Saving and borrowing behaviour among agropastoralists in West Pokot County, Kenya

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Abstract
Financial inclusion is an important development impetus, where knowledge of saving and borrowing behaviour provides valuable insights. This study focuses on access to and use of financial services among agropastoralists in rural Kenya, using survey-based household data from 2007 and 2017. Surveys show that households with savings increased from about 57% to 71%—coinciding with increased access to financial training and growing use of informal group-based savings organizations. Share of households that had access to credit also increased during this period, from about 26% to 54%. Support to group-based savings organizations can stimulate financial inclusion among agropastoralists.

KEYWORDS
credit access, Kenya, pastoralism, saving, West Pokot

1 | INTRODUCTION

The ability to smooth consumption through access to financial services is a basic pillar of household welfare. In OECD (Organisation for Economic Co-operation and Development) countries, easy access to financial services is often taken for granted. However, access to basic financial services in Sub-Saharan Africa remains limited and lags far behind other parts of the developing world. Consequently, the region has the lowest savings rate in the developing world (Dovi, 2008).
It is estimated that about 200 million households worldwide rely on income from pastoralism and agropastoralism in rural rangelands (Dong, 2016). In Kenya, arid and semi-arid counties (ASALs) host about 70% of the total livestock herd (Mwangi et al., 2020), and these drylands support about 8 million Kenyans, with animal husbandry as the main source of livelihood (Mburu et al., 2017). The traditional land use in these areas is pastoralism and agropastoralism, with land tenure systems that are communal and/or based on common property rights. The lack of savings in these rural areas makes it hard to cope with unexpected emergencies such as drought or household illness.

The saving and borrowing behaviour of poor people in developing countries is an important but understudied area, fraught with pre-conceived, but untested notions. It is typically argued in economic literature that poor people have a higher rate of time preference since they are preoccupied with immediate survival. Consequently, it is assumed that they will save less and borrow for consumption, if given the opportunity. However, how does this conventional wisdom stand up to the empirical evidence from rural Africa? According to Moseley (2001), it has been observed that rural African households often are extremely reluctant to cut down on savings and sell productive assets during a food crisis. This behaviour suggests that poor households in rural areas do not have high rates of time preference but are willing to make sacrifices in the present to promote future productivity. In areas with variable rainfall (such as West Pokot County in Kenya), this behaviour is enhanced by experience, since households know that they must always be prepared for a dry year.

However, economic progress additionally means that access to different savings and credit choices must be combined with human capital, in the form of financial literacy, on behalf of the saver or borrower. Financial literacy is defined as the households’ awareness, skills and knowledge enabling them to make informed, effective decisions about financial resources. Jalan and Somanathan (2008) argue that in Sub-Saharan Africa, awareness and knowledge about savings and credit options, and how to improve the understanding of money and to plan ones’ economic situation, is insufficient. However, as discussed in Sayinzoga et al. (2014) and Karlan et al. (2014), few studies have addressed the effect of financial training on economic behaviour in developing countries. The limited evidence is also mixed—enhanced financial literacy may reduce over-borrowing but could also lead to increased borrowing to finance start-up activities.

This paper focuses on Kenya, which had a population of 50.221 million people in 2017 (when the second survey in the data set was conducted), with 26% and 74% that year living in the urban and rural areas, respectively (World Bank, 2021). The country has a relatively stable macroeconomic environment with an annual GDP (gross domestic product) growth rate of 6.9% in 2007 and 4.8% in 2017 (Economic Commission for Africa, 2018). About 80% of the land in Kenya is either arid or semi-arid and prone to droughts and floods (Ulrich et al., 2012). More than half of the population live below the poverty line, and about one third of children under 5 and women suffer from chronic malnutrition. This vulnerability is heightened when disasters such as drought strike, necessitating external assistance such as food relief aid (World Food Programme, 2012).

However, Kenya has made notable advancements in the financial sector. The country has well-established financial institutions such as banks, microfinance institutions and mobile financial services. Mobile financial services have expanded since their inception in 2005. This has provided a favourable environment for financial inclusion. Despite the high rate of about 80% financial inclusion in Kenya in 2016 (FSD Kenya, 2016), most people especially in the rural and remote areas are still excluded from formal and regulated financial institutions such as banks that offer long-term savings and borrowing. A study in western Kenya by Dupas et al. (2016) reports that account ownership was quite low: only 20% of households had at least one member with a bank account. There is a dire need to better understand, and to develop, financial services in poor pastoralist/agropastoralist drylands in order to make residents beneficiaries of the present transition/development.

According to FSD Kenya (2016), over 40% of Kenyans utilize their savings to cope with shocks such as droughts. This suggests that access to financial services is important to help households bounce back in the wake of shocks. However, the sparse population density in the rangelands where pastoralism is the main source of livelihood does not provide enough demand for most commercial banks and other financial providers to set up service outlets. Low access to financial services leaves pastoralists with little capital assets. This in turn affects livestock production, and volumes of meat and milk produced, consumed and sold.
Financial inclusion is an important development impetus. Knowledge of saving and borrowing behaviour provides valuable insight into financial inclusion. This paper draws upon two household data sets from surveys directed at agropastoralists, collected and organized by the Swedish non-governmental organization (NGO) Vi Agroforestry in West Pokot County, western Kenya. The first study is from 2007 and the second was carried out 10 years later, in 2017. The fact that the survey was repeated in the same county using largely the same questions and to largely the same respondents (about 44% of the respondents who were interviewed in 2007 were interviewed again in 2017) provided an excellent opportunity for comparative analysis.

The main research question of this study is: How do pastoralists in western Kenya save and borrow money, and to what extent is their saving and borrowing behaviour affected by financial training and/or reliance on informal savings organizations? Savings and borrowing behaviour is correlated with various household characteristics and NGO extension services. Other research (cf. Bostedt et al., 2016) has dealt with the effects of such extension services on food diversity, based on the 2007 data. This analysis is unique in its longitudinal approach to the question of opportunities and choices concerning savings and loan behaviour among agropastoralists in Sub-Saharan Africa.

The financial sector in Kenya is diverse and consists of both formal and informal savings and credit institutions (see Table 1).

Mobile money in Kenya is a result of innovations between mobile telecoms and financial service providers to supply financial services over a mobile phone device. Mobile financial services have become popular in Kenya, and in 2016, about 71% of the Kenyan population was using at least one platform of mobile money services (FSD Kenya, 2016). Over time, mobile money service providers have collaborated with formal banks where account holders link their mobile money accounts to their bank accounts and can thus transfer money to and from their bank accounts to their mobile money wallets (Andiva, 2015; Central Bank of Kenya, 2013).

Kenya also has several informal village savings and loans groups. These are locally known as ‘merry-go-rounds’. These groups are primarily self-regulated; each group has its own rules on mobilizing, accumulating and using money. Members in these savings and credit groups are typically between 15 to 30 people who save regularly and can borrow from the group’s fund. Loans usually have terms of between 1 and 3 months and are repaid with an agreed amount of interest. The groups rely solely on their own savings. Over time, many commercial banks and other

| Financial service provider | Level of formal regulation | Accessibility by the rural population | Advantages | Disadvantages |
|----------------------------|----------------------------|--------------------------------------|------------|---------------|
| Mobile money wallets       | High                       | High                                 | -Secure    | -Limited volumes of amounts to save and borrow |
|                            |                            |                                      | -Low transaction costs |               |
|                            |                            |                                      | -No collateral required for borrowing, only credit history |               |
| Village Savings and Loans groups | Low                       | High                                 | -Low transaction costs | -Mismanagement can lead to embezzlement of funds, creating mistrust |
|                            |                            |                                      | -Foster collective action | -Limited amounts that can be saved and borrowed |
| SACCOs                     | Medium to low              | Medium to low                        | -Foster collective action | -Less popular in remote areas |
| Microfinance institutions  | High                       | Low to medium                        | -Provide long-term savings and offer lucrative interest rates | -Less popular in remote areas |
| Commercial banks           | High                       | Low to medium                        | -Provide long-term savings and borrowing services that can be invested into assets | -Less popular in remote areas |

Source: FSD Kenya (2016).
financial institutions have reached out to these groups to open group savings accounts and have offered group loans. However, according to Anyango et al. (2007), community-owned and managed groups often tend to stop functioning due to default or fraud, which erode the asset base of the group and can often reflect dysfunctional group dynamics.

Savings and credit cooperative societies, abbreviated as SACCOs, are incorporated with a view to mobilize savings and advance credit facilities to their members. SACCOs are either deposit-taking or non-deposit-taking. Deposit-taking SACCOs are those that take demand deposits and thus offer withdraw-able savings account services similar to those offered by banking institutions. Deposit-taking SACCOs are prudentially regulated by the Sacco Societies Regulatory Authority (SASRA). Non-deposit-taking SACCOs mobilize shares from their members, which is in turn used as collateral for credit facilities advanced to the members. These shares are refunded upon the member terminating their membership to the SACCO. Both deposit-taking and non-deposit-taking SACCOs are financial cooperatives. According to the Kenya Union of Savings and Credit Cooperative Societies (KUSCCO), there are currently over 12 000 registered SACCOs in Kenya (Kenya Union of Savings and Cooperative Societies, 2019).

Microfinance institutions, or MFIs, in Kenya offer micro-loans (small loans) to borrowers who may lack the qualifications for conventional loans from the banks. Some MFIs take deposits and operate the way formal banks do. According to the Central Bank of Kenya, the regulatory body of MFIs, there are 13 licensed deposit-taking MFIs in Kenya (Financial Sector Regulators Forum, 2017).

However, there is little presence of banks and MFIs, beyond the major towns. Particularly in the drylands, most formal financial institutions find it hard to invest in establishing service outlets due to sparse population and low demand for the financial services. The core business for most of the financial institutions is lending. Most find it highly risky to lend to pastoralists who derive most of their income from livestock. The risk perception of financial institutions towards pastoralists is exacerbated by uncertainties such as droughts and livestock diseases, which may cause mass deaths rendering pastoralists unable to repay their loans (International Institute of Rural Reconstruction [IIRR] and Technical Centre for Agricultural and Rural Cooperation [CTA], 2013).

2 | MATERIAL AND METHODS

Since 2001, Vi Agroforestry—a Swedish NGO working with tree planting and agroforestry education in Kenya, Rwanda, Uganda and Tanzania—has carried out surveys in the areas where there were active agroforestry extension services. The present paper is based on data from both the 2007 and the 2017 surveys. The sample in the 2007 survey consisted of 296 agropastoralists, retrieved from lists of households from the local official administration of different parts of West Pokot County. Of these, 164 respondents had received advice from Vi Agroforestry, while 127 had not. This advice mainly concerned agroforestry techniques but also included a study circle information package about savings and loans. Through this information package, participants could learn about advantages and disadvantages of different forms of saving, about budgeting and financial record keeping and about concepts associated with loans, such as interest and repayment. However, advice might have additionally spread from household to household, reaching also those who had not been in contact with the extension service. Indeed, that would have been a desired outcome for any extension service. The sample in the 2017 survey consisted of 310 agropastoralists from the same county, of which 129 (about 44%) had participated in the 2007 survey. In the 2017 survey, the question asking if the respondent had received advice from Vi Agroforestry was not used, since the focus of the organizations’ extension services was now on other areas—instead a question about whether the respondent used agroforestry techniques was used.

In both surveys, a three-step multistage randomized sampling technique was used: (1) in each of the seven divisions, locations were selected at random from a list; (2) within the locations, villages were randomly selected from a list; and finally, (3) in each village, participants were also randomly selected from a list. The goal was to randomly select 10 households from each village. However, for reasons of time and/or budget constraints for the survey, the final sample in some villages consisted of fewer respondents. The survey was conducted using structured
questionnaires in one-on-one interviews (see Mukoya et al., 2007). The main focus of the questionnaires—both in 2007 and in 2017—was on nutritional status and agroforestry techniques (see Bostedt et al., 2016), but part of the surveys contained questions about access to and utilization of community-based financial services. This section of the questionnaires will be the main focus of this analysis. The first question in this section was: ‘Do you practice any savings?’ The savings question was followed up by a question about how the household kept their savings, if they had any (‘If Yes, where?’). The alternatives were as follows:

- At home, ‘under the mattress’ etc.
- Informal groups system (merry-go-round, table banking, VSL, Hisa etc.)
- SACCO and CBO
- MFI
- Bank
- Investment
- NGOs
- Others

The examples provided under alternative two, informal system, essentially provide different names of very similar ways of organizing informal group savings organizations. Here, VSL refers to Village Savings and Loans associations, which is usually a source for very short loans, that is, 2–3 months, to cover for emergencies. ‘Hisa’ refers to the shares each individual has in such group-based saving systems, comparable to shares in the financial market.

The examples under alternative three, SACCO, village bank and CBO, are all more institutionalized savings alternatives. As mentioned above, SACCOs are savings and credit cooperative organizations, where members sell their produce, save money, secure loans and buy farm produce or other commodities related to their formation. CBO stands for community-based organizations, which are registered NGOs that are non-partisan and non-profit making usually meant to improve the socio-economic status of members or the community. Alternative four, MFI, stands for microfinance institution. A fifth alternative is to open a bank account. Alternative six is to save through some NGO—as results show this is very rare. Finally, one can save through investing, for example, in livestock.

The questionnaire also asked whether the respondent had accessed credit. This was followed up with a question about from what source the credit was accessed, with the alternatives:

- Family and friends
- Informal groups system (merry-go-round, table banking, VSL, Hisa etc.)
- Moneylender
- SACCO, village bank and CBO
- MFI
- Bank
- Others

The final relevant questions was what the credit funds were used for, with the alternatives:

- Business
- Consumption
- School fees
- Medical
- Housing
- Investments
- Funeral expenses
Farm inputs
Others

Descriptive data are presented as proportions (percentage), mean (standard deviations [SD]) and median [25th–75th percentiles]. Logit and multinomial regression analyses were used to determine the effects of household characteristics, geographical variation, extension services by Vi Agroforestry (for the 2007 sample) and the adoption of agroforestry practices (for the 2017 sample) on whether respondents had savings and/or loans and on savings options. Statistical significance was set at \( p < 0.05 \) level.

To better understand the drivers behind the choice, or the opportunity, to save, logit regressions were conducted on both the 2007 and the 2017 data sets. The logit model is based on the logistic distribution and is specified as

\[
F = \frac{\exp(\beta'x)}{1 + \exp(\beta'x)} = \Lambda(\beta'x) \tag{1}
\]

where \( F \) is the cumulative distribution function of the choice variable, \( x \) is a vector of explanatory variables for household \( i \) and \( \beta \) is a vector of associated coefficients. The household characteristics chosen as explanatory variables were age of the household head and the size of arable land; the hypothesis being that households with older and more experienced household heads and/or more arable land would be more likely to have savings.

To better understand the drivers behind different saving choices, a multinomial logit regression was conducted. The multinomial logit is useful for this case, since it is a model that is used to predict the probabilities of the different possible outcomes of a categorically distributed dependent variable, given a set of independent variables. Multinomial logistic regression is used when the dependent variable in question—in this case the savings alternatives mentioned above—falls into any one of a set of categories that cannot be ordered in any meaningful way.

The general form of the multinomial logit model is

\[
\text{Prob}(\text{choice } j) = \frac{\exp(\beta'_j x)}{\sum_{q=0}^{J} \exp(\beta'_q x)}, j = 0, \ldots, J \tag{2}
\]

where the probability of choosing alternative \( j \) is a function of a \( x \), a vector of explanatory variables for household \( i \), and \( \beta_j \) is a vector of associated coefficients for alternative \( j \).

3 | STUDY AREA

West Pokot County is largely a dryland area located in the Rift Valley Province in western Kenya (see Figure 1). It borders Uganda to the west, the counties of Trans-Nzoia and Marakwet to the south and the county of Turkana to the north and east. The county covers a surface area of about 9100 km\(^2\) and is divided into four sub-counties (North Pokot, West Pokot, Pokot Central and Pokot South), which are in turn made up of 20 wards. West Pokot County had an estimated population of 621,241 in 2019 (Kenya National Bureau of Statistics, 2019). The traditional lifestyle in the area has been pastoralism, but through rapid cultural, institutional and land use transition, this is now changing to sedentary agropastoralism. Within West Pokot, there is also considerable variation—from the dryland, predominantly pastoralist ward of Suam in the north-western part of West Pokot, via Kongelai in Riwo ward and Chepararia ward, where communal land is increasingly enclosed for intensified, livestock-based agropastoralist production; to the crop-based, agropastoralist ward of Kapenguria, with more rainfall at higher altitude in the south. Frequent over-grazing and increased population have led to a need for intensified and more productive land use, including growing crops and trees.
As with most pastoral areas, access to formal financial services has generally been low and biased towards those formally employed and towards those who business enterprises (Atandi, 2013). Pastoralists, who constitute a majority of the county’s population, are left out of the formal financial services. The drylands of Pokot is a geographically disadvantaged region due to harsh climatic conditions, poor infrastructure and insecurity due to cattle rustling. In such regions, livestock can serve as a liquid asset. Imai (2003) showed that many rural households in western Kenya are currently liquidity constrained and liquidity constraints are closely associated with cattle holdings. He argues that differences in liquid assets with associated credit constraints are an important cause of economic inequality among households in rural Kenya.

4 | RESULTS

Although both surveys were conducted among rural households in the same county of Kenya, and about 44% of these households were identical in both surveys, there are some differences in the descriptive statistics for the two periods (see Table 2).

As the table shows, the age of the household head was not significantly different between the two survey periods. However, both the land holdings and education level of the respondents were significantly higher in the
2017 sample than in the 2007 one. While the latter can to a certain extent be explained by a general progress in Kenya when it comes to education, the former is more surprising since, as a result of population increase, land holdings can be expected to become smaller over time. The dependence on, and availability of, communal land was likely larger in 2007; that is, the utilized farm size was larger than the owned land size, since the privatization/individualization of land process has continued/increased.

One explanation can be found in the geographical distribution of respondents.\(^1\) The Sook, Suam, Tapach and Mnagei wards were completely missing in the 2017 survey round. The main reason is that in 2017, the survey focused only on the areas where Vi Agroforestry had been working. Suam stands out in the 2007 sample as the division with the smallest number of acres per household, but with large communal land resources, while Sook stands out since no respondents here had been advised by Vi Agroforestry. Both of these divisions were poorer and had a dietary diversity score below the average in 2007. In all, this suggests that the sample in 2017 was slightly biased towards households that were slightly better off, with slightly better educated household heads and larger land holdings. For this reason, when showing results for savings and credit use, both results for the 2007 sample, the full 2017 sample and the sub-sample of 2017 respondents who were also interviewed in 2007 will be shown. Concerning the agroforestry question, it should be noted that the question was very differently worded in 2007 compared with 2017. In 2007, the share referred to those who had received advice from the NGO Vi Agroforestry, while in 2017, it referred to the share of the

### TABLE 2  Descriptive statistics by survey year for age of household head, size of land (acres), proportion of households receiving advice from Vi Agroforestry/practicing agroforestry techniques and proportion of households who had savings

|                                | Mean values 2007 (n = 296) | Mean values 2017 (n = 310) |
|--------------------------------|-----------------------------|-----------------------------|
| Age, household head (years)    | 38.66 [37.46–39.86]         | 40.57 [39.27–41.87]         |
| Land (acres)                   | 5.402 [4.592–6.212]         | 8.968 [8.308–9.628]         |
| Education level (levels: 1 = none, 2 = primary, 3 = secondary, 4 = tertiary) | 1.93 [1.82–2.04] | 2.26 [2.15–2.37] |
| Agroforestry (0 = no; 1 = yes)\(^a\) | 0.56 [0.503–0.617] | 0.93 [0.901–0.959] |
| Household savings (0 = no; 1 = yes) | 0.57 [0.513–0.627] | 0.76 [0.702–0.813] |

| Respondents per location\(^b\) |  |
| Chepareria | 69 | 107 |
| Kongelai  | 50 | 115 |
| Sook      | 50 | 0   |
| Suam      | 46 | 0   |
| Kapenguria| 55 | 86  |
| Tapach    | 6  | 0   |
| Mnagei    | 20 | 0   |
| Unknown   | 0  | 2   |
| Total     | 296 | 310 |

Source: Survey data (2007 and 2017).

Note: Figures in brackets are 95% confidence intervals.

\(^a\)For 2007, this refers to the share who had received advice from the NGO Vi Agroforestry. For 2017, this refer to the share to practiced agroforestry techniques.

\(^b\)Note that the locations described in the survey are a mix of wards and locations in a ward.
respondents who practiced agroforestry techniques. Hence, the significant increase in the share can be seen as a last-
ing effect of the extension efforts made by Vi Agroforestry since they ceased their activities in these areas in
2001/2008. The significant increase in the share with household savings merits further analysis.

Table 3 illustrates the responses.

As the table shows, about half of the respondents in 2007 had some form of savings. Of those who had savings, 
about a quarter of the household heads had received some kind of financial training. This is a small share, but when 
compared with the non-savers, it can be established that by 2017 almost everyone in the sample who had received 
some financial training had some savings. It was noted that financial institutions gave respondents training which 
inculcated the culture of saving in them. Furthermore, as Table 3 confirms, the share who had savings had increased 
from about 57 in 2007 to about 71% in 2017. In addition, almost three quarters of the savers had received some 
kind of financial training. When the whole 2017 sample is compared against those who also participated in the 2007 
study, the share of those who had savings and had received financial training is almost identical, confirming that the 
difference between 2007 and 2017 is not caused by the differences in the sampling on the division level between 
the years. The distribution among savings options is also similar. This suggests that no gain in terms of inference 
would be made by reducing the sample to those who also participated in the 2007 study.

In 2007, the most common form of saving was through cash at home (‘under the mattress’), used by about 37% of 
the savers. This is a readily available type of saving, but also one that exposes the household to theft and does not

| Year                  | Sample | Had savings (%) | Did not have savings (%) | No answer (%) |
|-----------------------|--------|-----------------|--------------------------|--------------|
| 2007                  | 296    | 57.1            | 41.9                     | 1.0          |
| 2017                  | 310    | 71.0            | 21.9                     | 9.0          |
| 2017 (respondents also interviewed in 2007) | 129   | 72.9            | 20.2                     | 6.9          |

| Year                  | Sample | Savers who had received training on financial matters (%) | Non-savers who had received training on financial matters (%) | No answers who had received training on financial matters (%) |
|-----------------------|--------|-----------------------------------------------------------|-----------------------------------------------------------|-----------------------------------------------------------|
| 2007                  | 296    | 25.7                                                      | 2.3                                                      | 0                                                        |
| 2017                  | 310    | 75.9                                                      | 19.1                                                     | 10.7                                                     |
| 2017 (respondents also interviewed in 2007) | 129   | 74.5                                                      | 26.9                                                     | 10.7                                                     |

| Type of saving (%) | 2007 | 2017 | 2017 (respondents also interviewed in 2007) |
|--------------------|------|------|---------------------------------------------|
| At home, ‘under the mattress’ etc. | 37.1 | 15.0 | 17.0                                        |
| Informal system (merry-go-round, table banking, VSL, Hisa etc.) | 13.8 | 35.9 | 36.2                                        |
| SACCO and CBO       | 6.6  | 15.9 | 22.3                                        |
| MFI                 | 0    | 2.3  | 1.1                                         |
| Bank                | 17.9 | 15.0 | 15.9                                        |
| Investment          | 23.3 | n/a  | n/a                                         |
| NGOs                | 0    | n/a  | n/a                                         |
| Others, unspecified | 1.2  | 15.9 | 7.4                                         |

Source: Survey data (2007 and 2017).
offer any interest on the savings. However, in 2017, the share of respondents using that form of saving had more than halved; only 15% used that form of saving.

The second most common type of saving in 2007 was through investment; more than 23% used that form of saving. This is mainly done through the purchase of livestock. Livestock production is important in the region—according to Nyberg et al. (2015), about 80% of an average farm was devoted to livestock production. Cattle can potentially be a productive form of saving. Furthermore, as shown by Wairore et al. (2015), the transformation towards private enclosures in West Pokot have provided the framework for increased pasture availability, easier livestock management and improved livestock productivity. Investment was not available as a savings option in the 2017 survey.

The third most common type of saving in both 2007 and 2017 was in a bank. About 18% of the respondents in 2007 and about 15% in 2017 stated that they mainly saved in a bank. The closest bank branches can be found in Kapenguria, the West Pokot county capital, where Barclays Bank Kenya Commercial Bank and Equity Bank have branches.

Semi-structured saving forms, such as SACCOs, used by about 14%, and informal systems, such as VSLs, used by about 7%, were of less importance in the 2007 sample but had increased to the most important and second most important types of saving in 2017, used by about 35% and 16%, respectively. The move from saving through cash at home (‘under the mattress’) to informal systems, such as Village Savings and Loans associations, is the most prominent change in the data on savings.

As mentioned, questions were also asked about access to credit and what types of credit the household had accessed (see Table 4).

As Table 4 shows, 26.3% in the 2007 sample had accessed any type of credit. Of them, almost everyone had some kind of saving—only 4.8% of the non-savers had accessed credit. This means that saving can be seen as a prerequisite for credit access—as the case is in most parts of the world. By 2017, the share who had accessed credit had more than doubled, to reach almost 54%. This means that in 2017 the majority of the respondents had both savings and loans. Furthermore, almost all creditors had received some training in financial matters, as compared with roughly a third of the creditors in 2007. This shows that financial literacy enhances savings, which in turn increases access to credit.

Interestingly, in 2007, the most common sources of credit were from SACCOs and CBOs, about 31% used that source, and from informal systems, such as VSLs, about 23% used that source, which were not the most common form of saving. In the 2017 sample, this had changed and SACCOs, village banks and CBOs seemed to have fallen out of favour and been replaced by informal systems such as VSLs. About 47% of all creditors relied on this source of credit.

As mentioned earlier, the questionnaires also contained a question about what the credit funds were used for; the responses are presented in Table 5.

By far the most common use of credit funds in the 2007 sample was for investment purposes. About 37% stated that use of the funds. The relationship between the categories ‘investments’ and ‘business’ can be interchangeable since investments can be either on-farm or off-farm businesses, for instance, purchase of livestock. According to Table 5, ‘school fees’ was another frequent use of credit funds and thus a heavy financial burden for the households in West Pokot. Almost 18% of the respondents who accessed credit did so to be able to pay school fees. This financial burden had increased dramatically by 2017, as almost half of the respondents who had accessed credit had done so to be able to pay school fees. An increasing share of children in Kenya attends school every year. Meeting school fees requirements for households with many children attending school, especially at secondary or tertiary levels, can become a challenge, and such parents may have taken loans to be able to do so.

As explained, to better understand the drivers behind the choice, or the opportunity, to save, logit regressions were conducted on both the 2007 and the 2017 data sets. The question of whether the household had received advice from Vi Agroforestry was included in the regression on the 2007 data set to further investigate possible positive effects from agroforestry extension services. For the 2017 data set, this question was replaced by the question whether the respondent had adopted any agroforestry techniques. The objective here is to investigate possible
lasting effects of agroforestry extension services. The dietary diversity score was calculated for each household in the 2007 sample using the World Health Organization (WHO) indicators originally intended for assessing infant and young child feeding practices (see Bostedt et al., 2016). The hypothesis when using this as an explanatory variable is that households with a more diverse consumption are also more likely to have savings. In Murendo et al. (2021), it was shown that for rural households in Zimbabwe, financial inclusion was positively associated with household

### TABLE 4  Share who had accessed credit and types of credit in the 2007 and 2017 West Pokot samples

| Year                  | Sample | Overall accessed credit (%) | Savers who accessed credit (%) | Non-savers who accessed credit (%) | No answer who accessed credit (%) |
|-----------------------|--------|-----------------------------|--------------------------------|-----------------------------------|----------------------------------|
| 2007                  | 296    | 26.3                        | 42.0                           | 4.8                               | 33.3                             |
| 2017                  | 310    | 53.9                        | 71.8                           | 8.8                               | 10.7                             |
| 2017 (respondents also interviewed in 2007) | 129    | 55.8                        | 73.4                           | 3.8                               | 22.2                             |

| Year                  | Sample | Creditors who had received training on financial matters (%) | Non-creditors who had received training on financial matters (%) | No answers who had received training on financial matters (%) |
|-----------------------|--------|-------------------------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------------|
| 2007                  | 296    | 37.2                                                        | 8.6                                                           | 0                                                           |
| 2017                  | 310    | 91.0                                                        | 19.6                                                          | 11                                                          |
| 2017 (respondents also interviewed in 2007) | 129    | 91.7                                                        | 31.6                                                          | 0                                                           |

| Type of credit (%)                                                                 | 2007 | 2017 | 2017 (respondents also interviewed in 2007) |
|-----------------------------------------------------------------------------------|------|------|--------------------------------------------|
| From family and friends                                                            | 10.2 | 14.4 | 15.3                                       |
| Informal system (merry-go-round, table banking, VSL, DFS, Hisa etc.)              | 23.1 | 47.3 | 52.8                                       |
| Moneylender                                                                        | 7.7  | 6.0  | 11.1                                       |
| SACCO, village bank and CBO                                                        | 30.8 | 4.8  | 2.8                                        |
| MFI                                                                                | 10.2 | 6.0  | 6.9                                        |
| Bank                                                                               | 11.5 | 7.8  | 8.3                                        |
| Others, unspecified                                                                | 6.4  | 13.8 | 2.8                                        |

Source: Survey data (2007 and 2017).

### TABLE 5  Use of credit funds in the West Pokot sample

| Use of credit funds | Percentage share, 2007 sample | Percentage share, 2017 sample |
|---------------------|--------------------------------|--------------------------------|
| Business            | 14.1%                          | 12.6%                          |
| Consumption         | 5.1%                           | 7.8%                           |
| School fees         | 17.9%                          | 48.5%                          |
| Medical purposes    | 6.4%                           | 2.4%                           |
| Housing             | 2.5%                           | 7.8%                           |
| Investments         | 37.2%                          | 16.2%                          |
| Farm inputs         | 8.9%                           | n/a                            |
| Various and no answer | 7.7%                         | 4.8%                           |

Source: Survey data (2007 and 2017).
nutrition. In the 2017 sample, the data on food consumption were not sufficiently detailed to allow calculation of the dietary diversity score. Instead, the frequency of animal protein consumption was used as a proxy. Finally, the question whether anyone in the household had received financial training was included as a dummy variable in both data sets, the hypothesis being that households who were more financially literate were more likely to have savings. The results can be seen in Table 6.

As the table shows, for the 2007 sample, only the dummy variable for financial training was statistically significant above the 95% level. Age of the household head and the dummy variable for whether the household had received advice from Vi Agroforestry were only significant on the 90% level. For the 2017 sample, both the use of agroforestry techniques and the financial training significantly increased the likelihood of savings above the 95% level. However, the age of the household head decreased the likelihood of saving at the 90% level, suggesting that households with older members are less likely to save. More surprising is that the size of land holdings does not seem to have any significant effect on the probability to save. This is because in some instances, the land was not utilized to its full potential leading to low productivity, low income and hence less amounts available to save. Overall, the goodness-of-fit measures show better values for the 2017 sample.

The marginal effects measure (evaluated at the mean of all explanatory variables) for financial training was 0.348 for 2007 and 0.447 for 2017. Since financial training is a categorical variable, these measures therefore show how the probability of savings changes as the categorical variable changes from zero to one, holding all other variables at their means. This means that the probability of savings increases with 34.8% with financial training in the 2007 sample, holding all other variables constant, and 44.7% in the 2017 sample. The corresponding marginal effects measure for whether the household had received advice from Vi Agroforestry in the 2007 sample was 0.114, and for adoption of agroforestry techniques in the 2017 sample was 0.372. This indicates that the probability of savings increases with about 11% if the household had received advice from Vi Agroforestry in the 2007 sample (bearing in mind the significance level of this variable), and 37.2% if the household had adopted agroforestry techniques in the 2017 sample. This could indicate that farmers with agroforestry in 2017 had more funds to save, likely due to increased and diversified sales of agricultural products. This increased the households’ income, which could be converted into savings after meeting the required expenses. It also indicates that the importance of agroforestry as a production system is substantial and has grown since the end of Vi Agroforestry activities in the area in 2001/2008.

Table 7 presents the results from the multinomial logit regression on savings choice. The default choice in the analysis is no saving. For 2007, the two respondents who did not state a saving choice were also lumped into this category. However, for 2017, ‘Others, unspecified’ was kept as a unique savings alternative. This was done since the 2007 savings alternative ‘Investment’ was not available in 2017, suggesting that some respondents who chose ‘Others, unspecified’ would have chosen ‘Investment’ if given the alternative. For both periods, the MFI alternative was merged with the SACCO/village bank alternative.

As can be seen, the results here provide a richer picture of the drivers behind saving than the analysis of the dichotomous save or no save choice in Table 6. Looking first at the 2007 sample, note that the coefficient for ‘Dietary diversity score’ on the choice ‘Save at home’ is negative and significant, indicating that households that ate a more balanced diet were less likely to choose this form of saving. The obvious interpretation is that these households were relatively richer and slightly more financially well informed and had therefore chosen a saving option that was safer and gave some interest. The variable ‘Frequency animal protein consumption’, used in the 2017 sample, does not have the same effect—possibly because it is a more crude measure of abundance and variety of food. The coefficient for age of household head is negative and significant on the 90% level for the savings alternative ‘Investment’ in the 2007 sample, suggesting that older household heads were less likely to invest their saved resources.

The variable ‘Financial training’ has a positive coefficient and is significant for all choices in the 2007 sample except ‘Investment’, implying that financial training increased the likelihood of almost all forms of saving. This also holds in the 2017 sample. The largest numerical value of the coefficient can be found for the choices ‘SACCO and CBO’ in both samples, closely followed by ‘Bank’ in the 2007 sample, indicating that financial training had the strongest effects on these choices.
| Variable                                    | 2007 sample | 2017 sample |
|--------------------------------------------|-------------|-------------|
| Constant                                   | 1.301       | -1.117      |
| Age, household head                        | -0.018      | -0.023      |
| Size land, acres                           | 0.013       | 0.028       |
| Advice Vi Agroforestry (yes = 1)           | 0.485       | 1.893       |
| Use agroforestry techniques (yes = 1)      |             | 2.71**      |
| Dietary diversity score                    | -0.189      | -1.58       |
| Frequency animal protein consumption       |             | 0.0002      |
| Financial training (yes = 1)               | 1.919       | 2.791       |
| Goodness-of-fit                            | LogL = −165.8216 | McFadden pseudo $R^2$: 0.0848 |
|                                            | LogL0 = −181.2011 | Max. likelihood $R^2$: 0.1080 |
|                                            |             | LogL = −104.0198 | McFadden pseudo $R^2$: 0.2996 |
|                                            |             | LogL0 = −148.5165 | Max. likelihood $R^2$: 0.2748 |
| No. of observations                        | 269         | 277         |

Source: Survey data (2007 and 2017).
Differences between groups tested with Student’s t-test:
*p < 0.05; **p < 0.01; ***p < 0.001.
TABLE 7 Multinomial logit on savings choices in the West Pokot sample

| Variable | 2007 sample | 2017 sample |
|----------|-------------|-------------|
|          | Coefficient | T-value     | Coefficient | T-value     |
| Save at home, 'under the mattress' etc. | 1.383 | 1.64 | −31.354 | 0.00 |
| Age, household head | −0.012 | −0.75 | −0.033 | −1.60 |
| Size land, ha | 0.005 | 0.21 | 0.031 | 0.76 |
| Advice Vi Agroforestry (yes = 1) | 0.086 | 0.24 | 30.892 | 0.00 |
| Use agroforestry techniques (yes = 1) | −0.466 | −3.14** | −0.0003 | −0.08 |
| Dietary diversity score | | | |
| Frequency animal protein consumption | | | |
| Financial training (yes = 1) | 1.637 | 2.56* | 2.442 | 4.61*** |
| Informal systems (merry-go-round, table banking, VSL, DFS, Hisa) | | | |
| Constant | −1.519 | −1.18 | −1.645 | −1.42 |
| Age, household head | −0.023 | −0.97 | −0.035 | −2.08* |
| Size land, ha | −0.068 | −0.93 | 0.045 | 1.32 |
| Advice Vi Agroforestry (yes = 1) | 1.156 | 1.99* | | |
| Use agroforestry techniques (yes = 1) | | 1.835 | 2.06* |
| Dietary diversity score | 0.009 | 0.044 | | |
| Frequency animal protein consumption | 0.0007 | 0.28 | | |
| Financial training (yes = 1) | 2.462 | 3.59*** | 2.492 | 5.68*** |
| SACCO, village bank, CBO and MFI | | | |
|Constant | −1.651 | −0.98 | −34.057 | 0.00 |
| Age, household head | −0.035 | −1.02 | 0.007 | 0.35 |
| Size land, ha | 0.043 | 1.26 | 0.015 | 0.36 |
| Advice Vi Agroforestry (yes = 1) | 0.252 | 0.34 | | |
| Use agroforestry techniques (yes = 1) | 30.436 | | 0.00 |
| Dietary diversity score | −0.122 | −0.44 | | |
| Variable                                      | 2007 sample |          | 2017 sample |          |
|----------------------------------------------|------------|----------|------------|----------|
|                               | Coefficient | T-value  | Coefficient | T-value  |
| Frequency animal protein consumption        | 0.002      | 0.64     | 4.449      | 5.52***  |
| Financial training (yes = 1)                | 3.487      | 4.23***  | 4.449      | 5.52***  |
| Bank                                         |            |          |            |          |
| Constant                                    | -4.214     | -2.91**  | -1.863     | -1.47    |
| Age, household head                         | 0.038      | 1.47     | -0.020     | -1.03    |
| Size land, ha                               | 0.025      | 0.85     | 0.025      | 0.62     |
| Advice Vi Agroforestry (yes = 1)            | 1.775      | 2.88**   |            |          |
| Use agroforestry techniques (yes = 1)       |            |          | 0.921      | 1.04     |
| Dietary diversity score                     | -0.184     | -0.93    |            |          |
| Frequency animal protein consumption        | -0.002     | -0.48    |            |          |
| Financial training (yes = 1)                | 3.108      | 4.74***  | 2.531      | 4.86***  |
| Investment                                  |            |          |            |          |
| Constant                                    | 0.149      | 0.15     | -3.177     | -2.08    |
| Age, household head                         | -0.036     | -1.94    | -0.003     | -0.17    |
| Size land, ha                               | -0.022     | -0.54    | -0.034     | -0.71    |
| Advice Vi Agroforestry (yes = 1)            | 0.516      | 1.26     |            |          |
| Use agroforestry techniques (yes = 1)       |            |          | 1.787      | 1.54     |
| Dietary diversity score                     | -0.032     | -0.18    |            |          |
| Frequency animal protein consumption        | -0.002     | -0.41    |            |          |
| Financial training (yes = 1)                | 1.297      | 1.83     | 2.938      | 5.37***  |
| Goodness-of-fit                             |            |          |            |          |
| Logl = -372.7803                            | McFadden pseudo $R^2$: 0.1147 |
| Logl$_0$ = -421.0577                        |            |          |
| Logl = -420.5839                            | McFadden pseudo $R^2$: 0.1238 |
| Logl$_0$ = -480.0539                        |            |          |
| No. of observations                         | 272        |          | 277        |          |

Source: Survey data (2007 and 2017).
Differences between groups tested with Student’s t-test:
* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. 
Finally, the variable ‘Advice Vi Agroforestry’ has a significant and positive effect on the choices ‘Informal systems’ and ‘Bank’, suggesting that the agroforestry extension services provided through the NGO Vi Agroforestry could have influenced households into choosing these forms of saving. For the 2017 sample, the use of agroforestry techniques also had a significant and positive effect on the choice of ‘Informal systems’ as savings option, while age had a negative effect.

Looking at marginal effects of financial training, the strongest significant effect in the 2007 sample is for ‘Bank’—where the probability of this form of savings increases with 13.5% with financial training—followed by ‘Informal systems’. It is also interesting to note the negative and significant marginal effect for the variable ‘Advice Vi Agroforestry’ on the choice ‘No saving’, where the probability of this form of savings decreases with 12.0% with agroforestry extension services. This indicates that this type of extension services had an effect, since it significantly reduced the likelihood that the household had no savings at all. No marginal effects were significant for the 2017 sample.

To better understand the drivers behind the choice to access credit, a logit regression was conducted. The household characteristics chosen as explanatory variables were (again) age of the household head and the size of arable land. The hypothesis to be tested is here somewhat hard to define, since on the one hand households with older and more experienced household heads and/or more land that is arable could be investing more and thus be more likely to have accessed credit. On the other hand, these households would tend to be slightly better off and thus not need to access credit.

The question of whether the household had received advice from Vi Agroforestry (for the 2007 sample) or used agroforestry techniques (for the 2017 sample) was included to investigate possible short- and long-term effects from agroforestry extension services on the choice to access credit. The dietary diversity score (for the 2017 sample) or frequency of animal protein consumption (for the 2017 sample) and the question whether anyone in the household had received financial training were also included. Finally, we used dummy variables for the different saving choices, with the baseline being no saving. With respect to causality, this essentially implies that the savings choice was made before the choice to access credit—which is likely, but may not always be the case. The results can be seen in Table 8.

Interestingly, although size of agricultural land is not significant, the t-value in the 2007 sample is relatively high and the sign is negative. This suggests that respondents with larger land holdings were less likely to have accessed credit—the reason could be that they did not need to. The coefficient for age is negative and significant for the 2017 sample, indicating that older household heads were more cautious and less likely to access credit. The financial training coefficient is positive for both samples and significant in the 2017 sample, suggesting that financial training made it slightly more likely to have accessed credit. Furthermore, all forms of saving significantly increased the likelihood of having accessed credit. Overall, the explanatory power of the logit regressions are very good, especially for the 2017 sample.

The marginal effect (again evaluated at the mean of all explanatory variables) of financial training increased from 0.1447 to 0.6512, indicating that the effect of financial training on the probability to access credit increased by more than four times in the 10-year period between 2007 and 2017. The marginal effects of the different types of savings on the probability of credit access are all significant. The strongest marginal effect is for the savings choice ‘SACCO, village bank and CBO’ in both samples. In the 2007 sample, this is closely followed by ‘Bank’, with a marginal effect of 0.7218, while in the 2017 sample, bank savers were less prone to access credit, with a marginal effect of 0.2879. Note that the marginal effects of different types of savings are relative to the alternative of no saving. The decrease in the marginal effect of saving in banks can be due to lending policies that have discouraged many respondents to save in banks and instead save at home, as shown by an increase in the marginal effect of saving at home in 2007 and 2017.

5 | DISCUSSION

Analysing the saving and borrowing behaviour of agropastoralists in western Kenya using a unique longitudinal data set spanning 10 years, we have found a dramatic increase in the savings rate between 2007 and 2017. A logit
**TABLE 8** Logit on credit access in the West Pokot sample

| Variable                                      | 2007 sample | 2017 sample |
|-----------------------------------------------|-------------|-------------|
| Constant                                      | –2.821      | –2.380      |
| Age, household head                          | –0.009      | –0.038      |
| Size land, ha                                 | –0.027      | –0.002      |
| Advice Vi Agroforestry (yes = 1)              | 0.099       | 0.666       |
| Use agroforestry techniques (yes = 1)         |             | 0.73        |
| Dietary diversity score                       | 0.107       |             |
| Frequency animal protein consumption          |             | 0.003       |
| Financial training (yes = 1)                  | 0.752       | 3.110       |
| Saves at home (yes = 1)                       | 1.808       | 1.873       |
| Saves through informal systems (yes = 1)      | 2.548       | 1.811       |
| Saves through SACCO etc. (yes = 1)            | 4.976       | 3.585       |
| Saves in bank (yes = 1)                       | 3.665       | 1.552       |
| Saves through investing (yes = 1)             | 1.458       | 2.51*       |
| Saves other, unspecified (yes = 1)            |             | 2.050       |
| Goodness-of-fit                               | LogL = −112.0424 | McFadden pseudo R²: 0.2903 | LogL = −96.3458 | McFadden pseudo R²: 0.4820 |
|                                              | LogL₀ = −157.8822 | Max. likelihood R²: 0.2925 | LogL₀ = −185.9918 | Max. likelihood R²: 0.4778 |
| No. of observations                           | 272         | 276         |

Source: Survey data (2007 and 2017).
Differences between groups tested with Student’s t-test:
*p < 0.05; **p < 0.01; ***p < 0.001.
analysis shows a strong correlation between this increase and the provision of financial training. The mode of saving also changed. In 2017, fewer households saved at home ‘under the mattress’ and a far larger share of households used some form of informal system, like Village Savings and Loans associations and other types of group-based saving organizations, such as SACCOs (savings and credit cooperative organizations). However, the share of those who saved in banks has not increased over the studied period, which might be explained by restrictions caused by availability, charges for financial transactions and minimum levels of deposits in banks. Our analysis of savings choices shows that financial training had a significant positive effect on all savings choices but had the strongest marginal effect on saving in a bank and that agroforestry extension services provided through the NGO Vi Agroforestry incentivized/enabled households to save and influenced them into choosing group-based saving organizations or opening a bank account. Karlan et al. (2014) argue that the impact of financial literacy programmes on saving and borrowing behaviour is limited, and evidence of such impact is scant. This study contributes to the academic debate by providing such evidence. Our findings indicate a dramatic increase in credit access among respondents between 2007 and 2017, when the share of households with access nearly doubled. The correlation with financial training is even stronger than for saving, since very few of the creditors had not received some form of financial training. The main source of credit was the same informal, group-based, savings organizations used for saving. Only a small minority took formal loans from banks. The main use of the credit funds in 2007 was for investments, while in the 2017 sample, almost half of the households stated that they accessed credit to fund school fees for their children.

One important reason for the relatively low usage of the bank system could be the fixed costs associated with this type of saving, like account opening fees and minimum balance requirements, or marginal costs such as transaction fees (Karlan et al., 2014). A study by Dupas and Robinson (2013) in western Kenya found that eliminating opening costs had a significant positive impact on the take-up of bank savings accounts and on investment levels among market-vending micro-entrepreneurs. Another reason could be lack of trust. Qualitative results, also from western Kenya, by Dupas et al. (2016) found that low trust in the bank often was cited as a key concern that deterred people from using formal bank accounts.

Our analysis of credit choices showed land sizes and age of household heads did not significantly influence access to credit. However, the amounts/size of credits are not accounted for, and some of the credits were inevitably small and short. It is likely that poorer segments of the society only access these.

6 | CONCLUSION

Overall, our findings clearly demonstrate that the economic situation for agropastoralist and pastoralist households in rural Kenya was slowly improving during the study period, with more households being able to manage fluctuation and cope with adversity through savings and loans. When designing interventions for financial inclusion in Sub-Saharan Africa, it is crucial to consider access to information and knowledge needs (Somanathan, 2010). However, we also need to consider obstacles created by financial institutions.

Our analysis shows that financial training has had a positive effect on the saving behaviour of agropastoralists in the area under study. There could of course also be an indirect effect, since the introduction of new agroforestry practices in itself might improve the households’ financial situation. A rise in income might create a surplus, which can be saved or borrowed against, in case of a need. This smoothens consumption during shocks and thus improving the overall welfare of people.

These results suggest that these welfare improvements could be further emphasized by increasing the number of trained advisors in extension services, who can provide enhanced financial support to group-based savings organizations. Through this, extension services can bridge the information gap and provide an even stronger impact.

Finally, a word about the transferability of these findings to other sub-Saharan agropastoralist and pastoralist settings. This is limited by several factors, one being the differences in availability of savings and loan options in different areas. While the conditions for West Pokot in this respect should be fairly representative of large parts of
northern Kenya, there might be large differences between Kenya and other countries in the region. The financial sector in Kenya is the most diverse in eastern and southern Africa, with the exception of South Africa. During the period under study (2007–2017), financial services also reached rural areas of Kenya through the MPesa mobile money system. By contrast, the financial sector in neighbouring Ethiopia, which also has a large pastoralist population, is much more regulated, and rural savings rates are likely to be much lower. Nevertheless, this study demonstrates how savings and loan behaviour can be improved, even in sub-Saharan rural settings, and can thus serve as a model for policy reform across the region.

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DATA AVAILABILITY STATEMENT

The data are available on request from the authors.

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ENDNOTE

1 Note that the Vi Agroforestry survey used a mix of geographical locations, some corresponding to divisions, some to wards and some to locations within a ward. We have as much as possible tried to use the geographical names that were established in 2010 with the promulgation of the new constitution.

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