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Income structures of Maasai households - Who benefits whom?

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Gendered division of responsibilities and activities is traditionally anchored in Maasai culture. With the changing socio-economic and natural environment, a diversification of livelihood strategies is observed by researchers. This is found to induce intra-household changes. It is yet unclear how women and men contribute to household income and who benefits from milk sales as women's main income activity. Based on theoretic considerations, we use data of Maasai households living in Morogoro region, Tanzania, to address these questions by assessing respective income shares and milk commercialization. Our findings suggest that with increasing access to milk markets women contribute 39%, 53%, and up to 57% of total income. Further, our results indicate that most women control the direct use of milk income. Considering indirect effects, this income benefits one fifth of women respondents. Supplementary housekeeping money is mostly spent on diversifying and increasing food purchases.

Keywords: Gender, household income, milk sale, Maasai, Tanzania



1. Introduction

In many pastoral societies socio-cultural structures have developed in which men and women have distinct gender roles. Such a traditional way of life can be observed among the Maasai people of East Africa; it is characterized by a general division of labor, responsibilities and decision making between the sexes (see Grandin et al., 1991; Hodgson, 1999; Mitzlaff, 1988; Talle, 1994). Their lifestyle has proven to be a well-adapted and suitable strategy for rearing cattle and small livestock in the vast arid and semi-arid rangelands of the Great Rift Valley.

However, their customary system faces various changes in their environment, including political issues like land privatization or forced resettlement; social developments like pressure from an increasing non-Maasai population; and natural challenges like climate shocks, loss of grazing areas and access to water sources. Recent studies focusing on this subject show that the Maasai adapt their livelihood strategies by diversifying their income activities (Brockington, 2001; Coast, 2002; Homewood et al., 2009; McCabe, 2003; McCabe et al., 2010; Radeny et al., 2007), or by intensifying livestock production and increasing commercialization of livestock products (Dietz et al., 2003; Ndagala, 1982; Zaal, 1999).

Considering that this process is likely to be linked with gender role shifts, such as an increased workload of women (Wangui, 2008) or general involvement in new activities (milk marketing), it is rather surprising that quantitative research on the intra-household economic aspects of this transition is limited. Most recent gender literature deals with one side of the coin, usually the women's side, only. In context with intra-household decision making power, McPeak and Doss (2006) found that husbands (may) choose the location of their *boma* (Maasai homestead) so as to influence the ability of their wives to sell milk.

To the authors' best knowledge, to date there are only two studies (McPeak and Doss, 2006; Radeny et al., 2007) that quantitatively estimate the income contribution of different pastoral activities, e.g. livestock or livestock products like milk, to household income. Yet, these studies do not explicitly highlight and focus on the relationship of women's and men's contribution. We bridge this knowledge gap and contribute to the pastoral and gender literature by focusing on the economic contributions of men and women to Maasai household income in three settings with different accessibility to milk markets. With milk sales as the main income option for women, the question arises of who benefits from sales activities.

In addition, the existing studies almost exclusively concentrate on the northern part of Maasailand, i.e. southern Kenya (Maasai Mara, the area south of Nairobi) and northern Tanzania (Serengeti, Ngorongoro Conservation Area and the larger Arusha area; for a map see Homewood et al., 2009). Yet, many Maasai live in central Tanzania (Dodoma region) or eastern Tanzania (Morogoro region). Thus we focus on this southern part of Maasailand, Morogoro Rural district, in particular.

The main aim of this paper is to gain a better understanding of the contributions of Maasai men and women to household income and its implications. Based on household theory the first objective of this study is to analyze the respective contributions to the household budget. With the commercialization of milk as the main income opportunity for women, the second objective is to assess who benefits from milk sales.

Following a brief description of the research area, we illustrate special considerations regarding research in the Maasai setting by defining men and women as separate economic actors, which thence leads us to the underlying theoretical household model. Next, we give an overview of the methodology used for data collection and analyses, and present and discuss the empirical findings. We start with the socio-economic characteristics of men and women and compare the different research areas. Then, we assess the income contributions of each gender to household income. With a discussion on the decision power over milk sales and the resulting income, we complete the empirical section. Finally, we conclude the paper by summing up the major findings, discussing their wider implications and suggesting further research.

2. Research area and Maasai setting

2.1 Research area

The research reported here took place in three locations of Morogoro Region, Tanzania. Situated about 80 km east of Morogoro town towards Dar es Salaam, the first and second site cover parts of Ngerengere and Kidugalo ward. The landscape is shaped by the Ngerengere River and its tributaries. Sparsely wooded grasslands and rolling plains at altitudes of 100-300 m above sea level mark the gradual ascend from the coastal lowlands to the central region. Following a slightly bimodal pattern, the precipitation during the rainy season, which usually lasts from mid-

November until May with a dry spell around February, reaches 500-1,000 mm (URT, 2007). Average monthly temperatures are around 25-28°C (URT, 2009, 2011).

Due to high heterogeneity within each of the scarcely populated administrative neighbors we redefined the research areas by dividing them (spatially) into a western part, with Ngerengere town and several villages featuring government offices, good infrastructure and easy (milk) market access; and a more remote eastern part with generally poorer infrastructure, like a deficient telecommunication network, limited transportation and distant (milk) markets. In order to capture this environmental setting of the Maasai living in the Ngerengere-Kidugalo-site, we differentiate by a remoteness indicator (i.e. travel time to a milk collection center) resulting in the two research areas, which we refer to as Ngerengere and Ngerengere Remote (Ngerengere R).

The third research area is located about 60 km north of Morogoro town towards Dodoma and covers the Kambala village area, i.e. the Maasai area of Hembeti ward. As part of the Wami-Mkata plains, the landscape is characterized by predominantly flat, alluvial plains at an elevation of 300-400 m above sea level. Annual rainfall ranges between 900-1,400 mm (URT, 2007) and temperature average is around 28-30°C (URT, 2009, 2011). Endowed with a moderate access to infrastructure, institutions and suitable grazing land, this research area has been longer used by the Maasai than Ngerengere and Ngerengere R.

Overall, the three research areas capture a gradient regarding access to milk marketing opportunities, infrastructure and general availability of institutions and services. The location factors decrease from Ngerengere to Kambala to Ngerengere Remote.

Confirming the agro-ecological categorization as River Valleys and Basins (URT, 2007), all three areas provide sufficient living space, open access grazing land and a continuous water supply throughout the year. The bodies of water are crucial to the Maasai pastoralists' survival strategy during the dry season.

2.2 Maasai men and women as individual economic actors

Polygamous family structures are frequently observed among the Maasai people. It is common for Maasai men of high social status and economic position to have several wives. Together with her children and dependents, each wife usually lives in her own house, referred to as *enkaji* (plural: *enkajjik*), and hence forms the smallest social unit (Forstater, 2002; McCabe et al.,

2010), i.e. a sub-household. In this social sphere, she decides independently on food and nutritional issues and is widely autonomous regarding different income generating activities like the use and sale of milk, handicraft output or (small) livestock products (see e.g. Homewood et al., 2009; McPeak and Doss, 2006; Ndagala, 1982; Wangui, 2008; Zaal, 1999). All wives together and the husband form a Maasai household, called *olmarei*. Here, decisions on issues concerning the whole household are usually made by the husband, who is also the main person responsible for herd management and livestock marketing. Various degrees of cooperation or even joint decision making within a family or between separate family units may occur, i.e. husband-wife or wife-wife. Yet, the institutional setting leaves us to differentiate between men (husband, *olmarei* head) and women (wife, *enkaji* head) as separate, individual economic actors, whom we focus on in this research.

Unless otherwise stated, we use the terms man, husband, household head and *olmarei* head interchangeably. The same applies to the terms woman, wife, sub-household head and *enkaji* head.

2.3 Maasai household model

The basic unitary model of household decision making assumes that all members of a household share the same preferences and act as an individual. For any production cycle, the household is assumed to maximize its utility (U), defined as a function of household consumption (C), subject to various constraints (see Sadoulet and Janvry, 1995; Singh et al., 1986).

In the case of the Maasai, similar to other pastoral people, the socio-cultural structure shows distinct division of labor and responsibilities by gender and age-sets (see Grandin, 1991 for a detailed description). The men are in charge of livestock, herd management and general household issues, while the women manage milking, milk distribution and milk marketing (see McPeak and Doss, 2006, for references on this topic). Therefore it is necessary to extend the unitary model to an intra-household model. Three variations are suggested by McPeak and Doss (2006) in the context of milk sales and the pastoral Gabra people of Kenya. They present (1) a cooperative model where both husband and wife decide jointly, (2) a traditional model where husband and wife decide independently of each other, and (3) a contested model where the husband may use his power as a “first mover” to influence his wife’s decision to sell milk. A variety of studies provide evidence, that all options can be observed in Africa (Michael, 1987;

Ndagala, 1982; Nduma et. al., 2001; Waters-Bayer 1985). The fieldwork experience and qualitative survey information from formal and informal focus group discussions and key person interviews indicates that the spheres of activities and respective decision making are very distinct in our research sites. This is supported by quantitative data showing that livestock responsibilities are clearly divided by gender (see appendices, table 7). In addition, we can rule out the location choice argument of husbands observed by McPeak and Doss (2006), because the initial settling of the households took place before the establishment of milk marketing options. Therefore, we consider the traditional model the most appropriate setting for our case.

With this, the total utility of a Maasai household is defined as the sum of the utility of the *olmarei* head ($U_{i=1}$) and of each *enkaji* head ($U_{i=2...n}$). For any production cycle, all heads, influenced by a vector of socio-economic characteristics (X^i), are expected to maximize their respective utility, i.e. a function of home-produced goods (C_h), market-purchased goods (C_m) and leisure (C_l), individually:

$$U = \sum_{i=1}^n U_i \rightarrow \text{Max } U_i(C_h^i, C_m^i, C_l^i; X^i)$$

3. Methodology and database

The analyses of this study are mainly based on data collected during a baseline survey for a research project on Maasai milk marketing under contractual arrangements in the three areas described in the previous section. Between August and November 2009 and between December 2009 and January 2010, household surveys were conducted among Maasai *olmarei* living in Ngerengere/Ngerengere R and Kambala, respectively. The interviews were conducted by a team of trained enumerators involving male and female, as well as Maasai and non-Maasai interviewers, so as to avoid language barriers (only Maa speaking respondents) or gender issues (respondents reluctant to speak with male/female enumerator).

To ensure that gender specific information could be collected according to the different responsibilities and livelihood activities, men and women were interviewed with two separate gender specific questionnaires. The questionnaire for the *olmarei* head focused on livestock aspects including herd composition, herd change, grazing strategies, inputs and responsibilities. The questionnaire for the *enkaji* head, usually the wife or other adult female household member,

focused on milk aspects such as production, marketing channels and the use of income derived from milk sales. Additional information was collected on household demographics and domestic topics like housing, cooking fuel, lighting, drinking water and food consumption.

We pursued a census approach and attempted to interview all Maasai *olmarei* heads (men) and *enkaji* heads (women) living in the area. We managed to interview 72% of all *olmarei* heads and 95% of all *enkaji* heads listed. In order to adequately address this paper's research questions in, we consider only complete *olmarei* datasets where the male *olmarei* head and all female *enkaji* heads were interviewed. Hence the analyses are based on 223 *olmarei* with 389 *enkajjik*.

Complementary information was gathered using qualitative techniques including formal (semi-structured) and informal interviews with key persons and random individuals. Further, organized and spontaneous (focus) group discussions with men and/or women, milk sellers and/or non-sellers and Maasai of different age groups allowed for broad insight into the Maasai society.

In order to accomplish the second research objective regarding income from milk sales, specific questions about decision power over revenues from milk sales (“milk money”) and its actual use were included in a follow-up survey undertaken in January and February 2011. This survey covered 169 milk selling *enkajjik* of the Ngerengere and Kambala area.

All data were analyzed using statistical software programs which allowed running various tests to identify significant differences between research areas or between gender. The statistical procedures used include t-test, Mann-Whitney test, χ^2 -test, Analysis of Variance (ANOVA) followed by Lewene-test for homoscedasticity and Games-Howell test (which can deal with unequal sample sizes) as post-hoc tests.

4. Empirical results

In this section, we present the empirical results relating to our research objectives. We present the socio-economic characteristics of Maasai men and women and compare the three research areas. Then we address total household income as a main (economic) component of total family utility and compare the contribution of *olmarei* heads and *enkaji* heads. We finalize the findings with an assessment of the control over and use of women's income from milk sales.

4.1 Socio-economic characteristics

The comparison of selected key characteristics of men and women is presented in table 1. With about 41 years, an *olmarei* head is significantly older than an *enkaji* head, which may be a wife, sister, widowed mother or other female adult, with about 32 years. This age difference indicates and relates to the traditional age-set structure in Maasai culture¹ (see e.g. Coast, 2001; Grandin, 1991; Mitzlaff, 1988 for details on the age-set). Further, compared to women, significantly more men receive formal education, they meet more often, know more people to rely on in case of an emergency, and own mobile phones more often. This can be related to the traditional lifestyle and hierarchic way of life, too. While the absolute figures differ between the three research areas, the general picture is consistent. The income diversification observed in other parts of Maasailand (e.g. Homewood et al., 2009) cannot be seen in our research area: men named one income source (livestock), women named two sources (milk, crops).

TABLE 1

As described in section 2, the three research areas reflect a gradient regarding the access to milk markets and other institutions and services. Therefore, table 2 describes key socio-economic characteristics at *olmarei*-level by research location. Several figures for Ngerengere, Kambala and Ngerengere R were found to differ substantially.

TABLE 2

An *olmarei* usually comprises 1.7 *enkajijik* and has about 8.8 household members. When looking at individual *enkaji* size, the Kambala area has significantly more persons per *enkaji* (5) than Ngerengere (4.3) and Ngerengere R (3.8). This can be related to the Maasai having lived in the region for a longer time period than in the other two areas. This earlier established settlement in

¹ While maturing, every Maasai male passes the different stages from boy to warrior to junior elder to senior elder. Every few years (7-15) all boys past puberty may participate in a circumcision ceremony, hence forming a new age-set of warriors with a unique name. Then, also older age-sets move up in status and may now get married. Usually women are “dancing” with their age mates and the previous, older age-set.

Kambala also implies a higher population density (which was also observed during fieldwork and confirmed with data not presented in this paper), hence a higher competition for grazing land, and may explain the significantly lower number of tropical livestock units² (TLU) owned per capita (4.6 TLU/capita) compared with Ngerengere (6.5) and Ngerengere R (5.7). This is also visible in the number of cows available per capita as an important indicator for pastoral livelihood. I.e. with about four to five TLU per capita, a livelihood as pure pastoralists may be sustained (Fratkin and Roth, 1990, cited in McCabe et al., 2010). Regarding other welfare indicators like ownership of mobile phones or living in an improved house (i.e. more durable construction material) there is a significant decline from Kambala to Ngerengere to Ngerengere R. This again is a result of the longer presence of Maasai in that area, as well as the proximity to the main highway along which telecommunication is generally good. Interestingly, the *olmarei* income (gross/net) and income per capita show a slight, yet not significant, decline similar to the accessibility of markets, institutions and services.

4.2 Economic analysis

4.2.1 Income contributions of men and women

In order to assess the income contribution of men and women, we calculated the average net income per capita of *olmarei* heads, *enkaji* heads and *enkajijik*, i.e. per capita income of all sub-households of a household. By relating these figures to the total net *olmarei* income, we computed the contribution of men (household head) and women (all sub-household heads) to total household income. With this, a good idea of the economic component of total household utility can be gained. Important other components like leisure or decision making power remain to be investigated in further research.

Table 3 shows that in all three areas, the annual net per capita income of an *olmarei* head (165,000 TZS) is higher than the respective income of an *enkaji* head (107,000 TZS). When looking at all *enkajijik* (186,000 TZS), however, the results indicate that men contribute 47% and women 53% to household income. This general picture gets mixed up a little when separated by research area. Here, the results for Ngerengere Remote direct in the opposite direction compared

² The concept of TLU's uses agreed upon conversion factors for different types of livestock to calculate a value for livestock holdings that can be compared internationally. The following conversion factors are used in this paper: 0.7 for adult cattle, 0.3 for calves, 0.1 for sheep and goats, 0.01 for poultry (Jahnke, 1982).

to Ngerengere and Kambala. Men contribute 60.7% and women 39.3%. These differences between research areas suggest a higher dependency of wives on their husbands in rural regions with missing income alternatives, like market access for milk sales. Ngerengere and Kambala have a secure milk market (milk collection center) and therefore the opportunity to generate income by selling surplus milk. This significantly higher average income of milk-selling *enkajjik* has been observed in previous research by the authors (Loos and Zeller, 2014a). However, we need to keep in mind that cattle are usually owned by the *olmarei* head, are often only allocated to women for their use, and may be reallocated or sold.

TABLE 3

4.2.2 Decision power and use of milk money

As women are traditionally in control of milk use, it is generally reported that they also decide how to use the income from sales activities (see e.g. McPeak and Doss, 2006; Mitzlaff, 1988; Wangui, 2008). Table 4 shows that this is true for most women (88.5%) involved in milk marketing in the research area. However, differences between Ngerengere (85.9%), Kambala (90.6%) and Ngerengere Remote (100%) were observed. In our case, Ngerengere has a secure milk market, Kambala has a re-starting market and Ngerengere R has a very limited market. Triangulating the quantitative data with this qualitative survey information and other findings in the literature (e.g. Waters-Bayer, 1985, 1988; Hodgson, 2001; Wangui, 2008), this may be linked or attributed to men gradually getting involved in women's milk business as the market for milk becomes more reliable and the chance for income diversification is not only seen at the *enkaji* but also at the *olmarei* level. This finding is in line with other studies related to cash crops (see FAO, 2011 for references). Our finding also confirms the result of a study by McPeak and Doss (2006) who found that male household heads may move closer to milk selling areas so as to facilitate milk selling. While they show, that male household heads are motivated doing this, we further show that male heads derive a higher share of milk income under their control compared to areas remote from milk markets where it is found that income from milk sales remains the sole domain of women.

TABLE 4

Further analysis of how milk sales income is used are presented in table 5. The results of the baseline and of the follow-up survey show that the priority lies in purchasing food (71% and 77%) and consumption goods (24% and 12%). Usually the milk money is partly spent on other purchases to include: inputs for livestock (12%, 23%) or milking (10%, 15%), pay for health expenses (10%, 22%) or school fees (2%, 14%), etc. This nicely demonstrates the decision power of Maasai women over earnings from milk. Although previous findings (Loos and Zeller, 2014a, 2014b) show a significantly higher income and food diversity of milk selling households, the data unfortunately does not allow to assess the actual expenditures that were paid with the milk income of women.

TABLE 5

Some differences regarding the main use of milk money stand out between the two survey rounds. Compared with the follow-up survey, the share of food purchases is 6.2% higher in the follow-up survey; purchases of other consumption goods is 11.8% lower. This variation could be related to seasonal effects, i.e. the follow-up survey was carried out later in the lean season which may have led to lower milk supply and hence a higher need for purchased food.

During the follow-up survey, milk-selling women were asked whether the income from milk sales is an addition to their budget or if they pass it on to their husbands, directly or indirectly. As shown in table 6, only one fifth perceive the cash benefits of their marketing activities as an extra amount they can spend at their own decision. Linking this to the purchase of food as the main use of milk money, a priority for diversifying the diet followed by increasing food quantities and higher quality food items bought can be observed. This is in line with Loos and Zeller (2014b) who showed that selling milk has a significant effect on increasing dietary diversity among the Maasai.

TABLE 6

Though these findings may suggest a rather low direct benefit for women investing their labor in the milk business, they may indirectly benefit in the long run through e.g. their husbands recognizing the potential of milk sales and investing in more productive breeds. Similar to previous research by the authors (Loos and Zeller, 2014a, 2014b; Loos, 2014) and by other researchers (see FAO, 2011 or Kristjanson et al., 2010 for further references) the results show that especially the food security of women and their *enkajjik* can be improved by enhancing commercialization and integration into markets. In-depth interviews with women revealed that from the work related to milk sales, women gain more freedom of spending some of the additional budget at their own discretion, and in turn, also reduce the amount asked as (cash) allowance from their husbands.

5. Conclusions

The aim of this paper was to gain a clearer understanding of the economic contributions of men (*olmarei* heads) and women (*enkaji* heads) to total household income as well as taking a closer look at decision power over and use of income derived from milk sales, thereby assessing who benefits from commercialization of milk. The research is based on a large baseline and follow-up survey in Tanzania. Its design allowed analyses along a “milk access gradient”. In addition, the paper presents, to our best knowledge for the first time, detailed in depth descriptive statistics on the contributions of men and women to Maasai household income.

Starting with the descriptive analysis of the key characteristics we found that compared to their wives, men (husbands) are older, have better access to education, meet more regularly and may rely on more people in case of need, and are more likely to own assets. Although we found that the traditional system of distinct responsibilities and gender roles remains in place, there is some evidence of men getting involved in the commercialization of milk. One fifth of milk selling women perceive the income as an addition to their budget which they mainly use for diversifying and increasing food purchases. Relating this to the 89% of women stating to be the sole decider on milk revenues, we conclude a certain trade-off between decision power, i.e. not needing to refer to their husband for housekeeping expenses, and additional effort through sales activities to earn cash.

While the average total income of men is higher than the average of women, their contribution to total *olmarei* income varies. I.e. if women have access to milk markets, their contribution to *olmarei* income is larger than their husband's contribution.

In a broader perspective, this research indicates that in areas where no or only limited other income alternatives are available, the Maasai still rely mostly on their cattle and animal products, especially milk. Establishing markets for milk offer an income alternative for women. However, we found that in areas closer to the milk market men control a higher share of income from milk sales compared to the most remote area where all milk sales are solely controlled by women. In terms of policies aiming at enhancing gender equity in dairy value chains, it appears advisable to support particularly education of women so as to strengthen women's empowerment and ensure their title to economic activities related to milk.

Further research looking at quantitative and qualitative data on intra-*olmarei* (husband-wives) and inter-*enkajjik* (wife – wife) cash and value flows may provide a clearer view on the whole budget of a Maasai household. This may allow a more elaborate statement on decision issues, household income, its composition and its distribution, and changes in gender roles. Hence, this paper reveals the relevance of questioning who actually benefits from milk sales and provides sufficient indications to consider the decision to sell to be beneficial for a household as a whole and for the milk-selling women, too. When interested in the whole utility of a Maasai household, further research should expand the economic component focused on in this paper to also address other aspects of household utility. Finally, we believe that the data sufficiently captures the situation on site and may serve as a reference for other research on Maasai or pastoral communities with comparable socio-economic characteristics and infrastructural settings.

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Tables

Table 1: Socio-economic characteristics of Maasai men and women in the research area

		<i>Olmarei</i> heads (N _{men} =223)	<i>Enkaji</i> heads (N _{women} =389)	Total (s.d.) (N _i =612)
Age (years)	**	41.2	32.4	35.7 (13)
Informal/traditional training+		0.23	0.20	0.21 (0.4)
Formal education+	**	0.64	0.39	0.48 (0.5)
Years of formal education (if received)		5.9	6.4	6.1 (1.8)
Travel time to nearest market (min)	**	70.4	77.5	74.9 (76)
Ownership of mobile phone+	**	0.64	0.16	0.34 (0.5)
Number of meetings in past seven days	**	4.5	2.5	3.2 (4.4)
Political position+		0.23	-	- -
Organization membership+	**	0.37	0.51	0.46 (0.5)
Number of people to rely on	**	3.0	2.2	2.5 (3.3)
Number of income sources	**	1.2	1.9	1.7 (1.0)

*(**) indicates significant differences at $\alpha=0.05$ ($\alpha=0.01$)

+indicates dummy variables (yes=1, no=0)

Source: Own data.

Table 2: Socio-economic characteristics of Maasai households (*olmarei*), by research area

		Ngerengere (N=107)	Kambala (N=82)	Ngerengere R (N=34)	Total (N=179)	Standard deviation
Number of <i>enkajjik/olmarei</i>		1.73	1.79	1.68	1.74	1.15
Olmarei size (persons/ <i>olmarei</i>)		8.48	9.54	7.79	8.76	5.79
Enkaji size (persons/ <i>enkaji</i>)	**	4.34 ^b	4.99 ^a	3.84 ^b	4.50	1.95
Dependency ratio ¹		1.23	1.13	1.23	1.19	0.72
TLU per capita	*	6.5 ^a	4.6 ^b	5.7 ^{ab}	5.7	5.5
Cows available per capita	*	2.7 ^a	2.0 ^b	2.7 ^a	2.4	1.9
Number of income sources		1.2	1.3	1.1	1.2	0.5
Ownership of a mobile phone (at <i>olmarei</i> -level)+	**	0.67 ^b	0.82 ^a	0.44 ^c	0.69	0.46
Improved housing+	**	0.25 ^b	0.41 ^a	0.03 ^c	0.28	0.45
Total <i>olmarei</i> net income (1,000 TZS)		3,056	3,000	2,227	2,908	5,147
<i>Olmarei</i> income per capita (1,000 TZS)		325	384	356	351	704
Total <i>olmarei</i> gross income (1,000 TZS)		5,045	4,214	3,902	4,565	5,505
<i>Olmarei</i> gross income per capita (1,000 TZS)		631	541	607	594	722
Access to markets, institutions and services		easy	moderate	difficult		

¹ ratio of (number of persons aged 0-14 and those aged 65 and above) divided by (number of people aged 15-65)

*(**) indicates significant differences between research areas at $\alpha=0.05$ ($\alpha=0.01$)

^{a, b, c} different superscripts in rows indicate significant differences at $\alpha=0.05$ between research areas

+indicates dummy variables (yes=1, no=0)

Table 3: Average income and income contributions of Maasai men and women

	Ngerengere	Kambala	Ngerengere R	Total
<i>Average net income per capita per year [in 1,000 TZS]</i>				
<i>Olmarei</i> (total)	325	384	356	351
<i>Olmarei</i> head (men)	140	176	216	165
<i>Enkaji</i> head (women)	107	116	83	107
<i>Enkajijik</i> (all women of an <i>olmarei</i>)	184	208	140	186
Contribution of men (%)	43.1	45.8	60.7	47.0
Contribution of women (%)	56.9	54.2	39.3	53.0
Access to institutions and services	good	moderate	difficult	

Source: Own data.

Table 4: Percentage of household units with control over income from milk sales

	Ngerengere (N=163)	Kambala (N=138)	Ngerengere R (N=13)	Total (N=314)
Men (<i>olmarei</i> head)	12.9	7.2	0.0	9.9
Women (<i>enkaji</i> head)	85.9	90.6	100	88.5
Both	1.2	2.2	0.0	1.6
Access to milk markets	easy	moderate	difficult	

Source: Own data (milk selling *enkajijik* only).

Table 5: Control and use of income from milk sales, by survey round

Milk selling households	Baseline survey (N=314)		Follow up survey (N=162)	
Women control milk income (%)	88.5		87.7	
<i>Main six uses of milk money</i> (%)	Main use	All uses	Main use	All uses
Buy food supplies	71.1	93.8	77.3	93.9
Buy consumption goods	24.1	88.3	12.3	82.2
Buy inputs for livestock	1.7	11.7	4.9	22.7
Pay for health expenses	0.7	10.3	0.0	22.1
Buy inputs for milking	1.0	10.0	0.0	14.7

Pay for school fees	0.0	1.7	2.5	13.5
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Note: "All uses" consider multiple answers, i.e. splitting milk money for different uses

Source: Own data (milk selling *enkajjik* only).

Table 6: Use of extra money from milk sales

	Directly asked question	Rephrased validation question
Share of <i>enkaji</i> heads who perceive the milk-money as an additional budget item (%)	20.9	19.6
<i>Use of extra milk money for food</i> (%)	Main priority	Multiple priorities
More diverse	50.0	80.6
Higher quantity	38.9	61.1
Higher quality	11.1	41.7

Source: Own data (follow-up survey).

Appendix

Table 7: Livestock related responsibilities within Maasai households in the research areas, considering shared responsibilities

Persons responsible (% of N=223)	Animal ownership	Marketing animals	Herding	Purchase of inputs	Medical treatment	Milking, milk use
Men (<i>olmarei</i> head)	95.7	96.0	39.3	82.9	93.5	4.0
Women (<i>enkaji</i> head)	23.9	15.9	4.7	8.0	11.3	94.9
Sons	10.9	7.6	48.7	3.7	10.9	4.0
Daughters	0.4	0.4	0.4	0.0	0.0	12.0
Other relatives	5.7	5.6	10.9	3.8	6.6	1.1
Hired labor	1.1	0.7	26.9	0.5	2.2	0.7
Others (friends, etc.)	0.8	0.6	1.5	12.3	0.0	0.0

Source: Own data.