



## IGNITE & TADB

Impact of financing on household dynamics, dairy productivity, and diet quality among men and women dairy producers in Tanzania

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TADB

The Impacting Gender and Nutrition through Innovative Technical Exchange in Agriculture (IGNITE) mechanism is a five-year investment to strengthen African institutions' ability to integrate nutrition and gender into their way of doing business and their agriculture interventions. IGNITE works with African agricultural institutions in Ethiopia, Nigeria, Burkina Faso, and Tanzania.

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## Executive Summary

The Tanzania Inclusive Processor-Producer Partnerships in Dairy project (TI3P) is a three-year dairy development project, running from 2022 to 2025, co-funded by the Bill & Melinda Gates Foundation (BMGF) and implemented by TADB in partnership with the Ministry of Livestock and Fisheries, Land O'Lakes Venture37 (v37), and Heifer International. TI3P offers loans across the entire dairy value chain focusing on processors, small, medium, and large-scale farmers, and input suppliers.

The focus of this study is small-scale dairy producers who received loans through Farmers' Producer Organizations (FPOs) by TADB/TI3P in Arusha, Kilimanjaro, Mbeya, and Tanga regions. This cross-sectional study assesses the relationship between TI3P's small-scale producer loans and gender- and dietary-related outcomes. It also seeks to understand factors influencing households receiving TADB/TI3P loans for men and women. The findings from this study will be used by TADB to make decisions on loans and product development in a gender- and nutrition-sensitive manner.

The study employed a mixed-methods design that included a household survey of 1,114 dairy-producing households (including 1,007 female and 950 male respondents); a survey of 153 markets, 20 Focus Group Discussions, and 15 Key Informant Interviews. This data was used to address three objectives:

1. Explore contextual factors that may influence men's and women's access to dairy-related financing by TADB/TI3P.<sup>1</sup>
2. Understand how men and women in dairy-producing households share the benefits and responsibilities of dairy production.
3. Explore the links between dairy production and dietary quality among members of dairy-producing households.

### Objective 1: Ability to access TADB/TI3P loans

We interviewed 295 TADB/TI3P loanholders, 41% of whom were women. Male and female loanholders are different in many ways, including the loan amount they receive (USD 1,258 for men vs. USD 949 for women) and their income profile (households with male loanholders report an average median annual income of USD 1,425 and households with female loanholders USD 1,167). Men's and women's access to loans differed substantially by region. In Kilimanjaro, 68% of the loanholders we spoke with were women while in Mbeya 82% of the loanholders we spoke with were men. This was in line with the sampling frame, where the majority of the loanholder population in Kilimanjaro were women, and the majority in Mbeya were men.

We observed that women who received the TADB/TI3P loans were relatively empowered. Women who are loanholders were more likely than other women to be unmarried (that is, never married, or were divorced/widowed/separated), have a higher age of marriage, have had previous paid employment, and be able to make unilateral decisions on visiting a dairy market. The education status of women did not significantly differ among loanholders and non-loanholders. We note that the direction of this effect on empowerment cannot be determined within the scope of this study.<sup>2</sup> Other factors that predicted being a loanholder among both men and women included older age,

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<sup>1</sup> We acknowledge that study respondents may have loans from other providers, but this study focuses on TADB/TI3P loans only.

<sup>2</sup> Due to limitations in the study design, we do not know if women who are already more empowered are the ones receiving loans, or if the loans themselves are influencing empowerment in some way.

ownership of a phone registered in their own name, access to information on banking and loans, and closer proximity to dairy markets.

Overall, there was broad consensus on challenges in the loan application process among both men and women as well as among both loanholders and non-loanholders. Challenges associated with loan applications included upfront costs, literacy and financial literacy, delays in the loan application process, lack of transparency surrounding selection criteria, difficulty securing collateral, and exclusion of young people. In addition to the aforementioned challenges, the youth are affected by perceptions of being immature, unreliable and not possessing the proper qualities for farming. Although women and men face similar challenges in accessing loans, existing inequities in access to education or collateral mean these challenges disproportionately impact women. Furthermore, women face cultural barriers hindering their decision-making. Gender-responsive loan products are needed to overcome these inequities.

We also observed that the current TADB/TI3P loans do not adequately fit the needs of all dairy-farming men and women. Some farmers reported preferences for a cash loan, which could be used to purchase their own cows or to provide better resources for existing cows. Issuance of cash loans to farmers is a risk for TADB, due to the possibility of farmers using the finances for other activities. This increases the likelihood of the farmers failing to repay their TI3P loans. Other farmers cited concerns about being able to produce adequate milk to repay payments, fears of being deceived, and skepticism after watching the experiences of other loanholders.

## Objective 2: Gender dynamics of dairy production

Men and women approach the responsibilities and benefits of dairy production differently. On average, men in our sample participate in more dairy-related tasks than women (7.1 vs. 6.1 out of 12) and spend more hours a day in dairy production (3.3 vs. 1.9 hours). Women report having at least some input in decisions for a wider range of dairy-related activities compared to men (3.7 vs. 3.2), but men tend to view themselves as having higher levels of input into decision-making on specific tasks. This finding suggests women have input into decisions around dairy-related activities but are not necessarily viewed as the primary decision-makers. Encouragingly, men and women report having at least some control over similar proportions of dairy-related income (79% vs. 73%, respectively) and women report having sole control over a higher proportion of dairy-related income than men (30% vs. 16%). However, while men spend more time on dairy-related tasks than women, women spend more time working overall, with 47% of women and 37% of men experiencing time poverty (defined as working more than 10.5 hours a day by the pro-WEAI).<sup>3</sup>

In general, households with a TADB/TI3P loan reported similar gender dynamics (allocation of labor and decision-making power on dairy-related activities, allocation of time, and control over dairy-related income) as households without a TADB/TI3P loan. Though respondents in loanholding households have greater involvement in dairy-related activities, and when women are loanholders, the gender gap in participation in dairy-related activities essentially disappears. Importantly, there is no quantitative evidence that having a TADB/TI3P loan increases labor within the household or leads to greater uncompensated labor among women, although a few individuals reported increased workload in qualitative interviews.

There are contradictory views among farmers on whether TADB/TI3P loans have been beneficial or harmful. Many loanholders have experienced some benefits in terms of income, milk production, or the number of cattle. However, there is also a widespread perception that the cows

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<sup>3</sup><https://weai.ifpri.info/files/2023/07/Pro-WEAI-Guide.pdf>

delivered through the loan process were of poor quality, leading to low milk production, difficulties repaying the loan, and, in rare cases, intra-household conflict. This is in line with the average liters of milk produced by the household in the week prior to the survey reported in the household survey; we see no difference in daily milk production between loanholders and non-loanholders in the ten TADB/TI3P FPOs (both groups produce on average 10 liters daily).

### Objective 3: Dairy production and dietary quality

Both men and women reported moderate risk of experiencing poor dietary quality (evidenced by a GDQS score of 17.3 on a scale of 0 to 49).<sup>4</sup> Women reported experiencing low dietary diversity (evidenced by an average MDD-W score of 3.8).<sup>5</sup> Although dietary quality was similar among men and women, men consistently consumed significantly more dairy than women (0.2 liters vs. 0.1 liters per day).

There were substantial differences in the consumption of specific food groups for men and women as defined by the GDQS. Women were significantly more likely to consume foods from the healthy GDQS food groups compared to men, while men were more likely to consume foods from the unhealthy GDQS groups.

Increased dairy production was weakly associated with increased dairy consumption among men and women at low levels of milk production, increased MDD-W scores among women, and increased GDQS scores among men. Although the differences between men and women for dairy consumption and dietary quality as measured by the GDQS were statistically significant, their magnitude is very small. Among men, each additional liter of milk produced per week was significantly associated with a 0.03-point increase in GDQS score which is considerably small in magnitude considering the average GDQS score; however, there was no association between milk production and dietary quality among women as measured by the GDQS. Overall, increased dairy production alone does not appear to be a sufficient strategy to meaningfully achieve high dietary quality.

The relatively weak associations among dairy production, loanholding status (having a TADB/TI3P loan), and dietary quality may point to situations in which cow productivity was not always sufficient to allow farmers to both consume the desired amount of milk and cover other household needs. Specifically, we observe that female loanholders have a higher GDQS score than women living with male loanholders highlighting the potential positive effects for a woman who is the loanholder compared to living in a household with a male loanholder in terms of her agency over finances that positively influences her GDQS score (dietary quality).

58% of men and 47% of women dairy farmers reported consuming milk or milk products in the previous day. Farmers reported their consumption of milk was driven by the quality of the cow producing milk, climatic factors affecting availability of feed, availability of land for steady supply of food for cows, having adequate water, having adequate feed, having access to veterinary care, and sufficient knowledge to increase milk production. As for the income from milk sales, farmers report that the income was largely used to repay loans, cover household expenses, or re-invest in dairy farming rather than to expand the quality or diversity of the diet.

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<sup>4</sup> GDQS risk score ranges from 0-49. A respondent is assessed against three categories of risk of experiencing poor dietary quality: high risk if score is <15, moderate risk if score is between 15-22, and low risk if score is ≥23

<sup>5</sup> MDD-W score ranges from 0-10. A respondent is assessed against two categories of achieving adequate dietary diversity: Not achieving MDD-W if score is <5, achieving MDD-W if score is ≥5

On average, farmers lived 9.8 kilometers from the nearest high-quality market. A high-quality market is defined as a market with a food basket price score greater than 23. The food basket price score reflects the lowest price for which you could amass a 23-point food basket (which corresponds to the GDQS's "low risk of experiencing poor dietary quality" category) at that market.

Market access was not associated with dietary quality, nor did it modify the relationship between dairy production and dietary quality. We find that older age for women and highest category of wealth as measured by the equity tool drive dietary quality as measured by the GDQS. Access to a food market was not a challenge among the farmers interviewed; however, they were more likely to cite challenges in accessing dairy markets. These challenges included issues with safe milk storage, milk processing, and milk transportation leading to poor quality milk or milk spoilage. As a result, farmers could be forced to take back the milk without payment.

## Recommendations

Our findings suggest several opportunities for TADB to strengthen gender and nutrition integration within the TI3P program or for future financing products in order to improve financial and nutritional outcomes for both women and men.

**First, additional efforts are needed to address the socio-cultural gender barriers preventing women from accessing loans.** Using gender-specific training-of-trainers for FPOs to deliver to their members that acknowledge gender barriers and stereotypes, and support FPOs to encourage the participation of women in livestock farming and decision-making. Since there are women seeking loans via the FPOs, here FPOs can again play a role in increasing the uptake of loans by women. TADB here can also play an important role in developing social and behavior change (SBC) messages for the FPOs in the training and outreach, and including the community in their activities. Because there are clear differences in women's uptake of loans by region, monitoring, and evaluation of these efforts should be disaggregated by both gender and region to allow for specific tracking and analysis of the program.

**Second, the design of the loans can continue to be made more women-friendly.** TADB staff view the fair application of loan eligibility criteria to men and women as a strength of their program. However, gender-neutral application of "fair" rules may ultimately exclude women from access to loans due to pre-existing disparities related to collateral or financial literacy. TADB can build on its existing commitment to fairness by further exploring the difference between equal application of criteria versus equitable access to loans. This could include supporting FPOs to build strong distribution models to reach rural women interest in dairy farming and the loan through strong outreach and marketing distribution models in the form of female loan officers and agent banking models. TADB could also provide gender-specific training and support to TADB staff in the development of capacity-building and support services for women loan applications and to improve women's financial ability and ability to take on loans. One way to ensure if the actionable steps are making a positive effect, TADB is encouraged to track and analyze the distribution of loans to women and men, set targets for gender balance, and review these annually.

**Third, there is a need to test loans that better suit the needs of dairy farmers. Farmers would like access to high-productivity cows as well as to financial products that respect their agency.** Farmers reported need cows with higher productivity and while this is a request that TADB can address, this should also be combined with further technical support on livestock management. This is to ensure that poor livestock management is not negatively affecting the cow productivity. Farmers would also prefer the ability to choose their own cows so they can



ensure a cow with high productivity, and this agency can also ensure more accountability from the farmers on managing their livestock.

**Finally, neither having a TADB/TI3P loan nor increased dairy production appear to meaningfully improve dietary quality on their own.** TADB can consider adding other components to their programming, such as educational components and SBC training that discuss the benefits of dietary diversity, to promote nutrition. This training should specifically consider targeting younger women and men who are not wealthy because they seem to be the ones who are not able to improve their dietary quality. Ultimately, any path through which dairy financing can improve nutrition will depend on the program's ability to improve household dairy production to ensure that farmers can consume more milk at home.

## Introduction

TADB is a state-owned development finance institution established in 2012 as an apex national-level bank for agricultural development in Tanzania. The bank is to be a catalyst for the delivery of short-, medium-, and long-term credit facilities for the development of agriculture in Tanzania. Its establishment is among the key initiatives and national goals enshrined in Vision 2025<sup>6</sup> to achieve food self-sufficiency and food security, economic development, and poverty reduction.

The TI3P project is a three-year dairy development project, running from 2022 to 2025, co-funded by the Bill & Melinda Gates Foundation (BMGF) and implemented by TADB in partnership with the Ministry of Livestock and Fisheries, Land O'Lakes Venture37 (v37), and Heifer International. The goal of TI3P is to catalyze the inclusive transformation of the Tanzania dairy sector by promoting public-private investments to increase the incomes of small-scale dairy farmers through increased formal milk aggregation, sustainable scale-up of on-farm production and productivity, growth of dairy processing, and increased demand generation. TI3P offers loans across the entire dairy value chain focusing on processors, small-, medium, and large-scale farmers, and input suppliers. The focus of this study is small-scale dairy producers who receive loans through FPOs by TADB/TI3P in Arusha, Kilimanjaro, Mbeya, and Tanga.

This cross-sectional study assesses the relationship between TI3P's small-scale producer loans and gender- and dietary-related outcomes. It also seeks to understand factors influencing households receiving TADB/TI3P loans for men and women. The findings from this study will be used by TADB to make decisions on loans and product development in a gender- and nutrition-sensitive manner.

## TADB/TI3P loan structure

TADB supports different segments of the livestock value chain, which includes livestock fattening, production of quality seeds, and dairy, which is where the TI3P project is focused. The bank's mandate is to act as a catalyst in agriculture, provide loans to livestock keepers, and offer advisory services to farmers. The TI3P program is designed to enhance dairy production through strategic financial support and training of farmers. Initially, the lack of cows was identified as the major issue faced by farmers, and the TADB/TI3P loan was designed to address this. Over time, other challenges such as the need for feed and sheds were identified, and systems are currently being developed to address these.

TADB works on increasing the involvement of women by working with women-only FPOs such as Kalali and Marukeni in Kilimanjaro which are both part of TI3P.<sup>7</sup>

### *Loan eligibility criteria*

The TADB/TI3P loans are primarily issued to farmers through groups (FPOs) due to lower risks of default. In all ten TI3P FPOs, loans were awarded as a group. Although the loans are awarded as a group, the needs of the individual farmers are assessed to determine eligibility. Applicants must be farmers and members of a recognized FPO, owning at least one dairy cow. Applicants are also required to demonstrate a genuine need for the loan, supported by a practical plan on how the funds will enhance their dairy operations. At the FPO level, the FPOs should have been operational for at least one year. The overarching criteria therefore focus on the potential productivity of the proposed use of the loan and the business viability of the applicant's farming operation.

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<sup>6</sup>Tandari, M. C. (2004). The Tanzania development vision 2025. *Dear Partners, Friends & Interested Readers*, 63.

<sup>7</sup>Outside of TI3P, TADB is offering favorable loans to women and youth through the Building a Better Tomorrow (BBT) project. The Youth Settlement Scheme is also a program in Tanga supporting youth in dairy farming through loans and the provision of technical support.

### *Collateral requirements*

The main collateral required includes primarily the cattle that applicants list. The cow that is provided as part of the loan is also insured and also serves as collateral. Collateral could be extended to include land or farm properties, but this is not always prioritized due to the difficulty in liquidating the assets. For group applications, collateral might include guarantees from members of the association. In the event of default on loan repayments, the dairy cow may be repossessed and assigned to another farmer.

### *Loan amount and disbursement*

The loan amount depends on the needs of the farmer and the cost of the dairy cows being purchased. TADB does not directly provide cows to the farmers but instead provides funds equivalent to the cows' value to suppliers, who then deliver the dairy cows to the farmers. While group loan amounts can start from 20-30 million TZS, individual loans within the groups are typically around 3 million TZS. To mitigate the risks linked to individual applicants such as lack of collateral, TADB has developed a policy requiring individual loans to amount to a minimum of 20 million TZS. FPOs are required to submit a debt limit as part of the application process. This debt limit is assessed against the groups' capacity and sets the limit for the maximum amount of loan that can be disbursed.

### *Loan repayment*

The repayment schedule could be monthly, quarterly, or biannually, depending on discussions between the loanholders and TADB. The schedule takes into account the operational needs of the dairy projects and any grace periods required for the cows to become productive. Loan repayments are facilitated through accounts held with CRDB Bank. Repayment is done through cash generated from milk production. Upon delivery of milk to the FPOs and payment to farmers, the FPOs deduct an amount which is deposited in the AMCOS. AMCOS collects milk sales proceeds and manages the repayment of the loans.

### *Loan application process*

The loan application process begins with awareness campaigns run by TADB to attract potential applicants. Those interested reach out to TADB to discuss their need for the loan and are assessed for eligibility. If ineligible, TADB explains the reason why to the applicants and advises on necessary changes to improve the chances of future applications. Applicants who pass initial screening and provided with a checklist of documents targeted to their category (that is, whether an FPO or an individual herder). Submitted documents are reviewed and farmers are vetted through site visits to assess the conditions of their sheds, farming experience, and trustworthiness. The final decision on successful applicants is made by a credit committee. Processing and issuing of loans take on average 2-3 months but could extend to 6 months depending on FPOs' internal processes. Some of the considerations made by the committee in selecting the loanholders include the operational period of the FPO (at least one year), compliance with legal requirements, quality of governance, and viability of the business.

## Literature Review

### *Financing to small-scale farmers in Tanzania*

Tanzanian smallholder farmers are substantially underfinanced and considered a high-risk profile by formal lenders.<sup>8</sup> Consequently, informal financial markets are dominant in rural areas.<sup>9</sup> These informal markets are characterized by high transaction costs, low levels of credit, and low levels of repayment rates.<sup>10</sup> Access to finance is important for improving productivity, as evidenced by a Tanzanian study which found that farmers who received credit through a program realized higher agricultural productivity compared to those who did not receive a credit; however, lack of information, inadequate credit supply, high interest rates, and defaulting were reported as major factors hindering smallholder farmers' access to credit.<sup>11</sup> According to the Tanzania 2020/2021 National Panel Survey, only 11% of households have used credit in the last 12 months.<sup>12</sup>

Research on smallholder farmers' access to credit in Africa reveals complex dynamics regarding gender disparities. Studies across various regions, including Nigeria<sup>13</sup> and Ethiopia<sup>14</sup>, consistently highlight limited credit access for women compared to men. For instance, a study conducted in Oyo state, Nigeria, found that being female reduced one's access to credit by 71.3%.<sup>15</sup> Similarly, research in Morogoro, Tanzania, identified three key factors influencing access to bank credit among smallholder farmers: the value of assets invested in farming activities, education level, and gender. Surprisingly, despite expectations of greater credit access for male farmers, recent findings indicate that female farmers actually have higher access rates, with 64.3% of women accessing bank credit compared to 35.7% of men.<sup>16</sup> These findings underscore the need for nuanced approaches to addressing gender disparities in credit access among smallholder farmers in Africa.

The state-owned TADB is a key player in enhancing smallholder farmers' access to loans at low interest rates and other affordable conditions in Tanzania. Since its foundation, the bank has accelerated the pace of industrialization and value addition by providing highly demanded long-term and short-term loans for the agro-processing industry.<sup>17</sup>

### *Dairy financing in Tanzania*

In the Tanzanian dairy sector, the provision of financial services is constrained by the existing production systems.<sup>18</sup> However, in the absence of collateral, banks are unwilling to lend to the sector, while cooperative societies are not sufficiently well-managed to provide adequate financial services. A panel study conducted in Tanzania highlights the reluctance of rural dairy farmers to

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<sup>8</sup> Financial Sector Deepening Trust. (2020). Credit Diagnostic report.

<sup>9</sup>Towo, E.N. (2012). Rural Small Scale farmers' access to credit in Iringa and Kilimanjaro regions, Tanzania. Doctoral dissertation, Sokoine University of Agriculture.

<sup>10</sup> Financial Sector Deepening Trust, 2020 (see 1).

<sup>11</sup> Girabi, F; Mwakaje, A. (2013). Impact of Microfinance on Smallholder Farm Productivity in Tanzania: The Case of Iramba District.

<sup>12</sup> National Bureau of Statistics (NBS) [Tanzania]. (2022). *Tanzania National Panel Survey Report (NPS): Wave 5, 2020/2021*. NBS.

<sup>13</sup> Obisesan, A., 2013. Credit Accessibility and Poverty among small holder cassava farming households in south west Nigeria, *Greener Journal of Agricultural Science*. 3(2): 120–127

<sup>14</sup> Yehuala, S. Haramaya University, Haramaya (Ethiopia). 2008. Determinants of smallholder farmers access to formal credit: the case of Metema Woreda, North Gondar, Ethiopia. MSc thesis (Rural Development). 110p. Haramaya (Ethiopia): Haramaya University.

<sup>15</sup> Ololade, R. A and Olagunju, F. I., 2013. Determinants of Access to Credit among rural Famers in Oyo state Nigeria. *Global journal of science frontier Research* 8(2):1-7

<sup>16</sup> Isaga, N., (2018) "Access to bank credit by smallholder farmers in Tanzania: a case study", *Afrika Focus* 31(1). doi:

<https://doi.org/10.21825/af.v31i1.9048>. Caution is warranted in interpreting the result on gender, as authors report that it may be influenced by the overrepresentation of females in the sample or by differences in access to financial information between genders.

<sup>17</sup>TADB. (2020). Smallholder Farmers Credit Guarantee Scheme. [www.tadb.co.tz/wp-content/uploads/2020/07/SMALL-HOLDER-credit-Guarantee-scheme.pdf](http://www.tadb.co.tz/wp-content/uploads/2020/07/SMALL-HOLDER-credit-Guarantee-scheme.pdf)

<sup>18</sup>Makoni, N; Mwai, R; Redda, T; Zijpp, A. van der; Lee, J. van der. (2013). White Gold; Opportunities for Dairy Sector Development Collaboration in East Africa. Centre for Development Innovation, Wageningen UR (University & Research centre).

take loans, primarily due to the requirement of presenting collateral.<sup>19</sup> This condition often results in low participation rates among farmers in credit or savings groups. Generally, gender data pertaining to dairy credit access is also quite limited, suggesting a need for more comprehensive research in this area.<sup>20</sup> The TI3P baseline report conducted in 2022<sup>21</sup> reveals that the majority of smallholder dairy farmers across 8 surveyed regions<sup>22</sup> have never received credit to support their dairy farming and have limited knowledge of available credit products. Inadequate collateral and guarantors are among the factors that constrain their ability to access financial services. Due to limited access to financial services, farmers typically rely on loans from extension agents, cooperatives, and village community banks (VICOBA), while micro-financial institutions are rare.

### *Gender roles in dairy production in Tanzania*

The gender division of roles in the dairy value chain in Tanzania is highly location- and culture-specific, making it difficult to generalize for the entire country. However, some general traits have been identified. First, women and men play important roles in dairy production.<sup>23,24</sup> Men typically own and control the dairy cows as they are more likely to be heads of households.<sup>25,26,27</sup> Consequently, men typically lead the decision-making process concerning selling or giving away dairy cattle and dominate decisions on income derived from dairy products, although joint decision-making is not uncommon.<sup>28,29</sup> Women, who are also responsible for domestic unpaid work, can be limited in their ability to expand their involvement in dairy production. Additionally, cultural norms favor men's participation in stages of dairy production that occur outside the home. For instance, men are allowed to move freely using motorbikes, which enables them to perform livestock extension services such as veterinary care.<sup>30</sup> However, these patterns are not universal. For example, when examining the gender division of roles in the Kilimanjaro and Tanga regions, women are responsible for feeding cows and milking them,<sup>31,32</sup> while men living in the Tanga region negotiate contractual agreements, and purchase feed. In the northern area of Tanzania, women are responsible for herding and watering calves, milking cows, and preparing food for the herdsmen.<sup>33</sup> In the Tanga region, women have control over the income generated from milk sales, whereas in the Kilimanjaro region, men have greater control.<sup>34,35</sup>

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<sup>19</sup> Katjuongua, H. and Nelgen, S. 2014. Tanzania smallholder dairy value chain development: Situation analysis and trends ILRI Project Report. Nairobi, Kenya: ILRI.

<sup>20</sup> Sikira A N, Waithanji E M, Galie A and Baltenweck I 2018: Gender aspects in the dairy value chain in Tanzania: A review of literature. *Livestock Research for Rural Development*. Volume 30, Article #69. Retrieved April 19, 2024, from <http://www.lrrd.org/lrrd30/4/anna30069.html>

<sup>21</sup> BACAS. (2022). Baseline Assessment Report for the Tanzania Inclusive Processor-Producer Partnerships in Dairy Project (TI3P).

<sup>22</sup> Pwani, Magharibi, Mara, Mwanza, Njombe, Kilimanjaro, Mbeya and Tanga regions.

<sup>23</sup> Kahamba & Xiuli. (2021). Effects of Women's Cooperatives on Capabilities and Gender Relations: Empirical Evidence from Women's Dairy Cooperatives in Kilimanjaro Region, Tanzania. *International Journal of Ag. Extension and Rural Development Studies*.

<sup>24</sup> Sikira, A.N., Waithanji, E.M., Galie, A. and Baltenweck, I. (2018). Gender aspects in the dairy value chain in Tanzania: A review of literature. *Livestock Research for Rural Development* 30(4): Article 69.

<sup>25</sup> Sikira, A. N, Waithanji, E. M., Galie, A. and Baltenweck, I. (2018b). Gendered Opportunities, Challenges and Prospects of the Dairy Value Chain in Tanzania. *Developing Country Studies* Vol.8, No.5.

<sup>26</sup> Mkenda-Mugittu, V. (2003). Measuring the invisibles: Gender mainstreaming and monitoring experience from a dairy development project in Tanzania. *Development in Practice*, 13(5), 459–473.

<sup>27</sup> Njuki, J., Waithanji, E.M., Macha, J., Mburu, S. and Kariuki, J.B. (2011). Gender and livestock value chains in Kenya and Tanzania.

<sup>28</sup> BACAS, 2022

<sup>29</sup> Nombo, C.I. and Sikira, A.N. (2012). Gender Issues in Dairy and Beef Value Chains in Tanzania. *Tanzania Journal of Development Studies*. Vol 12 No.1.

<sup>30</sup> Sikira, A.N., Waithanji, E.M., Galie, A. and Baltenweck, I. (2018).

<sup>31</sup> Kahamba & Xiuli. (2021).

<sup>32</sup> Sikira, A.N. (2010). Women empowerment and gender-based violence in Serengeti district, Mara region, Tanzania

<sup>33</sup> Sikira, A.N., Ndanu, H., Laswai, G.H. and Nandonde, S.W. (2013). Rapid appraisal of dairy value chains in Morogoro and Tanga regions in Tanzania.

<sup>34</sup> Kahamba & Xiuli. (2021).

<sup>35</sup> Sikira A.N., Ndanu, H., Laswai, G.H. and Nandonde, S.W. (2013).

### *Dairy and dietary consumption*

Animal source foods (ASF), such as milk, eggs, chicken, fish, and beef, are rich in protein and essential micronutrients. In particular, cow milk provides a significant amount of minerals, high-quality protein, and vitamins.<sup>36</sup> However, Tanzania's current average per capita milk consumption is estimated at only 64 liters per person per year,<sup>37</sup> which is much lower than neighboring countries such as Kenya, where per capita milk consumption is 110 liters per year.<sup>38</sup> A 2023 assessment of gender and nutrition in TI3P areas indicates that 50% of farmers had consumed milk or milk products in the previous week, with adults reporting more frequent consumption than children.<sup>39</sup>

There is some evidence that dairy production is associated with an improved diet in Tanzania: a 2018 study in Morogoro and Tanga found that households with dairy cattle had higher food consumption scores than those without, although the study did not specify whether the difference stems from increased income or increased own consumption.<sup>40</sup>

### *The potential for gender and dietary change in the dairy sector*

Tanzania's dairy sector has substantial potential for growth, and accessible financing options for small-scale producers can catalyze this growth. Although women often do not typically own cattle, they do often play a substantial role in dairy production and could directly benefit from financing. Financing could also have a longer-term impact on women's empowerment and household nutrition. Decision-making power is often tied to an individual's ability to contribute to household income, and women who control revenue from milk sales experience a corresponding increase in decision-making power, including the ability to purchase food for the household.<sup>41</sup> Additionally, qualitative evidence from non-dairy-producing households suggests that if a woman's income increases, milk consumption in the household increases, since men do not usually prioritize milk as much as women.<sup>42</sup>

## Conceptual Framework

The conceptual framework of the study is depicted in Figure 1 depicting layers of outcomes and contextual factors examined in the study. Dependent variables are shown in yellow, and independent variables are shown in white. In the top layer, we assume that within dairy-producing households, household dynamics affect decision-making on time and labor allocation, allocation of income, and dairy productivity. In turn, dairy productivity and allocation of income can influence the quality of the household's diet. The four layers behind represent contextual factors that influence these household dynamics. We assume household dynamics can be influenced by:

- Regional and geographic factors, including access to markets and cultural norms
- Household-level variables, such as socioeconomic status and household composition
- Financing for dairy through TADB/TI3P
- The sex of the TADB/TI3P loanholder.

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<sup>36</sup> WHO, FAO, UNU, (2007). Protein and amino acid requirements in human nutrition, WHO technical report series.

<sup>37</sup> Louis Kalumbia, 'Milk self-sufficiency: Tanzania requires nine billion litres', The Citizen, May 06 2023, accessed on June 05 2023. Available at: <https://www.thecitizen.co.tz/tanzania/news/national/milk-self-sufficiency-tanzania-requires-nine-billion-litres--4225090>

<sup>38</sup> Rademaker, C. J., Bebe, B. O., Van Der Lee, J., Kilelu, C., & Tonui, C. (2016). Sustainable growth of the Kenyan dairy sector: a quick scan of robustness, reliability and resilience (No. 979). Wageningen University & Research, Wageningen Livestock Research.

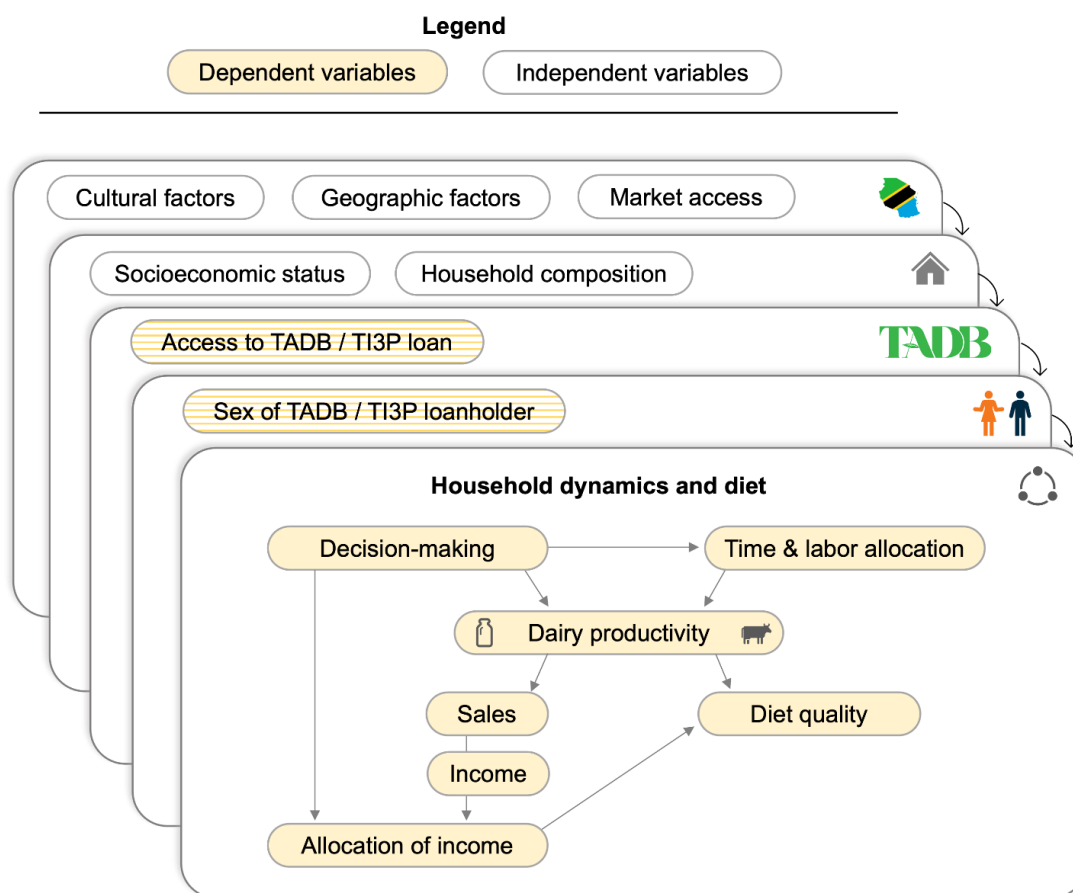
<sup>39</sup> Gender and Nutrition Formative Assessment of the TI3P dairy project areas, (2023).

<sup>40</sup> Häslér, B., Msalya, G., Garza, M., Fornace, K., Eltholth, M., Kurwijila, L., Rushton, J. and Grace, D. (2018). Integrated food safety and nutrition assessments in the dairy cattle value chain in Tanzania. *Global food security*, 18, pp.102-113.

<sup>41</sup> Gender and Nutrition Formative Assessment of the TI3P dairy project areas, (2023).

<sup>42</sup> Galiè, A.; Farnworth, C.R.; Njiru, N.; Alonso, S. (2021).

Figure 1: Conceptual framework for the study



The study explores how contextual factors, such as regional and household characteristics, might influence the ability to access TADB/TI3P loans. We also explore how access to loans and the sex of the loanholder impacts household dynamics such as division of labor and control over income. We focus on having received a TADB/TI3P loan and the sex of loanholder as both dependent and independent variables because these are factors that could be easily modified by TADB through changes to the TI3P program. Therefore, by focusing our analysis on the access to and influence of these loans, we aim to provide actionable insights that could improve TI3P programming.

The remainder of the report is structured as follows: the methodology chapter presents details on geographic coverage, our guiding research objectives and questions, the conducted data collection activities, the analytical methodology employed to answer the research questions, and study limitations. The four chapters hereafter present our study findings and answer the research questions. This is followed by a chapter on our conclusions based on the previously discussed findings. Finally, we present recommendations for TADB to strengthen gender and nutrition integration within the TI3P program or for future financing products in order to improve financial and nutritional outcomes for both women and men.

## Research objectives & questions

### **Objective 1: Explore contextual factors that may influence men's and women's ability to access dairy-related financing by TADB/TI3P.**

- How do regional cultural norms surrounding gender and dairy production, access to markets, household socioeconomic status, or household composition affect:
  - Women's ability to access loans?
  - The process through which women and men in dairy-producing households make decisions regarding loan applications (e.g., decisions if to apply, when to apply, and which household member to apply)?

### **Objective 2: Understand how men and women in dairy-producing households share the benefits and responsibilities of dairy production.**

- What is the allocation of labor, time, decision-making power around dairy and animal husbandry, and control of dairy-related income between women and men in dairy-producing households?
  - How do these indicators of women's empowerment compare among dairy-producing households that have a loan from TADB/TI3P versus dairy-producing households that do not have a loan? Does it differ when a woman holds the loan, instead of a man?
- Does access to loans lead to unintended negative consequences, such as intra-household conflict or increases in uncompensated labor, for women or men?

### **Objective 3: Explore the links between dairy production and dietary quality among members of dairy-producing households.**

- What is the relationship between the volume of dairy production and dietary quality among men and women in dairy-producing households?
  - How do these outcomes compare among dairy-producing households that have a loan from TADB/TI3P versus dairy-producing households that do not have a loan? Does it differ when a woman holds the loan, instead of a man?
  - Does access to and quality of local food markets influence the relationship between dairy production and dietary quality?
- How do women and men in dairy-producing households decide to sell, consume, or otherwise distribute the dairy they produce?

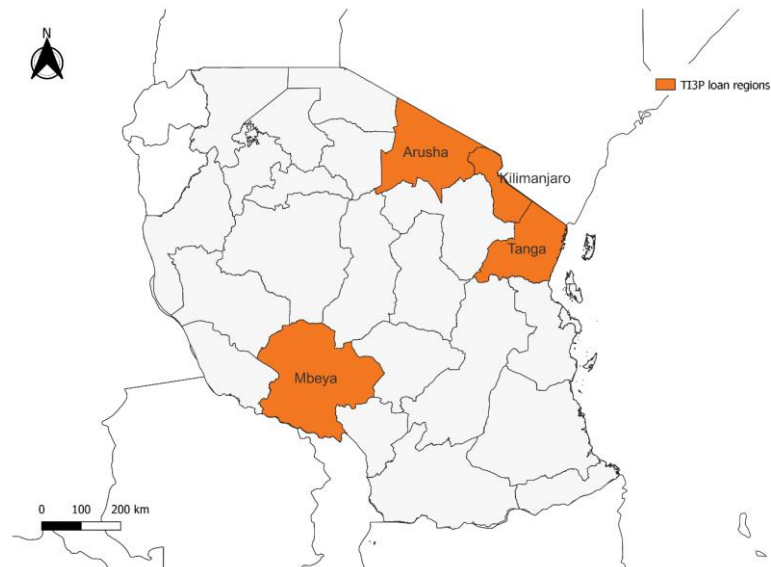


## Methodology

### Geographic coverage

TADB is targeting farmers in both nascent and established dairy markets. Established markets include Northern (Arusha, Kilimanjaro), Eastern (Tanga, Pwani, Dar es Salaam), and Southern (Iringa, Njombe, Mbeya) milk sheds. Nascent markets include the Lake zone milk shed (Mwanza, Mara, Kagera, Geita, Shinyanga, Simiyu) and Zanzibar. At the time of data collection, only small-scale producers in Arusha, Kilimanjaro, Tanga, and Mbeya had received loans. These four regions are therefore the focus of this study (Figure 2).

*Figure 2: Map of study area*



### Data collection activities

Data collection occurred between 17 October and 9 December, 2023. The study employed a mixed-methods design with four major activities (Table 1). Full descriptions of each activity are available in the Appendix.

Table 1: Data collection components

Component	Sample size	Participants
<p><b>Household survey of dairy producers</b></p> <p><i>Quantitative</i></p> <p>Cross-sectional one-time-point household survey of dairy producers in Tanga, Arusha, Kilimanjaro, and Mbeya</p> <p>See <b>Sampling for household survey</b> and <b>Appendix 1</b> for full details.</p>	<p>1,143 households</p> <p>1,957 participants (1,007 women and 950 men)</p>	<p><b>Group 1:</b> TADB/TI3P loanholders</p> <p><b>Group 2:</b> non-TADB/TI3P loanholders affiliated with an FPO where others have received TADB/TI3P loans</p> <p><b>Group 3:</b> non-TADB/TI3P loanholders affiliated with an FPO where no one has received TADB/TI3P loans</p>
<p><b>Market access assessment</b></p> <p><i>Quantitative</i></p> <p>Geospatial and direct observation data to understand households' access to high-quality food markets.</p> <p>See <b>Appendix 2</b> for full details.</p>	<p>153 markets</p>	<p>Food markets visited by all members of Group 1 (TADB/TI3P loanholder) and Group 2 (non-TADB/TI3P loanholders affiliated with an FPO where others have received TADB/TI3P loans)</p>
<p><b>Focus Group Discussions (FGDs)</b></p> <p><i>Qualitative</i></p> <p>Discussing community perceptions on gender roles in dairy production.</p> <p>See <b>Appendix 3</b> for full details.</p>	<p>20 FGDs with 3-5 participants each</p>	<p><b>Group 1:</b> TADB/TI3P loanholder</p> <p><b>Group 2:</b> non-TADB/TI3P loanholders affiliated with an FPO where others have received TADB/TI3P loans</p>
<p><b>Key Informant Interviews (KIIs)</b></p> <p><i>Qualitative</i></p> <p>Discussing how decisions around loan distributions are made and provide context on the regional dairy sector.</p> <p>See <b>Appendix 4</b> for full details.</p>	<p>15 KIIs</p>	<p>TADB staff who are tasked with distributing loans (Business Development Officers)</p> <p>Leaders of local FPOs</p> <p>Officials from local government authorities</p>

### Sampling for household survey

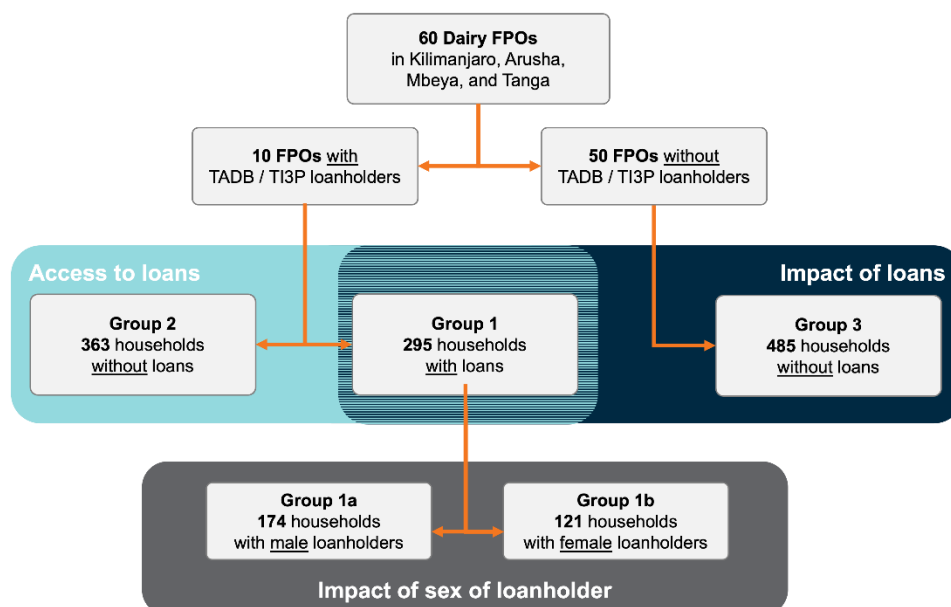
In order to meet the research objectives and be able to answer the research questions, we sampled households from three different groups for the household survey:

- **Group 1** households have had a TADB/TI3P loan for at least six months, subset into
  - **Group 1a**, households where a man holds the TADB/TI3P loan, and
  - **Group 1b**, households where a woman holds the TADB/TI3P loan.
- **Group 2** households belong to one of the 10 FPOs that have begun distributing the TADB/TI3P loans but that have not received a TADB/TI3P loan themselves.
- **Group 3** households belonging to an FPO that has not yet distributed TADB/TI3P loans.

Comparing these three groups allows us to assess each of our research objectives. For example, comparing Group 1 and Group 2 allows us to understand what drives access to loans. Comparing gender- and dietary-related outcomes among Group 1a and Group 1b allows us to understand whether the sex of the loanholder influences dietary and gender outcomes.

The final distribution of respondents is shown in Figure 3. Within all sampled households, we interviewed one primary respondent, who was either the TADB/TI3P loanholder or, in the case of a non-loanholding household, the household member most involved in dairy production. The rationale was to interview the member most knowledgeable about the TADB/TI3P loan (assuming this is also the person most knowledgeable about dairy-related activities), and in the case of non-loanholders, the person most knowledgeable about dairy-related activities. We also interviewed secondary respondents if households included at least one adult of the opposite sex as the primary respondent. This allowed us to examine intra-household gender dynamics. The full criteria for the selection of primary and secondary respondents are in Figure 16 in Appendix 1.

Figure 3: Sample for the household survey<sup>43</sup>



## Analytical methodology

### Objective 1: Ability to access TADB/TI3P loans

To reach objective 1, we restrict our analysis to the 658 dairy-producing households that belong to an FPO where TADB/TI3P has already distributed loans. This restriction allows us to focus on social and demographic factors associated with access to loans rather than on administrative factors related to TADB's rollout of the TI3P program.

<sup>43</sup> We were able to reach 93% of our target sample size due to: 1) unavailability of respondents - both primary and secondary; 2) rainy season in some regions like Tanga made it difficult to reach respondents that were identified in villages experiencing heavy rainfall/flooding; 3) one FPO (Marukeni) identified as an FPO with TADB/TI3P loanholders did not have any loanholders so the target for loanholders was not achieved; 4) outdated membership lists from FPOs.

To assess the gender-specific factors that predict having a loan, we performed univariate associations to identify variables that were strongly associated with being a loanholder, and subsequently predictors of access to loans. This was guided by considerations of temporal dynamics, that characteristics such as age and marital status would not be directly impacted by having a loan, and other factors such as market access and decision-making would only be impacted after a longer period of time. While the direction of effect is not established in this study, our hypothesis is that a strong association between loanholding and these variables therefore indicates the variables' predictive power.

### *Objective 2: Gender dynamics of dairy production*

In order to accurately capture gender dynamics within the household, we separately interviewed up to two individuals from each household: the household member who was most involved in dairy farming (defined as the loanholder in TADB/TI3P households) and, in Adult Female and Adult Male (F&M) households,<sup>44</sup> a household member of the opposite sex. Our analysis starts with providing descriptive statistics to understand general patterns among dairy-producing households in terms of:

- **Gender-specific participation in dairy-related tasks**, assessed by asking about household and individual participation in a list of 12 dairy-related activities
- **Gender-specific decision-making**, assessed by asking if respondents participated in “little to no”, “some”, or “most or all” of decisions on activities they participated in. In line with the definitions used by the Women’s Empowerment in Agriculture Index (WEAI), we aggregate “input into some” and “input into most or all decisions” in our analysis<sup>45</sup>
- **Allocation of time**, assessed using the 24-hour recall from the Women’s Empowerment in Livestock Index (WELI)
- **Control of income**, assessed by asking respondents about the proportion of income earned from selling dairy products that they have sole, joint, and no control over.<sup>46</sup> In line with the WEAI, we aggregate “joint” and “sole” control in some of our analyses.<sup>45</sup>

Our quantitative findings are accompanied by qualitative insights that allow us to contextualize these findings and explore the processes through which households decide to allocate the benefits and responsibilities of dairy production.

Finally, we assess whether gender dynamics among dairy-farming households differ based on a household’s TADB/TI3P loan status or the sex of the TADB/TI3P loanholder. For this we used econometric methods which are described in more detail in Appendix 10.

### *Objective 3a: Dietary quality in dairy-producing households*

We assess dietary quality among women using the GDQS<sup>47</sup> and the Minimum Dietary Diversity - Women (MDD-W). For men, we only use the GDQS because the MDD-W has not been validated

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<sup>44</sup>F&M households include at least one female adult and at least one male adult member ([https://www.usaid.gov/sites/default/files/2023-03/USAID\\_BHA\\_EAG\\_Indicator\\_Handbook\\_Mar\\_17\\_2023.docx](https://www.usaid.gov/sites/default/files/2023-03/USAID_BHA_EAG_Indicator_Handbook_Mar_17_2023.docx)).

<sup>45</sup>[https://www.ifpri.org/sites/default/files/Basic%20Page/weai\\_instructionalguide\\_1.pdf](https://www.ifpri.org/sites/default/files/Basic%20Page/weai_instructionalguide_1.pdf)

<sup>46</sup> Respondents were asked about the amount of income from selling dairy/dairy products they can (i) decide to use on their own without input from anyone else, (ii) decide to use together with someone else, and (iii) not make decisions about at all. Answer options to each of the three questions were: none, almost none, less than half, about half, more than half, almost all, and all. These received scores of 0, 0.1, 0.25, 0.5, 0.75, 0.9 and 1, respectively. To obtain the proportion of income over which the respondent has sole control, we divided the score of question (i) by the sum of the scores of questions (i), (ii), and (iii). To obtain the proportion of income over which the respondent has joint or sole control, we divided the sum of the scores of questions (i) and (ii) by the sum of the scores of questions (i), (ii), and (iii).

<sup>47</sup> GDQS is a food-based metric that uses a 24-hour recall to assess consumption of 25 food groups: 16 healthy food groups, 7 unhealthy food groups, and 2 food groups that are unhealthy when consumed in excessive amounts. Consumption of each of these

for men.<sup>48</sup> The rationale of using both the GDQS and MDD-W for women was that the GDQS measures overall dietary quality while the MDD-W measures micronutrient deficiency. Due to the larger number of food groups and the inclusion of consumption categories, the GDQS ranges from 0 to 49 points, a small point increase on the GDQS is much more plausible than a similar increase on tools like the MDD-W; using both measures therefore allows us to adequately assess dietary quality for women. In addition, we assessed a third outcome, volume of dairy consumed in liters by the respondents,<sup>49</sup> which we estimate using data collected in the GDQS tool.<sup>50</sup>

To explore the link between dairy production and dietary quality among members of dairy-producing households we first provide descriptive statistics on dietary outcomes among men and women. We then assess if there are any associations between dairy production from all cows in the week prior to the survey and dietary quality. Finally, we assess whether dietary outcomes differ based on a household's TADB/TI3P loan status or the sex of the TADB/TI3P loanholder. Our quantitative assessment is accompanied by qualitative insights to contextualize these findings and explore the processes through which households decide to allocate the benefits and responsibilities of dairy production.

### *Objective 3b: Market access and dietary quality*

During the household survey, we collected data on the food markets used by household respondents. We then conducted a full census of all 153 food markets used by members of the ten FPOs in which TADB/TI3P is active. For each market, we calculated a food basket score based on the availability of foods that are common in Tanzania and correspond to food groups on the GDQS (see Appendix 2 for details). Markets with a food basket score of at least 23 (which corresponds to the GDQS's "low risk" category) were considered high-quality markets. For high-quality markets, we calculated the minimum price for a food basket worth 23 points. We used GIS to assess the distance between each farmer's home and the nearest market with a food basket score of at least 5 as well as nearest high-quality market. These variables were used to explore the association between the characteristics of the nearest food markets and the dietary quality of individuals in households. Our analysis includes all respondents whose households are members of the 10 FPOs in which TADB/TI3P is active, for whom we have data on GDQS, and for whose households we have longitude and latitude coordinates for a final sample size is 871 respondents. To explore the association between the quality of the nearest market (measured by food basket score) and dietary quality (GDQS), we used mixed effects hierarchical modeling both by sex and for the overall sample.<sup>51</sup>

## Study limitations

### *Causality and reverse causality*

This observational, cross-sectional study did not include randomized assignment to TADB/TI3P. Although our analysis did adjust for systematic difference between loan holders and non-

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food groups is assessed as low, medium, or high based on standard scoring procedures. The GDQS metric has a possible range of 0-49, with a higher score corresponding to better diet quality. The GDQS incorporates dimensions of both nutrient adequacy and dietary risk factors associated with non-communicable disease risk in its design and scoring method.

<sup>48</sup> MDD-W uses a 24-hour recall to assess consumption of 10 food groups. MDD-W is calculated by summing the number of food groups consumed and can range from 0 to 10. Dietary adequacy, defined as MDD-W  $\geq 5$ , is a proxy for micronutrient adequacy, one important dimension of diet quality.

<sup>49</sup> Volume of dairy consumed was assessed using the GDQS data. The GDQS uses standardized cubes to enable respondents to estimate the volume of each food group that was consumed and converts that volume into grams based on standard density estimates for each food group. For the purpose of this analysis, we aggregated the volume of dairy or dairy products consumed and present the value in liters. However, these cubes have not specifically undergone validation for measuring volume of dairy consumed food group.

<sup>50</sup> To the best of our knowledge, a validated approach measuring dairy intake does not exist. The findings are therefore contextual and not generalizable to a larger population.

<sup>51</sup> We ran the same set of regressions using MDD-W as a measure of dietary quality and found the same results.

loanholders, it cannot conclusively demonstrate any causal effect of the loans (e.g., TADB/TI3P loans caused an improvement in dietary quality). Similarly, due to the cross-sectional nature of the study, this work is vulnerable to reverse causality. For example, we cannot conclusively determine whether loans increase women's empowerment or whether households with empowered women are more likely to access loans. We gain insights in this direction through our qualitative work.

### *Timing of the loan*

This study was conducted in the early stages of the TADB/TI3P loan application. We collected data from loanholders who have been in possession of the loan for a minimum of six months. While we do believe it is plausible to see some shorter-term effects (e.g., diet changes, control over income) within our timeframe, we have assumed that there has not been sufficient time for receipt of TADB/TI3P loans to lead to measurable impacts in terms of long-term household socioeconomic status and access to high-quality markets. Our conceptual framework therefore considers these variables to be predictors of having received a TAB/TI3P loan rather than the consequence of having received a loan.

### *Seasonality*

This study uses cross-sectional data from only one time period. Therefore, we are not able to capture any effects of seasonality on dietary quality, income, dairy productivity, or market access.

### *Generalizability*

In order to create a valid comparison group for TADB/TI3P loanholders, our study region is limited to the four regions where TADB has already begun distributing TADB/TI3P loans. While focusing on these reduces the possibility of bias, it also means our findings may not be fully generalizable to all regions in Tanzania. In particular, there may be different patterns observed in nascent milk markets, which are not included in this study.

The following sections present our study findings and answer the research objectives outlines above.

## Objective 1 Findings: Ability to access TADB/TI3P loans

This chapter shares our findings for Objective 1. It explores the contextual factors that influence men’s and women’s ability to access dairy-related financing by TADB/TI3P. We assess the extent to which geography, household composition, socioeconomic status, market access, and culture influence the ability to access the TADB/TI3P loan at the household level as well as among men and women.

### Comparison of men and women loanholders

Men and women loanholders differed in several ways (Table 14 in Appendix 5).

1. **Geography** – Female loanholders were more common in Kilimanjaro (44% women vs. 15% men), while male loanholders were more common in Mbeya (32% men vs. 10% women). This difference was marginally significant.
2. **Household composition** – While 49% of female loanholder households were headed by a woman, no households with a male loanholder were female-headed. Interestingly, the majority (61%) of households with female loanholders were also Adult Female and Adult Male (F&M) households, meaning these households include adult men but are headed by women.<sup>52</sup> Female loanholders households had significantly fewer children on average than male loanholder households.
3. **Socioeconomic status** – Although not statistically significant, we found differences in household socioeconomic status that were large in magnitude. Households of female loanholders were more than 25% more likely to be in the highest wealth category than households of male loanholders. On the other hand, households of male loanholders reported over 20% higher annual and monthly income levels than households of female loanholders. Livelihood patterns in these two groups show that male loanholder households engage more in informal work (12% vs. 3%) while more female loanholder households own businesses in addition to their agricultural work (24% vs. 19%).
4. **Demographics of loanholders** – Most male loanholders are currently married compared to female loanholders (93% vs. 63%). More female loanholders were either never married (11%) or were widowed, divorced or separated (23%). Male and female loanholders were similar in age and education status. Although not statistically significant, we found that a few more women loanholders were youth compared to men (10% vs. 6%).<sup>53</sup>
5. **Terms of the loan** – On average, female loanholders received a smaller loan (TZS 2,367,000, ~USD 949) compared to male loanholders (TZS 3,139,000, ~ USD1,258), and this difference was marginally significant. All female loanholders except one reported receiving their loan in the form of a heifer cow, while 19 male loanholders either received a cow and cash or cash only. Among the households that received part of the loan in cash, this cash was spent on fencing/housing materials, while the least amount was spent on medicine/veterinary care. These results are shown in Table 2 below.

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<sup>52</sup>F&M households include at least one female adult and at least one male adult member ([https://www.usaid.gov/sites/default/files/2023-03/USAID\\_BHA\\_EAG\\_Indicator\\_Handbook\\_Mar\\_17\\_2023.docx](https://www.usaid.gov/sites/default/files/2023-03/USAID_BHA_EAG_Indicator_Handbook_Mar_17_2023.docx)).

<sup>53</sup>The Tanzania National Youth Policy defines youth as individuals aged between 15 to 35 years. Ministry of Labour, Employment and Youth Development. “National Youth Development Policy,” December 2007.

We did not find any statistically significant differences in distance to the nearest dairy market between female and male loanholders.

*Table 2: Terms of the loan among male and female loanholders*

	HH with male loanholders	HH with female loanholders	p-value
	N= 174	121	
Value of loan (USD)	\$1,258 (164)	\$949 (72)	0.055
Months since award of loan	25.5 (4.7)	21.5 (3.9)	0.377
Number of cows purchased	1.2 (0.1)	1.1 (0.1)	0.043
Received cash as part of loan	19 (11%)	1 (1%)	0.022
Loan spent on fodder (USD) (N=20)	147 (31)	0 (.)	0.001
Loan spent on fence/house (USD) (N=20)	519 (110)	0 (.)	0.001
Loan spent on medicine/vet. care-USD (N=20)	60 (13)	0 (.)	0.001

### Characteristics of loanholding and non-loanholding households

Overall, TADB/TI3P loanholders have similar characteristics as non-loanholding members of FPOs where TADB/TI3P has distributed loans, with a few statistically significant differences. A detailed table for this analysis can be found in Table 16 in Appendix 6.

1. **Geography** – We did not observe a significant difference between loanholders and non-loanholders; however, 91% of households interviewed from Mbeya were loanholders compared to 28% households from the Tanga region. These differences reflect regional differences in the proportion of FPO members who became loanholders as part of TADB's rollout of the program.
2. **Household composition** – Loanholding and non-loanholding households were very similar in terms of the proportion of female-headed households (20% vs.18%), youth-headed households (8% vs. 6%), proportion of F&M households (71% for both), and number of household members.
3. **Socioeconomic status** – Loanholding households reported having fewer cows that were not acquired through the TADB/TI3P loan (non-TADB/TI3P cows) than non-loanholding households (3.3 vs. 5.0), and this difference was marginally significant. Loanholders were wealthier than non-loanholding households as assessed using the EquityTool<sup>54</sup> with only 9% of loanholders being in the low-to-middle wealth category compared to 20% of non-loanholders, however this difference was not significant and both loanholders and non-loanholders reported similar annual and monthly incomes as well as livelihood strategies.
4. **Market access** – Loanholding households are approximately five minutes nearer to the closest dairy market, and this difference was statistically significant.

<sup>54</sup> This is a short, country-specific questionnaire (ten questions for Tanzania). It is an easy-to-use method that allowed us to compare the wealth of our sample to the national population, as well as compare the wealth within our sample. The tool is accessible here: <https://www.equitytool.org/>



## Gender-specific factors that predict having accessed loans

To assess gender-specific predictors of having accessed loans, we compared male and female loanholders with respondents of the same sex who did not receive loans but were from households of FPOs that had already started distributing loans (see Table 17, Table 18, and Table 19 in Appendix 7).

### *Demographic characteristics*

**Among both men and women**, older age was associated with being a loanholder. Female loanholders were older than other women (54 years vs. 49 years) while male loanholders were older than other men (55 years vs. 50 years). A higher proportion of the youth were non-loanholders: 6% of loanholding women were youth, compared to 16% of non-loanholders; and 10% loanholding men were youth, compared to 21% non-loanholders. This difference was marginally significant for women ( $p=0.093$ ) and highly significant for men ( $p=0.006$ ).

**Among women**, we also observed that marital status, age of marriage, and history of previous employment were predictors of being a loanholder. Fewer female loanholders were currently married (63% vs. 79%) and their age at marriage was higher than the other women (25 (SD= $\pm 0.5$ ) years vs. 23.5 ( $\pm 0.4$ ) years,  $p=0.003$ ). More female loanholders have ever had paid employment (35% vs. 25%).

**Among men**, loanholders were more likely to be currently married (93% vs. 79%). No other significant differences on the demographic characteristics were observed.

### *Access to information*

**Among both men and women, loanholders have more access to information.** Loanholders were more likely to have a phone registered in their own name than farmers with no loans (92% for women and 94% for men). They were also more likely to have access to information on banking and loans (90% of women and 92% of men). Additionally, male loanholders were more likely to have access to information on dairy farming than other men (98% vs. 95%).

### *Market access*

**Among both men and women**, loanholders live closer to the dairy markets (13.8 minutes vs. 21.9 minutes for women and 13.3 minutes vs. 18.2 minutes for men). Majority of respondents access the markets by foot but other methods such as bicycle, own motorbike and bodaboda are utilized.

**Among women**, loanholders are more likely to be able to decide to visit the dairy market alone (70% vs. 47%). No female respondents, whether loanholder or not, reported facing objection from their husband/partner in going to the dairy market alone.

### *Summary of gender-specific predictors of TADB/TI3P loanholding*

A summary of the predictors discussed above is presented in Table 3.

Table 3: Summary of gender-specific predictors of loanholding

Predicts <b>women</b> becoming loanholders	Predicts both <b>women and men</b> becoming loanholders	Predicts <b>men</b> becoming loanholders
Not currently married <sup>55</sup>	Older age	Being currently married
Higher age of marriage	Ownership of phone registered in own name	Access to information on dairy farming
Having previous paid employment	Access to information on banking and loans	
Sole decision-making on visiting the dairy market alone	Distance to nearest dairy market	

## Perceptions of TADB/TI3P loans and experiences with loan applications

We used qualitative data to explore factors that influenced ability to access loans and analyzed responses by sex and region to explore how these factors impacted loan access.

### FPOs as enablers of women's empowerment

The existence of women-only FPOs encourages the participation of women within the associations,

*“From its inception, the cooperative has been registered under women's names. Although men can attend meetings and offer their input, they are ineligible for leadership roles due to the cooperative's registration as a women's group.”*

**-FPO leader, Kilimanjaro**

Other initiatives undertaken by FPOs to motivate women's participation include encouraging uptake of leadership roles, independence in decision-making, provision of more favorable loan terms, and provision of capacity building. In some cases, these efforts were seen as creating a counterbalance to cultural norms that restrict women's empowerment.

*“In our culture, especially in the northern part where the Maasai and Chagga live, it was difficult for a woman to sit with a man and make decisions. Traditionally, men would make decisions and then inform the women. However, in our cooperative, the situation is quite different. For instance, our assistant chairman is a woman, and I cannot make any decisions without her input. I always ask for her advice on matters, and her insights have been invaluable. We implement decisions together.”*

**-FPO leader, Kilimanjaro**

### Decision-making on loan uptake

Farmers reported three strategies for decision-making on whether or not to apply for a loan:

- 1. Joint decision-making among household members was the most common strategy.** Both male and female loanholders reported deciding to take a loan collaboratively by discussing it with their spouses and children. Some also consulted household members such as siblings and in-laws in their decision-making process. In making decisions on loan uptake,

<sup>55</sup>This includes never being married, cohabiting, or being widowed/divorced/separated.

members discuss the potential benefits of the loan, how they would handle repayments, and what they could potentially use the income for.

*“I have a family, I have children. So, I shared the plan to take out a loan with them. The loan itself is not money, but a cow. If we succeed in applying for the loan, we'll work together to take care of it. Therefore, I shared this with my children, who are my family.”*

**-Female loanholder, Arusha**

2. **Independent decision-making was reported among some female loanholders.** These women tended to be heads of their households and were less likely to be married, which may explain why they did not consult other family members.

*“This project is a business like any other. Continuing to have non-productive cows was a loss. This led me to apply for a loan without consulting family members, who are not familiar with my business.”*

**-Female loanholder, Tanga**

3. **Some farmers reported seeking external advice from outside the household, especially from their FPOs.** Information on awareness and benefits of the loan are provided during mobilization efforts from FPO leaders and bank representatives.

*“I decided to take action on my own. However, I consulted [only] with my chairman because I believe in moving forward without letting others hinder my progress.”*

**-Female loanholder, Kilimanjaro**

During our interviews, several respondents described gendered behavior that may have impacted loan uptake. These gendered behaviors differed by region. For example, in Tanga, both men and women perceived that women were hesitant to apply for loans compared to men:

*“Men tend to make decisions more quickly, whereas women often take time to assess whether they can proceed or not.”*

**-FPO leader, Tanga**

*“We initially focused on men because they tend to respond more positively to motivation. Women often discuss these opportunities with men, who then become the primary applicants.”*

**-FPO leader, Tanga**

In contrast, women in Kilimanjaro were interested in loans as a pathway to empowerment.

*“Women were more responsive and interested in acquiring cows through loans to empower themselves, whereas men preferred to purchase cows independently without seeking loans.”*

**-FPO leader, Kilimanjaro**

### **Factors influencing loan desirability**

Both men and women farmers reported similar expected benefits from taking up a loan, including increased milk production and increased income. They also reported similar contextual factors that influenced the desirability of loans.

Factors that **positively** influenced uptake include:

- The expectation that the loan would lead to increased milk production.
- The expectation that the loan would lead to increased income.
- The existence of a ready and reliable market where milk would be sold.
- Positive experiences of other loanholders in their community.

*“I didn't have a good dairy cow that produced a lot of milk. I saw this loan as an opportunity to acquire a dairy cow that could yield more milk, as the loan is affordable and can be repaid with milk.”*

**-Male loanholder, Tanga**

*“I would like to receive a loan to continue with my productive work because it will be easier to increase the income of the family as well as the childcare because that income will increase productivity and then the family will grow, and development will come to the household.”*

**-Female non-loanholder, Kilimanjaro**

Factors that **negatively** influenced the desirability for loans include:

- The fear of being deceived.
- Skepticism from members who had previously been misled.
- Lack of financial education on loans such as interest rates and repayment terms.
- Personal beliefs such as religious beliefs on interest-bearing loans.
- Lack of fit for the loans to their specific needs.
- Failure to meet pasture and shed requirements.
- Fear of taking proper care of the cows.
- Concerns that poor milk production would deter timely loan repayments.
- Already having cows.
- Preference for cash loans over cow loans.
- Preference for self-selection of the cows given.
- Age eligibility criteria, since they would be considered too old to secure a loan.

*“Reflecting on our past experiences with loans, I have a preference for receiving cash. My intention is to personally purchase cattle because, based on what I've observed, there are significant issues to consider. In our community, there have been instances where loans were provided for cattle purchases, but upon closer examination, many of these cattle were found to be underperforming in terms of milk production.”*

**-Male non-loanholder, Arusha**

FPO leaders and government representatives view the TADB/TI3P loan as having the additional benefits of low interest rates, repayment through milk, and lack of excessive monitoring, which allowed loanholders to exercise some level of control over their dairy activities and fast responsiveness of the bank. However, these views were not generally shared by farmers.

### *Challenges with the loan application process*

Both loanholders and non-loanholders shared challenges with the loan application process. While men and women generally reported similar challenges, women faced some additional barriers.

## Challenges affecting both men and women

1. **Upfront costs.** Applicants incurred several costs during the application process, including printing fees, costs of preparation of a shed, costs of veterinary expenses for cow inspection, and purchasing insurance in case of the death of a cow.

*“There are suddenly demands for contributions when you haven't even seen the cow. You hear about entry fees or insurance costs, but you haven't seen the cow yet. You're in need, and that's why you've come, but you're being asked for contributions without even starting to benefit from it. I perceive that as a challenge.”*

**-Male non-loanholder, Arusha**

2. **Literacy and financial literacy.** Farmers, FPO leaders, and TADB staff all recognize that lack of literacy skills affects the loan application process. Applicants with low literacy skills were sometimes supported by staff or other family members who were literate. Applicants were also sometimes educated on legal terminologies, loan repayment terms and financial requirements to mitigate any financial literacy challenges. However, farmers still perceived that lack of understanding of the terms of the loan created unfair situations.

*“Our lack of literacy has put us at a disadvantage, leading to unfair treatment. We signed documents without fully understanding them, agreeing to unrealistic milk production targets. This has left us in a vulnerable position, unable to contest the terms despite the reality not matching the promises made.”*

**-Male loanholder, Tanga**

3. **Delays in loan application process.** Some members cited the length of the application process or long loan processing time as a constraint.

*“TADB loans can take a long time to process. For example, there have been instances where loan applications took almost a year to be approved, which causes problems not only for us but also for the farmers who are trying to make improvements, such as building sheds. We have to be honest about these delays.”*

**-Government official, Tanga**

4. **Lack of transparency of selection criteria.** Lack of objectivity around the selection criteria of loanholders was reported as a challenge. Some of these challenges shared by members and FPO leaders include a lack of awareness of the process and criteria used, recognition by the government as a requirement, and subjectivity in the decision-making.

*“First of all, we didn't even know about it. We didn't fill out any forms. The leaders who received the milk came and called us, the milk sellers, to attend a meeting. We went and wrote down the names of all those who wanted cattle. We only wrote down the names, and that's it. We didn't add anything else.”*

**-Female non-loanholder, Arusha**

5. **Lack of collateral.** The requirement of collateral places a challenge in securing loans, especially for low-income herders. Younger farmers interested in applying for loans are limited since many do not own cows that could serve as collateral. One TADB staff member reported that young farmers are supported in overcoming this challenge.

*“We've also addressed the issue of collateral. Often, youth and women do not possess collateral. For example, a married woman might find the house, which could serve as collateral, registered under her husband's name. In Tanga, we have a program where we assess a youth's qualifications, purchase land on their behalf, which then serves as collateral for acquiring livestock. This simplifies the process for them.”*

**-TADB staff, Arusha**

- 6. Young age.** Young people were reported to be less involved in loan applications. One barrier was a lack of collateral among young people. Respondents often perceived youth as being uninterested in farming. Youth were also perceived as lacking important character traits for dairy farming, which could sometimes contribute to age-based discrimination. A significant difference is also observed in the loanholding status of youth in the quantitative study (Table 20 in Appendix 8). A higher proportion of the youth are non-loanholders compared to older adults (86% vs 72%,  $p=0.001$ )

*“...especially in the current climate where young people, after receiving education, are in search of better opportunities. However, it's important to understand that success in business requires patience and dedication, qualities that are not commonly found among the youth. Despite this, we continue to work with capacity-building institutions to identify promising young individuals we can support.”*

**-TADB staff, Mbeya**

#### Challenges affecting primarily women

- 1. Gender-unaware products.** The requirements, loan application process, and challenges faced were reported to be similar for both men and women. Many respondents viewed this equality as a positive feature of the loan.

*“Yes, women have equal access to resources and collateral options. The process and criteria for securing loans are the same for everyone, ensuring fairness and equal opportunity for all participants.”*

**-FPO leader, Mbeya**

However, there was also recognition that women could face additional challenges in the application process due to societal inequities such as lower literacy levels and limited access to land ownership, resulting in fewer women accessing the loans.

*“A widow might face unique challenges such as access to education. Rural women in particular differ from their urban counterparts. They might hesitate to seek help due to language barriers or literacy issues, fearing failure. This lack of confidence is a significant challenge for many women who might not feel brave enough to seek the assistance they need.”*

**-Male non-loanholder, Mbeya**

- 2. Gender norms.** Cultural and gender norms influence the acceptability of men's and women's access to loans and cow ownership. While access to loans for men and women varied across different FPOs, these differences were sometimes attributed to gender norms such as the role of the husband as the household head and sole decision maker and negative perceptions of women applying for loans

*“...a woman may express her desire to apply for a dairy cow loan, only to be dismissed by her husband with remarks undermining her capability based on gender. Cultural norms present another layer of challenge.”*

**-FPO leader, Kilimanjaro**

*“Initially, there was an issue where a woman, a member of the cooperative, completed a loan application form. However, her husband objected to bringing the cow home, saying, “I don’t want it,” despite our ongoing educational efforts.”*

**-FPO leader, Kilimanjaro**

*“It reflects societal norms. In many cases, women are actively involved in cattle breeding at the family level but lack recognition. This has led some women to initiate their own projects, declaring specific cattle as their own, despite the traditional claim by men.”*

**-TADB staff, Mbeya**

# Objective 2 Findings: Gender dynamics of dairy production

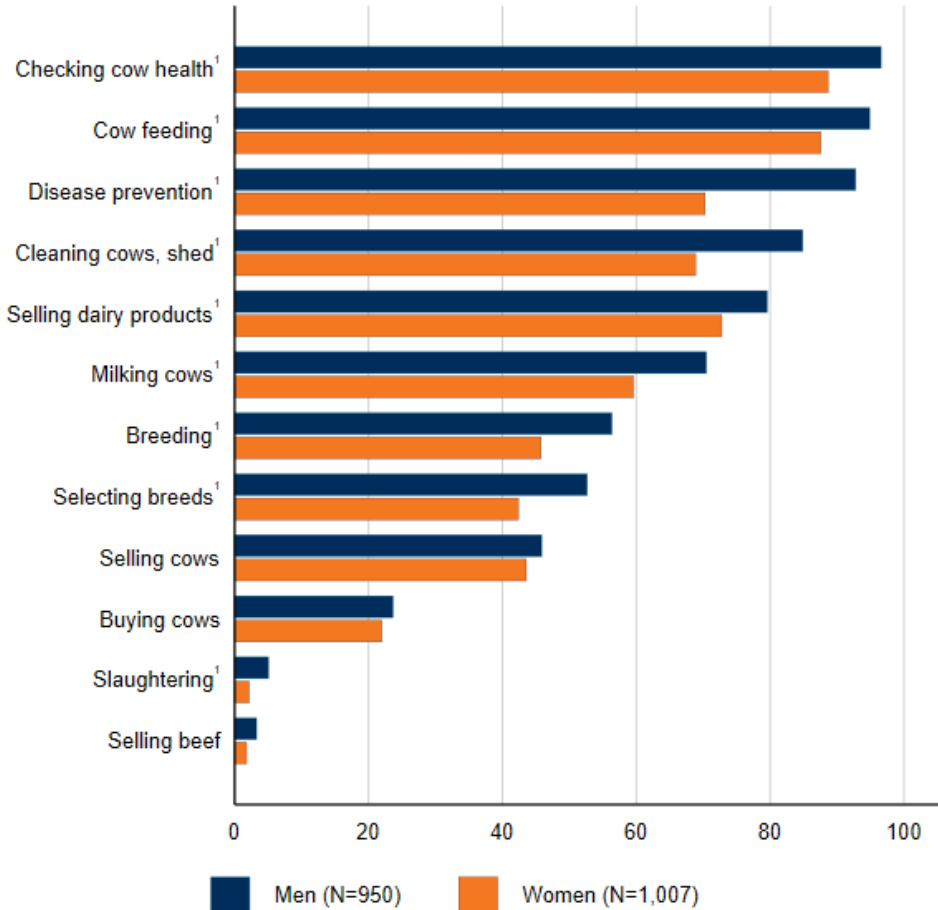
This chapter shares our findings for Objective 2. It explores how men and women in dairy-producing households share the benefits and responsibilities of dairy production.

## Allocation of labor and decision-making power

### Participation of men and women in dairy-related tasks

**Men consistently report participating in more dairy-related tasks than women.** On average, men participate in 7.1 out of 12 dairy-related activities while women participate in 6.1 activities ( $p < 0.001$ ). The most common activities were checking cow health and cow feeding, while only very few respondents participated in slaughtering or selling beef. For each of the individual 12 activities, men reported higher levels of participation than women, and this difference was statistically significant for all activities except for buying cows, selling cows, and selling beef (Figure 4). The biggest gender gap is seen in disease prevention and cleaning cows and sheds.

Figure 4: Participation of men and women in dairy-related activities



<sup>1</sup>Involvement differed significantly between men and women.



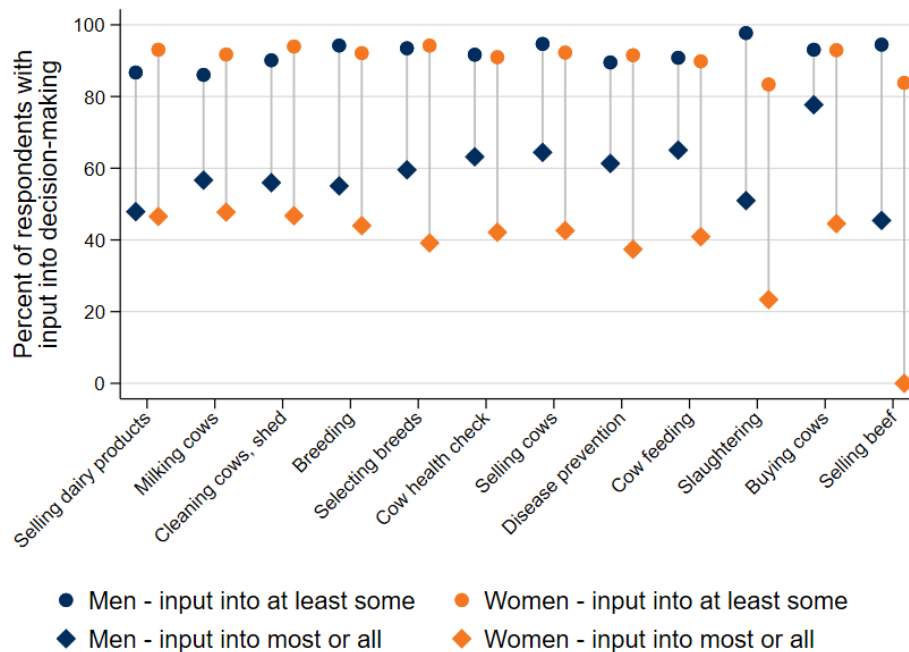
*Participation of men and women in decision-making around dairy-related activities*

**Gender dynamics regarding decision-making for dairy-related activities were more nuanced, with women having at least some input in decisions for a wider range of activities than men, but men viewing themselves as having higher levels of input into specific tasks.**

<sup>56</sup> On average, women report having at least some input into decisions for more activities compared to men (3.7 vs. 3.2., p=0.024). As shown in Figure 5, both women and men report having at least some input into decisions on activities that they are involved in. In general, women and men are equally likely to have at least some input into decisions for most activities they participate in; although, women are more likely to have at least some input in decision-making around selling dairy or dairy products compared to men (91% vs. 87%, p=0.049) while men are more likely to have input in decision-making on slaughtering cows (98% vs. 83%, p=0.045).

Among those with at least some input into decision-making, the percentage of respondents who see themselves as having input into most or all decisions around a specific task is consistently higher for men than for women. **These findings point to a situation where women have input into many decisions but may not be viewed or may not view themselves as the primary or final decision-maker.** Moving from left to right in Figure 5, women are more likely to see themselves as having input into all or most decisions related to milking cows or selling dairy products and least likely to see themselves as having input into all or most decisions on buying cows or selling beef. Compared to women, men are significantly more likely to report having input into all or most decisions related selecting which cow breeds to rear (60% vs. 39%), checking cow health (63% vs. 42%), selling cows (64% vs.43%), carrying out disease preventative measures (61% vs.37%), cow feeding (65% vs.41%), and buying cows (78% vs. 45%), These results hold when restricting the sample to F&M households.

*Figure 5: Input into decision-making on dairy-related activities for men and women (N=1,957)*



<sup>56</sup> See Table 21 in Appendix 9 for a detailed breakdown of decision-making for each activity.

### *Decision-making on the division of labor on dairy-related activities*

Qualitative interviews shed light on how the distribution of responsibilities related to dairy farming is done among household members. Some loanholders prefer to collaborate on all activities, while others divide dairy work with another household member. Additionally, certain farmers work alone while others allocate specific tasks designated for men and others for women.

#### Sole decision-making

Farmers indicate the primary decision-maker in their households is typically the man. In certain cases, men make the ultimate decisions but may seek input from the women in their households.

*“In terms of decision-making, it’s an area where I feel I must take control, such as deciding on the evening milking schedule.”*

**-Male loanholder, Arusha**

*“My husband is the one who decides. He owns the house, so he makes the decisions.”*

**-Female loanholder, Kilimanjaro**

In households where a man is not present, women are responsible for making decisions.

*“I make all the decisions myself because I am the head of the household and the family. I decided to hire a boy to assist because our traditions and customs allow male children to assist in collecting grass more than females.”*

**-Female non-loanholder, Tanga**

#### Joint decision-making

Some loanholders report a more collaborative approach to caring for the cows since acquiring the loaned animals. Household members alternate in activities, showcasing teamwork.

*“In my household, there is no gender-specific activity. I enjoy milking and have taught my wife and children to do it as well. When I’m not at home, they take over tasks like milking and cutting grass. If I’m late, my wife helps with cleaning the shed and feeding the cow. We all cooperate.”*

**-Male loanholder, Tanga**

### **Allocation of time among men and women**

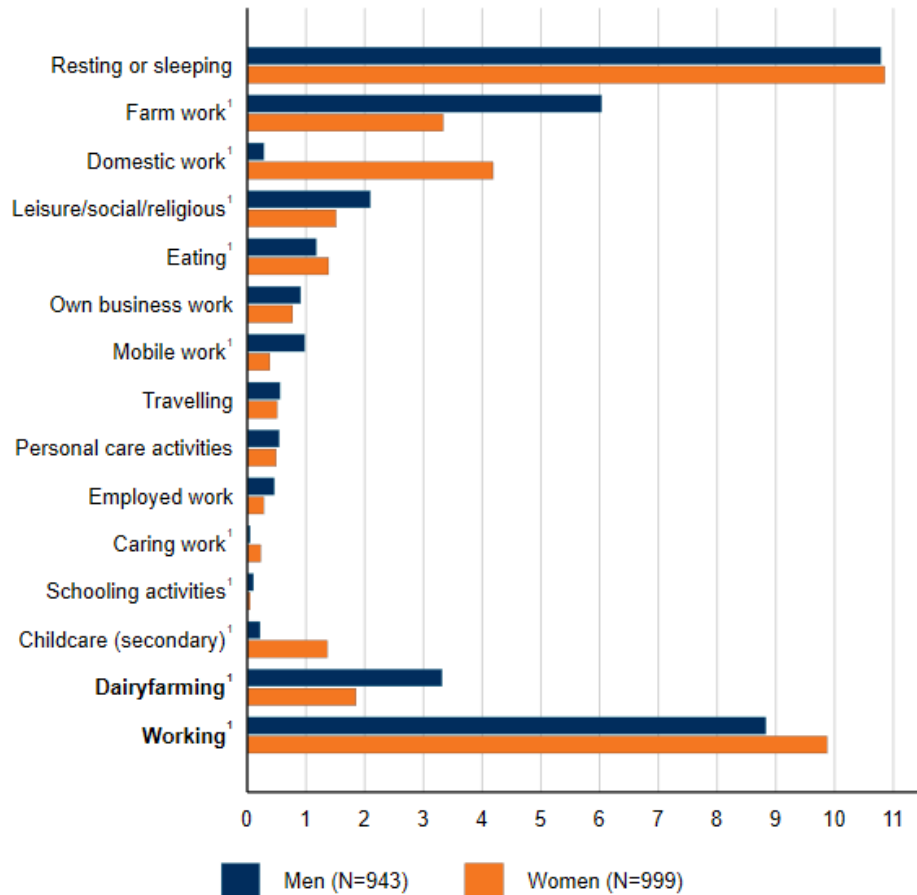
**Although men spend more hours in dairy farming than women, women spend more time working overall.** The most time-consuming activities for farmers are resting or sleeping (10.8 hours), farm work (4.7 hours), domestic work (2.3 hours), and leisure activities (1.8 hours). As shown in Figure 6, men spend significantly more time than women on farm work, leisure, mobile work, and schooling activities. In contrast, women spend more time on domestic work, caring work, and childcare while doing other activities. Dairy-farming activities, a subset of other work activities, consumed significantly more hours for men (3.3 hours) than for women (1.9 hours).<sup>57</sup>

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<sup>57</sup> Our analysis excludes data from 15 observations for whom we are missing data on time use for more than 2 out of 24 hours.

Women are more likely than men to be time-poor,<sup>58</sup> spending 9.9 hours a day working, while men spend 8.8 hours working (p=0.011). 47% of women and 37% of men in our sample are experiencing time poverty (p=0.028).

Figure 6: Allocation of time by men and women in hours



<sup>1</sup>Hours differed significantly between men and women.

### Control over dairy-related income

Men and women report having at least some control over similar proportions of dairy-related income (79% vs. 73%, respectively), with no significant differences by sex. Interestingly, women report having sole control over a higher proportion of dairy-related income than men (30% vs. 16%, p<0.001). These findings remain robust even after restricting the sample to F&M households. 27% of women and 21% of men report not having control over dairy-related income at all (Table 22).

Qualitative interviews shed light on how households decide to use their dairy-related income. There are regional differences in whether men or women are the primary decision-makers.

<sup>58</sup> The pro-WEAI defines hours worked as the sum of the time the respondent reported spending on work-related tasks plus half the time the respondent reported spending on childcare as a secondary activity + (1/2) time spent on childcare as a secondary activity). Work-related tasks include farm work, employed work, own business work, domestic work, caring work, and mobile work. An individual is time-poor if they worked ≥10.5 hours in the previous 24 hours.

Although many farmers reported high degrees of autonomy over the control of dairy-related income in their households, they also overwhelmingly emphasized collaboration and communication in decision-making around income.

In Mbeya, Tanga, and Kilimanjaro, women reported having substantial control over dairy income:

*“As the mother and head of the household, I make the decisions. I instruct my child on what needs to be done. Even when it comes to the money earned from selling milk, I ask him what he wants to do with it. If he has a plan, I allocate a certain amount for him to use as he wishes, while the rest is used for other purposes.”*

**-Female non-loanholder, Mbeya**

*“My wife decides. Most of the time, my wife controls the selling of milk, but she informs me about what she has sold.”*

**-Male loanholder, Kilimanjaro**

In contrast, male respondents in Arusha viewed themselves as the primary or final decision-makers on how to use dairy-derived income in their households.

*“In our culture, the elder (head) of the household is the primary decision-maker. For instance, if someone wishes to spend 25,000 shillings on hairdressing during Christmas, without considering other essential needs, the head of the household's decision is final and will be adhered to.”*

**-Male non-loanholder, Arusha**

*“Yes, the decision-maker is the head of the household, who is the father. He decides where the resources should be allocated. No one opposes his decisions, and he aims to avoid any problems. Therefore, the head of the household makes all the decisions.”*

**-Male non-loanholder, Arusha**

Male autonomy in decision-making was often linked to gender norms that specify that men are responsible for managing household income or significant household purchases.

*“Do you know why a man makes significant decisions? It's because the majority of the spending comes from a man. This means even if you have sold a calf or owe money somewhere, if you get the money, it will all go into the kitchen as usual, and everyone in the kitchen is involved. So, the man decides to engage a woman so they can discuss together. It's not just about doing things yourself as a man but working together. At a significant percentage, a man is the driver of the house.”*

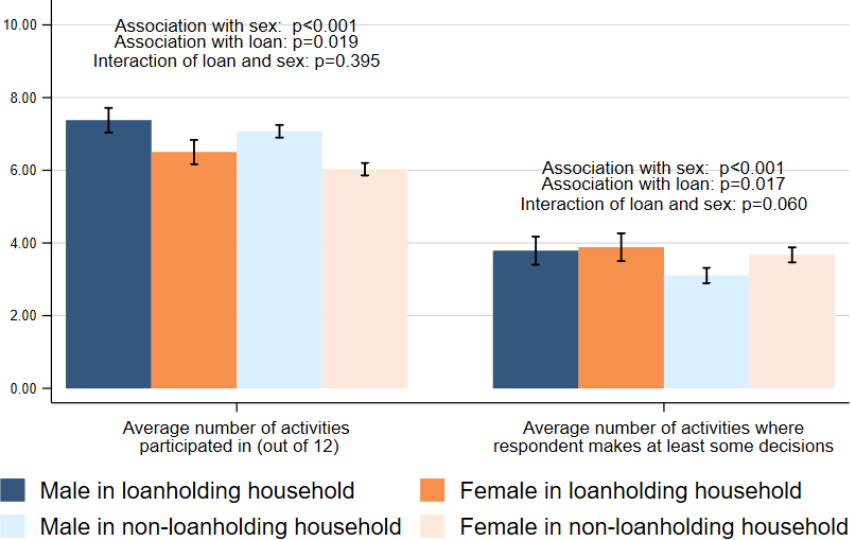
**-Male loanholder, Tanga**

## Associations between TADB/TI3P loans and gender dynamics

### *Allocation of labor and decision-making power on dairy-related activities*

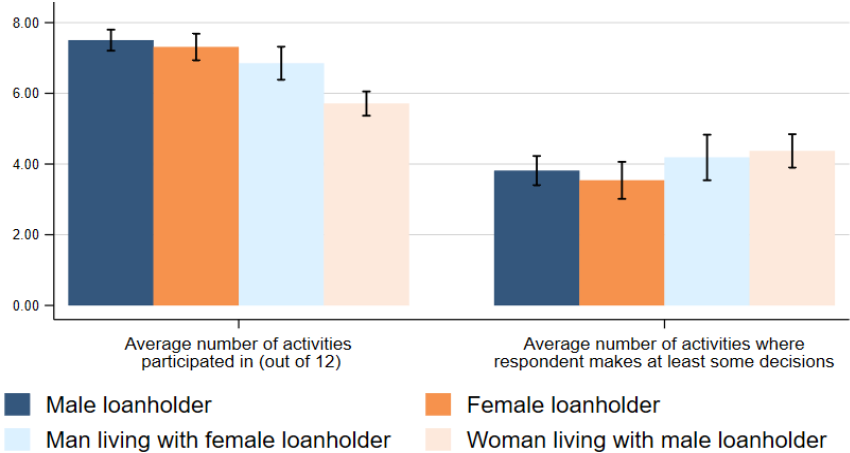
**Respondents in loanholding households are on average participating in more dairy-related activities and are more involved in decision-making on these activities compared to respondents in non-loanholding households (Figure 7).** Consistent with our previous results, men participated in significantly more dairy-related activities than women, and women reported participating in decisions about more activities than men.

Figure 7: Allocation of labor and decision-making power around dairy-related activities between women and men by loan status (N=1,957)



When looking at TADB/TI3P loanholding households only, we see that households with women loanholders exhibit no gender gap in dairy production (Figure 8). Male loanholders participate on average in most dairy-related activities (7.5), followed by female loanholders (7.3), men living with female loanholders (6.9), and, finally, women living with male loanholders (5.7). Respondents reported similar levels of decision-making regardless of the sex of the respondent or the sex of the loanholder.

Figure 8: Allocation of labor and decision-making power around dairy-related activities between women and men that have a TADB/TI3P loan by sex of loanholder (N=502)



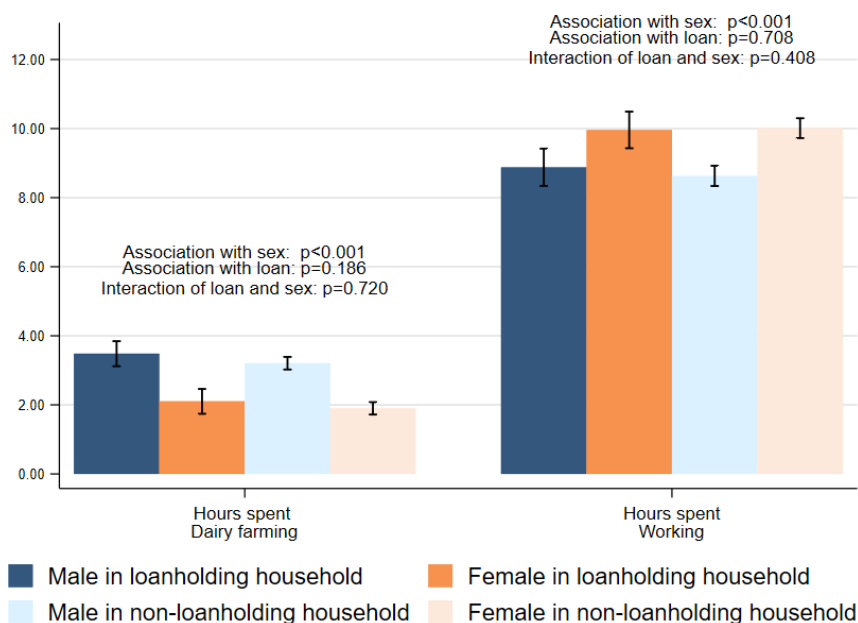
Allocation of time

Women and men in loanholding households spend a similar amount of time working overall and a similar amount of time on dairy farming as women and men in non-loanholding households (Figure 9). However, consistent with our previous results, we observe that men spend significantly more hours on dairy farming while women spend significantly more time working overall. When we restrict our analysis to households that have a TADB/TI3P loan,

we observe that these patterns are consistent whether the loanholder is a woman or a man (Figure 17, Appendix 10).

**These findings suggest that receiving a TADB/TI3P loan does not disproportionately increase labor among women or men.** However, receiving a loan also does not lead to equal allocation of labor within the household. While women in loanholding households report similar time spent working and time spent dairy farming as women in non-loanholding households, they are involved in a wider variety of dairy-related activities. We did not collect data on the time allocation of other household members (such as other women or children), but there is a possibility that some labor in loanholding households is shifted to other household members to accommodate the female respondents' increase in involvement in dairy-related activities. However, it may also be that female loanholders participate in more dairy-related activities in general, but did not allocate more time to them in the past 24 hours. Further, dairy-related activities may be displacing other activities that do not need to be taken up by other household members (e.g., stopping a small business to focus more on dairy farming).

Figure 9: Allocation of time between women and men by loan status (N=1,942 and N=1,957)



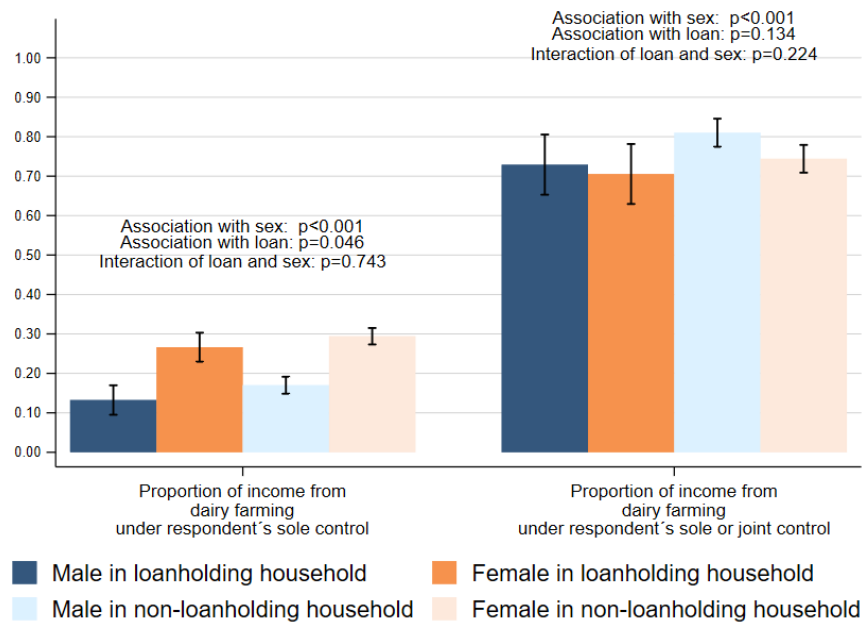
### Control over dairy-related income

**Respondents in loanholding households have sole control over a lower proportion of dairy-related income than respondents in non-loanholding households (Figure 10).** However, the proportion of dairy-related income over which respondents have either joint or sole control, however, is similar between loanholding and non-loanholding households. These findings could suggest a greater degree of shared decision-making around the use of income from dairy in loanholding households.

**Restricting the sample to TADB/TI3P loanholding households only, we see that when the loanholder is a woman, she exerts substantial independent control over dairy-related income compared to when the loanholder is a man (Figure 18, Appendix 10).** This holds across the different regions as well as when restricting the sample to F&M households only. When

considering the proportion of dairy-related income over which the respondent has either joint or sole control, the individual who is the loanholder has more control, regardless of their sex.

Figure 10: Control of dairy-related income between women and men by loan status (N=1,957)



## Perceived impacts of the TADB/TI3P loans

Farmers report both benefits and adverse externalities from TADB/TI3P loans. This section categorizes these impacts into perceived benefits and challenges of the TADB/TI3P loan facility.

### Benefits

Farmers attribute several benefits to the TADB/TI3P loans including perceptions of increase in the number of cattle, improvement of dairy-related structures, improved milk production, and increased income from milk sales (Table 4).

Table 4: Perceived benefits of the TADB/TI3P loans



#### Increased income

An almost equal number of male and female loanholders have reported an increase in income from milk sales, predominantly through sales to dairy processing firms like Asas. This was reported mostly by farmers in Mbeya, followed by Tanga, and Arusha.

*“Our living conditions have improved slightly because the income from milk has increased compared to before.”*

*-Female loanholder, Arusha*

*“The first change is the increase in income, the income you get changes you, now that all the needs at home are available, the children go to school well.”*

*-Male loanholder, Mbeya*

Loanholder farmers: Female – 5; Male – 6



### Increased milk productivity

Cows acquired through TADB/TI3P loans have significantly boosted milk yields within households, particularly in Arusha, Mbeya, and Tanga, as reported primarily by women farmers.

*“My neighbor asked me where I got this dairy cow because it was producing a lot of milk, about 14 litres. I told her that she needs to apply for this loan as a member of FPO/AMCOS.”*

*-Female loanholder, Tanga*

*“There have been changes because I take manure from home to the farm, and I've seen many changes and benefits from the increase in milk production.”*

*-Female loanholder, Arusha*

Loanholder farmers: Female – 8; Male – 2

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### Increased number of cattle

Two female loanholder farmers, one in Mbeya and another in Tanga, have reported an increase in the number of cows because of TADB/TI3P cows giving birth.

*“The positive changes include an increase in cows when they give birth. Now, there are three cows in the shed.”*

*-Female loanholder, Tanga*

*“The change I've experienced is an increase in cows because one has given birth, and my income has increased as well”*

*-Female loanholder, Mbeya*

Loanholder farmers: Female – 2; Male – 0

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### Improved dairy farming facilities

Loanholders report making improvements in their dairy farming facilities.

*“We used to keep the cattle in a fence, but now we've built a shed.”*

*-Female loanholder Arusha*

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### Negative externalities

Farmers highlighted challenges associated with TADB/TI3P loans, including reductions in cattle and assets, decreased milk productivity, declining income. Loanholders expressed significant financial strain stemming from owning the loaned cows. This strain arises from various factors, such as insufficient milk sales income to cover loan repayments and feed expenses, high production costs, and unexpected cow deaths (Table 5).

When farmers take out a loan, they are typically required to obtain cow insurance. If a cow dies, the insurance compensates the farmer, enabling them to repay the loan. However, there are often delays in receiving the insurance payout. During this period, farmers must cover the loan repayment from their own funds until they receive the insurance payout.



Table 5: Perceived adverse externalities of the TADB/TI3P loans



### Financial strain

Some loanholders, particularly women in Kilimanjaro, express financial strain due to owning the loaned cows. They cite insufficient milk sales income, which often fails to cover loan repayments and feed expenses.

*“I only see losses because everything I earn is used to feed the cow. This has also caused conflict with my children. I use what I earn from the farm, for example, after selling bananas, to feed the cow.”*

*-Female loanholder, Kilimanjaro*

*“Only losses. I take money from my maize business and instead of spending it on my family, I spend it on the cow.”*

*-Female loanholder, Kilimanjaro*

Loanholder farmers: Female – 4; Male – 3



### High milk production cost

Some women and men loanholders in Arusha and Kilimanjaro reported that the cost of milk production exceeds the actual milk produced by the cows received through the loan program. They highlighted discrepancies between the promised and delivered cows.

*“Initially, I feel that I have lost out since getting this cow. It has been costly, producing only two liters of milk, and I had to buy a heat pump. The cows we were shown were good, but the ones delivered were different.”*

*-Female loanholder, Kilimanjaro*

*“The changes are negative because the cow produces only one liter of milk, which disrupts my routine.”*

*-Female loanholder, Kilimanjaro*

Loanholder farmers: Female – 2; Male – 2



### Untimely death of cattle

Some farmers in Mbeya and Tanga, who hold loans have reported experiencing challenges with the loaned cows, including instances of cow fatalities. It is unclear whether receiving the cow through the loan was at all associated with a greater likelihood of cow death. However, loanholders were required to have insurance to repay the loan in the case of cow death.

*“I used the loan even though my cow died when it was eight months pregnant. This led to the death of three-quarters of my cows. In fact, I did not benefit from this loan.”*

*-Female loanholder, Tanga*

*“I have had one challenge. I have lost two calves during pregnancy, but the cow is not bad, it is good, but only because of the loss of two calves.”*

*-Male loanholder, Mbeya*

Loanholder farmers: Female – 4; Male – 3

### *Intra-household disagreements*

Ten farmers, majority of whom are women, reported experiencing intra-household disagreements attributed to the loans. These disagreements are often explicitly linked to the low productivity yield of the cows acquired through the loan, leading to concerns about repayment. Most of these reports came from farmers in Kilimanjaro, followed by Arusha and Tanga.

*“I had a disagreement with my husband. I told him the cow would produce 20 liters of milk, but it's only producing 1 liter.”*

**-Female loanholder, Kilimanjaro**

*“If these cows were productive, there wouldn't be any disagreements. I'm left alone with this cow, and I can't return or exchange it. As a farmer, I get nothing from this. We were told this cow would produce 10 or 15 liters of milk, but it only produces 2 or 3 liters. Please help us; our household is full of conflict.”*

**-Female loanholder, Kilimanjaro**

Loanholder farmers: Female – 7; Male – 3

### *Uncompensated labor*

Only two loanholders, both residing in Tanga, report that they have increased their workload after acquiring the TADB/TI3P loan to increase milk production.

*“The change for me involved increasing my work effort to boost production.”*

**-Male loanholder, Tanga**

*“There is a change, but the cow has not produced any milk so far.”*

**-Female loanholder, Tanga**

## Objective 3a Findings: Dietary quality in dairy-producing households

In this chapter, we explore the link between dairy production and dietary quality among members of dairy-producing households.

### Dietary quality among men and women respondents

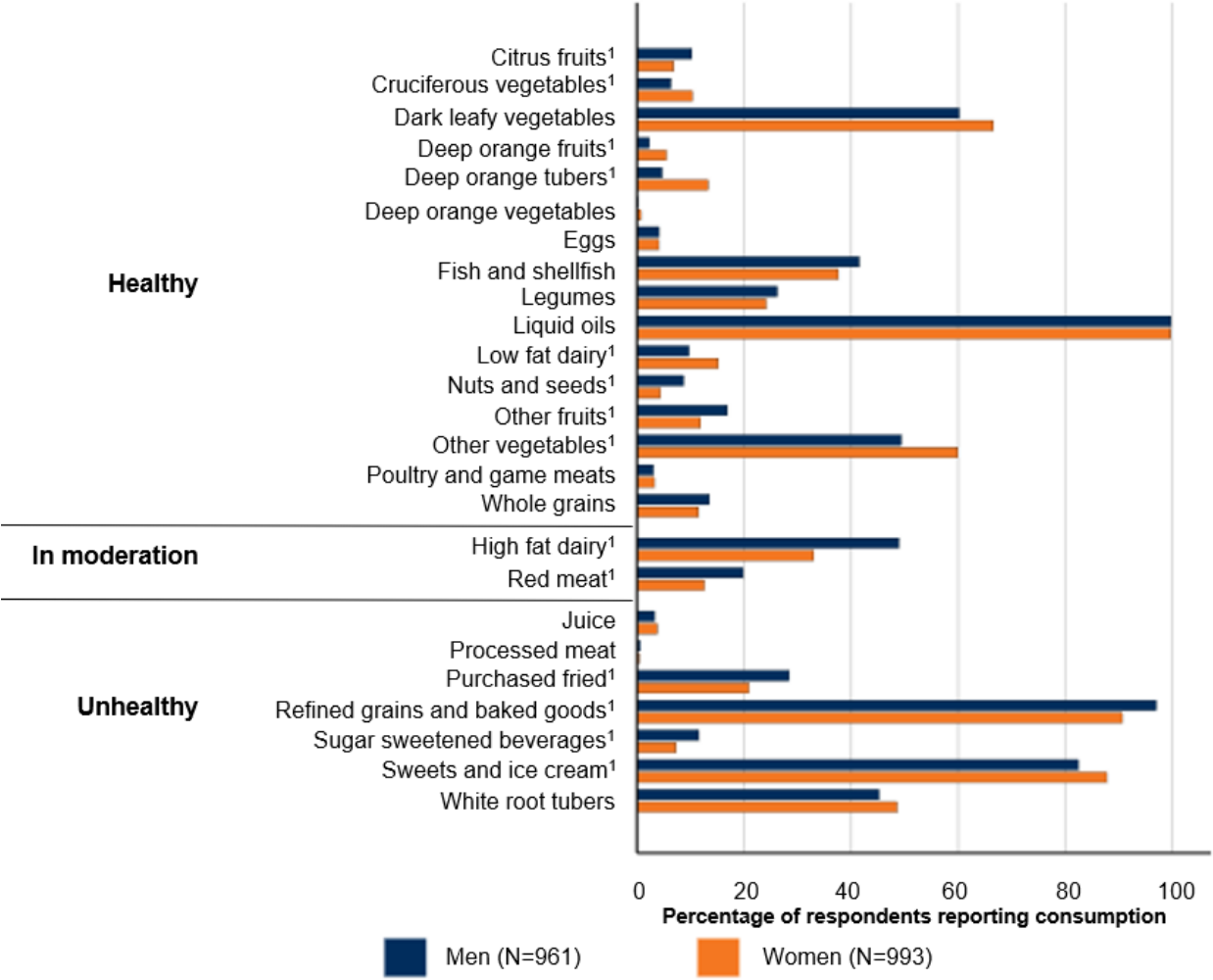
**On average, both men and women respondents reported sub-optimal dietary quality as measured by the GDQS.** The average GDQS score for both men and women were 17.3, indicating a moderate risk of poor dietary quality. 23% of men and 21% of women fell in the “high-risk” GDQS category of nutrient inadequacy and non-communicable diseases-related outcomes. Assessing the MDD-W for women, the average score for women was 3.8, suggesting a lower intake of essential micronutrients. 75% of women did not achieve dietary adequacy as defined by the MDD-W. See Table 6 below for average GDQS and MDD-W scores, as well as the proportion of men and women across the different categories for the two metrics.

*Table 6: Dietary quality among men and women in the sample*

	Men	Women	p-value
N=	961	993	
<b>GDQS score</b>	<b>17.3</b> (17.0, 17.6)	<b>17.3</b> (17.0, 17.7)	0.835
<b>GDQS risk</b>			0.520
High risk (<15)	222 (23%)	211 (21%)	
Moderate risk (15-22)	676 (70%)	732 (74%)	
Low risk (≥23)	63 (7%)	50 (5%)	
<b>MDD-W score</b>	-	<b>3.8</b> (3.6, 3.9)	-
<b>MDD-W achievement</b>			-
Not achieving MDD-W (<5)	-	741 (75%)	
Achieving MDD-W (≥5)	-	252 (25%)	

**Although the overall GDQS score for men and women is the same, there are substantial differences in the consumption of individual food groups by sex.** Among the 16 healthy GDQS food groups, five were significantly more likely to be consumed by women than by men (cruciferous vegetables, dark-green leafy vegetables, deep orange fruits, deep orange tubers, low-fat dairy, and other vegetables) while three were more likely to be consumed by men than by women (citrus fruits, nuts and seeds, and other fruits). Among the seven unhealthy food groups, men consume significantly more from three food groups (purchased fried food, refined grains and baked goods, and sugar-sweetened beverages) while women consume significantly more from one food group (sweets and ice cream). See Figure 11 for the consumption proportions of food groups as defined by the GDQS consumed by the two sexes.

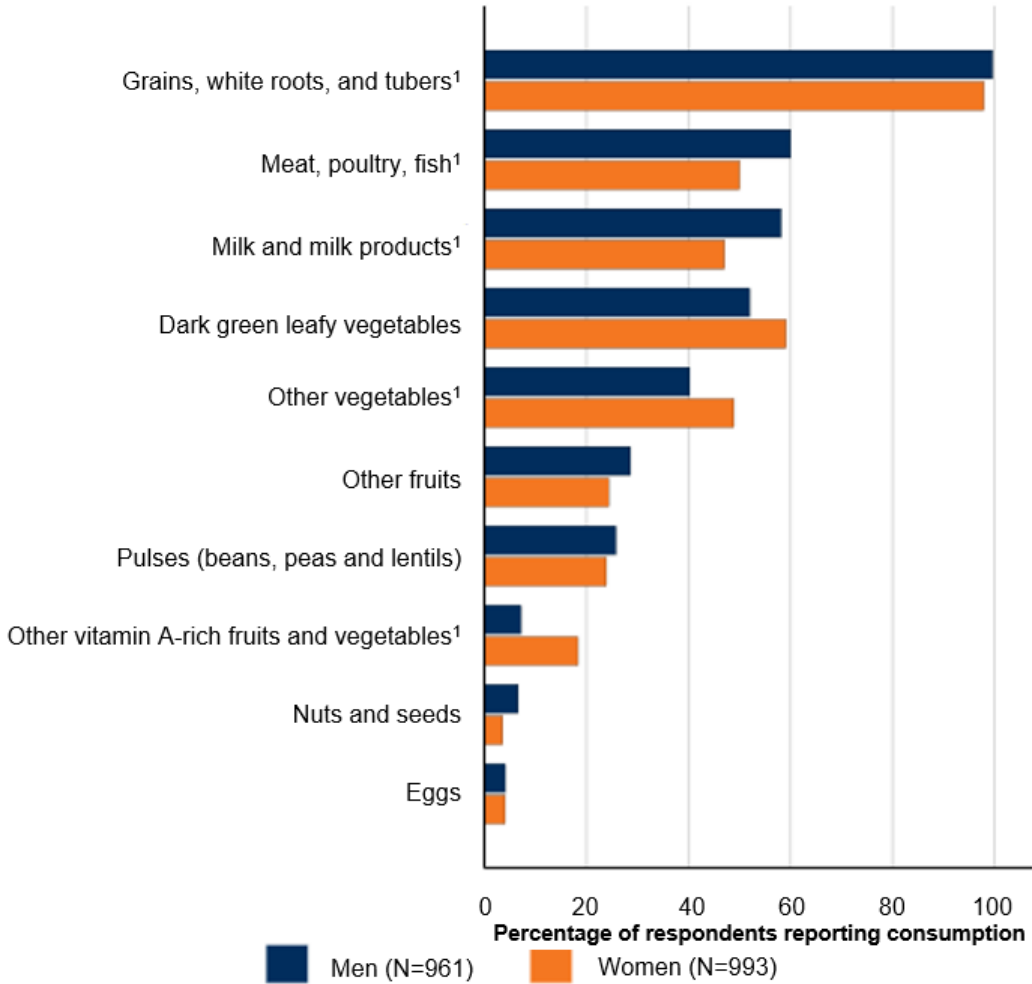
Figure 11: Consumption of GDQS food groups by sex



<sup>1</sup>Consumption differed significantly between men and women.

On the MDD-W, men consume more than women in three food groups (grains, white roots, and tubers; meat, poultry, and fish; and milk and milk products) while women are consuming significantly more vitamin-A-rich fruits and vegetables and other vegetables than men. See Figure 12 for the detailed consumption across the MDD-W food groups by men and women respondents.

Figure 12: Consumption across MDD-W food groups by sex



<sup>1</sup>Consumption differed significantly between men and women.

**Dairy consumption among men and women**

**Men consume significantly more dairy and dairy products on average compared to women.** Men consume an average of 0.2 liters of dairy or dairy products in a day while women consume 0.1 liters of dairy or dairy products in a day (p<0.001). These findings are consistent with both the GDQS and MDD-W results. In the MDD-W, 58.2% of men reported consuming milk and milk products compared to 47.1% of women. In GDQS, the patterns of dairy consumption were more nuanced, with significantly more women (15.2%) consuming low-fat dairy compared to men (9.7%) but significantly more men consuming high-fat dairy (48.8%) than women (33%). However, because largest average amount of dairy products consumed among both men and women are high-fat dairy products (e.g., whole milk), overall, these findings are still consistent with greater dairy consumption among men.

## Milk production from all cows

**On average, milk production<sup>59</sup> was 10 liters per week per dairy producing household, but ranged from 0 to 49 liters.** Households with male primary respondents produce more milk on average (10.9 liters) than households with female primary respondents (8.7 liters) and this difference is statistically significant ( $p < 0.001$ ). The significant association between milk production and the sex of the primary respondent disappears after adjusting for the number of non-TADB cows owned by the household (this includes all types of cows, including heifers, cattle etc.).

## Associations between milk production and dietary outcomes

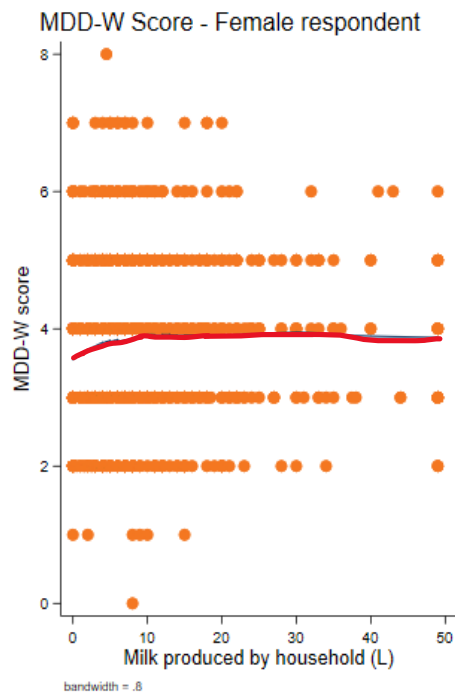
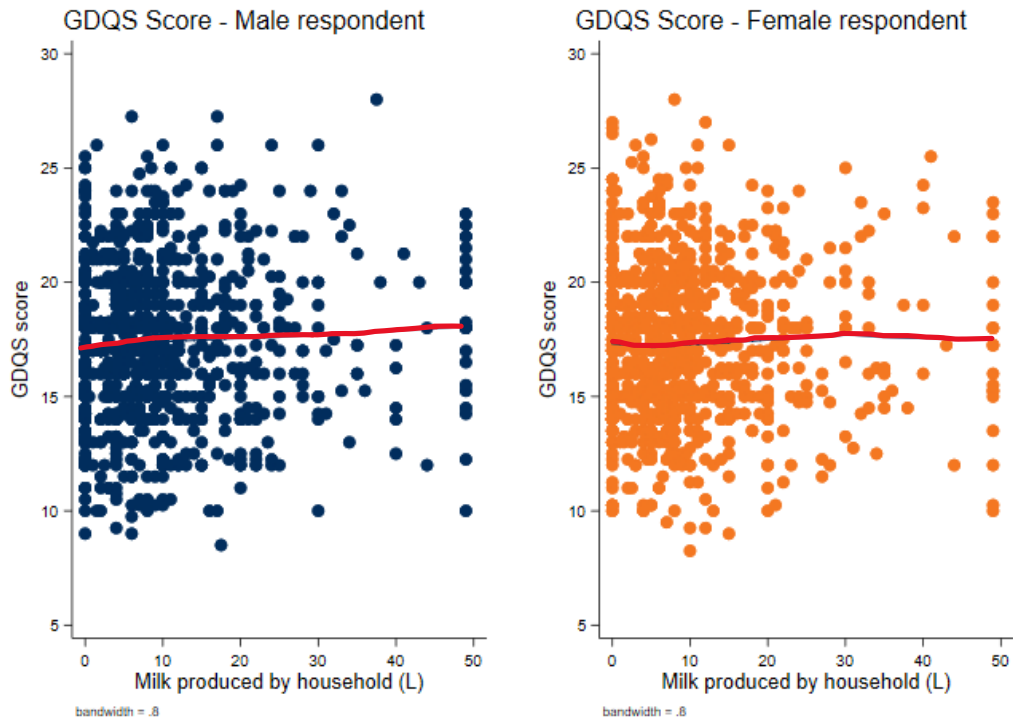
**There appears to be a weak positive, non-linear relationship between milk production and dietary outcomes, but this only exists at low levels of milk production.** We visually assessed the association between milk production and dietary quality using scatter plots and Lowess curves (Figure 13). GDQS scores had a weak positive association with household milk production among men but no association with household milk production among women. MDD-W scores exhibited a non-linear association with milk production among women with a slight positive association for the first 10 liters of milk produced and a flat relationship afterwards. This finding suggests that at very low levels of dairy production, increased dairy production translates into improved diet diversity, possibly by allowing women to introduce milk as a new food group into their diet. However, because the MDD-W only assesses whether or not a food group is consumed rather than the amount of a food consumed, it may be difficult to capture any additional increases in dairy consumption using the MDD-W.

**When we tested the relationship between milk production and dietary quality (as measured by GDQS) for both men and women using linear regression models, our findings aligned with this visual inspection.** Among men, each additional liter of milk produced per week was significantly associated with a 0.03-point increase in GDQS score which is considerably small in magnitude considering the average GDQS score; however, there was no association between milk production and dietary quality among women as measured by the GDQS. For MDD-W, models that included a quadratic term for milk production (testing a non-linear relationship) were significantly associated with MDD-W scores among women.

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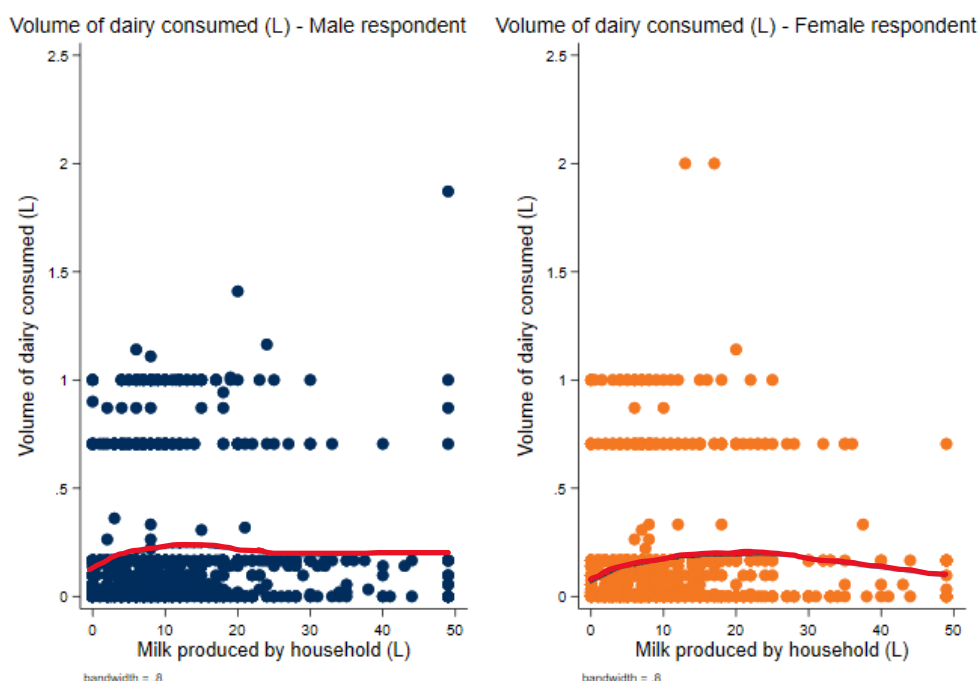
<sup>59</sup> Milk production was assessed at the household level by asking the primary respondent if their household had produced milk in the week before the survey, if so, what was the volume of milk produced.

Figure 13: Association between milk production and dietary quality



**There is a non-linear relationship between dairy production and dairy consumption among men and women (Figure 14).** At the lower values of milk production (below 20 liters per household), more production is associated with increasing likelihood of individual milk consumption for both men and women, but this reduces again at milk production that is greater than about 30 liters. Assessing the relationship using non-linear regression models, we find that the association between dairy production and dairy consumption is significant for both men and women.

*Figure 14: Association between milk production and dairy consumption*



## Associations between TADB/TI3P loans and diet

**Members of households with TADB/TI3P loanholders do not appear to have significantly different dietary quality or dairy consumption than members of other households.** The study found no association between dietary quality and household loan status, regardless of gender of the household member (respondent). Similarly, we did not observe any association between household loan status and the volume of dairy consumed among men or women. However, consistent with our previous findings, we did observe that men consume more dairy products than women irrespective of their loan status. (see detailed methodology and Figure 19, Figure 20, and Figure 21 in Appendix 11 to understand the interactions between the TADB/TI3P loans and diet).

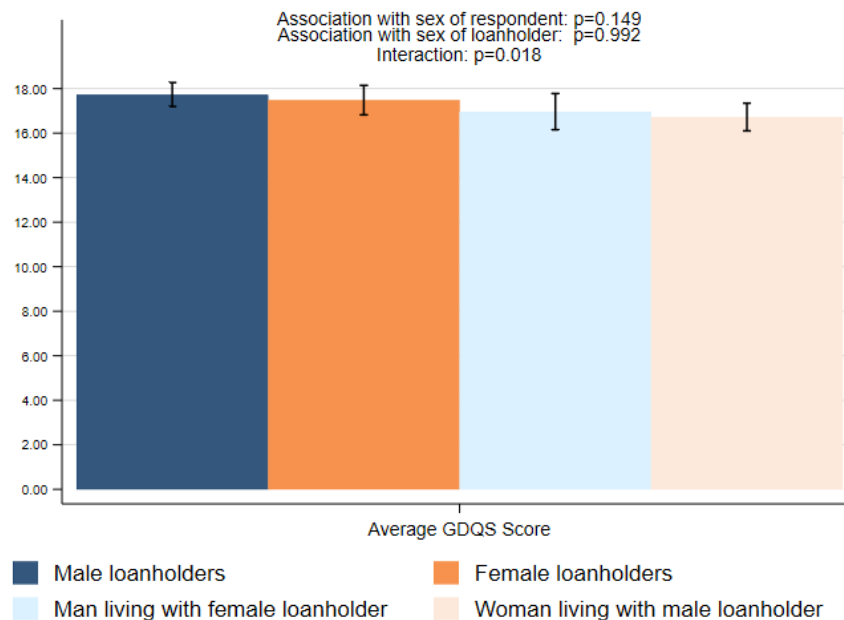
**When we restrict our analysis to households that have a TADB/TI3P loan, we observe that female loanholders have a higher GDQS score than women living with male loanholders** (see Figure 15 whereby the interaction between the sex of the loanholder and the sex of the respondent is significant).<sup>60</sup> This finding suggests that there may be positive effects for a woman

<sup>60</sup> The covariates used in the regression analysis include: region, sex of the head of the household, distance to the nearest market, total number of dairy cows not including those from the TADB/TI3P loan, and the equity tool.



who is the loanholder compared to living in a household with a male loanholder in terms of her agency over finances that positively influences her GDQS score (dietary quality). However, we did not observe similar patterns volume of dairy consumed (see figure 21 in Appendix 11).

Figure 15: Dietary quality (GDQS) by sex of loanholder in the household and sex of respondent



### Determinants of milk production

**Milk production was cited as a major factor that influenced the decision to sell or consume milk.** In the qualitative study, farmers identified several factors that can influence milk production, including cow quality, weather or climatic factors, availability and affordability of land and water and fodder, access to cow veterinary care, and farmer’s knowledge levels, as shown in Table 7.

Table 7: Determinants of milk production

	<p><b>Quality of the cow</b> Loanholders note the significant impact of the cows' breeding on milk production.</p> <p><i>“Firstly, owning high-yield dairy cows, ensuring they have quality fodder, and keeping up with their vaccinations are crucial for producing good milk.”</i> -Male loanholder, Arusha</p>
	<p><b>Weather or climatic factors</b> Farmers face challenges in securing pasture for their cows during the dry season, but they capitalize on the rainy season to cultivate enough feed.</p> <p><i>“To ensure successful grazing activities, you must prepare for the current rainy season by planting a lot of grass. This way, when summer comes, you will find the time useful...”</i> -Male loanholder, Tanga</p>



### Availability and affordability of land

Loanholders emphasize that having ample land for growing feed will ensure a steady food supply for the cows.

*"[If] you are keeping cattle but you have no feeding area, you have to rent a place. For instance, you rent a plain land you plant maize, you get food and food for the cattle. That is how we live."*

*-Female non-loanholder, Kilimanjaro*



### Water

Farmers mention that providing adequate water to cows plays an important role in its milk production.

*"Make sure you give the cattle enough water. So, until 9 or 10 am in the morning, the cattle rest. When they wake up you remove the manure again, add more food and around 1 or 2 pm in the afternoon you give them water."*

*-Female loanholder, Kilimanjaro*



### Fodder

Providing adequate feed to cows is essential in maintaining consistent milk production levels.

*"It requires cutting enough grass in the morning to feed the cows. We mix the grass with bran, corn bran, paddy bran, and sunflower seed residue to ensure the cows produce sufficient milk."*

*-Female non-loanholder, Mbeya*



### Access to veterinary care

Close monitoring of the cow's health condition and access to veterinary services are crucial for ensuring consistent milk production.

*"Taking care involves closely monitoring the cows' health and condition. If a cow's appearance changes, such as a decrease in milk production or a deterioration in its physical condition, it may indicate illness. Prompt veterinary consultation is essential. Without attentive care, one might miss early signs of illness."*

*-Male non-loanholder, Mbeya*



### Farmer's knowledge

Livestock management is an important factor in managing cows' milk productivity.

*"Good management involves practices that increase milk production, such as proper nutrition, timely breeding, prompt medical treatment, and maintaining clean sheds. These practices help maintain productivity, facilitating smoother loan repayments."*

*-Male local government official, Tanga*

## Deciding to sell or consume milk

Our qualitative data provides additional insight into the relatively weak associations between dairy production and diet. First, cow productivity was not always perceived as sufficient to allow farmers to consume the desired amount of milk and also to repay their loans. Second, income from milk

sales was used to cover a wide range of essential household expenses and to re-invest in dairy farming, and expanding the quality or diversity of the diet was not generally a priority.

### *Decisions around dairy consumption*

Decisions around dairy consumption were made at two levels – first households decided how much dairy could be kept at home for consumption. Second, households decide how to allocate dairy within the household.

### Determinants of household dairy consumption

**Household milk consumption is determined by cow productivity, family size and composition, and the need to meet loan obligations.** While quantitative results did not conclusively link household loan status to dairy consumption among men or women, qualitative findings shed light on this aspect (Table 8).

*Table 8: Determinants of dairy consumption*



#### **Cow productivity**

Farmers consider the productivity level of each cow when determining how much milk is consumed in the household.

*“The amount of milk you get depends on the cow’s feed, so you don’t always get the same quantity. On average, I sell about four liters of milk per day. The amount I use at home can be two or one and a half liters, depending on the number of people at home that day.”*

*-Male non-loanholder, Tanga*



#### **Family size**

Farmers identified family size as an important factor that dictates how much milk to keep at home.

*“I would use more milk based on the situation of my family. For example, when the children are not at home, maybe it’s just me and my husband, or there’s a worker. I’ll be using a little milk. But if the whole family is at home, I have to reduce what I sell and keep more at home.”*

*-Female non-loanholder, Arusha*

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### **Family composition**

Within the household, returning children and grandchildren, sick household members, or members who had recently given birth were sometimes prioritized for milk consumption. Most farmers mention that milk is mostly consumed by children and grandchildren. Despite the quantitative findings, few mention that the male household head consumes more milk than other members.

*“Milk consumption can significantly increase if there's a patient, a guest, or if a woman has recently given birth. After using one liter, you might find yourself using all of it.”*

*-Male non-loanholder, Kilimanjaro*

*“Some of us here are elders, and we've mentioned that our children live far from us. For me, half a liter is usually enough, but this December, my children are coming home. Just today, I received my grandchildren who are coming for the holidays, so half a liter won't be enough.”*

*-Female loanholder, Kilimanjaro*



### **Meeting loan obligations**

Farmers reported that meeting their loan obligations was a high-priority. Many loanholders, FPO leaders and local government officials have noted that the productivity of their cows was lower than expected. Consequently, there was not enough milk available for them to repay their loans and achieve their desired household consumption levels.

*“Out of 5 liters milked, I sell 4 liters and keep only 1 liter at home. Currently, I sell even that one liter because I feel it's insufficient for my family's needs at home. Therefore, I have to sell that one liter to contribute towards the debt.”*

*-Male non-loanholder, Arusha*

*“Yes, but for those whose cows produce less milk, some bring one liter, others one and a half liters. When calculated, it often doesn't meet the repayment amount. Even if it does, when someone receives 60,000 shillings and we deduct 50,000 shillings, they complain significantly and leave dissatisfied. It feels like we haven't helped them, but rather caused them harm.”*

*-FPO leader, Kilimanjaro*

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### **Use of income from milk sales**

Farmers mention three primary ways in which they utilize the income obtained from milk sales: meeting household needs such as children's education expenses and farm necessities, reinvesting in dairy farming, and investing in other income-generating activities. Notably, in the qualitative study, there is no discussion among farmers about expanding or altering their diet. While some mention using the money to purchase food items, the emphasis is on covering the costs of basic staples like cooking oil, salt, and tea, rather than on enhancing the diversity or quality of the diet.

## Objective 3b Findings: Market access and dietary quality

This chapter explores the association between the characteristics of the nearest food markets and the dietary quality of individuals in households. We hypothesized that access and proximity to food markets, particularly markets offering more nutritious food options, might influence dietary quality in households or modify the relationship between milk production and dietary quality.

### Market access among dairy farmers

On average, farmers' closest market is 5.2 km away and has a food basket score average of 20.6. Their nearest high-quality market is on average roughly twice as far from their home (9.8 km). High-quality markets have a higher average food basket score (26.5) and the average cost for a food basket at these markets was 1,210 TZS (USD 0.49). Table 9 shows summary statistics on food market access for dairy farmers. There are no statistically significant differences between men and women for any of the five variables.

Table 9: Summary statistics on food market access

	All	Men	Women
N =	880	432	448
Distance to nearest market (km)	5.2 (7.6)	5.1 (7.6)	5.4 (7.6)
Food basket score (nearest market)	20.5 (8.1)	20.4 (8.1)	20.6 (8.1)
Distance to nearest high-quality market (km)	9.8 (13.5)	9.8 (14.0)	9.8 (13.1)
Food basket score (nearest high-quality market)	26.5 (2.4)	26.5 (2.4)	26.5 (2.4)
Price for food basket at nearest high-quality market (TZS)	1,210 (426)	1,200 (429)	1,220 (424)

Mean is shown, with standard deviation in brackets.

### Relationship between quality of the nearest market and dietary quality

We found no association between the quality of the nearest market (using the food basket score) and the quality of the diet as assessed by GDQS. Similarly, we found no evidence that the quality of the nearest market modifies the association between milk production and dietary quality. These results are displayed in Table 23 and Table 24 in Appendix 12.

### Relationship between distance to high-quality market and dietary quality

We found no association between the distance to the nearest high-quality market<sup>61</sup> and dietary quality. There is no evidence that distance to the nearest high-quality market modifies the association between milk production and dietary quality. These results are displayed in Table 25 and Table 26 in Appendix 13.

### Relationship between food basket price and dietary quality

Finally, we find no significant association between the price of the food basket at the nearest market and dietary quality. There is no evidence that the price of the food basket

<sup>61</sup>A high quality market is defined as a market with a food basket score of greater than 23 taking into account the GDQS risk categories of low, moderate and high. To be categorized at low risk of poor dietary quality, the respondent must have a GDQS score of 23 or above.

modifies the association between milk production and dietary quality. These results are displayed in Table 27 and Table 28 in Appendix 14.

## Drivers of dietary quality (GDQS score)

Our findings indicate a weak correlation between milk production and dietary quality, no notable difference in household loanholding status concerning dietary quality, and no relationship between dietary quality and proximity to markets or high-quality markets. The initial assumption driving our analysis was that one of these factors would significantly influence dietary quality; however, this does not appear to be the case. Using a regression model<sup>62</sup>, on average, the highest wealth category of the equity tool and older age of the respondent drive improved dietary quality as measured by the GDQS. Statifying the results by the sex of the respondent, we find that older age is a significant driver of dietary quality among women ( $p=0.002$ ), while wealth (as measured by the equity tool) is a significant driver of dietary quality among men ( $p=0.023$ ).

## Challenges accessing markets

Despite not finding any link between market access and dietary quality, farmers face numerous challenges in market access, which hinder their access to dairy markets to sell dairy, and markets to buy nutritious food. This was reported both in quantitative and qualitative data. Both are presented here.

### Challenges accessing food markets

Farmers shared some experiences of transportation challenges, including distance and lack of transportation means. Insecurity was experienced among both men and women (Table 10).

Table 10: Challenges accessing food markets<sup>63</sup>



#### Transportation

Farmers face challenges with transportation to food markets, including distance and road quality. Most men and women loanholders travel by foot (50% vs. 43%). For men loanholders, this is followed by using their own motorbike (25%); and for women loanholders the second-most common mode of transport is by bodaboda (31%). The average time for both is 21 minutes.

*“Truly, it is far for us to go to the market. If you go, you may walk for an hour along the road, and even the load you carry from the market becomes a burden. So, the challenge is transportation. You find that mothers are suffering, walking on the road and burdened. Even if you get a motorcycle, it may cost around 4,000, which is a significant expense. So, the challenge is mainly about the distance; it’s far for us.”*  
-Female non-loanholder, Arusha



#### Insecurity

Farmers sometimes report facing security concerns while traveling to and from food markets, such as theft. However, only 3% of female and 8% of male loanholders reported having experienced safety issues when commuting to the market.

<sup>62</sup> The analysis used linear regression model with the GDQS score as the dependent variable, employment status, education level (proxy for knowledge), marital status, equity tool (wealth measurement), age, number of children, household size, annual income, and number of cows (not including those from the TADB/TI3P loan) as independent variables. The independent variables were selected based on the assumption that they would affect dietary quality beyond what has been measured already.

<sup>63</sup> See Table 15 for data on food market access from the household survey.

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*“You come to buy and then there are young hooligans, so they just steal from you.”*  
-Male loanholder, Mbeya

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### Challenges accessing dairy markets

Farmers, during the qualitative interviews, reported more challenges related to milk storage and transportation, low milk prices, spoilage and poor quality of milk, delays in payment, and the inability to process milk (Table 11).

Table 11: Challenges accessing dairy markets



#### Milk storage

Farmers reported facing challenges with milk storage, citing issues such as quality of milk containers or a lack of sufficient containers for milk storage.

*“My challenge is with the milk carrier; its handle often breaks, causing me to spill all the milk. The containers are of poor quality. Additionally, they don't curdle milk quickly, so we resort to using smaller containers, which are more practical for transportation”*

-Male non-loanholder, Mbeya



#### Transportation

Farmers mention facing challenges transporting milk to the market due to distance, especially during the rainy season when access to the milk market becomes more difficult.

*“The distance from here to there is quite far, requiring transportation like a bicycle or a motorcycle.”*

-Male loanholder, Tanga



#### Low milk prices

Farmers report challenges with the low buying price of milk, noting that it is insufficient to cover production costs and generate a profit.

*“The price of milk is very low, i.e., TZS 800 per liter. Even paying the employee is a challenge, and if you only rely on delivering to the FPO, you cannot pay the employee.”*

-Male loanholder, Arusha



#### Milk spoilage

Dairy farmers express significant concern about milk spoilage.

*“Sometimes you might find out that your milk, initially deemed safe, is returned after two or three days because it spoiled. When it's returned, the milk has been mixed with others, making it impossible to determine if the spoiled milk was yours or someone else's.”*

-Female loanholder, Arusha

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### **Quality assessments**

Farmers express significant concern about the quality assessments of milk.

*“When delivering milk, I sometimes face challenges with its perceived quality or consistency. If the milk is rejected for being of poor quality or too thin, it sets us back because we have to take it back.”*

*-Male non-loanholder, Mbeya*

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### **Delays in receiving payments**

Farmers report experiencing delays in receiving payments for milk, with some delays extending up to two weeks or more.

*“We agreed payments should be made between the 1st and 5th of each month, but sometimes it's delayed until the 15th, affecting employees' salaries and rights.”*

*-Male non-loanholder, Kilimanjaro*

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### **Inability to process milk**

Farmers cite a lack of equipment hindering milk processing at home, necessitating reliance on large processing companies to collect their milk before spoilage.

*“I have never processed milk because I lack the knowledge and equipment to do so. To process milk, you need a refrigerator. Sometimes the milk spoils at the station. If we were experts in processing, we could have prevented this.”*

*-Female non-loanholder, Tanga*

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## Discussion

In this section we reflect on and summarize some of the key findings of the report, provide context and pose hypotheses, and discuss the implications for the TADB/TI3P loan program.

### Ability to access TADB/TI3P loans among men and women

For both women and men, there is a positive correlation between having received a TADB/TI3P loan and older age, owning a phone, having access to information on banking and loans, and proximity to dairy markets. For women, there is a positive correlation between having received a TADB/TI3P loan and being unmarried, marrying at an older age, having previous paid employment, and having sole decision-making power to visit dairy markets. These gender-specific factors suggest that loans are often going to women who show alignment with key indicators of empowerment. While the design of this study does not allow us to prove causality (i.e., does the TADB/TI3P loan lead to higher women's empowerment or do more empowered women receive more TADB/TI3P loans), we argue that an average duration since the loan was awarded for women of 22 months has only limited potential of having impacted factors like having previously had paid employment or having sole decision-making power. Furthermore, being unmarried and marrying at an older age are exogenous factors, not impacted by the TADB/TI3P loan. While being unmarried is not itself an indicator of empowerment, in this context unmarried women are maintaining and managing their own households. Experience with paid employment and sole decision-making power among female loanholders may correlate with increased financial literacy skills, greater confidence in navigating the loan process, or a more conducive enabling environment and should be further explored.

The tendency of TADB/TI3P loans more frequently going to older, unmarried women with work experience and decision-making power is further compounded by differences among the regions. The concentration of female loanholders is highest in Kilimanjaro (68%) and lowest in Mbeya (18%). Out of the ten FPOs through which TADB is disbursing (or planning to)<sup>64</sup> TI3P loans, two are women-only FPOs; both located in Kilimanjaro. Overall, 41% of loanholders were women, and female loanholders are receiving lower loan amounts than men (USD 1,258 for men vs. USD 949 for women). Loan amounts are issued based on the repayment capacity of the applicants, indicating that female applicants might need more support in improving their repayment capacity.

Both sexes cite similar challenges with the loan application process including upfront costs, lack of literacy and financial literacy, delays in the loan application process, lack of transparency of selection criteria, and lack of collateral. However, existing societal inequities mean that, on average, these challenges pose a bigger barrier to women than men. Tanzania's recent National Panel Survey<sup>65</sup> found that 29% of women 25 years or older are not literate compared to only 16% of men. Similarly, the national survey found that only 2.9% of female-headed households have been able to use a land-owning certificate as collateral to access a loan compared to 6.6% of male-headed households. During our qualitative interviews, many respondents emphasized that the criteria for accessing loans were applied equally to men and women; however, in the context of these societal inequities, these policies will tend to disadvantage women. Both men and women cite a lack of collateral as a challenge in accessing the TADB/TI3P loan. Women and youth may, however, be disproportionately affected by this challenge due to limited access to resources. In instances where women do not have access to individual assets, they lack the autonomy to decide on loan uptake, limiting their access to the loans. Among non-loanholders, there is a significant difference between men and women in ever having had paid employment (57% for men vs. 25%

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<sup>64</sup> Loans for one of the ten FPOs have not yet been disbursed.

<sup>65</sup> National Bureau of Statistics (NBS) [Tanzania]. (2022). *Tanzania National Panel Survey Report (NPS): Wave 5, 2020/2021*. NBS.

for women,  $p < 0.001$ ). Although not statistically significant, female non-loanholders have lower levels of education compared to male non-loanholders (23% of the women have completed secondary or above, compared to 32% of the men,  $p = 0.141$ ). The opposite is observed among loanholders, where women have on average higher levels of education than men (31% above primary vs. 23%,  $p = 0.242$ ). The magnitude of these differences may be correlated with the challenges women face in accessing collateral necessary for loans. Among youth, the lack of these resources pushes them to either move for better opportunities or engage in other livelihood activities other than dairy farming. This is observed in the significant difference of loanholding status between youth and older adults (14% youth loanholders vs. 29% adults,  $p = 0.001$ ). There were no other significant differences in the characteristics of youth and older respondents, but some interesting differences were found. Youth had higher education levels (38% above primary vs. 25%), and a higher proportion of them have ever had paid employment (42% vs. 39%). However, the youth had a slightly lower income level than the older adults.

### Low milk production limits the impact of loans

Many farmers reported concerns about low cow productivity, which they attribute to receiving poor-quality cows through the TADB/TI3P loan. This is in line with the quantitative data where we see that the average daily milk production does not differ between loanholding and non-loanholding households of the ten TI3P FPOs (both groups report a daily average of 10 liters in the week prior to data collection). Poor productivity and low milk production limit the ability of the TADB/TI3P loans to have positive impacts on downstream factors like income and dietary quality. Loanholders expressed significant financial strain stemming from owning the loaned cows. This strain arises from factors like insufficient milk sales income to cover loan repayments and feed expenses, high production costs, and unexpected cow deaths. Although in general, our study did not find many unintended negative consequences of loans, the few instances of household conflict that were reported were explicitly linked to disagreements related to poor productivity among cows. Overall, more female than male loanholders reported experiencing intra-household conflict. The respondents mention family disagreements; allusions to violence are not made.

### Effect of loans on household dynamics

Within dairy farming households there are meaningful differences in the allocation of responsibilities by sex. Men participate in more dairy-related tasks than women and spend more hours in dairy farming than women. However, women spend 1.1 more hours working per day than men overall and are more likely to experience time poverty than men. Men, however, spend more hours in dairy farming compared to women. Women participate in decisions about more dairy-related activities than men, but when men are involved, they are more likely to view themselves as making all or most of the decisions. Men and women report having at least some control over similar proportions of dairy-related income (79% vs. 73%), but, encouragingly, women report having sole control over a higher proportion of dairy-related income than men (30% vs. 16%).

In general, households receiving a TADB/TI3P loan reported similar gender dynamics within the household. Respondents in loanholding households have greater involvement in dairy-related activities, and when women are loanholders, the gender gap in participation in dairy-related activities essentially disappears. Further, respondents in loanholding households have sole control over a lower proportion of dairy-related income than respondents in non-loanholding households. However, the proportion of dairy-related income over which respondents have either joint or sole control is similar between loanholding and non-loanholding households. These findings could suggest a greater degree of shared decision-making around the use of income from dairy in loanholding households. There is little evidence that receiving loans has unintended consequences of increasing the burden of labor among men or women. While women in

loanholding households report similar time spent working and time spent dairy farming as women in non-loanholding households, they are involved in a wider variety of dairy-related activities. There are a number of possible explanations for this (though our data does not allow us to make a definitive statement): 1) Some labor in loanholding households may be shifted to other household members to accommodate the female respondents' increase in involvement in dairy-related activities; 2) Female loanholders participate in more dairy-related activities in general, but did not allocate more time to them in the past 24 hours; and 3) Dairy-related activities may be displacing other activities that do not need to be taken up by other household members.

Few TADB/TI3P households reported intra-household conflicts, which explicitly linked to the low productivity of the cows and subsequent concerns about being unable to pay the loan. Among TADB/TI3P loanholding households, when the loanholder is a woman, she exerts substantial independent control over dairy-related income compared to when the loanholder is a man. This holds across the different regions and when restricting the sample to F&M households only.

### Weak relationships between dairy production and dietary intake

On average, both men and women in the sample have a moderate risk of poor dietary quality and low dietary diversity as measured by the GDQS. Furthermore, loanholders do not appear to have significantly different dietary quality or dairy consumption than non-loanholders. TADB/TI3P loans alone do not appear to be associated with dietary quality; this, however, was not a primary objective of the TI3P program. Higher levels of dairy production were only weakly associated with better dietary quality. Although these differences were statistically significant, the magnitude of this difference is very small. These relationships were also not impacted by market access (quality of nearest market, distance of nearest high-quality market, and price of food basket). The relatively weak associations between dairy production, loanholding status, and dietary quality may point to situations in which cow productivity was not always sufficient to allow farmers to consume the desired amount of milk and repay loans which are in line with the finding that loanholders' production of milk does not differ from non-loanholders.

Another potential explanation for these weak associations is intra-household decision-making around dairy consumption. The decisions about dairy consumption in households are largely driven by cow productivity and the amount of income left over after repaying the loan. Income from milk sales is also used for household expenses such as paying education fees or purchasing basic staples rather than expanding the diversity or quality of the diet. Only 58% of men and 47% of women reported consuming milk or milk products the previous day, pointing to a pattern where milk is diverted for sale rather than consumption.

Farmers face several challenges in accessing dairy markets, especially as it relates to bringing their dairy to sale, such as milk storage and transportation, low milk prices, spoilage and poor quality of milk, delays in payment, and the inability to process milk. For both dairy and food markets, farmers report transportation challenges, such as lack of transportation means and long distance. Generally, we find that the local availability of diverse foods was poor in the areas in which TADB/TI3P is disbursing loans, with the average farmer needing to walk almost 10 kilometers to reach a high-quality market. Nevertheless, our study finds no evidence of an association between market access and individual dietary quality. The study underscores that the variables assumed to affect dietary quality such as milk production, milk consumption, and access to markets have no or weak effect. Analysis of sex-stratified regressions highlighted that age for women and the highest equity tool (wealth) drive better dietary quality. This has implications for TI3P in terms of targeting women who are younger (a one-year increase in age is positively related to an increase in dietary quality) and men who are not relatively wealthy.

## Recommendations

Our findings suggest several opportunities for TADB to strengthen gender and nutrition integration within the TI3P program or for future financing products in order to improve financial and nutritional outcomes for both women and men.

### 1. Address the socio-cultural gender barriers for women in accessing loans

Women livestock farmers in Tanzania face social norms and barriers that make it more difficult for them to access loans. Women who receive loans exhibit traits such as being older, being unmarried, having previous paid employment, or increased access to information which are enabling factors for increasing their decision-making power and for empowerment. This finding suggests that significant groups of women may still be left behind. Women in the qualitative interviews described instances of wanting to apply for the TADB/TI3P loan but not getting support from the men in the household or successfully applying for the loan only to be rejected when bringing the cattle home.

#### Actionable steps for TADB:

- **Provide gender-specific training of trainers (TOTs) for FPOs to deliver to their members that acknowledge these gender barriers and stereotypes.** FPOs should promote the benefit of the TI3P loans for both men and women, and encourage equity in decision-making. FPOs should also be supported and encouraged to provide training for men to increase their support for women's participation and decision-making and promote positive masculinities. The supplemental training for women should include strategies to use in farming when encountering gender stereotypes from other farmers or members of the community. TADB can also consider adapting the GALS<sup>66</sup> methodology for this context.
- **Develop further understanding on the women who are seeking loans via FPOs.** The FPOs can play a role to increase the loan applications and uptake among women, especially among those who are interested in the loan but are not able to access it due to socio-cultural gender barriers.
- **Develop social and behavior change (SBC) messages** for FPOs to incorporate into trainings, outreach, marketing, and engagement with men and women farmers, their spouses, and other key stakeholders that promote women's access to and control over TI3P loans.
- **Conduct community outreach activities with key stakeholders**, including men, community leaders and elders, religious leaders, or other key influencers, to raise awareness of the benefits of TI3P loans and promote support for women's access to and control over TI3P loans.
- **Disaggregate monitoring and evaluation (M&E) indicators and data by region, sex, and age** to allow for specific tracking and analysis of program impacts and outcomes across different geographic areas as well as gender and age groups. Because cultural practices surrounding young and adult women's roles in dairy production vary by region, monitoring women's participation on a region-by-region basis will enable targeted interventions and adjustments to ensure equitable access and participation in all regions.

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<sup>66</sup> <https://gender.cgjar.org/tools-methods-manuals/gender-action-learning-system-gals>

## 2. Design more gender-sensitive loans

Both men and women report collateral requirements and financial literacy as problems with the design of the loan. Collateral requirements are directly related to the loan product design while financial literacy is a trait of the customer segment, but the loan product can be designed in a way to better support those who lack financial literacy. These challenges disproportionately affect women due to social norms. Consequently, TADB's gender-neutral application of "fair" rules may unfairly exclude women from access to loans.

### Actionable steps for TADB:

- **Conduct practical, gender-awareness training for TADB staff that includes a focus on the difference between *equality* and *equity* in the provision of loan services.** TADB staff view the fair application of loan eligibility criteria to men and women as a strength of their organization. TADB can build on this existing commitment to fairness within the institution by holding trainings that explore the difference between equal application of eligibility criteria versus equitable access to loans to demonstrate how development and implementation of equitable loan criteria for underserved groups, such as women, are necessary and important for achieving equality in outcomes for men and women.
- **Provide gender-specific training and support to TADB staff in the development of** capacity-building and support services for women loan applicants and recipients that address the specific challenges faced by women in accessing and managing loans, such as pre-loan application support, financial literacy training, mentorship programs, and networking opportunities.
- **Track and analyze the distribution of loans to men and women, set targets for gender balance and review annually.** This approach will allow TADB to not only have up-to-date information about the gender balance aspect of the loans but also gain a better understanding of the individual versus group loans, and loan amounts. Tracking these at high frequencies is useful for decision-making and determining the drivers of any gender imbalance.
- **Support FPOs build strong distribution models to reach rural women interested in dairy farming with the TADB/TI3P loans.** The FPOs can be encouraged and given the support to further analyze other outreach and marketing distribution models to reach women. These could be in the form of female loan officers, agent banking models or through the female extension works for a more gender-sensitive loan approach.

## 3. Test loan products that better fit the needs of both men and women

Men and women frequently report that the cows provided through the TADB/TI3P loans do not produce as much milk as expected. This low milk production means that the farmers earn less income than expected, making it difficult to repay the loan each month and sometimes leading to conflict within the household. TADB has indicated that Tanzania has a low supply of productive cows and the productivity may have further deteriorated due to poor management of cows. However, the perception of the livestock farmers is that the farmers expected more milk from the cows obtained through the TADB//TI3P loan compared to what they actually get. Additionally, milk is preferentially used to cover essential household expenses with little left for household consumption. Our findings suggest that the farmers would like loan products that align with their needs and leave room for choice.

#### Actionable steps for TADB:

- **Provide quality cows with higher productivity and support further technical training to manage livestock appropriately and** to ensure that the income from the loan is enough to not only repay the loan but also change other outcomes of dietary quality and milk consumption within the household.
- **Allow farmers to choose the cows.** Providing farmers with agency will ensure that they do not see the lack of choice as a barrier. According to the TADB staff, the farmers have the agency to choose their cow from a vetted supplier, however, there is a need for better oversight on this process because the farmers report not having the agency of choice.<sup>67</sup> Ensuring that farmers actually have the agency of choice will allow for more accountability on managing the livestock and improving productivity.

#### **4. Provide additional support to farmers supplementing the loan to improve dietary quality**

Our findings do not find meaningful associations between receiving a TADB/TI3P loan and individual dietary quality or milk consumption. We find that older age for women and higher wealth as measured by the equity tool for women drive improved dietary quality. Improved dietary quality is not an original objective of the loan program, however, TADB might consider adding other components to its programming that can directly affect the diets of the loanholder and the household through improved targeting practices.

#### Actionable steps for TADB:

- **Highlight the nutritional benefits of dietary diversity** through existing information channels such as FPOs or SBC training or a separate marketing campaign. The recommendation is to specifically consider targeting here for younger women and men that would be in the low wealth category. This will help reduce the gap in the dietary quality.
- **Explore strategies to boost the productivity of cows** to ensure that farmers can consume more milk at home. The productivity of cows can be improved by using best practices for livestock management. These strategies could include improved training for farmers or the provision of higher-quality cows through the FPOs and the livestock extension workers.

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<sup>67</sup> This information was shared by TADB during the validation workshop for this report.

## Appendix

### Appendix 1: Details on household survey of dairy producers

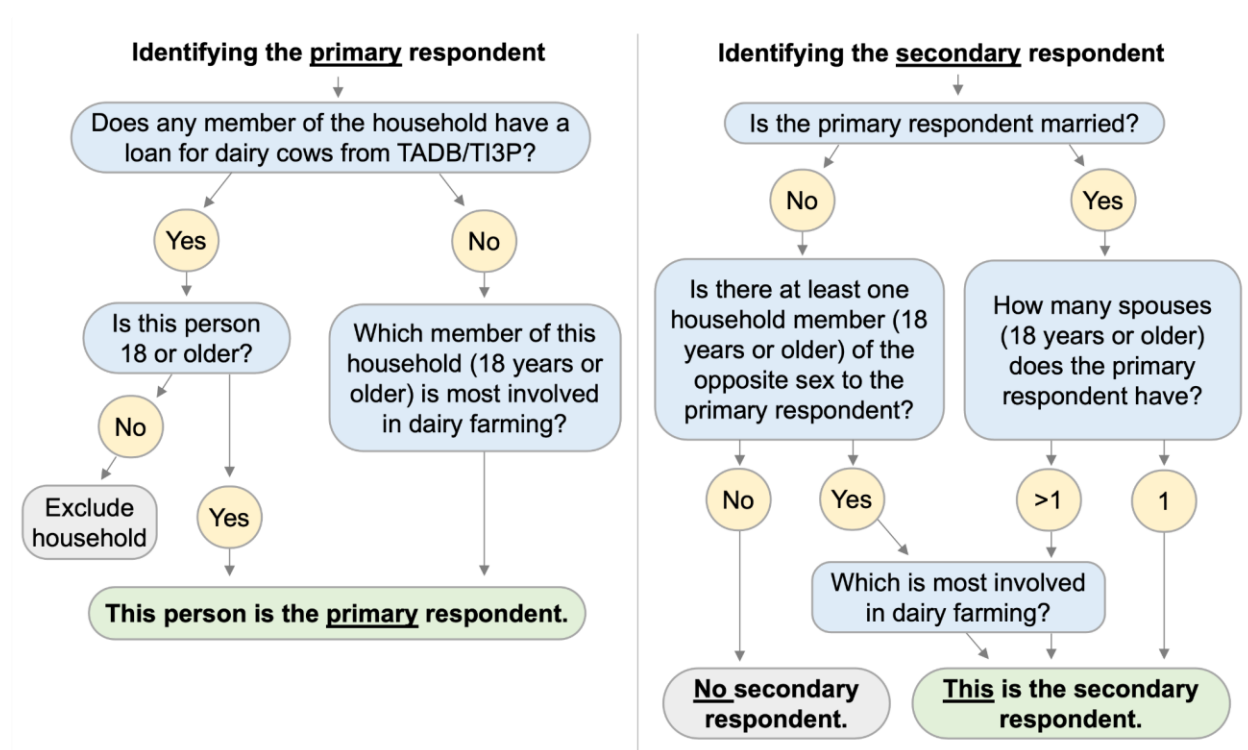
#### Survey modules

The household survey consisted of 10 main modules:

- Module 1: Introduction & household characteristics
- Module 2: Income & assets
- Module 3: TADB/TI3P loan details (TADB/TI3P loanholders only)
- Module 4: Market access for food purchases
- Module 5: Market access for dairy sales
- Module 6: Engagement, decision-making, and control over income in dairy-related activities
- Module 7: Dairy production & sales
- Module 8: Control over dairy-related income
- Module 9: Allocation of time
- Module 10: Global Diet Quality Score (GDQS)<sup>68</sup>

#### Respondent selection

Figure 16: Primary and secondary respondent selection



<sup>68</sup><https://www.intake.org/sites/default/files/2021-04/GDQS%20Overview%20Document%20-%20April%202021.pdf>

## Appendix 2: Details on market access assessment methodology

Our market access assessment used geospatial and direct observation data to understand households' access to high-quality food markets. Using the data gathered in Module 5 of our household questionnaire, we developed a list of food markets used by dairy-producing households that are members of the ten FPOs in which TADB has disbursed TI3P loans. These households reported a total of 153 unique markets; we visited all. "Markets" were broadly defined to include a diverse range of places that sell food, including open-air markets, informal shops, and formal establishments but exclude formal and informal restaurants. Because we worked primarily in rural areas and asked respondents to report where they purchased the *majority* of their food, most households referred us to kiosks/small shops (64) and open-air markets (54), with only a few (12) supermarkets referred. We sent data collectors to collect geospatial data on the exact location of these markets.

While at the markets, the data collectors directly observed the foods on sale at the market to assess the availability of food items that are common in Tanzania and are aligned with the food groups from the GDQS (Table 12). The market assessment was designed to include examples of foods from all 16 "healthy" food groups, two "unhealthy in excessive amounts", food groups, and two "unhealthy" food groups. The two unhealthy food groups, a) refined grains and baked goods and b) white roots and tubers were included in recognition of the fact that foods falling into these categories, including white rice, cassava root, and cooking bananas, are staples in the Tanzanian diet but are included in the score at a medium (rather than high) level corresponding to a one-point increase in the GDQS. The specific examples of foods within each of these food groups were taken from the list of foods included in the Tanzanian version of the Diet Quality Questionnaire<sup>69</sup> to ensure we were selecting locally relevant foods. While this list does not reflect an exhaustive list of all nutritious foods that could be purchased in local markets, providing data collectors with a pre-determined list of common foods reduced the misclassification of foods into their appropriate food groups and enabled us to calculate the cost of a standardized market basket in addition to a dietary diversity score. Previous literature suggests that market-level diversity can be associated with individual-level dietary quality<sup>70</sup> and that there can be substantial regional variations in the price of a food basket within Tanzania.<sup>71</sup> Consequently, market diversity and food prices were both important dimensions of market access for this study.

Using this data, we calculated a "food basket score" and a "food basket price" for each market. The food basket score was calculated by summing the GDQS points associated with each food group that was available at the market. The "food basket price" reflected the lowest price for which you could amass a 23-point food basket (which corresponds to the GDQS's "low risk" category) at that market.

Table 12: Food groups and items included in the food basket

Food group	Items	Quantity for food basket	GDQS Points
Citrus fruits	Orange, lemon	70 grams	2

<sup>69</sup> Global Diet Quality Project. (2021). *Diet Quality Questionnaire: Tanzania*. [www.dietquality.org/dqq](http://www.dietquality.org/dqq)

<sup>70</sup> Chege, C. G. K., Wanyama, R., Lundy, M., Nguru, W., & Jäger, M. (2021). Does Retail Food Diversity in Urban Food Environments Influence Consumer Diets? *Sustainability*, 13(14), 7666. <https://doi.org/10.3390/su13147666>

<sup>71</sup> Cochrane, N., & D'Souza, A. (n.d.). Measuring Access to Food in Tanzania: A Food Basket Approach.



Deep orange fruits	Mango, papaya	130 grams	2
Other fruits	Sweet banana, pineapple	120 grams	2
Dark green leafy vegetables	Spinach, amaranth	40 grams	4
Cruciferous vegetables	Broccoli, cauliflower, cabbage, sukuma (collard greens)	30 grams	+0.25
Deep orange vegetables	Pumpkin, carrot	40 grams	+0.25
Other vegetables	Tomato, avocado	120 grams	+0.5
Legumes	Beans, green peas, cow peas	50 grams	+4
Nuts and seeds	Groundnuts, groundnut paste, cashew nuts	20 grams	+4
Whole grains	Whole-grain maize ugali, sorghum ugali, millet porridge	20 grams	+2
Liquid oils	Sunflower oil, palm oil or similar	10 grams	+2
Fish and shellfish	Fish	40 grams	+1
Poultry and game meat	Chicken, duck	40 grams	+1
Eggs	Eggs	1 egg	+2
Low-fat dairy	≤2% fat milk	140 grams	+2
High-fat dairy	Whole milk (cow, goat)	240 grams	+2
Red meat	Beef, goat	40 grams	+1
Refined grains and baked goods	White rice, bread, chapati	30 grams	+1

White roots and tubers	Irish potatoes, cassava root, white sweet potatoes, cooking bananas/plantain	100 grams	+1
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### Appendix 3: Details on Focus Group Discussions

We conducted 20 structured FGDs. FGDs allowed us to capture as many views as possible in a time and cost-efficient manner and to harness group dynamics to allow for a deep discussion based on reactions to different participants' opinions and perspectives. The group discussion setting is ideal for discussing community perceptions on gender roles and decision-making in dairy production, especially in regions where dairy production is common is the norm (which is the case in the areas that we are drawing from). We used purposive sampling to ensure coverage across the different geographical regions where TADB/TI3P loans have already been distributed (Tanga, Arusha, Kilimanjaro, or Mbeya) as well as across gender and loan-holder status (Table 13). All focus group participants came from Groups 1 and 2 and were dairy producers from one of the FPOs where TADB has already provided small-holder loans.

Key themes explored in these groups included how regional cultural norms surrounding gender and dairy production impact women's access to loans and couples' approaches to loan applications; understanding processes through which dairy-producing households make decisions regarding dairy-related activities, including the decision to sell, consume, or otherwise distribute the dairy they produce; and unintended negative consequences of loans such as intra-household conflict or increases in uncompensated labor for women.

### Appendix 4: Details on Key Informant Interviews

In addition to FGDs, we conducted 15 KIIs. Respondents included local TADB staff tasked with distributing loans (Business Development Officers, one per region), leaders of the dairy FPOs, and local officials. Respondents were purposively sampled from each of the four regions where TADB is active as part of TI3P (Tanga, Arusha, Kilimanjaro, or Mbeya). As anticipated, most of the target respondents were men, with three women interviewed, two being leaders of women dairy cooperatives. In all the regions, we spoke to one TADB staff member and at least one local official from FPOs where TADB/TI3P loans have been distributed. In two of the regions (Kilimanjaro and Tanga), we also interviewed local government officials. The KIIs helped us understand how decisions around loan distributions are made and provided more context on the regional dairy sector in general.

*Table 13: Distribution of completed FGDs and KIIs*

Region	Method	Target group	Sex	Number
Arusha	KII	FPO leaders	-	1
		TADB staff	-	1
	FGD	TADB/TI3P loanholders	Female	1
			Male	1

		Non-TADB/TI3P loanholders	Female	1
			Male	1
Kilimanjaro	KII	FPO leaders	-	3
		Government official	-	1
	FGD	TADB/TI3P loanholders	Female	3
			Male	1
		Non-TADB/TI3P loanholders	Female	1
			Male	1
Mbeya	KII	FPO leaders	-	1
		TADB staff	-	1
	FGD	TADB/TI3P loanholders	Female	1
			Male	1
		Non-TADB/TI3P loanholders	Female	1
			Male	1
Tanga	KII	FPO leaders		5
		Government official	-	1
		TADB staff		1
	FGD	TADB/TI3P loanholders	Female	1
			Male	2
		Non-TADB/TI3P loanholders	Female	2
			Male	1
				<b>Total</b>

## Appendix 5: Characteristics of male and female loanholders

Table 14: Household (HH) characteristics of male and female loanholders

	HH with male loanholders	HH with female loanholders	p-value <sup>1</sup>
	N (%) or Mean (SD)	N (%) or Mean (SD)	
	N = 174	121	
<b>GEOGRAPHY</b>			
Region			0.059
Arusha	31 (18%)	20 (17%)	
Kilimanjaro	25 (15%)	53 (44%)	
Mbeya	55 (32%)	12 (10%)	
Tanga	62 (36%)	36 (30%)	
<b>HOUSEHOLD COMPOSITION</b>			
Female-headed household			<0.001
No	174 (100%)	61 (51%)	
Yes	0	59 (49.0%)	
F&M household			0.106
No	39 (23%)	47 (39%)	
Yes	134 (77%)	74 (61%)	
HH members (incl. respondent)	5.3 (0.2)	4.9 (0.4)	0.269
Number of adults in HH	2.9 (0.1)	3.1 (0.3)	0.364
Number of children in HH	2.4 (0.1)	1.8 (0.2)	0.002
<b>SOCIOECONOMIC STATUS</b>			
Equity Tool <sup>2</sup>			0.163
Low to Medium	19 (11%)	6 (5%)	
Higher	76 (44%)	45 (38%)	
Highest	79 (46%)	70 (58%)	
Livelihood Activities			0.204
Agriculture only	93 (59%)	71 (62%)	
Agriculture and own business	30 (19%)	27 (24%)	
Agriculture plus formal work <sup>3</sup>	17 (11%)	13 (12%)	
Agriculture plus informal work <sup>4</sup>	18 (11.6%)	3 (2.8%)	
Dairy cows cared for (excl. TADB cows)	3.3 (0.5)	3.4 (0.4)	0.867
Median Monthly Income - USD	152.2 (17.8)	120.9 (9.0)	0.074
Median Annual Income - USD	1,424.9 (135.8)	1,166.8 (121.4)	0.075
<b>LOANHOLDER DEMOGRAPHICS</b>			

Age of loanholder	55 (0.8)	54 (1.3)	0.592
Youth loanholder (<=35 years)			0.505
No	157 (90%)	113 (94%)	
Yes	17 (10%)	8 (6%)	
Education level of loanholder			0.242
No education	2 (1%)	0	
Primary or less	132 (76%)	84 (69%)	
Above primary	40 (23%)	37 (31%)	
Marital Status of loanholder			0.003
Never married	3 (2%)	13 (11%)	
Currently married	161 (93%)	77 (63%)	
Come we stay/Cohabiting	4 (2%)	4 (3%)	
Widowed/divorced/separated	5 (3%)	28 (23%)	

### MARKET ACCESS

Minutes to nearest dairy market <sup>5</sup>	10.3 (1.5)	9.6 (0.9)	0.493
<b>MILK PRODUCTION</b>			
Litres of milk produced in past week	10.5 (1.3)	9.8 (1.3)	0.582

<sup>1</sup> This p-value compares Male and Female TADB/TI3P loanholders. It reflects a chi-squared test for categorical variables and an F-test from a linear regression for continuous variables. <sup>2</sup>Households in the 1st, 2nd and 3rd quintiles make up the low to medium category, those in the 4th quintile make up the higher category, and those in the 5th quintile (richest 20%) make up the highest category. <sup>3</sup>Formal work includes salaries from employment and pension. <sup>4</sup>Informal work includes fishing, hunting and gathering, transfers/remittances, and other casual earnings. <sup>5</sup>Minimum distance reported by any household member

Table 15: Food market access among TADB/TI3P loanholders

	Male TADB/TI3P loanholders	Female TAB/TI3P loanholders	p-value
	N (%) or Mean (SD)	N (%) or Mean (SD)	
	N = 121	174	
<b>Minutes to the nearest food market</b>	21.3 (3.1)	21.3 (3.1)	0.993
<b>Mode of transport in accessing main food market</b>			0.001
Foot	46 (50%)	45 (43%)	
Bicycle	5 (6%)	0	
Motorbike (own)	23 (25%)	3 (3%)	
Bodaboda	10 (11%)	32 (31%)	
Public transportation	3 (3%)	18 (17%)	
By car	5 (6%)	7 (7%)	
<b>Experienced safety issues in commuting to main food market</b>			0.332
No	85 (92%)	103 (97%)	
Yes	7 (8%)	3 (3%)	

## Appendix 6: Characteristics of loanholding households

Table 16: Comparison of loanholding and non-loanholding households

	TADB/TI3P loanholders	Non-loanholders in TADB/TI3P FPOs	p-value <sup>1</sup>
	N (%) or Mean (SD)	N (%) or Mean (SD)	
	N = 295	363	
<b>GEOGRAPHY</b>			
<b>Region</b>			0.314
Arusha	51 (17%)	27 (8%)	
Kilimanjaro	78 (27%)	79 (22%)	
Mbeya	67 (23%)	7 (2%)	
Tanga	98 (33%)	250 (69%)	
<b>HOUSEHOLD COMPOSITION</b>			
<b>Female-headed household</b>			0.618
No	235 (80%)	298 (82%)	
Yes	59 (20%)	65 (18%)	
<b>F&amp;M household</b>			0.880
No	87 (29%)	104 (29%)	
Yes	208 (71%)	259 (71%)	
<b>Youth-headed household (&lt;=35 years)</b>			0.525
No	270 (92%)	341 (94%)	
Yes	25 (8%)	22 (6%)	
<b>Household size - incl. respondent</b>	5.1 (0.2)	4.9 (0.3)	0.448
<b>Number of adults in household</b>	3.0 (0.1)	3.0 (0.1)	0.901
<b>Number of children in household</b>	2.2 (0.2)	1.9 (0.2)	0.289
<b>SOCIOECONOMIC STATUS</b>			
<b>Equity Tool<sup>2</sup></b>			0.252
Low to Medium	25 (9%)	71 (20%)	
Higher	121 (41%)	118 (33%)	
Highest	149 (51%)	174 (48%)	
<b>Livelihood Activities</b>			0.780
Agriculture only	164 (60%)	216 (61%)	
Agriculture and own business	57 (21%)	79 (23%)	
Agriculture plus formal work <sup>3</sup>	30 (11%)	37 (11%)	
Agriculture plus informal work <sup>4</sup>	21 (8%)	20 (6%)	
<b>Total dairy cows owned/cared for - excluding TADB cows</b>	3.3 (0.4)	5.0 (0.8)	0.067
<b>Median Monthly Income - USD</b>	139 (12)	139 (20)	0.982

<b>Median Annual Income - USD</b>	1,319 (118)	1,409 (250)	0.749
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**MARKET ACCESS**

<b>Minutes to nearest dairy market<sup>5</sup></b>	10.0 (1.1)	14.8 (1.6)	0.027
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**MILK PRODUCTION**

Litres of milk produced in the past week	10.2 (1.2)	10.1 (1.9)	0.968
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<sup>1</sup>This p-value compares non-loanholding members of TADB/TI3P FPOs to TADB/TI3P loanholders. It reflects a chi-squared test for categorical variables and an F-test from a linear regression for continuous variables. <sup>2</sup>Households in the 1st, 2nd and 3rd quintiles make up the low to medium category, those in the 4th quintile make up the higher category, and those in the 5th quintile (richest 20%) make up the highest category. <sup>3</sup>Formal work includes salaries from employment and pension. <sup>4</sup>Informal work includes fishing, hunting and gathering, transfers/remittances, and other casual earnings. <sup>5</sup>Minimum distance reported by any household member.

## Appendix 7: Gender-specific factors that predict having accessed a loan

Table 17: Gender-specific demographic predictors of being a loanholder

	Women respondents living in TADB/TI3P households			Male respondents living in TADB/TI3P households		
	Loanholders	Non-loanholders	p-value	Loanholders	Non-loanholders	p-value
	N(%) or Mean(SD)	N(%) or Mean(SD)		N(%) or Mean(SD)	N(%) or Mean(SD)	
	<b>N= 121</b>	<b>458</b>		<b>174</b>	<b>364</b>	
<b>Respondent Age</b>	53.6 (1.3)	49.2 (1.0)	0.015	54.6 (0.8)	49.6 (1.1)	0.003
<b>Education Level</b>			0.541			0.343
No education	0	17 (4%)		2 (1%)	13 (3%)	
Less than Primary	5 (4%)	29 (6%)		4 (2%)	10 (3%)	
Primary	79 (65%)	303 (67%)		128 (74%)	234 (62%)	
Secondary/Vocational	31 (26%)	90 (20%)		29 (17%)	86 (23%)	
Post-Secondary	6 (5%)	15 (3%)		11 (6%)	34 (9%)	
<b>Marital Status</b>			0.002			0.027
Never married	13 (11%)	18 (4%)		3 (2%)	59 (16%)	
Currently married	77 (63%)	359 (79%)		161 (93%)	298 (79%)	
Come we stay/Cohabiting	4 (3%)	22 (5%)		4 (2%)	10 (2%)	
Widowed/divorced/separated	28 (23%)	54 (12%)		5 (3%)	10 (3%)	
<b>Age at marriage (N=998)</b>	25.0 (0.5)	23.5 (0.4)	0.003	28.7 (0.9)	29.7 (0.7)	0.406
<b>Number of children (N=1,033)</b>	4.0 (0.2)	4.1 (0.2)	0.826	4.0 (0.6)	3.3 (0.2)	0.289
<b>Youth (&lt;=35 years)</b>			0.093			0.006
No	113 (94%)	382 (84%)		157 (90%)	298 (79%)	
Yes	8 (6%)	72 (16%)		17 (10%)	21 (21%)	
<b>Respondent ever had paid employment</b>			0.063			0.215
No	79 (65%)	339 (75%)		98 (56%)	162 (43%)	
Yes	42 (35%)	115 (25%)		76 (44%)	214 (57%)	



Table 18: Relationship between access to information and having accessed a loan

	Women respondents living in TADB/TI3P households			Male respondents living in TADB/TI3P households		
	Loanholders	Non-loanholders	p-value	Loanholders	Non-loanholders	p-value
<b>N=</b>	121	458		174	364	
<b>Owens a phone with number registered in own name</b>			0.019			0.001
No	10 (8%)	110 (24%)		10 (6%)	86 (23%)	
Yes	111 (92%)	343 (76%)		164 (94%)	291 (77%)	
<b>Access to info on dairy farming</b>			0.341			<0.001
Not at all	2 (2%)	29 (6%)		4 (2%)	19 (5%)	
Small extent	20 (16%)	91 (20%)		12 (7%)	74 (20%)	
Medium extent	57 (47%)	211 (47%)		72 (41%)	138 (37%)	
To a high extent	43 (35%)	123 (27%)		86 (50%)	145 (38%)	
<b>Access to info on diet/nutrition</b>			0.281			0.481
Not at all	5 (4%)	48 (11%)		14 (8%)	42 (11%)	
Small extent	18 (15%)	82 (18%)		29 (17%)	79 (21%)	
Medium extent	51 (42%)	181 (40%)		74 (42%)	133 (35%)	
To a high extent	48 (40%)	143 (31%)		57 (33%)	123 (33%)	
<b>Access to info on baking and loans</b>			<0.001			0.002
Not at all	12 (10%)	149 (33%)		15 (8%)	97 (26%)	
Small extent	31 (25%)	113 (25%)		46 (27%)	106 (28%)	
Medium extent	51 (42%)	118 (26%)		55 (32%)	101 (27%)	
To a high extent	27 (23%)	75 (17%)		58 (33%)	73 (19%)	

Table 19: Relationship between dairy market access and having accessed a loan

	Women respondents living in TADB/TI3P households			Male respondents living in TADB/TI3P households		
	Loanholders	Non-loanholders	p-value	Loanholders	Non-loanholders	p-value
<b>N=</b>	121	458		174	364	
<b>Minutes to the nearest dairy market</b>	13.8 (1.5)	21.9 (2.6)	0.005	13.3 (1.6)	18.3 (1.4)	p=0.021
<b>Respondent personally participates in sales at least at one dairy market (n=945)</b>			0.135			p=0.334
No	9 (8%)	82 (21%)		8 (5%)	27 (8%)	
Yes	99 (92%)	308 (79%)		133 (95%)	300 (92%)	
<b>Mode of transport in accessing dairy markets (N=945)<sup>1</sup></b>			0.335			0.145
Foot	85 (79%)	245 (63%)		96 (68%)	163 (50%)	
Bicycle	8 (7%)	53 (14%)		11 (8%)	79 (24%)	
Motorbike (own)	2 (2%)	28 (7%)		26 (19%)	65 (20%)	
Bodaboda	12 (11%)	58 (15%)		4 (3%)	17 (5%)	
Public transportation	0	6 (2%)		0	0	
<b>Decision-making on female visiting dairy market (N=442)<sup>2</sup></b>			0.009	-	-	-
Respondent alone	70 (70%)	144 (47%)				
Respondent jointly with another household member	19 (19%)	74 (24%)				
Other household members without respondent	11 (11%)	88 (29%)				
<b>Experienced safety issues in commuting to dairy market</b>			0.572			0.610
No	96 (97%)	301 (98%)		124 (93%)	273 (91%)	
Yes	3 (3%)	7 (2%)		9 (7%)	28 (9%)	
<b>Experience of issues accessing dairy markets (N=83)<sup>3</sup></b>						
Long time in accessing the market	0	4 (1%)	0.470	2 (2%)	10 (4%)	0.434
Lack of access to transportation	1 (1%)	3 (1%)	0.748	1 (1%)	1 (0.4%)	0.482
Other <sup>4</sup>	1 (1%)	2 (0.6%)	0.660	11 (11%)	18 (8%)	0.554

<sup>1</sup>Less than 1% of households report using a car. <sup>2</sup>This question was asked to female respondents whose households sell their dairy products on the market/to an aggregator, and personally sell some milk/dairy products in a typical week. <sup>3</sup>This question was asked to respondents who experienced other challenges (other than safety) while going to or returning from the markets. <sup>4</sup>Other issues raised by respondents include poor condition of roads during rains, low prices of products, milk transportation equipment being too heavy to carry, spoilage and spillage of milk and road accidents.

## Appendix 8: Comparison of youth and older adults

Table 20: Characteristics of youth and older adults

	Youth (18-35 years)	Older adults (>35 years)	p-value
	N (%) or Mean (SD)	N (%) or Mean (SD)	
	N = 176	941	
Education level of loanholder			0.156
No education	6 (3.3%)	26 (2.7%)	
Primary or less	103 (58.5%)	689 (72.6%)	
Above primary	67 (38.3%)	235 (24.7%)	
Respondent ever had paid employment			0.662
No	102 (57.9%)	576 (60.7%)	
Yes	74 (42.1%)	374 (39.3%)	
Loanholding status			0.001
Non-loanholder	151 (85.9%)	680 (71.5%)	
Loanholder	25 (14.1%)	270 (28.5%)	
Median Annual Income - USD	1380.5 (153.9)	1355.1 (147.7)	0.795
Median Monthly Income - USD	140.8 (13.2)	136.3 (10.6)	0.685

## Appendix 9: Decision-making on dairy-related activities

Table 21: Decision-making on dairy-related activities for men and women

	Male respondent	Female respondent	p-value
<b>Checking cow health</b>			<0.001
Little to no input in decisions	35 (8.3%)	56 (9.0%)	
Input into some decisions	142 (33.7%)	327 (52.6%)	
Input into most or all decisions	245 (57.9%)	238 (38.3%)	
<b>Cow feeding</b>			<0.001
Little to no input in decisions	46 (9.2%)	59 (10.2%)	
Input into some decisions	159 (31.7%)	306 (53.1%)	
Input into most or all decisions	296 (59.1%)	212 (36.7%)	
<b>Disease prevention</b>			0.011
Little to no input in decisions	34 (10.5%)	41 (8.5%)	
Input into some decisions	112 (34.6%)	275 (57.3%)	
Input into most or all decisions	177 (54.9%)	165 (34.2%)	
<b>Cleaning cows, shed</b>			0.100
Little to no input in decisions	37 (9.9%)	22 (6.1%)	
Input into some decisions	146 (39.7%)	185 (50.0%)	
Input into most or all decisions	186 (50.4%)	162 (43.9%)	
<b>Selling dairy products</b>			0.146
Little to no input in decisions	65 (13.3%)	32 (6.9%)	
Input into some decisions	221 (45.2%)	226 (49.7%)	
Input into most or all decisions	203 (41.5%)	197 (43.3%)	
<b>Milking cows</b>			0.224
Little to no input in decisions	43 (14.0%)	23 (8.3%)	
Input into some decisions	114 (37.3%)	133 (47.9%)	
Input into most or all decisions	149 (48.8%)	121 (43.8%)	
<b>Breeding</b>			0.164
Little to no input in decisions	15 (5.8%)	27 (7.9%)	
Input into some decisions	107 (42.3%)	176 (51.6%)	
Input into most or all decisions	131 (51.9%)	139 (40.5%)	
<b>Selecting breeds</b>			0.002
Little to no input in decisions	17 (6.5%)	19 (5.8%)	
Input into some decisions	101 (37.8%)	187 (57.3%)	
Input into most or all decisions	148 (55.7%)	120 (36.9%)	
<b>Selling cows</b>			<0.001
Little to no input in decisions	16 (5.3%)	28 (7.8%)	
Input into some decisions	101 (33.7%)	189 (52.9%)	
Input into most or all decisions	184 (61.0%)	141 (39.3%)	
<b>Buying cows</b>			<0.001

Little to no input in decisions	10 (6.9%)	13 (7.1%)	
Input into some decisions	31 (20.7%)	91 (51.5%)	
Input into most or all decisions	109 (72.3%)	73 (41.4%)	
<b>Slaughtering</b>			0.034
Little to no input in decisions	0	4 (16.6%)	
Input into some decisions	10 (47.9%)	14 (63.9%)	
Input into most or all decisions	11 (49.8%)	4 (19.5%)	
<b>Selling beef</b>			0.072
Little to no input in decisions	1 (5.5%)	2 (16.2%)	
Input into some decisions	9 (51.5%)	11 (83.8%)	
Input into most or all decisions	8 (42.9%)	0	

Table 22: Control over dairy-related income by sex

	Male respondent N (%) or Mean (SD)	Female respondent N (%) or Mean (SD)	p-value
<b>Dairy-related income over which respondent has no control</b>			<0.001
None	537 (55.8%)	568 (56.7%)	
Almost none	61 (6.3%)	39 (3.9%)	
Less than half	196 (20.4%)	91 (9.1%)	
About half	34 (3.5%)	60 (6.0%)	
More than half	18 (1.9%)	76 (7.6%)	
Almost all	23 (2.4%)	36 (3.6%)	
All	93 (9.7%)	132 (13.2%)	
<b>Dairy-related income over which respondent has joint control</b>			<0.001
None	136 (14.1%)	251 (25.0%)	
Almost none	24 (2.5%)	114 (11.4%)	
Less than half	159 (16.5%)	159 (15.8%)	
About half	80 (8.3%)	111 (11.1%)	
More than half	92 (9.5%)	113 (11.3%)	
Almost all	112 (11.6%)	92 (9.2%)	
All	362 (37.6%)	162 (16.1%)	
<b>Dairy-related income over which respondent has sole control</b>			0.002
None	576 (59.8%)	395 (39.4%)	
Almost none	53 (5.5%)	95 (9.5%)	
Less than half	193 (20.0%)	182 (18.1%)	
About half	72 (7.5%)	130 (13.0%)	
More than half	25 (2.6%)	39 (3.8%)	
Almost all	17 (1.8%)	52 (5.2%)	
All	28 (2.9%)	110 (11.0%)	

<b>Proportion of dairy-related income over which respondent has no control</b>	0.21 (0.03)	0.27 (0.03)	0.170
<b>Proportion of dairy-related income over which respondent has joint control</b>	0.63 (0.03)	0.43 (0.04)	<0.001
<b>Proportion of dairy-related income over which respondent has sole control</b>	0.16 (0.01)	0.30 (0.02)	<0.001
<b>Proportion of dairy-related income over which respondent has joint or sole control</b>	0.79 (0.03)	0.73 (0.03)	0.170

## Appendix 10: Associations between TADB/TI3P loans and gender dynamics

To assess associations between TADB/TI3P loan status and household gender dynamics we use a mixed-effects regression model that accounts for clustering at the strata (group allocation), FPO and household level. In order to understand the sex-specific associations with access to loans, our models included interaction terms between loan status and sex of the respondent. For models assessing the associations with household with access to a TADB/TI3P loan, we adjusted for F&M household status, distance to the nearest market measured in minutes, the total number of dairy cows cared for by the household excluding the cows purchased through the TADB/TI3P loan, and the equity tool score, which is a measure of household wealth. For models assessing the associations with sex of the TADB/TI3P loanholder, we adjusted for F&M household status, number of children living in the household, the total number of dairy cows cared for by the household excluding the cows purchased through the TADB/TI3P loan, the equity tool score, and annual median income. In recognition that some of the observed associations between having received a TADB/TI3P loan and household dynamics could be driven by single-sex households, we conducted a sensitivity analysis where we restricted our sample to F&M households (N=1,628).<sup>72</sup> In general, the direction and magnitude of these associations in these sensitivity analyses were consistent when we restrict the sample to F&M households. However, not all results reached statistical significance. We believe that the lack of significance primarily reflects a reduction in power stemming from the smaller sample of F&M households rather than evidence of a lack of association.

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<sup>72</sup>Single-sex households are households with either at least one adult female and no adult male, or households with at least one adult male and no adult female.

Figure 17: Allocation of time between women and men in dairy-producing households that have a TADB/TI3P loan by sex of loanholder (N=502)

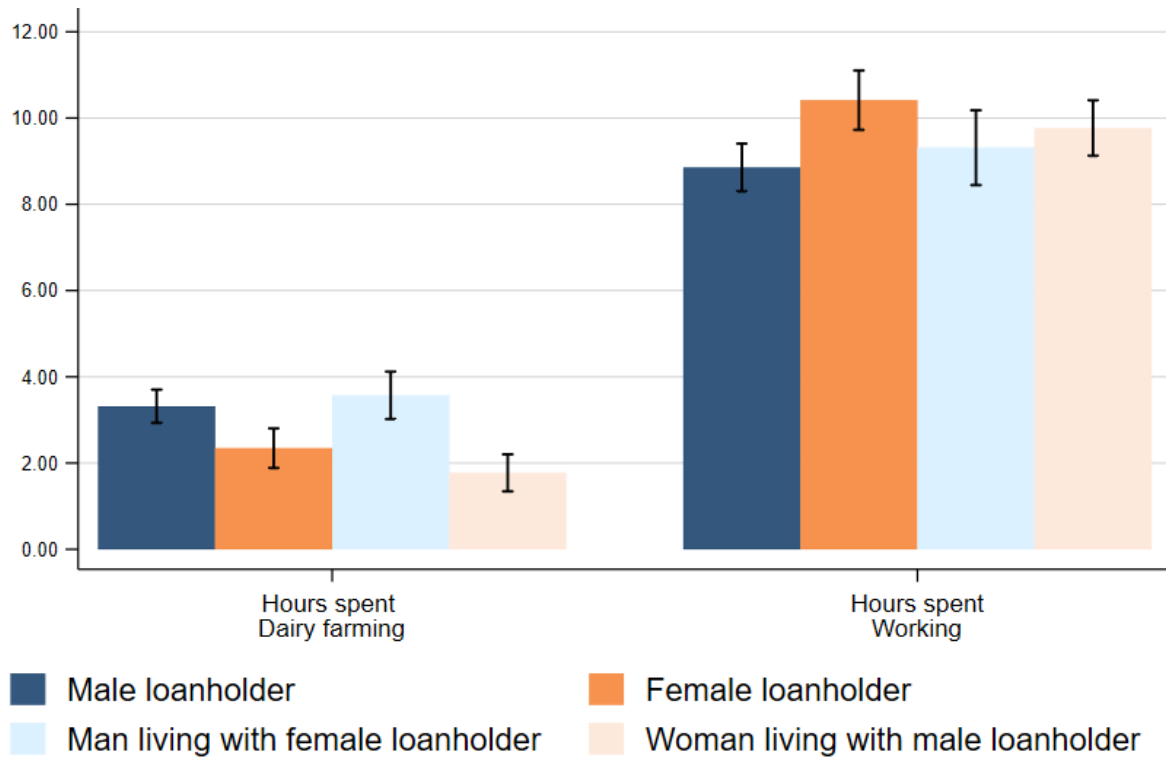
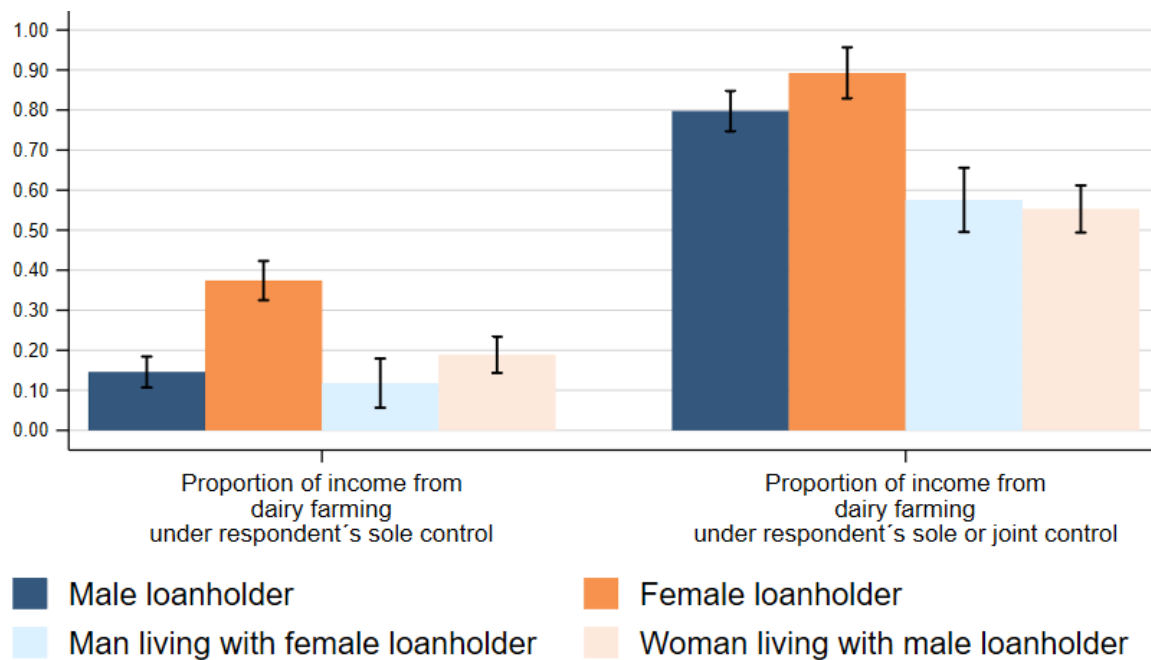


Figure 18: Control of dairy-related income between women and men that have a TADB/TI3P loan by sex of loanholder (N=502)





## Appendix 11: Assessment of dietary quality by loan status and sex

In order to assess if there are for associations between TADB/TI3P loan status and dietary outcomes, we use mixed-effects regression model that accounts for clustering at the strata (group allocation), FPO and household level. In order to understand the gender-specific associations with access to loans, our models included interaction terms between loan status and sex of the respondent. For models assessing the associations with household with access to a TADB/TI3P loan, we adjusted for F&M household status, distance to the nearest market measured in minutes, the total number of dairy cows cared for by the household excluding the cows purchased through the TI3P loan, and the equity tool score, which is a measure of household wealth. For models assessing the associations with sex of the TADB/TI3P loanholder, we adjusted for F&M household status, number of children living in the household, the total number of dairy cows cared for by the household excluding the cows purchased through the TI3P loan, the equity tool score, and annual median income.

Figure 19: Dietary quality (GDQS) by loanholding status of households and sex

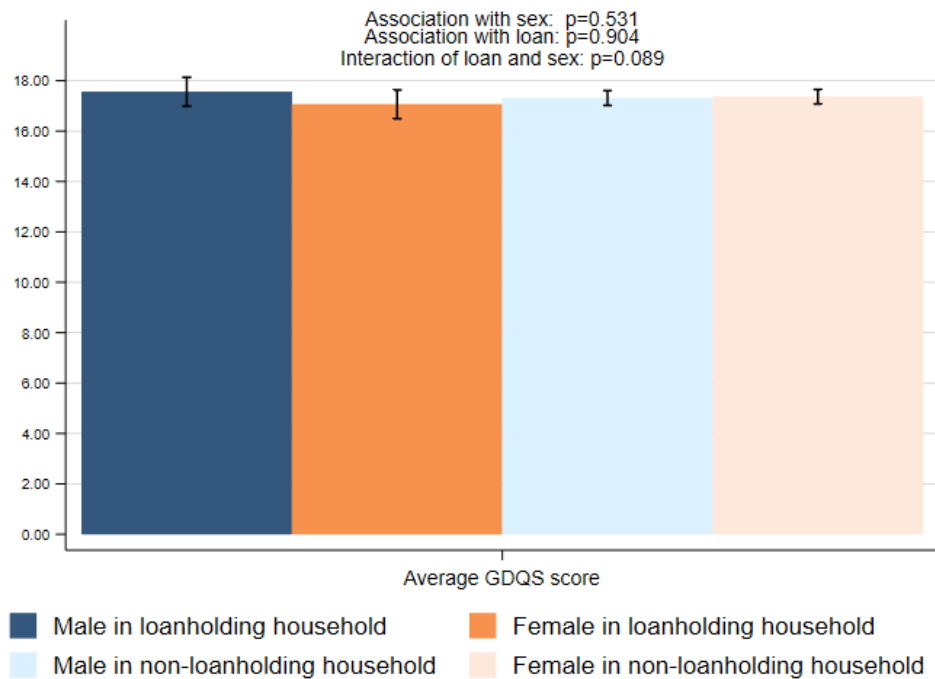


Figure 20: Volume of dairy/dairy products consumed by loanholding status of households and sex

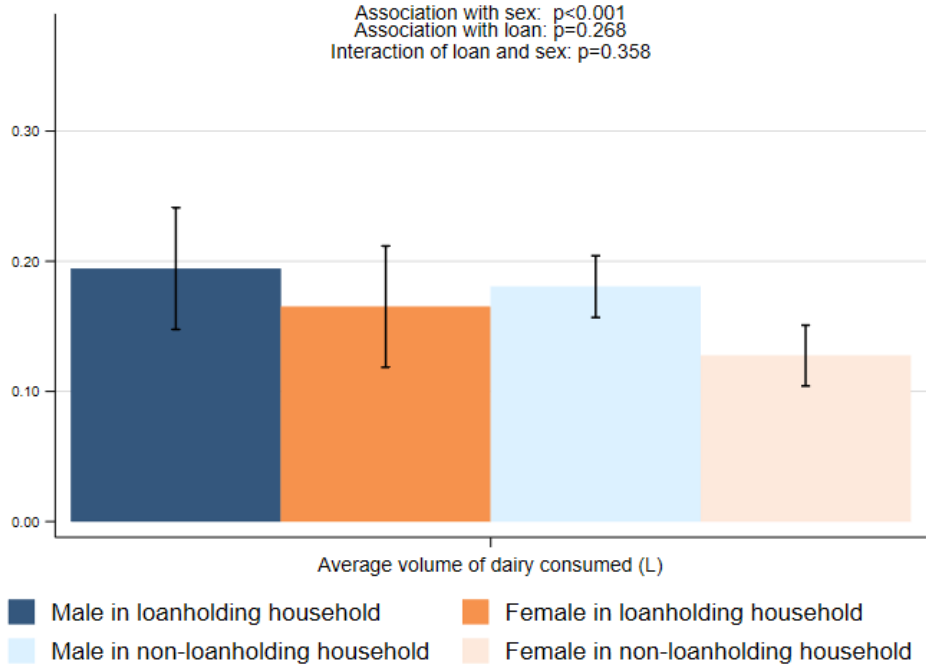
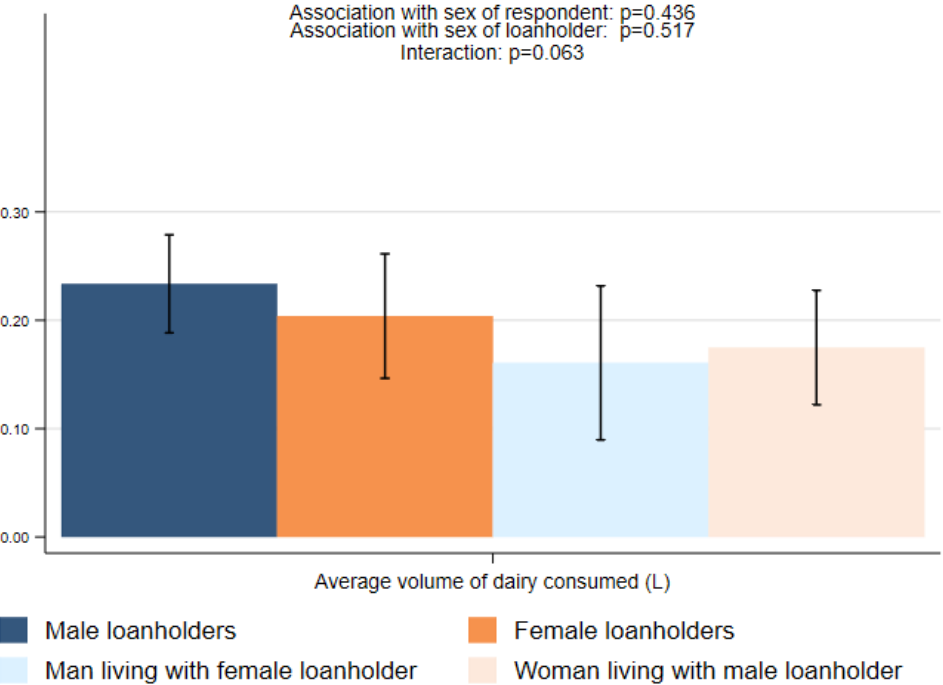


Figure 21: Volume of dairy/dairy products consumed by sex of loanholder in the household and sex of respondent



## Appendix 12: Relationship between quality of the nearest market and dietary quality

Table 23: Association between food basket score and dietary quality

	GDQS		
	Overall	Men	Women
N=	871	429	442
Food basket score	-0.01 (0.02)	-0.01 (0.02)	-0.01 (0.02)
Constant	17.47*** (0.36)	17.66*** (0.48)	17.29*** (0.50)

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 24: Association between food basket score, milk production, and dietary quality

	GDQS		
	Overall	Men	Women
N=	871	429	442
Milk production (l)	0.01 (0.04)	0.05 (0.05)	-0.04 (0.05)
Food basket score	-0.03 (0.03)	-0.01 (0.03)	-0.03 (0.03)
Milk prod*basket score	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)
Constant	17.82*** (0.56)	17.15*** (0.71)	17.63*** (0.72)

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Appendix 13: Relationship between distance to nearest high-quality market and dietary quality

Table 25: Association between distance to nearest high-quality market and dietary quality

	GDQS		
	Overall	Men	Women
N=	871	429	442
Distance to market (km)	0.01 (0.01)	0.02 (0.01)	-0.01 (0.01)
Constant	17.18*** (0.22)	17.24*** (0.31)	17.14*** (0.25)

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 26: Association between distance to nearest high-quality market, milk production and dietary quality

	GDQS		
	Overall	Men	Women
N=	871	429	442
Milk production (l)	0.03 (0.03)	0.06 (0.03)	0.02 (0.02)
Distance to market (km)	0.03 (0.3)	0.04 (0.03)	0.01 (0.02)
Milk prod*distance	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Constant	16.84*** (0.26)	16.59*** (0.37)	16.93*** (0.36)

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

## Appendix 14: Relationship between food basket price and dietary quality

Table 27: Association between price of food basket in the nearest high-quality market and dietary quality

	N=	GDQS		
		Overall	Men	Women
		871	429	442
Price of 23 points in nearest high-quality market (per 100 TZS increase)		0.07 (0.04)	0.03 (0.06)	0.09 (0.05)
Constant		16.51*** (0.49)	17.11*** (0.62)	16.01 (0.54)

Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 28: Association between price of food basket in the nearest high-quality market, milk production, and dietary quality

	N=	GDQS		
		Overall	Men	Women
		871	429	442
Milk production (l)		-0.04 (0.03)	0.03 (0.04)	-0.09 (0.05)
Price of 23 points in nearest high-quality market (per 100 TZS increase)		0.01 (0.05)	-0.00 (0.08)	0.06 (0.08)
Milk prod*price		0.01 (0.01)	0.00 (0.01)	0.01 (0.00)
Constant		17.00*** (0.59)	16.97*** (0.81)	16.26*** (0.83)

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1