



## Regular Research Article

## Evidence and determinants of rural crime victimization in Tanzania

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## ABSTRACT

Rural crime victimization, especially in form of theft, is a serious problem in rural areas in Sub Saharan Africa as it may undermine their sustainable development. Using the case of Tanzania, we investigate the evidence of crime and analyze the factors which determine victimization. Based on a panel dataset of 786 households from rural Tanzania, we find relatively high victimization rates of 37 % and 47 % in 2016 and 2018, respectively. The random-effects and pooled logit models reveal that living in a rural region with high levels of unemployment is positively correlated with the likelihood of victimization. Moreover, exposure to weather shocks such as floods is positively associated with the likelihood of being affected by crime. We conclude that rural crime victimization requires attention due to its high incidence in Tanzania. Improving job opportunities especially for the youth in rural Tanzania is expected to reduce the likelihood of victimization. Guardianship should be encouraged, especially during times of weather shocks.

## 1. Introduction

Rural crime is far more common in developing than in developed countries and has several negative effects on society (Zvejkic and Frate, 1995; Frate and Alvazzi, 1998; van Dijk, 2008; van Kesteren, van Dijk and Mayhew, 2014). It has been found to impede income, rural livelihoods and threaten food security of the often deprived and poor small-scale farming households (Fafchamps and Minten, 2006; Ganpat and Isaac, 2018; Neubacher et al., 2019). Furthermore, burglary and theft affect farming households not only by a loss in property and work time, but they also create psychic cost making people feeling unsafe in their living environment (Barclay et al., 2001; Ceccato and Abraham, 2022). Finally, it may challenge social cohesiveness in rural communities and undermine sustainable development in rural areas (Neubacher et al., 2024; Ceccato, 2015; Skaperdas et al., 2009).

Against this background, it is important to understand rural crime and its causes in order to prevent its high social and economic costs to individuals and society as a whole. Preventing crime also increases the attractiveness of rural areas as a living place and eventually prevents outmigration of young people whose labor forces are urgently needed in

sustaining farming and thus food security in the longer run (Duda et al., 2018). This is also in line with the Agenda 2030 of the United Nations which includes the Sustainable Development Goal (SDG) 16 to “promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels” (UN, 2020).

Despite its frequent appearance, the evidence of rural crime in developing countries is still very limited, mostly due to a lack of data (Grote and Neubacher, 2016; Tanner, 1967). This also applies to Sub Saharan Africa (SSA), where only a few studies exist (Bunei et al., 2013; Bunei and Barasa, 2017; Fafchamps and Moser, 2003; Osterhoudt, 2020; Sidebottom, 2013; Clack and Minnaar, 2018; Neubacher et al., 2019, 2024). We focus on rural Tanzania which is particularly well suited due to its important agricultural sector, high levels of food insecurity and high victimization rates in rural areas (Neubacher et al., 2019, 2024). Since most reported rural crimes are property-related ordinary farm crimes (Bunei et al., 2013; Sidebottom, 2013), we focus on theft including theft of agricultural goods and personal items. We aim to answer the following two research questions: First, to what extent are rural people in Tanzania affected by crime, in particular theft? And

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second, what factors determine victimization in Tanzania?

This paper contributes in several ways to the given literature. First, crime in developing countries is a neglected and underresearched topic (Grote and Neubacher, 2016; van Kesteren et al., 2014; van Dijk, 2008). This paper adds evidence on crime based on a representative primary survey from rural Tanzania. Second, there are very few studies (Sidebottom, 2013; Mears et al., 2007a; Barclay and Donnermeyer, 2011) which have systematically analyzed how variations in attractive targets on farms (livestock, crops, machinery, etc.) explain differences in the occurrence of theft. Thus, our research aims to close the gap on theft victimization by drawing on a primary disaggregated dataset with information about what was stolen, when and where. Third, to identify determinants of victimization, we use the routine activity approach (Cohen and Felson, 1979) which provides a solid rationale for why we use certain variables and how they are functionally related to crime victimization. This allows to adequately measure target and guardianship components from a single dataset over time, as suggested as a welcome extension of given research by Sidebottom (2013). Fourth, most existing research is descriptive in nature as they are cross-sectional with very few studies applying econometric analyses (Grote et al., 2024; Mears et al., 2007b). This paper applies econometric models to a panel dataset from the two years 2016 and 2018 of a relatively large randomly selected sample of rural households. By deriving some robust estimations on the determinants of farm crime, our results aim to improve crime prevention strategies of rural households.

The paper is structured as follows: Section two provides an overview of the theoretical and empirical literature on rural crime and the routine activity approach as a basis for further analyses. Section three presents the data and the methodology. Section four shows the results and discusses them and section five concludes.

## 2. Literature review

### 2.1. Theories to identify determinants of crime victimization

Economists assume that individuals make rational choices based on perceived costs and benefits of committing a crime. This rational choice approach takes the perspective of the offender who commits a crime when the expected utility exceeds the utility, he or she could obtain by using time and other resources for alternative activities (Becker, 1968; Ehrlich, 1973). Criminologists also apply this rational choice approach but narrow it down: in addition to a motivated offender, a suitable target must be present, and a capable guardian absent (Cohen and Felson, 1979). This framework, called the routine activity approach (Cohen and Felson, 1979), helps to analyze the likelihood and determinants of and opportunity for certain crimes, and it contains elements (i.e. of exposure) which have been ignored in economics so far (Barslund et al., 2007). It thus also considers some of the modifications of previous crime theories for Africa as suggested by Arthur (1991). Specifically, the routine activity approach includes the following three components:

- A *motivated offender* is somebody who is inclined to commit a crime. He or she can behave rationally by weighing the costs and benefits of committing a crime. However, emotions are likely to be involved as well, as suggested by Bouffard et al., (2000) and these can prove to be a benefit (“thrill”) when committing a crime.
- A *suitable target* is an object (mostly property) or a person who may be threatened by a motivated offender if its characteristics make it attractive to a potential offender.
- *Guardianship* acts as an obstacle to offenders and can be both, human (e.g. through neighbors, friends, relatives, passersby, reliability of and access to the police) or non-human (e.g. locks, alarms, watchdog) (Bursik and Grasmick, 1993).

It is the interaction between these three elements, or the circumstances in which a criminal act happens, rather than the characteristics

of potential offenders or victims. The more these three elements overlap, the higher the probability of criminal behavior. With this approach, we can find a solid rationale for why we use certain variables and how they are functionally related to crime victimization and what signs we expect to see (Barslund et al., 2007).

### 2.2. Empirical evidence on the routine activity approach

A number of articles on the routine activity approach have explicitly focused on the *suitable target* and its characteristics to see how well they help explaining risk of crime victimization. The examples of suitable targets range from farm crime (Neubacher et al., 2019, 2024; Bunei et al., 2013; Bunei and Barasa, 2017), cattle rustling (Sidebottom, 2013), wildlife poaching (Pires, 2015; Herbig and Warchol, 2011), looting of archeological sites (Grove et al., 2018) to cybercrime (Yar, 2005). Very often, crime is assumed to increase with indicators related to lifestyle and income (Barslund et al., 2007; van Kesteren et al., 2014; Clinard and Abbott, 1973; Arthur, 1991). Felson and Clarke (1998) describe suitable targets as “hot” based on their value, inertia, visibility and access (VIVA). Clarke (1999) broadens the notion of property-related crime according to whether it is “CRAVED” (Concealable, Removable, Available, Valuable, Enjoyable, and Disposable). These CRAVED aspects may also change over time. Felson and Clarke (1998) refer to the “life cycle of goods” meaning that a product is particularly hot when it is new to the market until it reaches saturation. Accordingly, the theft rate of highly priced vanilla is relatively high at harvest time (Osterhoudt, 2020). Generally, theft of crops is likely to increase in certain months, particularly during harvesting season (Neubacher et al., 2024 or when it can be more easily disposed of (Holmes and Jones, 2017; Bunei et al., 2013). The attractiveness of the target is also judged differently at the time of the crime than at later times, e.g. when the stolen goods are processed, transported or traded (Moreto and Lemieux, 2015). Finally, the properties of suitable targets can be also affected by shocks related to health or weather. This may be due to the increased value of targets as availability decreases in the event of a weather shock such as a flood or drought, making them more attractive to thieves (Sidebottom, 2013). Floods can also cause disruption to trade due to destroyed roads or train routes, leaving farmers with surplus and relatively large crop stocks, which thereby become attractive targets for thieves (Tanner, 1967). Health shocks which are generally accompanied by a loss of earnings and high medical costs are expected to reduce the attractiveness of targets. Sick people also more often stay at home but their capacity to guard and defend is likely reduced which make them suitable targets (Chalfin et al., 2019; Azimi and Daigle, 2021).

*Guardianship* is a comparatively underdeveloped component of the routine activity approach (Hollis-Peel et al., 2011, Hollis and Hankhouse, 2019). It has been found that higher levels of guardianship are associated with significantly lower levels of crime (Cohen and Felson, 1979). Guardianship has been described by household size or male adult share. The unemployment situation in villages might be related to guardianship because jobless individuals are then at home more often (D’Alessio et al., 2012). The use of mobile phones as guardianship variable has been suggested by Hollis and Hankhouse (2019) as they can be used to call somebody for help or assistance in case of imminent victimization. It also depends on spatial (or geographical) characteristics (Brantingham and Brantingham, 1981), as farm isolation has been shown to increase vulnerability of farm households to victimization. Due to lack of guardianship, potential offenders are less likely to be detected by victims or witnesses (Fafchamps and Moser, 2003; Fafchamps and Minten, 2006). Smaller and widely dispersed land plots, as well as greater distances between plots and the homestead, are also associated with higher vulnerability to victimization because thefts are less likely to be discovered (Donnermeyer et al., 2011; van Dijk, 2008; Ganpat et al., 2016).

Describing *offenders* is hardly possible and often ends in speculation and anecdotes. Because criminal offences often go unreported, crime

statistics are unreliable. Asking victims to characterize the (often unknown) offenders is not considered a sensible approach. Nevertheless, it appears reasonable to assume that there are numerous motivations for opportunistic offenders such as the need for food, money, drugs including alcohol, or the urge to improve one's lifestyle (e.g. mobile phone theft) (Bunei and Barasa, 2017). There is also general criminological evidence that a large share of ordinary crimes (such as theft) anywhere in the world are committed by young adult males (UNODC, 2018). When youth density is high, more potential offenders become part of the society and the risk of victimization increases. In fact, delinquent youth correlate with poor education and unemployment (UNODC, 2018). In pastoralist societies there are definitions of masculinity in which young men are encouraged to steal livestock and cattle (Barrett et al., 2001).

### 2.3. Evidence from Sub Saharan Africa

There are only few studies on rural crime in Sub Saharan Africa, including Kenya (Bunei et al., 2013; Bunei and Barasa, 2017), Madagascar (Fafchamps and Moser, 2003; Osterhoudt, 2020), Malawi (Sidebottom, 2013), Lesotho (Khoabane and Black, 2012), South Africa (Clack, 2013, 2015; Clack and Minnaar, 2018) and East Africa (Barrett et al., 2001). Studies which apply the routine activity approach (i.e. Bunei et al., 2013, Bunei and Barasa, 2017) either focus on suitable targets or on guardianship but seldom on both. These papers are mostly qualitative and descriptive in nature and come to some inconclusive results related to the importance of the different aspects of the routine activity approach. Studies which apply econometric analyses include for example Mears et al., (2007b) and Fafchamps and Moser (2004). Only

two studies on rural crime from Tanzania are known from the literature (Neubacher et al., 2019, 2024). There are three other, more focused works, one on the illegal, violent livestock trade of the agro-pastoral Kuria people (Fleisher, 2002) and two on the ethnic vigilante Sungu-sungu groups in the North (Kudo, 2020; Bukurura, 1995). It turns out that Tanzania is especially suitable for our research as farm households have been victimized at high rates and often repeatedly (Neubacher et al., 2019). The rural areas are characterized by a farming sector which is dominated by small-scale subsistence farms and vital to the rural population and the economy, contributing around 26 % to its GDP in 2021 and employing about 61 % of its labor force (World Bank, 2023).

## 3. Data and methodology

### 3.1. Data

The objective of the data collection was to identify to what extent rural households are affected and how they cope with external shocks. We included questions on theft and other types of crime which can be also considered as external shocks (Buonanno, 2003). The data was collected from farming households in the two rural regions Morogoro and Dodoma of Tanzania (see Fig. 1) in the years 2016 and 2018. These regions are characterized by small-scale farming and partly also by food insecurity. In the sub-humid Morogoro region maize, vegetables, rice and sesame are mainly cultivated with little livestock keeping. Most of the farming is self-sufficient with little on- or off-farm processing of crops or other products. The level of food security varies over the year. Farming is rain-fed and depends on two rainy seasons (with the long rainy period from March-June and the short one from October-

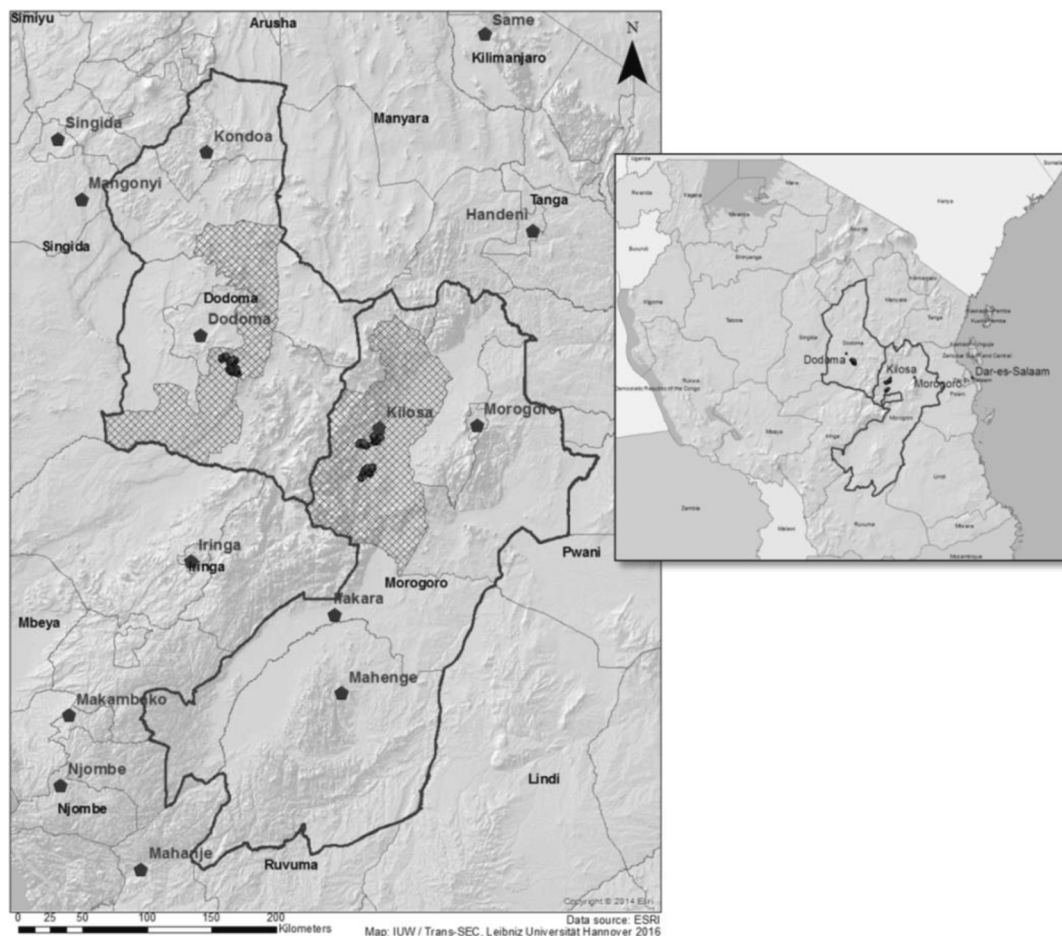


Fig. 1. Study region in Tanzania. Source: Trans-Sec Survey (2024).

December). Dodoma is a predominantly semi-arid region with a long dry phase and very short rainy months. Millet (sorghum and other types of millet), peanuts and sunflowers dominate – with pronounced livestock farming. Food insecurity is much more prevalent in the region in comparison with Morogoro where some commercialization exists at various levels of intensity (Kissoy et al., 2020).

The districts of Kilosa (Morogoro) and Chamwino (Dodoma) were selected for the data collection because they represent about 70 to 80 % of the land-based management systems in Tanzania with respect to the agroecological conditions (Graef et al., 2014). The survey was conducted in the villages Changarawe, Nyali and Ilakala in the district of Kilosa (Morogoro), and in the villages Ilolo, Ndebwe and Idifu in the district of Chamwino (Dodoma). In each of the six villages, 150 households were randomly selected in a first wave in 2014 on the basis of household lists, taking into account the size of the village. We make use of the second and the third waves (2016 and 2018) as the section on victimization has been newly introduced in the questionnaire in 2016. The total sample amounts to 786 households.

The data collection was conducted by a team from the Sokoine University of Agriculture in Morogoro and the Ardhi University in Dar es Salaam, Tanzania in cooperation with the Leibniz University Hannover and Weihenstephan-Triesdorf University of Applied Sciences, Germany. The enumerators comprised 12 Tanzanian graduate students who attended a one-week training course and pre-tested the survey instrument with households in the field. The computer-assisted personal interviews were conducted with the heads of the households. Detailed information about type, frequency and severity of victimization over the last 12 months, the reporting behavior and safety measures taken by the households to prevent crime were collected. Some of the victimization questions were further refined in the third wave in 2018 to get more details about the cases, i.e. what has been stolen, where and when. Furthermore, individual, household and village characteristics were collected. After the interview, each completed questionnaire was cross-checked for plausibility and consistency.

### 3.2. Methodology

To operationalize the routine activity approach, we identify the variables representing the suitable target and the absence of guardianship and examine their relationships with the likelihood of a rural household experiencing victimization. Victimization is defined as (i) crime in general, (ii) theft in general, (iii) theft of agricultural products (i.e. livestock, crops, firewood) or (iv) theft of personal items (transport or other items). Two different logit models are run: a random-effects logit model and a pooled logit model. As conceptualized in Section 2, the probability ( $Y_i$ ) that household  $i$  experiences victimization can be specified as

$$Y_i = F(T_i, G_i, O_i) \quad (1)$$

where  $F$  is the cumulative distribution function of the logistic distribution.  $T$  represents characteristics of a suitable target;  $G$  is a vector of characteristics of guardianship, whereas  $O$  denotes other control variables. Since our data are from two years, a year dummy is also included in the model. As presented, most of these variables are at household level, but some of them are at the village level. Thus, our model is further specified as:

$$Y_{ivdt} = \alpha + \beta T_{ivdt} + \partial G_{ivdt} + \tau O_{vdt} + \omega_{ivdt} \quad (2)$$

where  $Y_{ivdt}$  denotes the probability that household  $i$  in village  $v$  of district  $d$  experiences victimization during the last 12 months (year  $t$ ).  $T$ ,  $G$  and  $O$  have been already defined for equation 1, and  $\omega$  is the error term.  $\alpha$  is the constant and  $\beta$ ,  $\partial$  and  $\tau$  are the parameters showing impacts of the independent variables on victimization. The selected vectors are further specified in the following:

$$T_{ivdt} = [age_{ivdt}; education_{ivdt}; marital\ status_{ivdt}; farmland\ p.c._{ivdt}; assets\ p.c._{ivdt}; TLU_{ivdt}; livestock\ species_{ivdt}; motorcycle_{ivdt}; past\ victimization_{ivdt-1}; health\ shocks_{ivdt}; weather\ shocks_{ivdt}] \quad (3)$$

With respect to the suitable target  $T$ , we include variables of household head characteristics (age, marital status and education), farmland per capita as well as asset value per capita and asset value per capita squared, the number of tropical livestock units (TLU) and the number of livestock species to represent their available, removable and disposable traits, number of motorcycles, whether the households have been victimized in the past and whether they have been affected by health and weather shocks in the last 12 months.

$$G_{ivdt} = [hsize_{ivdt}; maleadults_{ivdt}; wage\ employment_{ivdt}; HCI_{ivdt}; mobile\ phones_{ivdt}; distance\ plots_{ivdt}; land\ plots_{ivdt}; paved\ road_{vdt}; dist\_market_{vdt}; dist\_t\_police_{vdt}; unemployment_{vdt}] \quad (4)$$

Guardianship ( $G$ ) is represented by a number of household variables and four village variables. Household characteristics are household size, proportion of male adults in the household, wage employment, household commercialization index (HCI), number of mobile phones, distance to plots and number of land plots. The four village variables are existence of a paved road, distance to the nearest police station, distance to the nearest market and unemployment in villages.

$$O_{vdt} = [inequality_{vt}; village\ dummies_v; time\ dummies_t] \quad (5)$$

Other control variables ( $O$ ) are consumption inequality in the villages, year and village dummies. All monetary variables are measured in 2010 purchasing power parity dollars (2010 PPP\$). Because our data are panel, we use a random-effects and a pooled logit model with robust standard errors to account for potential heteroscedasticity. The variance inflation factor (VIF) diagnostic test is performed and its results do not signal any serious multicollinearity problem. The results prove robust across the different models (Appendix Table 1). Table 1 presents the detailed definition and descriptive statistics of the variables which are used in our econometric models.

The characteristics of the suitable targets are briefly described as follows: Farm households are mainly small-scale with an average of 0.5 ha per capita. Livestock keeping is not very pronounced in the study site with an average of around 1.4 TLU. However, a high standard deviation in 2016 indicates that there used to be some farm households with larger TLU which has been reduced up to 2018. The number of motorcycles only amounts to an average of 0.1 and farm households are relatively asset-poor. Many households have been victimized repeatedly in 2018, and additionally, weather shocks affected many households in 2016. The effects of health shocks have been less severe.

With respect to guardianship, it can be highlighted that households are relatively large in size with an average of around 4.6 members. Wage employment plays a minor role in the rural region. The household commercialization index amounts to an average of 32 to 35 with a standard deviation of around 30 which indicates that some farm households do sell their agricultural products on markets. Infrastructure improved slightly over time: the distance to the next village market decreased from an average 4.1 km to 2.6 km and the distance to the next main road from 3.2 to 2.1 km. However, the distance to the next police station amounts to an average of around 17 km. Almost each household possesses one mobile phone. Concern about unemployment in the village decreased a little amounting to an average of 3.6 in 2016 and 2.9 in 2018. The Gini coefficient decreased from 0.36 in 2016 to 0.33 in 2018 which indicates an adequate inequality and a slight trend towards more equality over the two years.

## 4. Results and discussion

### 4.1. Evidence on victimization in rural Tanzania

In the survey, the farm household heads were asked to report

**Table 1**  
Definition and descriptives of variables (n = 786).

Variable	Definition	Year 2016		Year 2018	
		Mean	SD	Mean	SD
<b>Suitable target T</b>					
<i>age</i>	years of household head (hhh)	51.2	16.5	52.7	16.1
<i>education</i>	years of schooling of hhh	4.5	3.5	4.3	3.4
<i>marital status</i>	1 = hhh married	0.7	0.4	0.7	0.4
<i>farmland per capita</i>	ha	0.5	0.9	0.5	0.4
<i>asset score per capita</i>	weight of asset	14.6	35.6	13.7	24.5
<i>TLU</i>	Tropical Livestock Unit	1.5	13.1	1.3	3.1
<i>livestock species</i>	number	1.4	1.1	1.4	1.2
<i>motorcycles</i>	number	0.1	0.3	0.1	0.3
<i>past victimization</i>	1 = yes	.	.	0.4	0.5
<i>health shock</i>	1 = hh affected during last 12 months	0.2	0.4	0.3	0.5
<i>weather shock</i>	1 = hh affected during last 12 months	0.8	0.7	0.4	0.6
<b>Guardianship G</b>					
<i>hhsz</i>	number of nucleus members	4.7	2.2	4.5	2.1
<i>male adults</i>	share (%) of male adults in hh	28.5	21.4	28.2	22.1
<i>wage employment</i>	share (%) of male adults in hh size	3.8	14.5	0.6	5.0
<i>HCI</i>	Household Commercialization Index	0.35	0.32	0.32	0.30
<i>mobile phones</i>	number in hh	0.8	0.8	1.0	0.8
<i>distance plots</i>	average distance to plots (min)	28.2	33.9	34.9	35.3
<i>land plots</i>	number of plots	1.6	0.9	2.0	1.1
<i>dist_road</i> <sup>+</sup>	distance to next main road (km)	3.2	5.0	2.1	2.9
<i>dist_market</i> <sup>+</sup>	distance to next village market (km)	4.1	6.7	2.6	4.2
<i>dist_police</i> <sup>+</sup>	distance to next police station (km)	17.0	18.8	17.7	18.6
<i>unemployment</i> <sup>+</sup>	concern in village <sup>+</sup> (0 = no fear, 5 = fear)	3.6	1.5	2.9	1.8
<b>Other control variables O</b>					
<i>inequality</i> <sup>+</sup>	(Gini) Consumption Expenditures (PPP USD 2010)	0.360	0.0	0.333	0.0
<i>village dummies</i> <sup>+</sup>					
<i>year dummies</i>					

Note: <sup>+</sup> data at the village level; all other variables are at the household level; sd: standard deviation  
Source: Trans-SEC.

whether their household had been affected by any offense in the last 12 months. In 2016, 289 (37 %) of all surveyed households faced 362 crime cases. In 2018, this share increased to 462 cases affecting 366 (47 %) households, respectively (Table 2). Of the various offenses, theft and vandalism play the most important role for the rural population. Theft equals 65–70 % of all offenses. Theft incidents increased from 259 cases in 2016 to 299 cases in 2018. Due to the high number of cases, theft is further disaggregated into theft of agricultural products and theft of personal items. Theft of agricultural products includes theft of crops (98 cases in 2018), of livestock (95), working tools (40) and firewood (20). Stolen crops mainly include horticultural crops such as fruits and vegetable (i.e. banana, guava, mango, water melon, tomato, beans) but also diverse other crops (i.e. maize, sugarcane, cassava, sorghum, rice, cowpea, groundnuts, millet, sunflower). With respect to livestock, mostly chicken but in rare cases also ducks, rabbits, goats, pigs, and cows or cattle are stolen. Stolen working tools include hammer and axe, hand hoes, plough, irrigation pipes but also machetes, knives, pots and buckets. Theft of firewood occurred on average 5.29 times to one

**Table 2**  
Type, frequency and damage of victimization (annual prevalence), 2016 and 2018.

Type of Crime	Number of cases <sup>1</sup>		Incidence (mean) <sup>2</sup>		Damage (mean in USD PPP 2010)	
	2016	2018	2016	2018	2016	2018
<b>Theft victimization</b>						
<b>Theft of agricultural products</b>						
Theft of crops	107	98	2.58	2.29	98	46
Theft of livestock	82	95	1.79	1.59	59	102
Theft of working tools	18	40	1.39	1.18	101	17
Theft of firewood	7	20	5.29	2.25	15	7
<b>Theft of personal items</b>						
Theft of personal property (handy, jewelry)	30	29	1.60	1.31	75	43
Theft of transportation (bicycle)	9	10	1.11	1.40	103	113
Theft of transportation (motorcycle)	3	0	.	.	3,172	.
Theft from motorcycle (radio, mirror)	3	7	1.33	1.00	100	30
<b>Total theft</b>	<b>259</b>	<b>299</b>				
<b>Other types of victimization</b>						
Vandalism (crop/livestock)	60	116	1.83	2.22	241	101
Burglary/attempted burglary/assault/threat	13	16	1.00	1.06	115	26
Robbery, land 'robbery'	11	7	1.00	1.00	2,673	140
Others (i.e. fraud/bribery/corruption)	19	24	1.00	1.00	154	86
<b>Total other types of victimization</b>	<b>103</b>	<b>163</b>				
<b>Total</b>	<b>362</b>	<b>462</b>				

<sup>1</sup>The number of victimized households amounted to 289 in 2016 and 366 in 2018. This is equal to a victimization rate of 36.77 % in 2016 and 46.56 % in 2018.

<sup>2</sup>Incidence indicates repeated victimization; if mean is > 1, some households have been victimized more than once.

Source: Trans-SEC.

household in 2016 but decreased to an average of 2.25 in 2018 and its damage was relatively small as compared to the theft of crops and livestock. Theft of personal items (46 cases in 2018) refers to theft of i.e., handy or jewelry (29), theft of means of transportation (10) and parts from motorcycle (7). Vandalism almost doubled from 60 cases in 2016 to 116 cases in 2018 pointing at increasing social conflicts with Maasai or Sukuma who look for land allowing pastoral grazing of their livestock. Other types of victimization such as robbery and land 'robbery', burglary/attempted burglary/assault/threat and fraud/bribery/corruption are less common in our sample in rural Tanzania. With respect to the average monetary damage, theft of means of transportation, robbery and 'land' robbery, theft of agricultural products including livestock, and vandalism affected households most severely.

Nevertheless, it should be mentioned in this context that only a fraction of these cases is reported to the police. This is either because the damage is low, because the victims think that it does not help anything or because there was little trust in the respective institutions (Neubacher et al., 2019, 2024). Furthermore, stolen items such as crops or firewood, are often commonplace and unidentifiable (Tanner, 1967). Nevertheless, these products are of great importance to rural households given food and energy insecurity, as fuelwood supplies a large share of Tanzania's energy needs (Doggart et al., 2020).

Looking at the place and time of theft (Table 3), we find that theft of crops and agricultural products mostly occur in the field at night, while theft of livestock more likely happens at home in the afternoon or at night. During the day, household members often work in the field, which

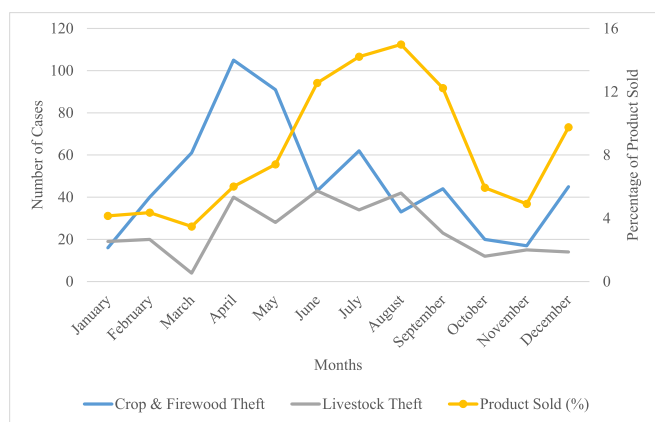
**Table 3**  
Time and place of theft of agricultural products in 2016 and 2018 (multiple answers per household possible).

Time and place	Theft of agricultural products			
	Theft of crops		Theft of livestock	
	2016	2018	2016	2018
<b>Place of theft</b>				
At home, n (%)	22 (21 %)	20 (20 %)	77 (95 %)	90 (95 %)
In the field, n (%)	83 (78 %)	77 (78 %)	3 (4 %)	3 (3 %)
On the market, n (%)	0	0	0	0
In public transport, n (%)	0	0	0	0
In the street, n (%)	0	0	0	1 (1 %)
Missing values	2 (1 %)	1 (1 %)	2 (1 %)	1 (1 %)
<b>Time of theft</b>				
In the morning, n (%)	2 (2 %)	5 (5 %)	6 (7 %)	7 (7 %)
In the afternoon, n (%)	23 (22 %)	20 (20 %)	36 (44 %)	33 (34 %)
In the evening, n (%)	34 (32 %)	25 (26 %)	14 (17 %)	12 (12 %)
During night, n (%)	47 (44 %)	48 (49 %)	25 (30 %)	42 (44 %)
Do not know, n (%)	0 (0 %)	0 (0 %)	0 (0 %)	1 (1 %)
Missing values	1 (1 %)	0 (0 %)	1 (1 %)	1 (1 %)
<b>Total (n)</b>	<b>107</b>	<b>98</b>	<b>82</b>	<b>95</b>

Note: With respect to the place, one household did not respond.  
Source: Trans-SEC.

reduces the guardianship at home providing opportunities to steal livestock in the afternoon at home. At night, crops are often stolen from the field, while household members are sleeping at home and when it is dark. Other studies confirm that theft occurs more likely at night when victims are asleep and the level of guardianship is low (Bunei et al., 2013; Clinard and Abbott, 1973). In very rare cases, households are victimized on the market, in public transport or in the street. Also in the morning, only a few households are affected by theft.

Our data from rural Tanzania further shows that theft of crops and livestock is seasonal and varies over the year (Figure 2). Both types of theft (crops and firewood, livestock) peak in April for the first time and then in June to August for the second time. The peak in April corresponds with the lean season when little food is sold and available in the markets. Crops, firewood and livestock alike become suitable targets in such situation which is characterized by food insecurity in our sample (Kissoly et al., 2017). The second peak in June to August corresponds with the harvest season of the major crops (millet, sorghum, corn). This is the time when crops are ripe and ready to be consumed or sold, even by thieves. The almost countercyclical trends from June to August, which are associated with crop and firewood theft on the one hand and livestock theft on the other could be explained by a change in the attractiveness of suitable targets. At the beginning of the harvest season,



**Fig. 2.** Seasonality of different types of victimization and sales of products (n = 1572).

Source: Trans-SEC

thieves may focus on crops for personal consumption or sale, as these are easier targets than more valuable livestock, which are better guarded by household members during the day and fenced near the homestead in the evening. Many farmers also mark their high-value animals with special ear tags, making it difficult for an offender to sell them at a local market. It is only when these easily accessible crops are not available that perpetrators are more likely to take the risk of stealing livestock. This would correspond with the “life cycle of goods” (Felson and Clarke, 1998).

Furthermore, the peaks in livestock theft could be because there is less guardianship at home during the harvest time, making it easier to steal livestock from the homestead. Tanner (1967) suggests that it may also be social rather than physical shortage which leads to crime. This means that agricultural goods are stolen due to their importance for social activities such as festivals, weddings or religious ceremonies.

The harvest time is also the time when farmers who have just sold their crops have money or buy things that have value. This leaves farmers vulnerable to theft, especially when others can see that they now have some money and/or valuable things. In addition, the harvest season is also the time of harvest celebration, alcohol consumption and community gatherings, which can increase opportunities of crime. The result that theft is high in certain months or when it can be more easily disposed of is supported by Holmes and Jones (2017) and Bunei et al., (2013).

#### 4.2. Determinants of victimization

To analyze the determinants of victimization, we present the results from two specifications: the random-effects logit model and the pooled logit model with reported marginal effects in Table 4. First, we focus on the likelihood that a rural household will be affected by theft in general. In the first specification, we do not include the past victimization as one of the explanatory variables to avoid temporal autocorrelation (column 1 and 3) while in the second specification, we include it (column 2 and 4). We correct for location and time fixed effects. The results are robust and show the same significant factors leading to victimization in both models.

We note from Table 4 that most suitable target characteristics turn out to be statistically insignificant. Only two variables appear to be associated with the likelihood of becoming a victim of theft. First, we find that weather shocks expose households to theft. This highly statistically significant result is in line with Blakeslee and Fishman (2018), Yu et al., (2017) and Grote et al., (2024) who also find strong positive effects of weather shocks on crime but in Asia. Weather shocks such as droughts or heatwaves and floods or storms increase the strain on individuals who may cope by committing a crime (Nguyen et al., 2023; Agnew, 2012). This implies that hot weather for example decreases the threshold of aggressive actions by individuals resulting in crime (Anderson et al., 2000). Weather shocks may also weaken formal and informal social controls. A flood for example may force people to displace temporarily from the inundated area. This leads to a loss of informal social control. But also formal control by the police is likely to be weakened in such flooded areas because road access to the flooded area might be blocked. Moreover, weather extremes in the form of floods or droughts are likely to reduce the availability of food, fuel or water for some time. As a result, these basic livelihood products become attractive targets (Nguyen et al., 2022, 2023; Sidebottom, 2013).

The second variable which appears to be associated with the likelihood of becoming a victim of theft, is past victimization. Thus, households that have been victims of crime in the past are more likely to become crime victims again. This result is statistically significant at the 5 % level but only in the pooled logit regression. The repeat-victimization theory suggests that offenders are more likely to reoffend if they have a history of success and are familiar with the homestead and therefore feel more familiar with the situation and know the escape route (Iratzoqui, 2015; Wittebrood and Nieuwebeerta, 2000;

**Table 4**  
Determinants of theft victimization in rural Tanzania (marginal effects).

Independent Variables	Dependent variable: theft general			
	Random-Effects Logit		Pooled Logit	
	(1) Without past victimization	(2) With past victimization	(3) Without past victimization	(4) With past victimization
<b>Suitable target T</b>				
<i>age</i>	0.001 (-0.0008)	0.001 (-0.0008)	0.001 (-0.0008)	0.001 (-0.0008)
<i>education</i>	-0.0006 (-0.0038)	-0.0006 (-0.0037)	-0.0003 (-0.0038)	-0.0001 (-0.0038)
<i>marital status</i>	-0.00129 (-0.002)	-0.0128 (-0.0311)	-0.0155 (-0.0303)	-0.0129 (-0.0303)
<i>farmland p.c.</i>	0.00185 (-0.02)	0.0185 (-0.0201)	0.016 (-0.0159)	0.0165 (-0.016)
<i>TLU</i>	0.002 (-0.0017)	0.002 (-0.0017)	0.0019 (-0.0023)	0.0019 (-0.022)
<i>livestock species</i>	0.0109 (-0.012)	0.0109 (-0.012)	0.0111 (-0.012)	0.0108 (-0.012)
<i>asset score p.c.</i>	0.0001 (-0.0004)	0.0001 (-0.0004)	-0.0001 (-0.0004)	0.0001 (-0.0004)
<i>motorcycle</i>	-0.00227 (-0.0422)	-0.0228 (-0.0422)	-0.0227 (-0.0422)	-0.0235 (-0.0463)
<i>past victimization</i>	-	0.0042 (-0.0564)	-	<b>0.0677**</b> (-0.0324)
<i>health shock</i>	-0.006 (-0.0268)	-0.0061 (-0.0269)	-0.0073 (-0.027)	-0.0085 (-0.027)
<i>weather shock</i>	<b>0.0731***</b> (-0.0167)	<b>0.0733***</b> (-0.0172)	<b>0.0745***</b> (-0.0176)	<b>0.0766***</b> (-0.0175)
<b>Guardianship G</b>				
<i>hh size</i>	-0.0061 (-0.007)	-0.006 (-0.0071)	0.0053 (-0.0069)	-0.0052 (-0.0069)
<i>male adults</i>	-0.0004 (-0.0006)	-0.0004 (-0.0006)	-0.0005 (-0.0006)	-0.0005 (-0.0006)
<i>wage employment</i>	<b>0.0018*</b> (-0.001)	<b>0.0018*</b> (-0.001)	<b>0.0017*</b> (-0.001)	<b>0.0017*</b> (-0.001)
<i>HCI</i>	<b>0.0009**</b> (-0.0004)	<b>0.0009**</b> (-0.0004)	<b>0.0009**</b> (-0.0004)	<b>0.0009**</b> (-0.0004)
<i>mobile phones</i>	-0.0095 (-0.016)	-0.0096 (-0.016)	-0.0088 (-0.0157)	-0.0099 (-0.0157)
<i>distance plots</i>	<b>0.0007**</b> (-0.0003)	<b>0.0007**</b> (-0.0003)	<b>0.0007**</b> (-0.0003)	<b>0.0007**</b> (-0.0003)
<i>land plots</i>	0.0144 (-0.0119)	0.0144 (-0.0119)	0.0166 (-0.0117)	0.0162 (-0.0117)
<i>dist_paved road</i>	-0.0033 (-0.0028)	-0.0033 (-0.0028)	-0.0033 (-0.0032)	-0.0033 (-0.0032)
<i>dist_market</i>	0.0033 (-0.0022)	0.0033 (-0.0023)	<b>0.0036*</b> (-0.002)	<b>0.0037*</b> (-0.002)
<i>dist_police station</i>	<b>-0.0031**</b> (-0.007)	<b>-0.0031**</b> (-0.0014)	<b>-0.0031**</b> (-0.0013)	<b>-0.0031**</b> (-0.0013)
<i>unemployment</i>	<b>0.0362***</b> (-0.007)	<b>0.0362***</b> (-0.007)	<b>0.0356***</b> (-0.007)	<b>0.0357***</b> (-0.007)
<b>Other control variables O</b>				
<i>inequality</i>	-0.5388 (-0.7335)	-0.5366 (-0.7363)	-0.5388 (-0.7335)	-0.492 (-0.7887)
<i>Year and village dummies</i>	yes	yes	yes	yes
<i>N</i>	1572	1572	1572	1572
<i>chi<sup>2</sup></i>	79.85***	80.46***	105.56***	109.88***

Note: significant variables are in green. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1; robust standard errors in parentheses.

Source: Trans-SEC.

Dolliver et al., 2022).

A number of significant variables refer to *guardianship*: unemployment, distance to plots, distance to the next police station, the HCI and to a lesser extent wage employment and distance to market. Concern of unemployment is highly statistically and significantly positively correlated with victimization. An estimated 10 to 12 million youth which refer to the economically active population aged 15 to 24 currently without work but in search of employment, enter the workforce in Tanzania each year. At the same time only 3 million formal jobs are created (Policy Forum, 2021). When youth density and unemployment are high, more potential offenders become part of the society and the risk of victimization increases. The United Nations (UN) confirm that delinquent youth correlate with poor education and unemployment (UNODC, 2018). With respect to the distance to the land plots, it takes an average of about 30 min walk to the plots, making it easy for offenders to steal agricultural products from the relatively remote fields. Guardianship related to the plots is thus relatively low. The descriptives from Table 3 confirm that theft of crops mainly occurs in the fields. The statistically significant negative correlation between the distance to the next police station and victimization can be explained by the fact that the police are usually stationed where more crimes are recorded. Usually, this is the case in cities with more potential offenders, while in rural areas the overall crime rate is comparatively low (with the exception of farm crime). In this sense, distance to the police is more of a measure of the distance to the city. It may also be that the police have no effect on victimization rates due to unmotivated police officers and inefficient courts, as Fafchamps and Moser (2004) found from Madagascar. In Tanzania it was also shown that rural households have little trust in the police (Neubacher et al., 2019).

The significant result at the 5 % level that a higher HCI is associated with a higher exposure to theft can be explained by the observation that first, household members have to go to markets and thus leave their farms unguarded (Omiti et al., 2006). Second, they often follow very predictable routines when going to markets thus lowering guardianship at specific times. These two assumptions might in fact be true for some households where livestock are stolen from home in the afternoon or in the morning (Table 3). However, livestock theft also occurs to a large extent at night which is counter to this assumption. Third, commercialization may also increase the exposure to targets e.g. on markets. However, our results indicate that farm households have been mainly victimized at home or in the field but not on markets (Table 3). The slightly significant results that a higher distance to markets and increased wage employment are correlated with a higher exposure to theft supports the just mentioned result related to the HCI. Both reduce guardianship as household members are away from home for extended periods of time during the day.

With respect to the *other control variables*, only some time and village fixed effects show some significant results. The correlation with inequality is not significant which can be explained by the fact that there is adequate inequality and that there has been the trend towards more equality over the last two years (see Table 1).

Since crime in general varies very widely, ranging from theft of agricultural assets to burglary, robbery, vandalism, conflict with neighbors, and being cheated at work (see Table 2), their potential causes are also likely to be very different. Hence, Table 5 compares the determinants of different types of victimization in four pooled logit regressions. These include not only crime and theft in general, but also theft of agricultural products and theft of personal items.

This more differentiated look at theft of agricultural goods (i.e. livestock, crops, firewood) and personal items (i.e. transport) in particular provides some interesting context-specific findings. Both types of theft are associated with weather shocks and unemployment. However, while weather shocks and unemployment correlate with theft of agricultural products at the 1 % significance level, this is only at the 5 % level with theft of personal items. In terms of weather shocks, this might reflect that they increase the strain on people in times of crisis and

food insecurity (Nguyen et al., 2023; Agnew, 2012). Crops can be more easily stolen i.e. from remote fields and they are more attractive targets. Theft of personal items, however, is less likely to be correlated with victimization because personal items are more difficult to sell during such times. In terms of unemployment, the effect related to theft of agricultural products might be more pronounced as products such as crops or livestock can be directly consumed or working tools can be used for working on land.

For theft of agricultural products, statistically significant determinants also include age, as well as number of land plots. Households with older household heads turn out to be more likely affected. This might be the case because older household heads might not be quite as effective in protecting their agricultural goods. Offenders can also more easily run away or defend themselves in case of being detected. This result is in line with the evidence found by Barslund et al., (2007). Also, more plots are likely to decrease the guardianship, thus leading to more cases of stolen crops from the fields. However, the number of plots may also be an indicator that the households are better-off and thus more likely victimized.

With respect to theft of personal items, there are some statistically significant correlations with a number of variables which relate to guardianship. These include distance to the next police station, household size, wage employment and to a lesser extent the HCI. A highly significant negative correlation with victimization related to theft of personal items was found regarding the distance to the next police station. This is likely due to crime opportunities in more densely populated urban areas where police are stationed. Seen in this light, the overall distribution of crime (in terms of an urban–rural divide) has a much stronger effect than low levels of guardianship in remote areas. In comparison, there is no correlation between distance to the next police station and theft of agricultural products. This can be explained by the observation that, unlike other crimes, theft of crops or livestock does not occur in cities but almost exclusively in rural and remote areas. Additionally, it is more difficult to detect and the damage might be comparatively small (i.e. firewood). The significant and negative correlation between household size and theft of personal items indicates that the rural households are more likely victimized due to decreased guardianship. This makes sense as there are fewer household members available who protect the own property. The slightly significant correlations of the share of household members with wage employment and the HCI with the theft of personal items may imply that the households are better off so that they are more likely to be affected. If the share of members who are wage earners, is high, it means that household members are most likely absent from home. As a result, guardianship is reduced, which increases the opportunity of a criminal activity (Omiti et al., 2006). The same is true with respect to the HCI, as described above.

## 5. Summary and conclusion

This paper has addressed the two research questions: (1) to what extent are rural people in Tanzania affected by crime, in particular theft? And (2) what factors determine victimization in Tanzania? We have used a panel dataset of 786 households from rural Tanzania, and find that in 2016, 37 % of all surveyed households had been affected by some type of crime over the last 12 months. This share increased to 47 % in 2018. Some households have been victimized even more than once. Most crimes relate to theft of agricultural products or personal items. While crops are largely stolen from the field, livestock are stolen from home. The occurrence of crime is particularly high in the afternoon and during night, and during harvesting season. The almost doubling of vandalism cases from 2016 to 2018 point at increasing social conflicts with Maasai and Sukuma. These conflicts arise due to shortage of land as the pastoral Maasai or Sukuma people look for grazing land for their livestock.

With respect to the second question, our results from random-effects

**Table 5**  
Marginal effects of determinants of victimization across different types (pooled logit regression).

<i>Independent Variables</i>	<b>Crime General</b>	<b>Theft General</b>	<b>Theft of agricultural products</b>	<b>Theft of personal items</b>
<b><i>Suitable target T</i></b>				
<i>age</i>	0.0008 (-0.0008)	0.001 (-0.0008)	<b>0.0016**</b> (-0.0008)	-0.0002 (-0.0005)
<i>education</i>	0.0032 (-0.004)	-0.0001 (-0.0038)	-0.0003 (-0.0036)	-0.0002 (-0.0023)
<i>marital status</i>	-0.0418 (-0.0314)	-0.0129 (-0.0303)	-0.0243 (-0.0284)	0.0233 -0.0194
<i>farmland p.c.</i>	0.012 (-0.0166)	0.0165 (-0.016)	0.0195 (-0.0149)	-0.0066 -0.0149
<i>TLU</i>	0.0014 (-0.0021)	0.0019 (-0.022)	0.0021 (-0.0024)	-0.0021 -0.0036
<i>livestock species</i>	0.0144 (-0.0125)	0.0108 (-0.012)	0.0125 (-0.0114)	0.0055 -0.0082
<i>asset score p.c.</i>	-0.0002 (-0.0004)	0.0001 (-0.0004)	-0.0001 (-0.0004)	0.0001 -0.0002
<i>motorcycle</i>	0.0106 (-0.0466)	-0.0235 (-0.0463)	-0.0362 (-0.0453)	-0.0033 -0.0269
<i>past victimization</i>	<b>0.0869**</b> (-0.0342)	<b>0.0677**</b> (-0.0324)	<b>0.0514*</b> (-0.0304)	0.0205 -0.0188
<i>health shock</i>	-0.0236 (-0.0281)	-0.0085 (-0.027)	-0.024 (-0.0257)	0.0162 -0.0156
<i>weather shock</i>	<b>0.0586***</b> (-0.0186)	<b>0.0766***</b> (-0.0175)	<b>0.0578***</b> (-0.0165)	<b>0.0250**</b> -0.0103
<b><i>Guardianship G</i></b>				
<i>hh size</i>	-0.0043 (-0.0071)	-0.0052 (-0.0069)	0.0022 (-0.0065)	<b>-0.0111**</b> -0.0046
<i>maleadults</i>	-0.0008 (-0.0006)	-0.0005 (-0.0006)	-0.0002 (-0.0005)	-0.0006 -0.0004
<i>wage employment</i>	0.0013 (-0.0011)	<b>0.0017*</b> (-0.001)	0.0011 (-0.0009)	<b>0.0010**</b> -0.0005
<i>HCI</i>	<b>0.0008*</b> (-0.0004)	<b>0.0009**</b> (-0.0004)	0.0005 (-0.0004)	<b>0.0004*</b> -0.0003
<i>mobile phones</i>	0.008 (-0.0163)	-0.0099 (-0.0157)	-0.0064 (-0.0148)	-0.0049 -0.0096
<i>distance plots</i>	<b>0.0009**</b> (-0.0003)	<b>0.0007**</b> (-0.0003)	0.0005 (-0.0003)	0.0002 -0.0002
<i>land plots</i>	0.0131 (-0.0122)	0.0162 (-0.0117)	<b>0.0183*</b> (-0.0109)	-0.0047 -0.0076
<i>dist_paved road</i>	-0.0013 (-0.003)	-0.0033 (-0.0032)	-0.0044 (-0.0032)	-0.0002 -0.0018
<i>dist_market</i>	0.001 (-0.0022)	<b>0.0037*</b> (-0.002)	0.0026 (-0.0018)	0.0004 -0.0013
<i>dist_police station</i>	<b>-0.0038***</b> (-0.0013)	<b>-0.0031**</b> (-0.0013)	-0.0017 (-0.0011)	<b>-0.0028***</b> -0.0009
<i>unemployment</i>	<b>0.0480***</b> (-0.0072)	<b>0.0357***</b> (-0.007)	<b>0.0286***</b> (-0.0067)	<b>0.0091**</b> -0.0044
<b><i>Other control variables O</i></b>				
<i>inequality</i>	0.5711 (-0.8221)	-0.492 (-0.7887)	-0.0795 (-0.7566)	-0.418 -0.4757
<i>Year and village (dummy)</i>	yes	yes	yes	yes
<i>N</i>	1572	1572	1572	1572
<i>chi<sup>2</sup></i>	176.64***	109.88***	86.36***	52.85***

Note: significant variables are in green. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1; robust standard errors in parentheses.

Source: Trans-SEC.

and pooled logit models reveal that living in a rural region with higher levels of unemployment increases the likelihood of victimization across different types of crime. Exposure to weather shocks is also positively associated with the likelihood of getting victimized. In sum, lack of guardianship is a particularly important aspect in determining victimization. We find that the routine activity approach provides a useful framework for identifying determinants of crime and by explaining how they are functionally related to victimization. However, we also find that this approach is not free from ambiguities, as certain variables cannot be clearly assigned to a dimension. For example, weather shocks or socio-economic characteristics such as age or mobile phones can be associated with suitable targets but also with guardianship.

Our findings suggest some concrete policy recommendations: first, we conclude that the level of guardianship should be increased. Particularly, in times of weather shocks, more guardianship is needed. With climate change, this aspect is expected to become more important, as weather shocks will likely become stronger and more frequent in Sub Saharan Africa (Umeh and Gil-Alana, 2024; Nguyen et al., 2024). Second, developing new jobs in the villages are likely to reduce unemployment, thus avoiding crime. This is especially important for the youth since their levels of unemployment are very high in Tanzania, and high levels of youth density generally implies that more potential offenders exist (UNODC, 2018). Third, more attention should be paid to social conflicts involving the Maasai and Sukuma, as these conflicts are expected to further increase in the future due to increasing land and water scarcity (Nguyen et al., 2023).

There are also some further research needs. First, we promote more research on prevention measures as their effects are likely to differ, depending on the type of crime. Thus, it is far from clear to what extent the use of traditional safety and precautionary measures such as locks, fences or watchdogs should be promoted, and whether social networks and establishing trust in the community can play a role in increasing human guardianship and thus decreasing the risks of victimization. A study from Nigeria suggests that community participation supports crime prevention but evidence is still very scant (Arisukwu et al., 2020). Second, the seasonal aspects of different types of crime call for more research as it is not clear to what extent there is a correlation between harvesting time, the sale of food products over the year, food insecurity and the types of victimization. Third, it is suggested to conduct analyses on the determinants of crime at the plot level and not only at household level. In case households own many plots – which is not the case in our

sample – only a subset of these plots is subject to theft suggesting that plot characteristics are more important than household characteristics. Fourth, it is not clear whether the results from Tanzania can be transferred to other countries in Sub Saharan Africa. This is especially important as Sub Saharan Africa has the largest population of young people in the world and unemployment remains one of the big challenges (Ighobor, 2017) suggesting that rural crime might be also an increasing problem in other countries. Finally, we also call for more research on impact evaluations to assess the effects of crime victimization on people’s livelihoods, including food security, well-being or social cohesiveness in communities. More research on these aspects could contribute to the sustainable development of rural areas.

**CRedit authorship contribution statement**

**Ulrike Grote:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Conceptualization. **Gregor Mager:** Writing – review & editing, Methodology, Formal analysis, Data curation, Conceptualization. **Anja FaBe:** Writing – review & editing, Supervision, Methodology, Data curation, Conceptualization. **Frank Neubacher:** Writing – review & editing, Writing – original draft, Conceptualization. **Luitfred Kissoly:** Writing – review & editing, Investigation, Data curation.

**Declaration of competing interest**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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**Appendix A**

**Table 1**  
Determinants of victimization across different types (random effects and pooled logit models).

Independent Variables	Crime General		Theft General		Theft of agric. products		Theft of personal items	
	Random	Pooled	Random	Pooled	Random	Pooled	Random	Pooled
<i>Suitable target T</i>								
age	0.0008 (-0.0009)	0.0008 (-0.0008)	0.001 (-0.0008)	0.001 (-0.0008)	0.0016** (-0.0008)	0.0016** (-0.0008)	-0.0002 (-0.0005)	-0.0002 (-0.0005)
education	0.0032 (-0.004)	0.0032 (-0.004)	-0.0006 (-0.0037)	-0.0001 (-0.0038)	-0.0005 (-0.0036)	-0.0003 (-0.0036)	0.0003 (-0.0022)	-0.0002 (-0.0023)
marital status	-0.0419 (-0.0315)	-0.0418 (-0.0314)	-0.0128 (-0.0311)	-0.0129 (-0.0303)	-0.0241 (-0.0283)	-0.0243 (-0.0284)	0.0227 (-0.0182)	0.0233 (-0.0194)
farmland p.c.	0.012 (-0.0189)	0.012 (-0.0166)	0.0185 (-0.0201)	0.0165 (-0.016)	0.0203 (-0.0212)	0.0195 (-0.0149)	-0.0067 (-0.0121)	-0.0066 (-0.0149)
TLU	0.0014 (-0.0012)	0.0014 (-0.0021)	0.002 (-0.0017)	0.0019 (-0.022)	0.0021 (-0.0018)	0.0021 (-0.0024)	-0.0021 (-0.0025)	-0.0021 (-0.0036)
livestock species	0.0144 (-0.0125)	0.0144 (-0.0125)	0.0109 (-0.012)	0.0108 (-0.012)	0.0128 (-0.0111)	0.0125 (-0.0114)	0.005 (-0.0082)	0.0055 (-0.0082)
asset score p.c.	-0.0002 (-0.0004)	-0.0002 (-0.0004)	0.0001 (-0.0004)	0.0001 (-0.0004)	-0.0001 (-0.0004)	-0.0001 (-0.0004)	0.0001 (-0.0002)	0.0001 (-0.0002)
motorcycle	0.0107	0.0106	-0.0228	-0.0235	-0.0343	-0.0362	-0.0047	-0.0033

(continued on next page)

Table 1 (continued)

Independent Variables	Crime General		Theft General		Theft of agric. products		Theft of personal items	
	Random	Pooled	Random	Pooled	Random	Pooled	Random	Pooled
past victimization	(-0.0446)	(-0.0466)	(-0.0422)	(-0.0463)	(-0.0445)	(-0.0453)	-0.0235	-0.0269
	0.0791	<b>0.0869**</b>	0.0042	<b>0.0677**</b>	0.026	<b>0.0514*</b>	0.0124	0.0205
health shock	(-0.2136)	(-0.0342)	(-0.0564)	(-0.0324)	(-0.0439)	(-0.0304)	-0.0201	-0.0188
	-0.0234	-0.0236	-0.0061	-0.0085	-0.0238	-0.024	0.0166	0.0162
weather shock	(-0.0303)	(-0.0281)	(-0.0269)	(-0.027)	(-0.0258)	(-0.0257)	-0.0151	-0.0156
	<b>0.0583***</b>	<b>0.0586***</b>	<b>0.0733***</b>	<b>0.0766***</b>	<b>0.0565***</b>	<b>0.0578***</b>	<b>0.0245**</b>	<b>0.0250**</b>
Guardianship G hh size	(-0.0218)	(-0.0186)	(-0.0172)	(-0.0175)	(-0.0159)	(-0.0165)	-0.0101	-0.0103
	-0.0043	-0.0043	-0.006	-0.0052	0.0017	0.0022	<b>-0.0111***</b>	<b>-0.0111**</b>
maleadults	(-0.0072)	(-0.0071)	(-0.0071)	(-0.0069)	(-0.0065)	(-0.0065)	-0.0042	-0.0046
	-0.0008	-0.0008	-0.0004	-0.0005	-0.0002	-0.0002	-0.0006	-0.0006
wage employment	(-0.0006)	(-0.0006)	(-0.0006)	(-0.0006)	(-0.0006)	(-0.0005)	-0.0004	-0.0004
	0.0012	0.0013	<b>0.0018*</b>	<b>0.0017*</b>	0.0011	0.0011	<b>0.0010**</b>	<b>0.0010**</b>
HCI	(-0.0011)	(-0.0011)	(-0.001)	(-0.001)	(-0.0009)	(-0.0009)	-0.0005	-0.0005
	<b>0.0008*</b>	<b>0.0008*</b>	<b>0.0009**</b>	<b>0.0009**</b>	0.0005	0.0005	<b>0.0004*</b>	<b>0.0004*</b>
mobile phones	(-0.0004)	(-0.0004)	(-0.0004)	(-0.0004)	(-0.0004)	(-0.0004)	-0.0003	-0.0003
	0.0081	0.008	-0.0096	-0.0099	-0.0061	-0.0064	-0.005	-0.0049
distance plots	(-0.016)	(-0.0163)	(-0.016)	(-0.0157)	(-0.0148)	(-0.0148)	-0.0093	-0.0096
	<b>0.0009**</b>	<b>0.0009**</b>	<b>0.0007**</b>	<b>0.0007**</b>	0.0005	0.0005	0.0002	0.0002
land plots	(-0.0004)	(-0.0003)	(-0.0003)	(-0.0003)	(-0.0003)	(-0.0003)	-0.0002	-0.0002
	0.0131	0.0131	0.0144	0.0162	0.0174	<b>0.0183*</b>	-0.005	-0.0047
dist_paved road	(-0.0125)	(-0.0122)	(-0.0119)	(-0.0117)	(-0.0111)	(-0.0109)	-0.0067	-0.0076
	-0.0013	-0.0013	-0.0033	-0.0033	-0.0046	-0.0044	-0.0001	-0.0002
dist_market	(-0.0029)	(-0.003)	(-0.0028)	(-0.0032)	(-0.003)	(-0.0032)	-0.0015	-0.0018
	0.001	0.001	0.0033	<b>0.0037*</b>	0.0024	0.0026	0.0005	0.0004
dist_police station	(-0.0027)	(-0.0022)	(-0.0023)	(-0.002)	(-0.0019)	(-0.0018)	-0.0012	-0.0013
	<b>-0.0038***</b>	<b>-0.0038***</b>	<b>-0.0031**</b>	<b>-0.0031**</b>	-0.0016	-0.0017	<b>-0.0027***</b>	<b>-0.0028***</b>
unemployment	(-0.0013)	(-0.0013)	(-0.0014)	(-0.0013)	(-0.0011)	(-0.0011)	-0.0008	-0.0009
	<b>0.0481***</b>	<b>0.0480***</b>	<b>0.0362***</b>	<b>0.0357***</b>	<b>0.0289***</b>	<b>0.0286***</b>	<b>0.0091**</b>	<b>0.0091**</b>
Other control variables O inequality	(-0.0081)	(-0.0072)	(-0.007)	(-0.007)	(-0.0067)	(-0.0067)	-0.0043	-0.0044
	0.5676	0.5711	-0.5366	-0.492	-0.0956	-0.0795	-0.4255	-0.418
Year and village (dummy)	(-0.8205)	(-0.8221)	(-0.7363)	(-0.7887)	(-0.7377)	(-0.7566)	-0.4568	-0.4757
	yes	yes	yes	yes	yes	yes	yes	yes
N	1572	1572	1572	1572	1572	1572	1572	1572
chi <sup>2</sup>	135.93***	176.64***	80.46***	109.88***	73.22***	86.36***	51.47***	52.85***

Note: significant variables are in green. \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1; robust standard errors in parentheses.

Source: Trans-SEC.

Data availability

Data will be made available on request.

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