

# Socioeconomic Determinants of Household Saving Behavior in Rural Areas of Adama City, Ethiopia

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## Abstract

Cellular automata (CA) are widely used in computing technologies to model complex, distributed, and emergent systems, yet their global dynamics remain difficult to characterize. This paper presents a novel computational framework that applies concepts from algebraic topology, geometry, and proximity theory to analyze CA behavior. We introduce invariant structural descriptors derived from state-transition spaces to classify dynamical regimes such as stability, periodicity, and complexity. The method is validated on elementary cellular automata and extended to biologically inspired models, demonstrating how topological and geometric features correspond to computational properties and emergent patterns. By linking discrete automaton rules with continuous mathematical structures, the proposed approach provides new tools for understanding robustness, universality, and phase transitions in rule-based systems. These findings support advanced modeling applications in complex computing environments, including bio-inspired computation, network dynamics, and intelligent system design.

**Background:** Low household savings rates hinder economic development in Ethiopia, yet the specific drivers in transitional rural-urban communities remain poorly understood. Economic pressures such as low income, large family sizes, and high consumption are hypothesized to be central, yet the interplay with psychological barriers like low financial literacy and mistrust of institutions remains under-examined and poorly integrated into policy.

**Methods:** Following a mixed-methods explanatory design, data were collected from 403 households in rural areas of Adama City. Quantitative data from structured questionnaires were analyzed using descriptive statistics and multiple linear regressions to identify key determinants. Qualitative data from focus group discussions and key informant interviews were analyzed thematically to contextualize the statistical findings.

**Results:** Income was the strongest positive predictor of saving behavior ( $p < 0.001$ ), while family size ( $p = 0.018$ ) and consumption ( $p = 0.002$ ) had significant negative effects. Notably, demographic variables such as education, age, sex, and occupation were statistically insignificant. Qualitative analysis revealed that low financial literacy and a strong preference for informal savings due to mistrust and distance to banks were critical barriers that explained the reliance on cash over formal accounts.

**Conclusions:** Breaking the cycle of low savings in Ethiopia requires interventions that address both economic realities and psychological barriers. Policies must move beyond demographic targeting and instead focus on increasing household income, managing the financial pressures of large families, and implementing trauma-informed financial literacy programs that build trust in formal institutions. Integrating these insights into rural development and financial inclusion strategies offers a practical pathway to enhance household financial security.

**Keywords:** Saving Behavior, Age, Income, Family Size, Consumption, Digital Financial Literacy.

## Abbreviations

**SSA:** Sub-Saharan Africa

**GDP:** Gross Domestic Product

**OLS:** Ordinary Least Squares

**VIF:** Variance Inflation Factor

**NVivo:** A software package for qualitative data analysis

**ETB:** Ethiopian Birr (the currency)

## Introduction

### Background of the Study

Saving is widely recognized as a cornerstone of economic development and long-term stability. In advanced economies, high domestic savings rates support substantial investments in infrastructure, technology, and social services, improve sustained prosperity. In contrast, Sub-Saharan Africa (SSA) faces persistent challenges in mobilizing domestic savings, which limits resources for critical investments and increases dependence on external financing [1]. To address this, mobile banking and digital financial services have emerged as vital innovations for promoting financial inclusion and saving behaviors in underserved areas [2, 3]. While microfinance institutions and community-based savings groups have also expanded access, limitations in their scalability and liquidity remain [4, 5]. Deep-seated issues such as low and volatile incomes, a dominant informal sector, and infrastructure gaps continue to impede savings accumulation across the region, making financial literacy essential for building trust in formal financial systems [6, 7].

Ethiopia reflects these regional dynamics even amid its rapid economic growth. The nation's gross savings stood at approximately 19% of GDP in 2023, a level below what is needed for fully self-sustained development [1]. This challenge is even more pronounced in rural areas, where households often rely on traditional in-kind mechanisms like livestock or grain, which provide limited liquidity and security. However, recent progress in financial inclusion has accelerated through microfinance institutions, cooperatives, and digital initiatives, with adult account ownership reaching around 49% in 2024 [8]. For instance, rural savings and credit cooperatives in regions like Oromia have positively influenced members' saving practices [9]. This makes transitional settings like the rural areas of Adama City where agricultural livelihoods intersect with urban expansion a critical context for examining the socioeconomic determinants of household saving behavior [10]. Understanding these specific factors is vital for designing effective interventions to enhance saving rates and support sustainable economic growth in rural Ethiopia.

### Statement of Problem

This study looks at the problem of low household savings in the rural areas of Adama City, Ethiopia. We want to understand how things like income, family size, spending habits, education, and personal details affect how different families save money in this area that is changing from rural to more urban [10]. The goal is to find out what stops people from saving and suggest specific ways to help them build a better habit of saving.

Saving behavior simply means putting aside some of your income for the future instead of spending it all. It's a measure of financial security, influenced by your economic situation, your community, and the financial services available to you [7]. Peo-

ple can save formally (like in a bank or a microfinance account) or informally (like in a community savings group or by storing goods). When savings are low, it means families have little money set aside for emergencies or big investments [9].

Research shows that saving rates are low in many developing countries, especially in sub-Saharan Africa (SSA). On average, countries in the SSA region save only about 17% of their total national income (GDP), which is much lower than the global average of 36% [1]. In this region, saving is hard because of poverty, unpredictable incomes, and a reliance on informal jobs. This means there isn't enough local money to fund important development projects [6]. While programs like mobile banking and microfinance have made it easier for people in countries like Nigeria and Ghana to save, overall savings are still not high enough to support long-term growth [2, 3].

The main factors that lead to low savings are numerous. Predictors such as low and unsteady incomes, large families that cost more to support, and not knowing much about managing money all leave less cash to put away [7]. Additionally, there are root causes like difficulty accessing banks and formal financial services, along with a cultural preference for informal saving methods. When families don't save, they have to depend too much on foreign aid, loans, and money from relatives living elsewhere. This makes the country's economy weaker and unable to invest in things like new roads and buildings [4]. In rural areas, the ups and downs of farming make these problems even worse, keeping families in poverty [5].

Even though we know a lot about saving patterns globally and in Africa, we still don't know enough about how different groups of people (based on age, gender, or job) save in places that are a mix of rural and urban. Studies often miss the specific ways these factors interact in these changing communities. In Ethiopia, while we have national numbers, we need more detailed studies at the household level in places like Adama. We especially need to understand how the city's growth is affecting the saving habits of people in the surrounding rural areas [9, 10].

Studying this issue is critical because low savings are holding back Ethiopia's economic growth. The country's total savings are expected to be only about 15.4% of its national income in 2025, which is not enough for the country to develop on its own [1]. In rural Adama, where farming and city life are coming together, understanding these issues can help create better policies. These policies can help with unpredictable incomes, improve access to banks, and make families stronger against economic shocks. This supports Ethiopia's national goals of including more people in the financial system and reducing poverty [8].

The findings from this research can help improve low savings rates by giving clear evidence about what really influences saving. This will allow for the creation of targeted programs to teach financial literacy, expand access to microfinance, and support community-based savings projects. This could help families rely less on informal saving, increase their financial security, and support the wider economy in rural Ethiopia, ultimately helping to build a stronger culture of saving [9], [10].

### This Study Aims to Answer two Main Questions

1. What is the saving status of different households in rural areas of Adama City?
2. What are the major factors that determine how different households in rural areas of Adama City save?

### Significance of the Study

This study provides critical, evidence-based insights for policy-makers to design targeted interventions such as income support and financial literacy programs to effectively increase savings in rural Ethiopia. For financial institutions, the findings guide the development of appropriate products and services for underserved communities. Academically, the research fills a critical gap by offering a detailed analysis of saving behavior in a transitional rural-urban context, establishing a foundation for future studies and contributing to broader strategies for poverty reduction and sustainable economic growth.

### Limitations of the Study

While this study provides valuable insights, it is important to acknowledge its limitations, which were shaped by practical constraints and the chosen research design.

First, the study's cross-sectional design is a key limitation. The data was collected at a single point in time, which means it

captures a snapshot of saving behavior but cannot show how it changes over time. Saving habits can be influenced by seasonal factors, economic shocks, or policy changes that a one-time study might miss. A longitudinal study, which follows the same households over several years, would provide a more dynamic understanding of these behaviors.

Second, the study's geographical scope is limited to the rural areas of Adama City. The findings are highly relevant to this specific context but may not be generalizable to other parts of Ethiopia or to different countries with unique cultural, economic, and social conditions. For example, households in a purely agricultural region or a major urban center might face different financial pressures and opportunities.

Third, the research relied on self-reported data from respondents regarding their income, consumption, and savings. This information is subject to recall bias, where individuals may not accurately remember their financial details over the past month or year. There is also the possibility of social desirability bias, where respondents might overstate their savings or understate their consumption to appear more financially responsible. While the researcher took steps to build trust, some level of inaccuracy in self-reported data is often unavoidable.

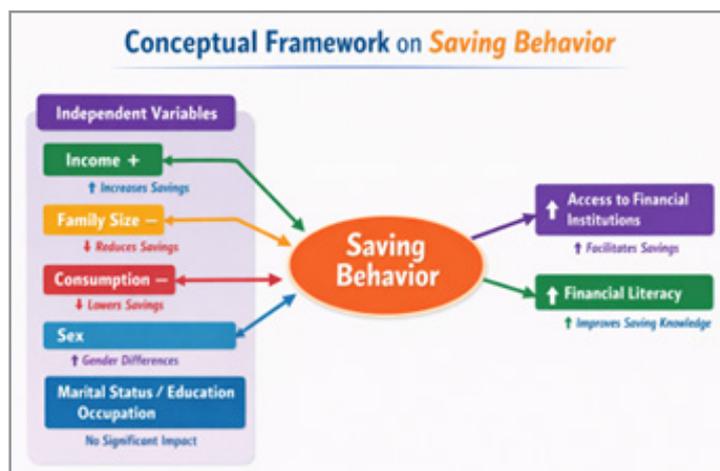


Figure 1: Conceptual Framework of the Study

### Research Methodology

This part explains how the study was carried out. It describes the tools and steps taken to make sure the research on household saving behavior in rural Adama City was thorough, fair, and focused on what the study set out to find.

### Research Design

The researcher chose an explanatory research design. The main goal was not just to describe how people save, but to understand the reasons behind it. The researcher wanted to see how factors like income and family size directly cause changes in saving habits [11]. This design is the best choice for figuring out the "why" behind the numbers, which is essential for creating policies that can actually make a difference.

### Research approach

The study utilized a concurrent embedded (i.e., both qualitative and quantitative research approaches) to understand saving behaviors among different house hold residing in rural areas of

Adama city. The main part of the study was quantitative (using surveys and statistics), but qualitative parts (like interviews) were also included to add depth. This was a necessary choice because saving money isn't just about math; it's also about people's feelings, beliefs, and local customs [12]. If the study only looked at the numbers, it would miss important reasons why people save or don't save, like not trusting banks or not knowing how to manage money. By combining both, the researcher gets a much clearer and more complete picture.

### The Target Population

The focus was on all households in the rural areas of Adama City. This specific area was picked on purpose because it is a place where traditional farm life is mixing with city growth [13]. This creates a unique environment where people face a mix of old and new financial pressures. Studying a place in transition like Adama gives special insights into how saving habits change as a community develops.

## Sampling Technique and Sample Size

The researcher needed to talk to enough people to get a true picture of the whole community. To do this, the researcher used a well-respected formula called Cochran's formula to calculate that a sample of 384 households was needed. This method gives confidence that the sample is large enough to represent the entire area [15]. To account for a 5% non-response rate, the final adjusted sample size was 403. The study ensured a representative sample by applying both random and purposive sampling techniques. Because the formula applicable in situations when the size of the population is unknown, especially in large, heterogeneous, and geographically distributed populations and the sample is statistically valid, with a high confidence level and margin of error, thus representing the population adequately.

### The Formula is

$$n_o = \frac{Z^2 * p(1 - p)}{e^2}$$

Where:  $n_o$  = initial sample size,  $Z = 1.96$  (for a 95% confidence level),  $p = 0.5$  (maximum variability),  $e = 0.05$  (margin of error)

Substituting the values

$$n_o = \frac{(1.96)^2 * 0.5(1-0.5)}{(0.05)^2} \quad n_o = \frac{3.8416 * 0.5(0.5)}{0.0025} \quad n_o = \frac{3.8416 * 0.25}{0.0025} \quad n_o = \frac{0.9604}{0.0025} = 384.16$$

To account for a 5% non-response rate  $384.16 * 0.05 = 403$ . This was rounded up to 384 and then increased by 5% to make up for people who might not respond. This gave a final sample size of 403.

The researcher used simple random sampling for the surveys, which is like drawing names from a hat, to make sure every household had a fair chance to be included. For the interviews, the researcher used purposive sampling to intentionally find people who knew a lot about local money matters, ensuring their stories were meaningful.

## Data Collection Methods

The researcher gathered information in several ways to build a strong case. The researcher used structured questionnaires to get clear, comparable data from all 403 households. The researcher also held focus group discussions and one on one interviews to hear people's stories and opinions in their own words. Finally, the researcher looked at secondary sources, like other studies

## Demographic Characteristics factors Determine Saving

Table 1: Shows Sex

Sex	Freq.	Percent
Male	260	60
Female	143	40
Total	403	100.00

Source; survey result 2025

Out of the sample different house hold taken for the study 60% are male and 40% are female. Under those respondents 260 of them are males and 143 of them are females. The sex of the head of the different group emphasizes the impact of saving as it is shown that the male population are more and suppose to involve themselves in different occupational status are inclined to save

on rural savings, to see how the findings fit into a bigger picture [16]. Using multiple sources helps confirm that the conclusions are solid.

## Methods of Data Analysis

To make sense of the data, the researcher first used descriptive statistics to create a basic profile of the households, like average income and family size. Then, to answer the main question, the researcher used multiple linear regressions (OLS). This is a statistical tool that helps see which factors income, family size, spending, etc. have the biggest impact on savings [12].

### It Tells Not Just if Something Matters, but How Much it Matters. The Model used is Written as

$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8$  Where  $Y$  is saving behavior, the  $X$ s are the factors like income, and the  $\beta$ 's are the numbers that show how much each factor affects savings. The researcher also ran diagnostic tests to make sure the statistical model was sound and the results were reliable.

## Reliability and Validity

To ensure the study was trustworthy, the researcher took several steps. The researcher pilot tested the survey questions on a small group first to make sure they were easy to understand. The researcher had experts review the plan to check for any flaws. Most importantly, the researcher used triangulation, which means comparing the survey results with the interview findings. When the numbers and the stories point to the same conclusion, the researcher can be very confident that the findings are true [15].

## Result and Interpretation

This chapter analyses the result of the determinants to develop Different group of saving behavior by using descriptive statistics and econometrics model (multiple linear regression). The former were used to description purpose while the later was used to analyze determinates of Different group of saving. Under this section there are demographic characteristic factors which describe the total background of the respondents. Such factors are; group of respondents, sex, marital status and family size.

more. The sex of the population determines the income to as larger extent as the group paid to male population is more than that of female population which is again reveals the differences in the saving behavior of the population. The consumption pattern also signifies the differences in saving.

**Table 2:** Descriptive Statistics (Mean, Standard Deviation, Min, Max)

Variable	Obs.	Mean	Std. dev.	Min	Max
Age	403	32.5	7.2	18	60
Family Size	403	4.8	1	2.5	12
Income	403	2500	1500	200	8000
Consumption	403	1600	900	100	3500

Source: survey result 2025

The descriptive statistics from Table 4.3 provide valuable insights into the characteristics of the respondents in this study. The Average group of respondents is 32.5 years, indicating that the majority of individuals are young adults, likely in the phase of building careers, families, and planning for long-term financial goals. The relatively small standard deviation of 7.2 suggests that most respondents are of a similar age, which may imply that they share similar financial priorities and saving behaviors. The Average family size is 4.8 members, which is larger than the typical household size seen in many regions. This larger family size likely increases consumption needs, which can make saving more challenging for many respondents. The standard deviation of 1 indicates that family sizes are somewhat consistent across the sample. On income, the Average monthly income is 2500 ETB, with a significant standard deviation of 1500, reflecting considerable income disparity among the respondents. While higher-income individuals have a greater capacity to save, low-

er-income respondents may struggle to cover basic expenses, making saving more difficult. In terms of consumption, the Average monthly consumption is 1600 ETB, but the high standard deviation of 900 shows great variation. Some respondents report very low consumption, while others have much higher expenditures. This variation can be attributed to differences in income and family size, with larger families and higher incomes often leading to higher consumption needs. The diverse patterns of consumption and income suggest that saving behavior is highly variable within the sample, with some respondents able to save more than others based on their financial situation. Overall, the study indicates that saving is a challenging behavior for many, especially considering the large family sizes and modest incomes observed in the sample. These findings highlight the importance of targeted financial education and policies that can address the unique economic conditions, family structures, and financial priorities of the community in rural areas of Adama city.

#### Different Group Income and Expenditure Patterns

**Table 3:** Income and Consumption of the Different House Hold

Variable	Obs.	Mean	Std.dev.	Min	Max
Income	403	1900	1167.969	190	6000
Consumption	403	1380	884.2602	100	3200

Source: survey result 2025

The result of the survey stated that on average, the respondents' monthly income was 1,900 Birr, with a standard deviation from the mean at approximately Birr 1,167.97. It reflects very low-income levels, with extremes ranging between a minimum of 190 to a maximum of 6,000 Birr per month. These variations reflect variations in financial capacity, where generally, higher-income earners have the potential to save more. This implies that income is an important determinant of saving behavior; the higher the earnings, the greater the propensity to allocate funds to saving. About the consumption expenditure, respondents have varied expenditure ranging from a total of 100 Birr to 3,200 Birr with a mean expenditure of 1,380 Birr with a standard deviation of 884.260 Birr. This range puts into light the differences in financial priorities and consumption habits in different group house hold. The majority of expenditure by the respondents is on essential needs, such as food, farming inputs, non-food items, and ceremonial costs.

behavior may further be complicated by the fact that those with greater consumption needs-especially those from larger households-may have less disposable income to save. It means that in rural areas of Adama city, saving potential depends mainly on the level of income and the pattern of consumption with respect to different group house hold. To complement the quantitative findings, a qualitative analysis was conducted to explore the underlying perceptions, motivations, and barriers influencing household saving behavior. This analysis provided the necessary context to interpret the statistical results by capturing the lived experiences of the participants.

Qualitative data from focus group discussions and key informant interviews were transcribed verbatim and subjected to thematic analysis using NVivo 12 software. An inductive coding approach was employed, allowing themes to emerge directly from the data without preconceived assumptions. Key findings were then systematically cross-validated against the quantitative results to ensure a comprehensive and robust interpretation.

High variability in consumption spending suggests that saving

**Table 4:** Summary of Qualitative Themes

Theme	Frequency	Example Quote
Low financial literacy	45%	"I don't know how to calculate interest."
Preference for cash savings	32%	"Banks are too far; I keep money at home."

Source: Survey result, 2025

### Pervasive Low Financial Literacy

The most significant barrier identified was a widespread lack of understanding of formal financial systems. As shown in Table 4.5, this theme was mentioned in 45% of the qualitative discussions. Participants expressed confusion over fundamental concepts such as interest calculation and the benefits of formal banking. The respondent quote, "I don't know how to calculate interest," underscores a critical knowledge gap that hinders engagement with formal financial institutions and perpetuates a reliance on basic cash savings.

### Preference for Informal Savings Mechanisms

A strong preference for keeping cash at home or participating in community-based savings groups was the second most dominant theme, appearing in 32% of the discussions. This preference was driven by a combination of practicality and deep-seated mistrust. The quote, "Banks are too far; I keep money at home," illustrates how physical distance and associated costs create significant barriers to access. Furthermore, many participants per-

ceived informal systems as more trustworthy and flexible than formal banks.

### Integration with Quantitative Findings

These qualitative insights serve to contextualize and explain the quantitative results. The identification of income as the primary positive predictor of savings is explained by participants' desire to securely manage any surplus income. Similarly, the negative impact of consumption is vividly illustrated by the accounts of families struggling to cover essential expenses. Finally, the qualitative data clarifies why demographic variables like education, sex, and age were statistically insignificant; the overwhelming economic pressures of low income, high consumption, and large family size appear to overshadow individual demographic characteristics in shaping financial behavior. This integrated analysis confirms that effective interventions must address not only economic constraints but also the critical barriers of financial literacy and institutional trust.

### Correlation Matrices

**Table 5:** Correlation matrices

	(obs. =403)									
Saving (Y)	1.0000									
Education	-0.0609	1.0000								
Group	0.3245	-0.1052	1.0000							
Marital status	0.5754	-0.0944	0.2821	1.0000						
Family size	-0.5148	0.0007	-0.1527	-0.5702	1.0000					
Occupation	0.2109	0.1028	-0.0762	0.12609	-0.02609	1.0000				
Sex	0.4863	-0.0915	0.3138	0.6851	-0.4198	0.1198	1.0000			
Income	0.7436	-0.11431	0.4505	0.5711	-0.26019	0.14310	0.5863	0.5152	1.0000	
Consumption	0.5258	-0.1369	0.4543	0.4629	-0.2476	0.1664	0.5575	0.4966	0.76	1.0000

Source: survey result 2025

As above tables show correlation analysis indicates a strong positive correlation ( $r = 0.7436$ ) between income and savings, indicating that higher earners tend to save more. A moderate positive correlation was observed for marital status ( $r = 0.5754$ ) and sex ( $r = 0.4863$ ), suggesting married individuals and one particular sex (requiring further clarification based on variable coding) tend to report higher savings. Conversely, It also showed that family size had a moderate negative correlation with saving capacity,  $r = -0.5148$ , meaning that the larger the family, the lesser the saving capacity. Whereas group and occupation were weakly positively correlated with savings, having values of  $r = 0.3245$  and  $r = 0.2109$ , respectively. In addition, consumption showed a moderate positive relationship of  $r = 0.5258$ , while education

showed a very weak negative correlation of  $r = -0.0609$ , which could probably be due to one's ability to plan on further investigation into this unexpected relationship.

### Inferential (Econometric) Analysis

This section moves beyond simply describing the data to uncover the underlying relationships and test the study's core hypothesis: those specific socioeconomic factors significantly determine household saving behavior in rural Adama City. The primary tool used for this analysis was multiple linear regression (OLS estimation), which helps to identify which factors have a statistically significant impact on savings and to measure the strength of that impact.

**Table 6:** The Econometric Results and Model Statistics of Factors Influencing Saving

Statistic	t-Statistic (T)	P-value (P > t)	Coefficient (Coef.)	Standard Error (Std. Err.)	Model Statistics
Education	0.06	0.953	3.902	403.50251	-
Age	0.38	0.706	2.013	5.1438583	-
Marital Status	0.54	0.591	56.781	104.9558	-
Family Size	-2.44	0.018*	-33.088	13.54521	-
Occupation	0.44	0.664	29.676	67.90705	-
Sex	0.00	0.998	0.1434	93.96288	-

Income	6.13	0.000*	0.418	0.06403631	-
Consumption	-3.33	0.002*	-0.273	0.0819109	-
Constant	0.46	0.646	80.900	175.04038	-
Number of Observations	-	-	-	-	403
R-squared	-	-	-	-	0.6954

Source: survey result 2025

The regression results in Table 4.5 highlight several key factors influencing saving behavior among individuals in rural areas of Adama city. The most significant determinants identified in the model are Income, Family Size, and Consumption. The analysis reveals insights into how these factors affect saving behavior.

Income is the strongest predictor of saving behavior in the model, with a t-statistic of 6.13 and a p-value of 0.000, indicating that it is statistically significant. The coefficient of 0.418 suggests that as income increases, saving behavior also increases. This is consistent with the economic theory that individuals with higher disposable incomes are more likely to allocate a portion of their earnings towards savings. Higher income allows for more savings potential, thus reinforcing the role of income in influencing saving behavior.

Family size exhibits a negative relationship with saving behavior. The coefficient of -33.088, coupled with a t-statistic of -2.44 and a p-value of 0.018, indicates that larger families tend to save less.

This can be attributed to the financial burden associated with larger family sizes, which leads to increased consumption. Larger families often face more expenses, leaving less disposable income for savings. Hence, the more dependents a person has, the lower their saving capacity.

There is a negative relationship between Consumption and saving behavior. With a t-statistic of -3.33 and a p-value of 0.002, consumption is statistically significant in explaining saving behavior. The coefficient of -0.273 suggests that higher levels of consumption reduce the ability to save. Individuals who allocate a larger portion of their income to consumption typically have less money available for saving. Therefore, as consumption rises, saving behavior declines.

Variables such as Education, Age, Marital Status, Occupation, and Sex were found to have little to no impact on saving behavior in this model. Education (t-statistic = 0.06, p-value = 0.953), Group (t-statistic = 0.38, p-value = 0.706), Marital Status (t-statistic = 0.54, p-value = 0.591), Occupation (t-statistic = 0.44, p-value = 0.664), and Sex (t-statistic = 0.00, p-value = 0.998)

Table 7: Regression Results

Source	SS	DF	MS
Model	8,290,575.11	8	1,036,321.89
Residual	3,631,938.73	394	64,856.05
Total	11,922,513.8	402	186,289.28

all have p-values greater than 0.05, indicating they do not have statistically significant relationships with saving behavior in this context.

The R-squared value of 0.6954 suggests that the model explains approximately 69.54% of the variation in saving behavior. This is a relatively strong explanatory power, indicating that the independent variables included in the model capture a significant portion of the variation in saving behavior.

The Adjusted R-squared value of 0.6891 accounts for the number of predictors in the model and still indicates a good fit, showing that even after adjustment, the model retains substantial explanatory power. However, it should be noted that 31% of the variation remains unexplained; suggesting that other factors such as access to financial education, social networks, or cultural influences could also play a role in shaping saving behavior.

The Mean Variance Inflation Factor (VIF) of 2.61 indicates that there is no problem with multicollinearity. This value is well below the commonly accepted threshold of 10, meaning that the independent variables are not highly correlated with each other. As a result, the estimates of the coefficients are unbiased and reliable.

The findings suggest that income, family size, and consumption are the most important factors influencing saving behavior in rural areas of Adama city. To improve saving rates, policies focused on increasing income levels could be effective. Additionally, promoting financial literacy, especially in larger families or among individuals with high consumption levels, may encourage group saving behaviors.

Other variables, such as education, age, marital status, occupation, and sex, did not have a significant impact on saving behavior and thus may not require direct intervention in relation to saving behavior.

So, future research could explore other potential influences on saving behavior, such as access to financial services or education, which might provide a more comprehensive understanding of the factors that drive savings.

Statistics	Value
Number of Observations	403
F-statistic (8, 394)	15.98
p-value (Prob > F)	0.0000
R-squared	0.6954
Adjusted R-squared	0.6891
Root MSE	254.67

Source: survey result 2025

The F-statistic (15.98) with a p-value of 0.0000 indicates that the model is highly significant, meaning that at least one of the independent variables significantly affects the amount of savings.

#### Goodness-of-Fit (R-squared & Adjusted R-squared)

R-squared (0.6954) suggests that 69.54% of the variance in savings is explained by the independent variables. Adjusted R-squared (0.6891) accounts for the number of predictors, indicating a strong explanatory power of the model.

#### Error Measurement

The Root MSE (254.67) shows the standard deviation of the re-

siduals, providing insight into the accuracy of the model's predictions. The model effectively explains the variation in savings behavior across different house hold in rural areas of Adama city. The results indicate that age, family size, income, gender, occupation, education level, marital status, and consumption levels play a significant role in determining individual savings.

#### Analysis of Coefficients

Results of regression analysis for the model are given below that include estimated coefficients, their standard errors, t-statistics, p-values, and 95% confidence intervals for each explanatory variable.

Table 8: Test of coefficients

Variable	Coefficient (Coef.)	Std. Error	t-value	p-value	95% Confidence Interval
Education	3.9119	403.5025	0.06	0.953	[-789.3753, 797.1991]
Age	2.0125	5.1439	0.38	0.706	[-8.1004, 12.1254]
Marital Status	56.7806	104.9558	0.54	0.591	[-149.5628, 263.1240]
Family Size	-33.0876	13.5452	-2.44	0.018	[-59.7175, -6.4577]
Occupation	29.6757	67.9071	0.44	0.664	[-103.8299, 163.1813]
Sex	0.1426	93.9629	0.00	0.998	[-184.5888, 184.8740]
Income	0.4079	0.0666	6.13	0.000	[0.2770, 0.5388]
Consumption	-0.2729	0.0819	-3.33	0.002	[-0.4339, -0.1119]
Constant (_cons)	80.9004	175.0404	0.46	0.646	[-263.2296, 425.0304]

Source: survey result 2025

Family Size negatively affects savings (Coef. = -33.09,  $p = 0.018$ ), implying that larger families tend to save less due to increased consumption demands.

Consumption has a significant negative impact on savings (Coef. = -0.27,  $p = 0.002$ ), meaning that higher spending reduces savings.

Income positively influences savings (Coef. = 0.41,  $p < 0.001$ ), confirming that as income increases, savings also rise. The results indicate that economic factors (income and consumption) and family size play a dominant role in shaping saving behavior, while demographic characteristics are less influential.

Education ( $p = 0.953$ ), Group ( $p = 0.706$ ), Marital Status ( $p = 0.591$ ), Occupation ( $p = 0.664$ ), and Sex ( $p = 0.998$ ) do not significantly influence savings, as their p-values exceed 0.05.

This suggests that demographic factors like age, gender, and marital status have little predictive power in determining saving behavior in rural areas of Adama city.

The constant term (80.90,  $p = 0.646$ ) suggests that, even when all explanatory variables are zero, the base level of savings is not statistically significant.

Final, the findings highlight that family size, income, and consumption are the key determinants of saving behavior in rural areas of Adama city. The other demographic variables do not show significant effects, implying that saving patterns are primarily shaped by economic conditions rather than personal characteristics like education or gender.

Analysis of Significant Variables Influencing Saving Behavior

The following results in Table 4.1 give the descriptive statistics for the major variables influencing saving behavior in rural areas of Adama city: Family Size, Income, and Consumption. These

factors have been significant determinants of saving behavior in the regression analysis.

**Table 9:** Total descriptions of significance variables

Variable	Obs.	Mean	Std. dev.	Min	Max
Age	403	32.5	7.2	18	60
Family Size	403	4.8	1	2.5	12
Income	403	2500	1500	200	8000

Source; survey result 2025

From the result of the survey taken from rural areas of Adama city, it was obtained that, on average, a respondent has gained an income of 2,500 birr per month with a standard deviation of 1,500 birr. The range of income is from a minimum of 200 birr to a maximum of 8,000 birr. This indicates that there is a great variation in the range of income for the respondents. The higher-income earners save more because they have a higher disposable income, which again leads to a general observation that the level of income is a major determinant of one's ability to save. Besides, higher-income recipients are more inclined to earmark a portion of their income towards savings.

Family size averages 4.8 with a standard deviation of 2.5 and ranges from 1 to 12 members. The larger the family size, the more financial burden one has, which decreases one's ability to save. Large families with a large number of dependents usually spend more daily, leaving little room for saving.

The total monthly expenditure for the sample ranges between 100 and 3,200 birr, with an Average expenditure of 1,380 birr and a standard deviation of 884.26 birr. The important categories of expenditure observed are food, farming inputs, non-food items, and ceremonial costs. These categories represent the major ways respondents allocate their incomes. The reason for this, as evidenced through the regression, is that increased consumption reduces capacity for saving because individuals with higher spending get to retain less for saving.

### Discussion and Summary: Factors Influencing Saving Behavior

The regression analysis presented in the previous section has identified key factors influencing saving behavior among individuals in rural areas of Adama city. This section interprets these findings within a socio-economic framework, analyzing how variables such as income, family size, and sex affect saving behavior across different group house hold.

### Model Overview and R-squared Interpretation

The R-squared value of 0.69 indicates that the selected independent variables explain approximately 69% of the variation in saving behavior among the population. This suggests that the regression model fits well, with income, family size, and sex being the most influential factors in determining saving behavior.

### Income and Saving Behavior

The regression results show a positive relationship between income and saving behavior. Specifically, for each additional Birr earned, savings increase by 0.6891 Birr. This finding aligns with basic economic theories, which argue that individuals with high-

er incomes tend to have more disposable income and, thus, a higher capacity to save. This result is consistent with previous studies, such as those by [4,7,16], all of which identified income as a primary determinant of saving behavior.

### Gender Differences in Saving Behavior

The analysis also reveals a gender gap in saving behavior, with men saving more than women on average. This disparity may be attributed to several socio-cultural factors, including differences in income levels between men and women, differing household responsibilities, and gender disparities in financial decision-making authority. These findings are consistent with the research by which highlighted that men in rural areas tend to save more than women [16]. Therefore, improving financial literacy among women and increasing women's income could narrow the savings gap and foster more inclusive financial behaviors.

### Family Size and Saving Behavior

Family size was found to negatively impact saving behavior. The coefficient for family size indicates that each additional family member reduces savings by approximately 33 Birr. This finding aligns with the socio-economic reality that larger families tend to face higher living costs, including food, healthcare, and education. As a result, larger families allocate a greater portion of their income to meet daily needs, leaving less for savings. This is in agreement with the findings of which showed that larger family sizes correlate with higher expenditure and lower savings.

### Insignificance of Other Variables

Other variables such as education, age, marital status, and occupation were found to be insignificant in explaining saving behavior within this study. Although education is often considered a key factor in saving behavior, it did not appear to influence savings in this context, possibly due to the generally low level of formal education in the population. In this case, income and family structure seem to play a more substantial role in determining saving behavior [10]. Similarly, group and marital status were not significant determinants, suggesting that socio-economic factors such as income and family size may have a more pronounced effect on savings habits.

In conclusion, the findings from this analysis underscore that income, family size, and sex are the primary factors influencing saving behavior in rural areas of Adama city. People with higher incomes are more likely to save, while larger family sizes and gender disparities pose challenges to saving behavior. The results suggest that policies aimed at increasing income and improving financial literacy, particularly among women and larger families, could be effective in promoting saving behavior. Fur-

thermore, future research could explore additional factors such as access to financial services, cultural attitudes toward saving, and informal saving mechanisms to better understand saving behavior in this context.

## Conclusion

### Conclusion and Recommendations

This study aimed to investigate the determinants of saving behavior across different house hold in rural areas of Adama city, Oromia Region. The research specifically examined how various demographic factors such as age, sex, family size, and marital status influenced saving behavior. The relationship between income, consumption, education, and savings behavior was established through correlation analysis and multiple regression models.

The findings indicate that several demographic and socio-economic factors significantly impact saving behavior. Family size emerged as the most significant determinant, showing a negative relationship with saving behavior, with larger families tending to save less. The study also found that approximately 69% of the variation in saving behavior could be explained by the factors included in the regression model ( $R\text{-square} = 0.697$ ). The remaining 31% of the variation is likely attributed to other factors not captured in this study.

Income has a positive and significant relationship with savings. Higher income levels tend to lead to an increase in saving behavior. Family size has a negative relationship with saving behavior, as larger families tend to have lower savings, likely due to higher living costs.

Consumption also negatively affects saving behavior, with higher consumption leading to reduced savings ( $p = 0.002$ ). On the other hand, demographic factors such as education, age, marital status, sex, and occupation were found to be insignificant in explaining saving behavior within the scope of this study. Also, other factors such as low-income levels, inaccessibility to financial institutions, high consumption, and a lack of awareness about saving practices also negatively impacted saving behavior.

### Recommendations

Based on the findings, the following recommendations are made to improve saving behavior among individuals in rural areas of Adama city:

- Providing family planning services can help many group family sizes, reducing the financial strain on households and increasing their potential to save.
- Launch public campaigns to educate people on the importance of saving and managing consumption to ensure long-term financial security.
- Increase the accessibility of financial services, such as savings and credit institutions in rural areas to enhance saving behaviors.
- Introduce financial literacy programs to equip people with the knowledge and skills to manage their finances and save effectively.
- Incentivize long-term saving and investment through financial products and policies that promote sustainable economic practices and wealth accumulation.

### Suggestions for Further Studies

Since this research was limited to rural areas of Adama city, it is recommended that future studies replicate this research in other regions to validate the findings and explore regional variations in saving behavior. Moreover, given the cross-sectional nature of this study, it would be beneficial for future research to adopt a longitudinal approach to observe how saving behavior evolves over time.

So, future research could explore other potential influences on saving behavior, such as access to financial services or education, which might provide a more comprehensive understanding of the factors that drive savings.

### Declarations

#### Ethics approval and consent to participate

All procedures adhered to the ethical principles for research with human subjects as outlined in the Declaration of Helsinki. Participation was entirely voluntary, and participants were assured of their right to withdraw at any time without consequence. To protect participant privacy, all collected data were anonymized and treated with the utmost confidentiality.

#### Consent for publication

Not applicable.

#### Availability of data and materials

The data sets used and analyzed during the current study are available from the corresponding author (Fikadu Getachew Mideksa) on reasonable request.

#### Competing interests

The author declares that they have no competing interests.

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#### Author contributions

F.G.M. was solely responsible for the conceptualization, methodology, data collection, analysis, and writing of the original draft. The author has read and agreed to the published version of the manuscript.

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