

Second, women are disproportionately responsible for unpaid care and domestic work, which limits their ability to participate in pineapple production and income generation. We don't have evidence that men are participating more in care and domestic activities as a result of their household being involved with Tuzamurane.

Third, women contractors are more likely to be in households in which they are the key person generating income and contributing to pineapple farming. This is because they are more likely to be single and in many cases supporting other household members, such as their children and/or parents or in-laws. This means that while both women and men within the household can be involved in pineapple farming, men are more likely to be the contract holder. The role of contracts in making the work of women within the household more visible could be explored by the cooperative. This would require wider changes in social norms and reallocating the time spent on unpaid care and domestic tasks within the household.

Positive impact on job creation

The evaluation found that Tuzamurane enabled a positive impact on job creation among the pineapple farms of men producers, but not among those of women producers. Men producers hired an additional 2.5 workers, on average. The gendered difference is due to the finding outlined above that men contractors increased land ownership during the life of the project. The number of casual workers hired is linked to the area of land owned.

At the cooperative level, the growth of the cooperative led to greater employment capacity. The cooperative grew from one staff member when it was first formed to 31 staff members, which is substantively higher than staff numbers in the other enterprise and cooperative interviewed.

Tuzamurane has a strong commitment to social responsibility

Tuzamurane is providing several services to its members and suppliers – and more so than other cooperatives and enterprises growing or processing pineapple. This reflects Tuzamurane's strong commitment to its social responsibility, as well as its access to a market for its produce that enables it to provide such services. In addition, 75% of cooperative members are aware that loans are available, and this is significantly higher than awareness among members of other cooperatives. 39% of members are aware that the cooperative contributes to pension insurance. While this is higher than among members of other cooperatives, it reflects that this contribution had only recently been introduced.

Similar levels of women's participation in governance as found in other cooperatives

Three-quarters of Tuzamurane members consider themselves to be involved in important decisions taken by the cooperative. This is similar to the response of cooperative members in the comparison group. Similarly, women's participation in Tuzamurane decision making is not significantly impacted by the project.

These results raise questions about the policies and practices that could be put in place to enable women cooperative members to participate and benefit fully from the cooperative.

A mixed impact on women's empowerment at personal and relational levels

The evaluation shows that contractors' involvement in Tuzamurane has had a positive impact on social norms related to violence within the household, with 67% of interviewed Tuzamurane contractors considering domestic violence to be unacceptable (compared to 50% in the comparison group). However, with regard to other indicators of empowerment at the personal level, the evaluation found no impact on women's leadership skills or self-confidence as a result of participation in Tuzamurane.

Within households, we observe some changes in decision making. Tuzamurane men contractors (cooperative members or suppliers) are significantly less likely to take decisions alone regarding the selling of crops, but this is not confirmed by women. Regarding income spending, there seems to be a small effect towards women being more likely to take decisions alone and less likely to take decisions with other household members.

Some evidence of impact on gender norms (environmental level)

There is evidence that the project has increased the acceptability of men's participation in care and domestic work. Both women and men seem more likely to believe that a large share of men in their community would consider it acceptable to do care work as a result of the intervention, or to do cooking, cleaning the house or washing clothes (impact stronger among women). Men contractors seem more likely than those in the comparison group to believe that a large share of men in their community would consider it acceptable

to collect water or firewood. However, it is important to note that the evaluation did not find an actual increase in men's participation in these activities.

High levels of reporting of and response to problems of contractors

Tuzamurane cooperative members and suppliers are more likely to have experienced a problem with Oxfam or Tuzamurane than their counterparts involved in other cooperatives, and to have contacted either organization regarding the issue. 15% of participants in Tuzamurane stated that they had experienced an issue, which is significantly higher than among members of other cooperatives or farmer groups, at 7%. As the relationship between contractors and Tuzamurane is a commercial one, it is unsurprising that issues have arisen through the life of the contracts. 78% of those stating that they had experienced an issue with Oxfam or Tuzamurane had reported the issue. This high rate demonstrates that they know how to go about reporting problems and feel comfortable doing so. When comparing responses and satisfaction, members of Tuzamurane were more likely than members of other cooperatives to have received a response, and to be satisfied with the response received (88% of those who raised an issue were satisfied, compared to 80% among other cooperatives or farmer groups).

Among all Tuzamurane contractors, 60% said they know how to provide feedback or make a complaint (compared to 56% among other cooperatives or farmer groups). This shows that communication about the existing feedback mechanisms could be improved.

The impact of COVID-19

While this review focuses on 2015–2019, at the time of finalizing this report the cooperative had been affected by the COVID-19 pandemic. A blog post written by Laetitia Umulisa on 11 May 2020 says: 'In Rwanda, the implementation of lockdown measures has placed a major distress on the country's food value-chains, particularly businesses in the agricultural sector. Research done by Rwandese economists on the indicative socio-economic impacts of COVID-19 on Rwanda (Bizoza and Sibomana 2020) predicts that, despite the measures taken by the government to curb the spread of the virus and the discipline of Rwandan citizens, the agriculture sector and international trade will be negatively affected. Small and medium enterprises (SMEs) are expected to be even more affected, yet they are a main source of livelihoods for most Rwandans.' She also highlighted the need for the government's response to support SMEs to recover from the economic shock (Umulisa, 2020).

Jean Damascéne Hakuzimana, president of Tuzamurane, reported: 'Since the outbreak was confirmed in Rwanda, we have not been able to ship six metric tonnes of dried pineapple to our main client in France. We have been forced to hold on the product until further notice. Now, we do not have any other choice than to reduce our staff. We will only remain with three staff out of 31 contracted staff.' In addition, the cooperative had to stop some of the services provided to its members, such as loans.

Ulrike Joras, in her blog post published on 29 June 2020, highlights the importance of SMEs diversifying production and markets to mitigate the impact of a shock like the one created by the pandemic through transport restrictions and market disruptions. She writes:

> 'Increased storage capacity may help for some products for a while, but identifying alternative markets and adjusting production can be critical to keep income up. In Rwanda, a producer of dried pineapple for the export market started selling raw

pineapples locally when reduced international cargo flights lead to a decline of export sales.'

She makes reference to Tuzamurane, which had to stop processing pineapple at the height of the pandemic.

Finally, Oxfam in Rwanda carried out a rapid assessment of the impact of COVID-19 on the horticulture value chain, which demonstrates the highly disruptive nature of the pandemic. Not only did it harm the ability to export produce and access markets; it also reduced access to inputs and interaction with extension officers, and led to harvest losses of fresh produce (Oxfam, 2020). Oxfam is calling for the development of a sector-specific recovery plan led by the National Agricultural Export Development Board of Rwanda, in coordination with stakeholders and with attention to the specific needs of farmers, aggregators, processors and exporters.

By the end of 2020, the cooperative had resumed processing and exporting organic-certified dried pineapples. Staff have been re-employed, although the cooperative had a lower number of contracted staff at the end of 2020 than in 2019 (18, down from 31), reflecting lower levels of production. In the longer term, the impacts of the pandemic and associated restrictions are likely to have a negative impact on the growth and overall positive trajectory found by this evaluation.

6.2 PROGRAMME LEARNING CONSIDERATIONS

Based on the results and conversations with Oxfam and EDP staff, we identified the following key learning recommendations.

Strengthen strategies to overcome barriers to women's income generation

First, these results highlight the need to understand specific systemic barriers to women's income generation. Key barriers found to be limiting project impact for women include access to land, time poverty resulting from responsibility for care and other unpaid work, and norms around whose name is on the production contract.

On a project-specific level, it is recommended that there is more focus on exploring strategies to counteract such systemic barriers for women's equitable engagement with the cooperative and women's income generation. Different women will face these barriers differently. For example, women living alone with their children, widows, or those whose husband is away due to migration, will face specific constraints. It is particularly important is to consider whether different strategies are needed for women in these situations, as well as for women living with their partner.

At a broader level, many of these same barriers are important factors hampering women's income generation. In the case of land ownership, this is despite progressive national laws and policies. This suggests that the change needed is around social norms and practices, rather than policy change. In some cases, national laws and policies around gender equality have also made the topic harder to openly discuss in a setting of closed civic space. We suggest that any future work targeting women's income generation incorporates an element around shifting social norms and practices, and public campaigning.

Consider joint contracts in both men and women's names within one household

The evaluation has shown that women living with a partner often work in pineapple production under a contract in their husband's name (or do other household work, making production possible).

Tuzamurane could explore further whether joint contracts could be a useful mechanism to make the work of women more visible in their household and increase women's access to income and influence in economic decision making. Women and men from the same household could be jointly contracted as suppliers of the cooperative. EDP could link Tuzamurane to another enterprise supported by EDP in Ethiopia, which introduced contracts that are jointly owned by women and men when they are producing together, to share experience.

Explore different policies to build an inclusive business model, particularly in relation to the membership fee

The cooperative membership fee is high and prevents less well-off suppliers from becoming members. Cooperative members who joined in the past four years are relatively better-off, which is similar to those who were already cooperative members in 2015. At the moment, only a third of cooperative members are women, and the policy of allowing women to pay the membership fee in instalments has not affected the cooperative's gender composition.

The entry membership fee currently reflects the cooperative's assets, which have increased over the years as Tuzamurane has grown. Shareholdings and potential dividends from membership have also increased; however, in all but one instance to date these have been reinvested, not impacting household income. The cooperative could explore calculating the fee differently. Options could include taking into account annual asset growth or the assets of new members. These options would have to be linked to a discussion around how to calculate and share dividends in an equitable manner, and be voted on at the cooperative's General Assembly, in accordance with the national law on cooperatives.

Building an inclusive business model is also about the internal processes and procedures around employment and governance practices. While the evaluation did not specifically look at these, exploring current processes and procedures to identify barriers preventing some people from participating in and contributing to the cooperative would highlight changes needed to strengthen inclusivity.

Work with the government to support the building of inclusive cooperative models across Rwanda

Oxfam and EDP could also consider advocating for the government to publish guidelines around inclusive cooperative practices, highlighting the role of membership fees as a barrier to entry. This would be in line with the Government of Rwanda 2018 National Cooperative Policy Review, which identifies as an area of policy intervention the need to 'Promote cooperative membership for special groups of people such as youth, people with disabilities, women, and Rwandans living in the diaspora.'

The cost of registering a cooperative with the government is also high. Reducing this cost could also enable lower membership fees and would help in building a more inclusive business model.

Reflect on the return on investment from organic farming to producers, and see how the price premium could be further transferred to producers

Organic farming is expensive (and labour intensive); however, the general assumption is that organic produce sells at a higher price than non-organic, in an international market. For Tuzamurane, drying organic pineapple opens up access to an international market, which has a higher return. In addition, selling in an international market and selling dried products reduces seasonal price fluctuations, creating a more stable profit than is possible in the domestic market. The findings from this evaluation confirm that the cooperative is selling the dried organic pineapple internationally at higher rates than fresh, non-organic pineapple sells domestically. It was therefore assumed that for producers, growing organic pineapple and supplying Tuzamurane would lead to a higher price for their fresh produce.

However, while the evaluation highlights an increase in yields for contractors as a result of the project, leading to an overall increase in income, there is no impact on the price the contractors receive per kg of pineapple. We estimate that the price received is approximately 130 Rwandan francs (RWF) per kg. This seems to be the same as the price received by the comparison farmers – both those who grow organically and those who do not.

While supplying Tuzamurane can bring its contractors price stability over time, and other benefits, the finding that price per kg has not increased challenges an important assumption behind the project's theory of change. The cooperative and EDP could investigate further the reasons behind this result: do the costs associated with organic production, such as inspection and certification, negate the benefits of selling on an international market, as previous studies have shown?[64] What would enable a higher price to be paid to the producers?

The cost of certification is certainly high, and the transaction costs associated with its annual renewal are significant too. At the moment, Tuzamurane pays the cost of certification on behalf of its suppliers. If this is what is driving the lack of a price benefit for contractors, EDP and Oxfam could consider advocating for certification agencies to implement multi-year certification schemes, as a way to reduce transaction costs.

Strengthen awareness of feedback mechanisms to enhance accountability

Feedback mechanisms are critical to enhance accountability and improve programme effectiveness. In the setting of EDP, the relationship between smallholder farmers and the cooperative is a commercial one, especially as Tuzamurane supports producers to obtain and maintain organic certification. This has consequences for the power dynamics between the cooperative (or enterprise) and the producers. While reporting and response rates are high among those who have experienced a problem, a little under half of the contractors involved with Tuzamurane are not aware of how to provide feedback or report an issue. We recommend that accountability systems are clearly advertised and that all contractors are made aware of their rights and informed about how to report an issue.

Given the power dynamics, feedback systems could also be reviewed to explore whether any other channels and features should be put in place to ensure that feedback mechanisms are accessible and safe, and that contractors feel comfortable using them when they experience an issue.

Continue advocacy for a sector-specific COVID-19 recovery plan

In light of the highly disruptive effect of the pandemic on the horticulture value chain, it is recommended that Oxfam continues its existing advocacy work calling for the development of a sector-specific recovery plan led by the National Agricultural Export Development Board of Rwanda, in coordination with stakeholders and with attention to the specific needs of farmers, aggregators, processors and exporters.

6.3 EVALUATION LEARNING CONSIDERATIONS

Revise Oxfam's livelihood outcome indicator to value the critical role of unpaid care and domestic work in income generation, and to reflect a more wholistic understanding of enhancing livelihoods

The current focus of the livelihood outcome indicator used by Oxfam in its Effectiveness Review series (and other impact evaluations) does not take into account the critical contributions of feminist economists in understanding and analysing income generation. The indicator has a narrow understanding of what enhancing livelihoods means: improving household income, measured through consumption. In addition, it relies on a tedious data collection process of going through different types of expenditures, which may feel disempowering and intrusive for the people being interviewed. The new indicator should reflect the gendered nature of income generation and value the critical role of unpaid care and domestic work in household income generation. It should also reflect the importance of women's access to their own income and control over income within the household.

In the same way as Oxfam highlights the need to change the way in which we measure economic success in light of the climate crisis,[65] the Effectiveness Review livelihood indicator should be revised to reflect a wider understanding of livelihood – one that takes into account wellbeing and what 'living a good life' means for different people, in a given context.

APPENDIX 1: DESCRIPTION OF THE POPULATION

This appendix presents respondents' and households' characteristics in 2015 (and at time of the survey for a few characteristics which we assume not to have been affected by the project under review). Information about 2015 was recalled by respondents.

Table A1.1: Comparison between intervention and comparison groups

	Comparison group mean	Intervention group mean	p-value	Observations	Level of significance
Respondent characteristics					
The respondent is a woman	0.496	0.343	0.039	650	**
Age of respondent	43.336	45.514	0.177	650	
The respondent had some primary education – at time of the survey	0.652	0.625	0.341	650	
The respondent does not have any formal education – at time of the survey	0.145	0.227	0.017	650	**
The respondent received no formal education, some primary or graduated from primary	0.797	0.853	0.044	650	**
The respondent is single – at time of the survey	0.035	0.088	0.151	650	
The respondent is widowed – at time of the survey	0.058	0.080	0.310	650	
The respondent is divorced – at time of the survey	0.040	0.012	0.101	650	
Asset-based wealth distribution					
HH was in the first 20% of the wealth distribution in 2015	0.273	0.088	0.000	646	***
HH was in the second 20% of the wealth distribution in 2015	0.228	0.155	0.011	646	**
HH was in the fourth 20% of the wealth distribution in 2015	0.162	0.259	0.003	646	**
HH was in the fifth 20% of the wealth distribution in 2015	0.134	0.303	0.012	646	**
Income sources					
Number of off-farm activities the HH members were involved in in 2015	1.080	0.948	0.120	650	
Number of off-farm activities the HH members were involved in in 2015, excluding government transfers and remittances	0.922	0.896	0.658	650	
Number of crops cultivated in 2015	6.669	7.135	0.184	650	
Pineapple farming					
HH grew pineapple in 2015	0.444	0.716	0.011	649	**
HH started growing pineapple in 2013 or before	0.236	0.478	0.013	650	**
HH grew pineapple in 2007 or before	0.065	0.303	0.000	650	***
HH started growing pineapple between 2008 and 2013	0.170	0.175	0.929	650	

HH started growing pineapple between 2014 and 2015	0.185	0.219	0.418	650	
Organic certification was obtained in 2015 or before	0.025	0.215	0.000	650	***
Cooperative or group participation					
The respondent or another HH member was a member of a pineapple cooperative in 2015	0.283	0.375	0.092	650	*
The respondent was a member of a cooperative or farmer group (of any crop) in 2015	0.504	0.618	0.026	650	**
Member of any group in 2015 (saving groups, religious groups, etc.)	0.980	0.952	0.302	650	
Number of groups the respondent was involved in in 2015	3.130	3.203	0.689	650	
Member of any group excluding pineapple cooperative in 2015	0.942	0.916	0.613	650	
Number of groups the respondent was involved in in 2015, excluding pineapple cooperative	2.855	2.849	0.974	650	
Household composition					
Number of household members in 2015	4.772	5.060	0.198	650	
Number of household members below 15 years in 2015	1.915	1.932	0.914	650	
HH existed in 2015 – in its current structure	0.935	0.952	0.615	650	
Household structure relied on a single woman – single-parent or a woman living with her parents - in 2015	0.103	0.092	0.729	650	
The household head was a woman in 2015	0.123	0.124	0.985	650	
The household head was a woman who was not living with her spouse in 2015	0.110	0.100	0.726	650	
The highest level of education in the household was some primary education (completed or not)	0.539	0.562	0.477	650	
No adult household member received a formal education in 2015	0.038	0.064	0.372	650	
Agricultural land and casual workers					
Size of agricultural land owned in 2015, winsorized at 1%	0.610	1.262	0.000	646	***
Size of agricultural land used in 2015	0.533	1.073	0.000	647	***
Size of agricultural land used for pineapple farming in 2015	0.141	0.507	0.000	332	***
Number of casual workers employed on land on a monthly basis in 2015	1.525	4.988	0.078	647	*
The HH owned more than half a hectare of agricultural land in 2015	0.421	0.741	0.000	650	***

The tests of equality of means presented in Table A1.1 takes into account the clustered nature of the data at the cell level (the administrative level above villages and below sectors). This is because information may be correlated within cells (due to similar environmental conditions, markets, etc.). While 25 cells were covered by the survey, in a few cells only a very small number of individuals were interviewed. We therefore grouped a few cells together, by sector, to correct for this, and the analysis is hence run with 17 clusters.

APPENDIX 2: PROPENSITY SCORE MATCHING METHODOLOGY

The results presented in Section 5 use propensity score matching (PSM). PSM is a statistical technique that allows the effect of an intervention to be estimated by accounting for the covariates that predict receiving the intervention. The idea behind PSM is to match similar individuals in the intervention group to those in the comparison group, based on observed characteristics at baseline. After each participant is matched with a non-participant, the average 'treatment effect on the treated' (those who benefitted from the intervention) is equal to the difference in average outcomes of the intervention and the comparison groups after project completion. There are different approaches to matching, i.e. to determining whether or not an individual is observationally 'similar' to another individual. For an overview, we refer to Caliendo and Kopeinig (2008). This section describes and tests the specific matching procedure employed in this Effectiveness Review.

ESTIMATING PROPENSITY SCORES

Rosenbaum and Rubin (1983) suggested implementing the matching procedure in two steps. In the first stage a propensity score is estimated, while in the second stage observations are matched on the basis of their propensity score. Following Caliendo and Kopeinig (2008), only variables that influence the participation decision, but are unlikely to have been affected by participation in the project (or anticipation of it), were included in the matching model. Baseline data were not available, so survey respondents were asked to recall information related to their household's or personal situation in 2015, before EDP's support to Tuzamurane. While these recall data were unlikely to be completely accurate, this should not have led to significant bias in the estimates as long as the measurement errors due to the recall data were not significantly different for the intervention and comparison groups.

In the context of this review, it was difficult to find a good matching model by statistical standards, due to strong differences in the population in 2015 (in relation to land ownership in particular). The matching model is hence estimated after exclusion of the upper end of distribution of agricultural landowners (those who owned above 3 ha of agricultural land in 2015) in both intervention and comparison groups (10 observations vs 5 observations, respectively). Table A2.1 shows the results of the probit regression model used to estimate the propensity scores. This reports the marginal effects at the mean and the corresponding standard errors. Note that the estimation is performed on 634 observations, due to one missing value.

Table A2.1: Estimating the propensity score on variables used for matching

	Marginal effect	Standard error	p-value
Being in the intervention group			
The respondent is a woman	-0.11*	0.04	0.02
Number of household members in 2015	-0.00	0.01	0.90
Age of respondent	0.00	0.00	0.74
The respondent received no formal education, some primary or graduated from primary	0.15**	0.05	0.00
HH was in the first 20% of the wealth distribution in 2015	-0.25***	0.05	0.00
HH was in the second 20% of the wealth distribution in 2015	-0.12*	0.06	0.05
HH was in the fourth 20% of the wealth distribution in 2015	0.07	0.07	0.30
HH was in the fifth 20% of the wealth distribution in 2015	0.20**	0.07	0.01
Number of off-farm activities the HH members were involved in 2015, excluding government transfers and remittances	0.01	0.03	0.81
Number of crops cultivated in 2015	-0.02	0.01	0.11
The respondent or another HH member was a member of a pineapple cooperative in 2015	-0.12*	0.05	0.02
HH grew pineapple in 2015	0.20***	0.05	0.00
HH grew pineapple in 2007 or before	0.25***	0.07	0.00
Organic certification was obtained in 2015 or before	0.39***	0.08	0.00
Number of groups the respondent was involved in in 2015, excluding pineapple cooperative	-0.04*	0.02	0.04
Household structure relied on a single woman – single-parent or a woman living with her parents - in 2015	0.07	0.08	0.40
Observations	634		

Marginal effects

The construction of the wealth index is described in Section 5. Variables dated 2015 are estimates, based on recall data.

Dependent variable is binary, taking 1 for project participant individuals, and 0 otherwise.

* p < 0.1, ** p < 0.05, *** p < 0.01.

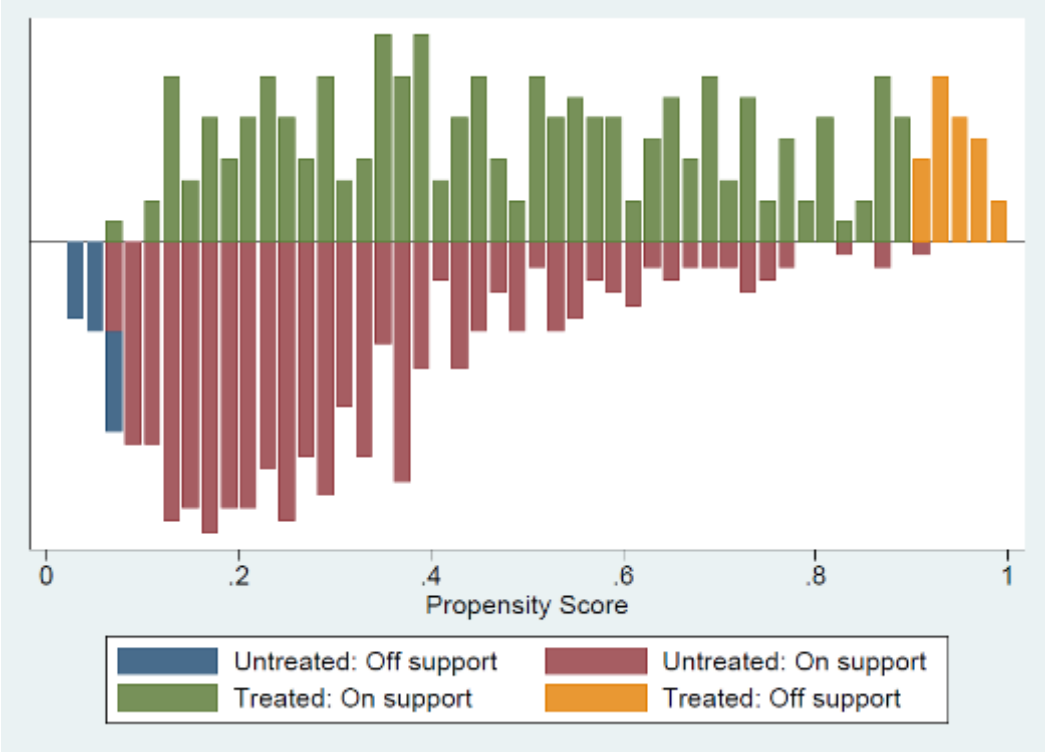
DEFINING THE REGION OF COMMON SUPPORT

After estimating the propensity scores, it is necessary to verify that there is a potential match for the observations in the intervention group with those from the comparison group. This means checking that there is common support. The area of common support is the region where the propensity score distributions of the intervention and comparison groups overlap. The common support assumption ensures that each intervention observation has a comparison observation nearby in the propensity score distribution (Heckman et al.,1999).

Since some significant differences were found between the intervention and comparison groups in terms of the baseline and demographic characteristics (as detailed in Section 4.2), some of the people in the intervention group are too different from the comparison group, based on the data available, to allow for meaningful comparison. We developed a minima and maxima comparison, deleting all observations whose propensity score was smaller than the minimum and larger than the maximum in the opposite group (Caliendo and Kopeinig, 2008). In this instance, 67 of the 634 interviews carried out – 25 of which were in the intervention group – were dropped because they lay outside the common support area. This means that the estimates of differences in outcome characteristics between the two groups apply to this subsample of project participants and non-participants; that is, they do not represent the surveyed population as a whole. This is discussed further in Section 4.3.

Figure A2.1 illustrates the area of common support and indicates the proportion of households lying on and off the common support area, by intervention and comparison groups.

Figure A2.1: Propensity score on and off the common support area



'Treated' refers to the intervention group and 'Untreated' refers to the comparison group.

MATCHING INTERVENTION INDIVIDUALS AND HOUSEHOLDS TO COMPARISON INDIVIDUALS AND HOUSEHOLDS

Following Rosenbaum and Rubin (1983), after estimating the propensity scores and defining the area of common support, individuals are matched on the basis of their propensity score. The literature has developed a variety of matching procedures. For the main results presented in this report using a matching model, we chose to employ the method of kernel matching. The kernel matching method weights the contribution of each

comparison group member, attaching greater weight to those comparison observations that provide a better match with the treatment observations. One common approach is to use the normal distribution with mean zero as a kernel, and weights given by the distribution of the differences in propensity score. Thus 'good' matches get a larger weight than 'poor' matches.

We used the psmatch2 module in STATA using 0.06 as a bandwidth and restricted the analysis to the area of common support. When using PSM, standard errors of the estimates were bootstrapped using 1,000 repetitions to account for the additional variation caused by the estimation of the propensity scores and the determination of the common support.[66]

Analyses are hence carried out with 17 clusters, which is relatively low by statistical standards. In the Effectiveness Reviews, given that statistical methods correcting for low number of clusters are not available for PSM models, we adopted a pragmatic approach (following Jonathan Lain's blog post of 21 December 2016). We checked whether regular clustering led to reducing our standard errors, which would lead to over-rejecting the null hypothesis that the project had an impact. Regular clustering seems to increase our standard errors, as one would expect, in spite of the relatively low number of clusters. For this reason, the whole analysis in this report is correcting for the clustered structure of the data.[67]

CHECKING BALANCE

For PSM to be valid, the intervention group and the matched comparison group need to be balanced, in that they need to be similar in terms of their observed baseline characteristics. This should be checked. The most straightforward method of doing this is to test whether there are any statistically significant differences in baseline covariates between the intervention and comparison groups in the matched sample. The balance of each of the matching variables after kernel matching is shown in Table A2.2 (the estimates are provided using PS-weighted regressions, clustering at the village level). None of the variables implemented for the matching is statistically significant once the matched sample is used.

Table A2.2: Balancing test on the set of covariates used for matching, after matching

	Intervention group mean	Comparison group mean	p-value
The respondent is a woman	0.38	0.4	0.78
Number of household members in 2015	4.94	4.75	0.42
Age of respondent	44.48	43.07	0.53
The respondent received no formal education, some primary or graduated from primary	0.86	0.89	0.18
HH was in the first 20% of the wealth distribution in 2015	0.1	0.11	0.85
HH was in the second 20% of the wealth distribution in 2015	0.17	0.19	0.47
HH was in the fourth 20% of the wealth distribution in 2015	0.26	0.22	0.34
HH was in the fifth 20% of the wealth distribution in 2015	0.26	0.25	0.87
Number of off-farm activities the HH members were involved in 2015, excluding government transfers and remittances	0.89	0.85	0.62
Number of crops cultivated in 2015	7	6.87	0.72
The respondent or another HH member was a member of a pineapple cooperative in 2015	0.32	0.28	0.56
HH grew pineapple in 2015	0.68	0.65	0.74
HH grew pineapple in 2007 or before	0.23	0.24	0.81
Organic certification was obtained in 2015 or before	0.12	0.12	0.98
Number of groups the respondent was involved in in 2015, excluding pineapple cooperative	2.85	2.82	0.84
Household structure relied on a single woman – single-parent or a woman living with her parents - in 2015	0.09	0.12	0.49
Observations			568

The matching process reduces the differences between the two groups. Table A2.3 shows the averages in both groups for a range of baseline variables (or individuals' characteristics which we assume would not be affected by the project such as age, education and literacy of respondents, head and co-head of households) after matching correction.

Table A2.3: Balancing test on other baseline characteristics, after matching

	Intervention group mean	Comparison group mean	p-value
The respondent had some primary education – at time of the survey	0.62	0.78	0.00
The respondent does not have any formal education – at time of the survey	0.24	0.10	0.00
The respondent is single – at time of the survey	0.10	0.04	0.15
The respondent is widowed – at time of the survey	0.08	0.08	0.95
The respondent is divorced – at time of the survey	0.01	0.03	0.22
Number of off-farm activities the HH members were involved in 2015	0.95	0.99	0.67
HH started growing pineapple in 2013 or before	0.41	0.41	0.98
HH started growing pineapple between 2008 and 2013	0.19	0.17	0.80
HH started growing pineapple between 2014 and 2015	0.25	0.21	0.43
The respondent was a member of a cooperative or farmer group – of any crop – in 2015	0.59	0.56	0.63
Member of any group in 2015	0.95	0.97	0.60
Number of groups the respondent was involved in in 2015	3.15	3.09	0.74
Member of any group excluding pineapple cooperative in 2015	0.93	0.93	0.96
Number of household members below 15 years in 2015	1.92	1.81	0.59
HH existed in 2015 – in its current structure	0.95	0.93	0.72
The household head was a woman in 2015	0.13	0.13	0.90
The household head was a woman who was not living with her spouse in 2015	0.10	0.13	0.66
Highest level of education in the household in 2015 was some primary education	0.58	0.60	0.67
No adult household member received a formal education in 2015	0.07	0.03	0.24
Size of agricultural land owned in 2015, winsorized at 1%	1.10	0.70	0.00
Size of agricultural land used in 2015	0.93	0.61	0.00
Size of agricultural land used for pineapple farming in 2015	0.45	0.25	0.10
Number of casual workers employed on land on a monthly basis in 2015	4.19	1.64	0.13
Observations			568

PROPENSITY SCORE WEIGHTING

By design, this evaluation places a gender (and equity) lens at its core, which led the evaluation to investigate whether different people benefitted differently from EDP support, depending on their gender and their socio-economic profile. In particular, the review explores whether women and men benefitted differently from the project, and whether people who were members of a pineapple cooperative in 2015 benefitted differently to those who were not. The evaluation also assesses the extent of the differences in living conditions and experiences of different social groups, in the absence of the project.

Differential impacts are estimated and tested through PS-weighted multivariate regressions with interaction terms, controlling for the other matching variables.

The specification is as follows, to test for gendered impacts:

$$Y_{ip} = a + b.Gender + c.Project + d.Gender * Project + e.X + \varepsilon_{ip} \qquad (1)$$

Following the example of Hirano and Imbens (2001), we weight the observations according to the propensity score. Observations are assigned weights equal to one for the citizens in intervention villages and $\hat{P}(\boldsymbol{X_i})/(1-\hat{P}(\boldsymbol{X_i}))$ for the citizens in comparison villages. The variable $\hat{P}(\boldsymbol{X_i})$ represents the probability of a citizen being in the intervention group, given

their observable characteristics, measured through the vector of matching variables $\boldsymbol{X_i}$. We report estimates of b – the effect of being a man compared to being a woman in the comparison group, c – the impact of the project among women, d – the additional impact of the project for men, which provides a test of significance of the differential impact. Note c+d provides the overall impact of the project for men. These results are presented in the tables throughout Section 5.

The same specification is used to explore whether impacts on household income are differential for people who were already members of a pineapple cooperative in 2015. The specification is as follows:

$$Y_{ip} = a + b.Coop2015 + c.Project + d.Coop2015 * Project + e.X + \varepsilon_{ip} \qquad (2)$$

b is the effect of being a member of a pineapple cooperative in 2015 compared to not being a member of a pineapple cooperative in the comparison group. c is the impact of the project among people who were not part of a pineapple cooperative in 2015, d is the additional impact of the project for pineapple cooperative members in 2015, which provides a test of significance of the differential impact. Note c+d provides the overall impact of the project for pineapple cooperative members in 2015. The results are commented on in Sections 5.1 and 5.2 when differential impacts are observed, and the Tables are available on demand.

Note that the sample size for women respondents and for pineapple cooperative members in 2015 is lower than the sample size for men respondents and for non-cooperative members in 2015. There is a risk that this could lead to differential levels of significance per subgroup. This will be commented on in Section 5 in case sample sizes may be driving the results.

APPENDIX 3: ROBUSTNESS CHECKS

In order to check for the validity of the results presented in Section 5, additional analyses with different estimation techniques were performed. Three econometric models were used to test the robustness of the estimates presented in Section 5.

This appendix presents the three models and the results (impact estimates) for the two main outcome indicators. All the tables that are not presented here are available on request.

It is important to note that, as with the PSM methods used in the main body of the report, these alternative models can only account for observable differences between the intervention and comparison groups. Unobservable differences may still bias the results.

MODEL 1: PROPENSITY-SCORE WEIGHTING, WITH LAND SIZE AT BASELINE AS ADDITIONAL CONTROL VARIABLE

We use propensity-score weighting, following the example of Hirano and Imbens (2001). We estimated an OLS regression with interaction terms, weighting the observations according to the propensity score. Observations were assigned weights equal to 1 for the intervention households and $\hat{P}(\boldsymbol{X_i})/(1-\hat{P}(\boldsymbol{X_i}))$ for the comparison households. The variable $\hat{P}(\boldsymbol{X_i})$ represents the probability of an individual being in the intervention group, given their observable characteristics, measured through the vector of matching variables $\boldsymbol{X_i}$ – this was estimated in the probit regressions in Section 5. Standard errors were corrected for clustering at the community level.

MODEL 2: PROPENSITY-SCORE WEIGHTING FOR MEN RESPONDENTS ONLY

To test for the significance of the impact among men, we ran PS-weighted regressions with matching variables as control variables, restricting the sample to men respondents.

MODEL 3: PROPENSITY-SCORE WEIGHTING FOR MEN RESPONDENTS ONLY, WITH LAND SIZE AT BASELINE AS ADDITIONAL CONTROL VARIABLE

To check that the effect among men is not driven by the initial imbalance in land ownership, imperfectly corrected by the matching model, we ran PS-weighted regressions with matching variables as control variables, and land size in 2015 as additional control variable.

Table A3.1: Household expenditures

	Total daily food expenditures per EA – RWF	Total daily non-food expenditures per EA – winsorized – RWF	Total daily food AND non-food consumption expenditures per EA – winsorized – RWF	Log transformation of total daily food AND non-food consumption expenditures per EA
OLS regression with PS weighting and additional control variable				
Difference (standard error)	111.97*** (37.58)	167.39 (157.66)	279.43 (177.06)	0.14 (0.10)
Observations (intervention group)	216	216	216	216
Observations (total)	568	568	568	568
Men respondents only: OLS regression with PS weighting				
Difference (standard error)	234.15*** (37.68)	312.76** (154.27)	543.22*** (160.12)	0.31*** (0.07)
Observations (intervention group)	134	134	134	134
Observations (total)	315	315	315	315
Men respondents only: OLS regression with PS weighting and additional control variable				
Difference (standard error)	224.54*** (50.44)	253.25 (197.49)	473.93** (219.99)	0.25** (0.10)
Observations (intervention group)	134	134	134	134
Observations (total)	315	315	315	315

Table A3.2: Asset-based measure of wealth

	Normalized wealth index
OLS regression with PS weighting and additional control variable	
Difference (standard error)	0.03 (0.15)
Observations (intervention group)	216
Observations (total)	568
Men respondents only: OLS regression with PS weighting	
Difference (standard error)	0.18 (0.15)
Observations (intervention group)	134
Observations (total)	315
Men respondents only: OLS regression with PS weighting and additional control variable	
Difference (standard error)	0.10 (0.20)
Observations (intervention group)	134
Observations (total)	315

Table A3.3: Job creation at the household level

	Number of casual workers hired on agricultural land monthly
OLS regression with PS weighting and additional control variables	
Difference (standard error)	1.00 (0.97)
Observations (intervention group)	216
Observations (total)	567
Men respondents only: OLS regression with PS weighting	
Difference (standard error)	3.19** (1.40)
Observations (intervention group)	134
Observations (total)	315
Men respondents only: OLS regression with PS weighting and additional control variables	
Difference (standard error)	2.47* (1.31)
Observations (intervention group)	134
Observations (total)	315

APPENDIX 4: RISK OF BIAS TABLE

Not all quasi-experimental impact evaluations are the same. Choices made during sampling, selection of the comparison group and at the analysis stage are crucial in assessing overall confidence in the results. Table A4.1 uses our standard framework to assess the risk of bias against 11 predetermined parameters. This framework is specifically for ex-post quasi-experimental impact evaluations. Lower overall risk provides higher confidence in the results.

Table A4.1 Risk of bias

	Title	Description	Assessment	Description
Sampling				
1	Random sampling	Score LOW risk if: Sampling is conducted using probability random sampling methods on a clearly established sample frame. Score MEDIUM risk if: Sampling is conducted using probability random sampling methods at geographical level (e.g. village level), and use random sampling to select respondents within the geographical area. Score HIGH otherwise.	LOW	All suppliers of the cooperative were contacted for the survey (cooperative members or not). All pineapple farmers in the comparison group were contacted (members of farmers group from another Oxfam project in the pineapple value chain). Within villages where pineapple farmers were identified in the comparison areas, random sampling was used to identify additional respondents (not necessarily growing pineapple before the project started).
2	Representativeness of project participants	Score LOW risk if: Project participants have been involved for the entire duration of the project and have been involved in the project with the same level of exposure. Project participants have been exposed to a variety of different activities, and some may have dropped out from some activities, but sampling is conducted on the entire list of project participants. Score MEDIUM risk if: Project participants have been exposed to a variety of different activities. Sampling is conducted only among those project participants that have been enrolled for the entire duration of the project or that have been enrolled in all the activities. These are not less than 80% of the entire list of project participants OR it is clear the results apply only to a particular group of project participants. Score HIGH otherwise.	LOW	Project participants in this setting are the cooperative's suppliers (cooperative members or not). The whole list of cooperative members was used.
3	Selection of survey respondents	Score LOW risk if: Identification of survey respondents is not determined by project participation (the same protocol to identify the respondent(s) within the household is applied in intervention and comparison groups). The resulting selection of survey respondents is not affected by project participation (based on observables). Score MEDIUM risk if:	MEDIUM	The selection of respondents is based on their involvement in pineapple farming (group A and B) and farming activities (group C). In group A and B, the respondents are the individuals directly involved with the cooperatives or farmer groups. The same

		Identification of survey respondents is not determined by project participation (the same protocol to identify the respondent(s) within the household is applied in intervention and comparison groups). The resulting selection of survey respondents is affected by project participation (based on observables). Score HIGH otherwise.		selection of survey respondents is used in intervention and comparison groups, provided the identity of the household members involved in pineapple farming and with a cooperative is not affected by the growth of the EDP-supported cooperative. In group C, the gender of the respondent is randomly assigned when there are both women and men involved in farming in the household.
Selecting comparison group				
4	Potential for contamination (spillovers)	Score LOW risk if: Units for the comparison group are selected in geographical areas where it is not reasonable to expect the project to have had spillover effects. The project also implemented some activities (which are not considered the most relevant under analysis) which are expected to also have had an impact in the comparison group. (e.g. the project implemented campaigns using radio and other digital media, but these are only a minor component of the activities implemented). The report makes clear which impact is assessed (added-value of other components, taking into account exposure to those minor components). Score HIGH risk if: Units for the comparison group are selected within the same geographical area as the intervention group, and it is reasonable to expect that project activities had spillover effects. (e.g. comparison observations within the same village, for awareness-raising projects).	LOW	The comparison group was selected for being out of reach of the EDP-supported cooperative value chain.
5	Self-selection of project participants	Score LOW risk if: The comparison group is exploiting an experiment or natural experiment. Units are randomly selected at community level both in the intervention and comparison groups. The selection process for the comparison group is mimicking the selection process used by the project. Score MEDIUM risk if If the self-selection is corrected during the matching procedure (e.g. controlling for group participation at baseline). Score HIGH risk if: Project participants were selected or self-selected based on idiosyncratic or unobservable characteristics, and the selection of comparison respondents is done randomly from neighbouring geographical sites.	MEDIUM	The selection process is mimicking the selection process used by the project (membership of cooperative/farmer groups) for part of it (group B). The other part is a random sampling (group C), to mimic the fact that some farmers may have switched to pineapple farming with the growth of the EDP-supported cooperative. However, the matching process highlights strong self-selection and corrects for it, as much as possible.
6	Other interventions in the comparison group	Score LOW risk if: There are no other actors in the area (e.g. INGOs, NGOs, governmental programmes). Other actors are conducting activities which are not linked to the project's theory of change. Score MEDIUM risk if:	MEDIUM	The Pineapple Value Chain Promotion project (PVP) was implemented in both intervention and comparison areas, and taken into account in the evaluation design (see Section 3).

		Other actors are conducting similar activities linked to the project's theory of change in both the intervention and the comparison groups. Score MEDIUM-HIGH risk if: Other actors are conducting similar activities linked to the project's theory of change in the comparison group only, but the evaluation purposefully chooses to compare these activities to the intervention, making it clear that the impact is compared with these other activities (e.g. as a natural experiment). Score HIGH risk if: Other actors are conducting similar activities in the comparison communities only. Other actors are conducting activities in the comparison communities, which are not the same but are partially related to the project's theory of change.		
Analysis				
7	Representativeness	Score LOW risk if: During analysis or matching procedure less than 10% of the sample in the intervention group is excluded. Score HIGH risk if: During analysis or matching procedure more than 10% of the sample in the intervention group is excluded.	LOW	67 of the 634 interviews carried-out – 25 of which were in the intervention group – were dropped because they lay outside the common support area.
8	Robustness checks	Score LOW risk if: Magnitude and statistical significance of the results are approximately consistent with different econometric models. Score HIGH risk if: Results are not consistent with different econometric models.	LOW	
9	Triangulation	Score LOW risk if: Results are triangulated and consistent with other evaluation methods within the same evaluation. Results are triangulated and consistent with other data on the same project but from different evaluations. Score MEDIUM risk if: Results are not consistent with other evaluation methods or sources but the differences are explained in the report. Score HIGH risk if: Results are not triangulated with other evaluation methods or sources.	LOW	Results are triangulated between qualitative interviews with cooperative or enterprise owners and they are consistent with results from the quantitative analysis. The results are also discussed in light of other evaluations of similar projects, such as the impact evaluation of the Pavitra cooperative in Nepal (Caeyers, 2014).
10	Multiple hypothesis testing	Score LOW risk if: Multiple hypothesis tests apply Benjamini or Bonferroni tests. The evaluation drafted a pre-analysis plan prior to data analysis, and followed the plan. Score MEDIUM risk if: The evaluation drafted a pre-analysis plan prior to data analysis, and significant changes to this are clearly justified. Score HIGH otherwise.	LOW	A pre-analysis plan was drafted and followed.
11	Clustering	Score LOW risk if: Clustering is applied.	LOW	Analyses are carried out with 17 clusters, which is

		Clustering was tested but rejected as providing higher standard errors than non-clustering estimates. Score HIGH otherwise.		relatively low by statistical standards. In the Effectiveness Review, given that statistical methods correcting for low number of clusters are not available for PSM models, we adopted a pragmatic approach (following Jonathan Lain's blog post of the 21 December 2016). We checked whether regular clustering led to reducing our standard errors, which would lead to over-rejecting the null hypothesis that the project had an impact. Regular clustering seems to increase our standard errors, as one would expect, in spite of the relative low number of clusters.

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NOTES

1 For more information on Oxfam's Enterprise Development Programme, see: http://edp.oxfam.org.uk/

2 Single women living with their parents, women living alone with their children, or women who have been widowed as a result of the genocide, for example.

3 See Umulisa, 2020 ; Bizoza and Sibomana, 2020; Oxfam, 2020; and Joras, 2020.

4 For example, see Oya et al. (2018).

5 See Oxfam International, 'The Carbon Inequality Era', at: https://medium.com/@Oxfam/the-carbon-inequality-era-71e20205a0d4

6 For more on the Enterprise Development Programme, see: http://edp.oxfam.org.uk/

7 The second enterprise supported by EDP in Rwanda since 2015-2016 dries cassava leaves.

8 Interview conducted on 26 September 2019.

9 Ibid.

10 Ibid.

11 The survey was carried out with individual farmers and horticulture organizations who met at least one of the following criteria: 1. Production in at least 0.5 hectare in collectively operated open-field horticulture over the past 12 months; 2. Horticulture production in at least 100m2 of collectively operated greenhouses over the past 12 months; 3. Horticulture gross sales of 5,000,000 RWF over the past 12 months (see the baseline report published in March 2014 by the European Union's External Cooperation Programme for Rwanda).

12 'There are also very few processed products produced by organizations in Rwanda. Juices, mainly pineapple and passion fruit, are the one product that appears in significant volume at 2.05 million litres per year, with total sales of 1,794 million FRW. Juices comprise 92.8% of production and 95.8% of sales. Preserves (pineapple, strawberry, gooseberry) and dried fruit and nuts account for the small fraction remaining.' (AGRER Consortium, 2014, p. 21)

13 Interview with the Tuzamurane president on 26 September 2019.

14 Oxfam. (2019). EDP Annual Report 2019.

15 The loan was fully repaid by March 2019.

16 Interview with the Tuzamurane president on 26 September 2019.

17 The cooperative introduced the pension scheme in 2019, consistent with a new national policy encouraging people to save for their retirement.

18 Interview conducted on 26 September 2019.

19 Note that the management of the cooperative is at three levels: a bi-annual General Assembly held in March and October; a board of directors, which provides regular inputs on the management of the cooperative; and a committee group, which supervises the actions of the board and the staff members employed by the cooperative.

20 Baseline data were not available, so survey respondents were asked to recall some basic information about their household's and their own situation during the year 2015. While this recall data is unlikely to be completely accurate, it is the best-available proxy for households' and individuals' pre-project situation.

21 The list did include a very small number of contractors who were not currently supplying the cooperative because they had lost organic certification.

22 The impact evaluation of Pavitra, a Nepali cooperative supported by the first phase of EDP, highlights this as a limitation of its ex-ante design: 'It is crucial to note the unavoidably unrepresentative nature of the sample at endline, given the huge expansion of Pavitra membership (from 216 members at baseline to 816 members at endline) and the increased

number of non-member seed suppliers (from 216 to 1,340) in the two and a half years since EDP started. Therefore, the improvement in outcomes such as material well-being observed on average for this study is quite likely to be an understatement of the true benefit derived from EDP by the bulk of farmers.' (Caeyers, 2014, page 20).

23 Duterimbere is a national NGO working in Rwanda to empower women towards eradication of poverty. See: https://duterimbere.org.rw/

24 Adult equivalence scales take into account the age and number of household members, acknowledging that household members of different ages may have different needs, and potential economies of scales of consumption linked to household size. Instead of dividing total household consumption by the number of household members (per capita measure), one divides total household consumption by the number of adult equivalent (each member aged above 15 counts for 1 and each member aged below 15 counts for 1/3), power 0.9, following Deaton and Zaidi (2002).

25 It is generated under the assumption that if each of the assets and housing characteristics constitute suitable indicators of household wealth, they should be correlated with each other. That is, a household that scores favourably on one particular wealth indicator should be more likely to do so for other wealth indicators (alpha score 0.82). We ensure the item-rest correlation for each asset is greater than 0.1. We also ensure that Cronbach's alpha is at least 0.7, following the guidance of Bland and Altman (1997).

26 The wealth index is taken directly from the first principal component. We follow the approach of Filmer and Pritchett (2001). In this case, the first component explains a small share of the total variance (20%), which is consistent with general practice presented in Vyas and Kumaranayake (2006); the studies reviewed by the authors consider first components that explain between 12% to 27%. PCA enables us to assign weights to the different assets, to capture as much information as possible from the data. Broadly, PCA assigns more weight to those assets that are less correlated with all the other assets, as these carry more information. By contrast, items with more intra-correlation are given less weight. The wealth index hence computed is a score, which characterises the distribution of wealth in the population.

27 As noted by several speakers in the conversation organized by CGDEV and Data2X: 'Is Household Headship a Useful Concept? A Research and Policy Conversation'. https://www.cgdev.org/event/household-headship-useful-concept-research-and-policy-conversation

28 Analysis conducted with 251 people.

29 This was 28%, according to the 2012 Fourth Rwanda Population and Housing Census in rural areas (see NISR, 2014).

30 We comment on differences that are statistically significant at least at 10%, by a test of equality of means.

31 This was 30% among women in rural areas and 25% among men, according to the 2012 Fourth Rwanda Population and Housing Census in rural areas (see NISR, 2014).

32 This was 4% in the intervention group and 1% in the comparison group, respectively.

33 Interview conducted on 26 September 2019.

34 Ibid.

35 Note that Tuzamurane received organic certification from Ecocert.

36 This is the logarithmic estimate after controlling for land size, presented in Table A3.1, as it gives more conservative estimates than the one presented in Table 5.1.

37 This is among households included in the PSM analysis, i.e. excluding the largest landowners; among the entire sample of Tuzamurane contractors, average land owned is 1 ha among women and 1.4 ha among men.

38 This is due in part to people farming pineapple in a group on a collective farm but not on their household farm, or people who started growing pineapple recently and have not yet harvested.

39 Note that only farmers with organic certification sell their produce to the cooperative.

40 These are the estimates after controlling for the differences in agricultural land size in 2015, as they provide more conservative estimates than the PSM model.

41 We do see some price variation on average, depending on the type of farming done, but the association is not statistically significant. It also seems driven by small numbers and hence is particularly sensitive to measurement error. We believe that the price per kg is imperfectly measured here, as we calculated it based on sold quantity and total sales revenue over the previous 12 months, and there may be measurement errors for both these variables. In addition, this estimate would not reflect price seasonal variation as it is an estimate over the last 12 months, which is particularly important for farmers selling their produce on the domestic market.

42 After controlling for the differences in agricultural land size in 2015.

43 After controlling for the differences in agricultural land size in 2015.

44 After controlling for the differences in agricultural land size in 2015.

45 After controlling for the differences in agricultural land size in 2015.

46 The analysis is conducted with the information from 216 people.

47 Note that the number of people involved in pineapple farming is not impacted by EDP support to Tuzamurane on average (this is similar to the results of the impact evaluation of the Nepali cooperative Pavitra; see Caeyers 2015), nor is it significantly different for women contractors and men contractors. However, the trend seems to be positive for men contractors (meaning it is more likely for them to have new household members contributing to pineapple farming). The trend is negative and close to 0 for women contractors.

48 Interview conducted on 26 September 2019.

49 For more information, see: https://www.fairforlife.org/

50 Note that only members of pineapple cooperatives were asked this set of questions in the questionnaire.

51 Interview conducted on 31 October 2019.

52 Follow-up interview on 4 November 2019.

53 Interview conducted on 31 October 2019.

54 Interview conducted on 26 October 2019.

55 These were measured following Lombardini, Bowman and Garwood (2017). The indicator of leadership skills is calculated as the number of statements that the person totally agrees with: 'I can handle new situations with relative comfort and ease'; 'I feel comfortable bringing people together for a meeting and leading the discussion'; 'I feel comfortable speaking up in public to help decide on important decisions, such as infrastructure – e.g. roads, water supplies – to be built in my community.'

56 The indicator of self-confidence is calculated as a binary indicator, taking the value 1 if the person totally agrees with both statements ('I feel that I have a number of good qualities' and 'I am equal to my peers' (e.g. my siblings when I am with my family, my friends in the village, colleagues or other farmers when I am at a work meeting, etc.).

57 We ran the impact analysis by restricting it to Tuzamurane contractors and farmers involved in groups working with Duterimbere, to make sure that the results displayed in Tables 5.5 and 5.6 are not driven by a higher share of people being involved in GALS trainings or similar activities in the intervention group. The results are not changed when restricting the analysis to people involved in GALS (people who could participate, rather than people who directly participated).

58 Note that alternative designs were considered to further explore the impact on job creation, but they were not feasible. These included 1. Exploring the impact among a group of casual workers; 2. Adopting a market approach to understand the impact on the local economy.

59 The data does not allow us to distinguish whether the suppliers were already supplying the cooperative in 2015.

60 The analysis is carried with data from 251 persons. It does not take into account the potential correlation of data at cell level, due to the relatively small number of observations per group.

61 The age difference is not surprising, and this is consistent with the results of a similar analysis conducted as part of the impact evaluation of EDP support to Pavitra cooperative in Nepal (Caeyers, 2015).

62 Interview conducted on 26 September 2019.

63 Oxfam. (2019). EDP Annual Report 2019.

64 For example, see Oya et al. (2018).

65 See Oxfam International, 'The Carbon Inequality Era', at: https://medium.com/@Oxfam/the-carbon-inequality-era-71e20205a0d4

66 Bootstrapping is a statistical procedure where repeated samples are drawn from the original sample and parameters, such as standard errors, are re-estimated for each draw. The bootstrapped parameter is calculated as the average estimate over the total number of repeated draws.

67 The PSM model is made of 16 variables. When we run PS-weighted regressions with interaction terms – see Section 5.2 – we end up with a model made of 18 variables and the constant. 17 clusters do not allow us to compute the F-test to test for joint nullity of coefficients.

OXFAM EFFECTIVENESS REVIEWS

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