https://doi.org/10.31279/2782-6414-2025-2-1 Research article

Effect of Land Grabbing, Forced Evictions and Inadequate Compensation on Economic Capital and Food Security of the Displaced Pre-Urban Farmers in Addis Ababa, Ethiopia

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TO CITE:
Gnamura K., Antwi M., Abenet B. Effect of Land Grabbing, Forced Evictions and Inadequate Compensation on Economic Capital and Food Security of the Displaced Pre-Urban Farmers in Addis Ababa, Ethiopia. *Research in Economic and Financial Problems.* 2025;2:1.
https://doi.org/10.31279/2782-6414-2025-2-1
EDN OTVOIM

DECLARATION OF COMPETING INTEREST: none declared.

RECEIVED: 03.03.2025
REVISED: 17.04.2025
ACCEPTED: 05.06.2025

This article has been previously published as a preprint
https://doi.org/10.21203/rs.3.rs-5343393/v1

ABSTRACT

This study investigates the effects of urbanization-induced displacement on economic capital and food security comparing the evicted and non-evicted peri-urban farming households in Addis Ababa, Ethiopia. A mixed-methods approach is employed. The mixed research method combined a quantitative household survey of 446 households (223 displaced and 223 non-displaced households) and a qualitative Focus Group Discussions with 12 groups involving 96 key informants from Lemmi Kura sub-city of Addis Ababa and Kura Jidda Woreda of Sheger city. The data were analyzed using logistic regression, indexes of economic capital security and household food security, and thematic content analysis of the qualitative information to determine the extent that forced eviction influenced the displaced pre-urban farmers. Mann-Whitney U-test was employed to compare the differences between the treatment and control groups in economic capital and household food security status. Key findings indicate that evicted households face significant challenges, with a 72.7 % lower likelihood of achieving economic capital security and 93.4 % reduced odds of maintaining food security compared to non-evicted households. The study also demonstrated that there are significant differences between evicted and non-evicted households regarding economic capital and household food security. These results underscore the urgent need for policies to curb forced eviction, protect their agricultural land, and provide sustainable support for displaced pre-urban farming communities.

KEYWORDS: displaced peri-urban farmers, economic capital security, farmland grab, food security, forced eviction, logistic regression, urbanization

https://doi.org/10.31279/2782-6414-2025-2-1
УДК 336.2
Исследовательская статья

Последствия захвата земель, принудительных выселений и неадекватной компенсации для экономического капитала и продовольственной безопасности переселенных фермеров в Аддис-Абебе, Эфиопия

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ДЛЯ ЦИТИРОВАНИЯ:
Гнамура К., Антви М., Абенет Б. Последствия захвата земель, принудительных выселений и неадекватной компенсации для экономического капитала и продовольственной безопасности переселенных фермеров в Аддис-Абебе, Эфиопия. *Исследование проблем экономики и финансов.* 2025;2:1.
https://doi.org/10.31279/2782-6414-2025-2-1
EDN OTVOIM

КОНФЛИКТ ИНТЕРЕСОВ:
авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

ПОСТУПИЛА: 03.03.2025
ДОРАБОТАНА: 17.04.2025
ПРИНЯТА: 05.06.2025

Данная работа изначально была размещена в виде препринта
https://doi.org/10.21203/rs.3.rs-5343393/v1

АННОТАЦИЯ

В данном исследовании изучается влияние перемещения населения, вызванного урбанизацией, на экономический капитал и продовольственную безопасность, сравниваются выселенные и невыселенные фермерские домохозяйства в пригородах Аддис-Абебы, Эфиопия. Смешанный метод исследования объединил количественный опрос 446 домохозяйств (223 перемещенных и 223 неперемещенных домохозяйства) и качественные обсуждения в 12 фокус-группах, в которых приняли участие 96 ключевых респондентов из Лемми-Кура в пригороде Аддис-Абебы и Кура-Джидда-Вореда в городе Шегер. Данные были проанализированы с использованием логистической регрессии, индексов сохранности экономического капитала и продовольственной безопасности домохозяйств, а также тематического контент-анализа качественной информации, чтобы определить, в какой степени принудительное выселение повлияло на переехавших фермеров, живших до появления городов. Для сравнения различий между основной и контрольной группами в экономическом капитале и статусе продовольственной безопасности домохозяйств был использован U-критерий Манна-Уитни. Основные результаты показывают, что выселенные домохозяйства сталкиваются со значительными проблемами: вероятность достижения экономической безопасности капитала на 72,7 % ниже, а вероятность сохранения продовольственной безопасности на 93,4 % ниже, чем у невыселенных домохозяйств. Исследование также продемонстрировало, что существуют значительные различия между выселенными и невыселенными домохозяйствами в отношении экономического капитала и продовольственной безопасности домохозяйств. Эти результаты подчеркивают настоятельную необходимость разработки политики по пресечению принудительных выселений, защите сельскохозяйственных земель и оказанию устойчивой поддержки перемещенным фермерским общинам, жившим до появления городов.

КЛЮЧЕВЫЕ СЛОВА: перемещенные фермеры из пригородов, экономическая безопасность капитала, захват сельскохозяйственных земель, продовольственная безопасность, принудительное выселение, логистическая регрессия, урбанизация

1. INTRODUCTION

Addis Ababa, Ethiopia's rapidly expanding capital, captures the tension between urban development goals and the rights of agricultural communities. Over the past thirty years, the city's population has more than doubled, exceeding five million residents. The rapid population growth in Addis Ababa over the past thirty years can be attributed to several interrelated factors, including significant internal migration, economic transformation, and policy changes. Addis Ababa, Ethiopia's rapidly expanding capital, exemplifies the tension between urban development and the rights of agricultural communities, as its population has more than doubled over the past thirty years, surpassing five million residents. The built-up area in Addis Ababa has quadrupled from 1990 to 2023, with a notable increase of 224.7 % in built-up areas from 1993 to 2023 [1; 2]. Agricultural land has significantly decreased, with a reduction of 15.92 % in agricultural land cover over two decades [3]. The urban expansion intensity index indicates that urban areas are growing faster than the overall city growth, reflecting a shift from agricultural to urban land use.

The encroachment on peri-urban farmlands has led to a decline in food production, contributing to food insecurity in the region [4]. The loss of ecosystem services, valued at approximately 90.7 million USD annually, underscores the economic implications of urban sprawl on food production and climate regulation.

Urban expansion significantly impacts small-scale farmers, leading to land expropriations and tenure insecurity. This phenomenon is particularly evident in peri-urban areas where urban growth encroaches on agricultural land, displacing farmers and disrupting their livelihoods. Urban expansion has resulted in extensive land expropriations, particularly in cities like Addis Ababa and Shinshicho, where agricultural land has been converted for housing and infrastructure development [5]. Displaced farmers face severe livelihood insecurity, with studies indicating that evicted households are 92.3 % less likely to achieve secure livelihoods compared to their non-evicted counterparts. The loss of agricultural land leads to economic displacement, forcing farmers to seek alternative income sources, which often exacerbates food insecurity [6].

The loss of agricultural land due to rapid urbanization poses significant threats to food security and ecosystem services, with an estimated annual economic impact of 90.7 million USD from reduced natural land cover [1]. Urban growth in sub-Saharan Africa, particularly in cities like Addis Ababa and Kampala, has led to substantial reductions in agricultural land, with built-up areas quadrupling in some regions [7]. In Kampala, agricultural land decreased from 48.02 % to 16.69 % between 1989 and 2015, highlighting the urgency of addressing urban sprawl (Muchelo et al., 2024). The degradation of land quality directly impacts food security, as urbanization often leads to the loss of fertile agricultural areas and essential ecosystem services [8].

The expansion of Addis Ababa has significantly impacted Indigenous Oromo communities, leading to their displacement and the commoditization of their lands. This urban growth, driven by government policies, has resulted in the erosion of traditional systems and livelihoods, as the city expands into surrounding areas historically inhabited by the Oromo. The rapid urbanization has led to the eviction of Oromo households, with studies indicating that over 223 families in peri-urban areas have faced significant socio-economic challenges due to land expropriation [9]. Protests against the Addis Ababa Master Plan highlight the community's resistance to displacement, which has been perceived as a threat to their cultural identity and rights [10; 11]. The commoditization of farmlands and grazing areas has been a central aspect of urban expansion, undermining existing customary land use practices and traditional values [12]. The government's approach to land management has often prioritized economic development over the rights of Indigenous populations, leading to inadequate compensation and loss of cultural heritage [13].

Urbanization in Addis Ababa has significantly impacted farmland and green infrastructure, primarily due to population growth and the proliferation of informal settlements. The rapid urban expansion has led to a dramatic increase in built-up areas while simultaneously reducing agricultural land and green spaces. This transformation poses challenges for sustainable development and food security, necessitating urgent policy interventions. Rapid urbanization in Ethiopia leads to informal land acquisition, with individuals using bogus contract documents to claim legal possession, highlighting the challenges of formal land access and the pressures on urban land due to population growth [14]. Rapid urbanization in Addis Ababa has led to significant land expropriation, displacing peri-urban indigenous communities and resulting in loss of livelihood and food insecurity, exacerbated by inadequate compensation and rehabilitation measures [9]. Urban green space in Addis Ababa decreased from 120.4 km² in 1990 to 76.26 km² in 2021, while built-up areas increased by 216.5 km², highlighting the impact of urbanization on green infrastructure [15].

Urban expansion from 1986 to 2011 has significantly altered land use, particularly impacting agricultural areas. This transformation is evident in various regions, where built-up areas have increased dramatically, often at the expense of farmland, leading to challenges in food production and sustainability. In central Ethiopia, built-up areas quadrupled from 1990 to 2023, while arable land declined significantly, highlighting the direct competition between urban growth and

agricultural land [1]. In Iwo, Nigeria, built-up areas expanded from 9.30 km² in 1982 to 30.69 km² in 2023, with farmland showing a decreasing trend, indicating a similar pattern of urban encroachment on agricultural land [16]. Urban sprawl has serious implications for food security, as it reduces the availability of land for agriculture, which is crucial for local food systems [17]. The loss of agricultural land not only threatens food production but also affects the livelihoods of farming households, as seen in Shinshicho, Ethiopia, where urban expansion has led to significant agricultural losses [18]. Urban agriculture is proposed as a viable solution to mitigate these impacts, promoting local food production within urban settings through practices like rooftop gardens and community farms [19]. Effective urban planning and policy frameworks are essential to balance urban growth with agricultural sustainability, ensuring food security amidst rapid urbanization. While urban expansion poses significant challenges to agriculture and food production, innovative strategies like urban agriculture and improved land-use policies can help address these issues, fostering a more sustainable urban environment.

The urbanization of Addis Ababa has resulted in profound socio-economic and environmental challenges, necessitating effective urban development strategies. The rapid expansion of the city has led to significant land-use changes, particularly affecting agricultural lands and displacing farming communities. Displacement has led to income losses and unemployment among expropriated farmers, exacerbated by inadequate compensation and resettlement support [3]. Land speculation has further marginalized lower-income groups, complicating access to land ownership [20]. While urbanization presents opportunities for development, it also poses significant risks to livelihoods and environmental sustainability, highlighting the urgent need for comprehensive urban planning that prioritizes both urban growth and agricultural preservation.

In Ethiopia, land grabbing significantly impacts vulnerable populations through forced evictions and inadequate compensation, exacerbating urbanization challenges. The existing land use system is marred by tenure insecurity and corruption, necessitating urgent reforms in ownership rights and compensation practices. Land grabbing often leads to forced evictions, particularly affecting farmers on the peripheries of urban areas like Addis Ababa, resulting in income losses and unemployment. Inadequate compensation and lack of resettlement support further deteriorate the living conditions of displaced individuals [21].

The rapid urban expansion in Ethiopia has created significant tenure insecurity among peri-urban farmers, as their land rights are often undermined by state-controlled land acquisition practices [22]. Corruption within the land administration system exacerbates these issues, leading to a disregard for local community interests [23].

There is a pressing need for reforms that prioritize responsible governance of land tenure, ensuring that the rights of local communities are respected and that compensation practices are fair and transparent. Implementing a rights-based approach could help safeguard the interests of affected populations and promote sustainable development [24].

Conversely, while the negative impacts of land grabbing are evident, some argue that large-scale land investments could potentially enhance agricultural productivity and economic growth if managed responsibly. However, this perspective often overlooks the immediate human rights concerns and the long-term sustainability of local.

Addressing the challenges of urbanisation-induced displacement requires a comprehensive approach. This includes developing fair compensation mechanisms, implementing programmes for skill development and alternative employment for evicted farmers, designing targeted food security interventions, and reforming urban expansion policies to better integrate the needs of periurban farming communities. This study bridges gaps in the existing literature by examining how land grabs, forced evictions, and inadequate compensation drive economic capital and food insecurity in Addis Ababa. Through mixed methods analysis, it highlights the discrepancies between Ethiopia's urbanisation rhetoric and the realities of displaced farmers, advocating for reforms that align urban growth with economic capital security and food sovereignty and agrarian justice. By addressing these issues holistically, policy makers and urban planners can work toward more inclusive and sustainable urban development that preserves economic capital, food security and livelihoods for vulnerable peri-urban communities.

2. MATERIALS AND METHODS

2.1. The study area

The study area focuses on the Lemmi Kura sub-cities of Addis Ababa, and the Kura Jidda sub city of Sheger City of Oromia, Ethiopia, with a particular emphasis on the impacts of urban expansion on local communities. Lemmi Kura, established in 2019/2020, is one of the city's designated expansions zones and comprises 10 Woredas, the lowest government structure in Addis Ababa. The study covers specific localities within Lemmi Kura (Figure 1), including Woreda 14 (Yeka Abbado), Woreda 2 (Ayat), and Woreda 6 (Bole Arabsa), which have been significantly affected by urbanization. Kura Jidda Woreda from the Kura Jidda sub city of the Sheger city, Oromia region was included for comparative purposes, providing a point of reference from a different administrative region.

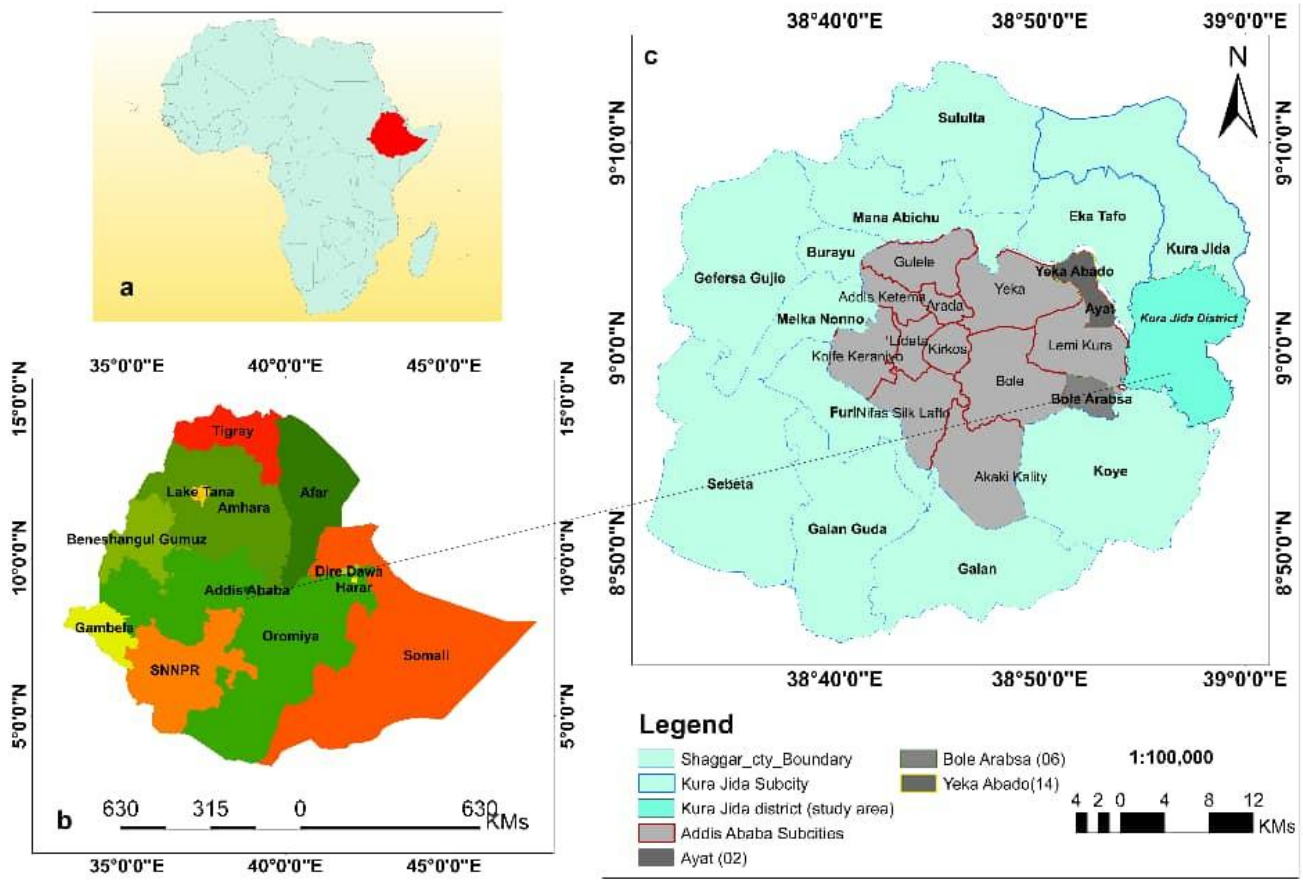

Figure 1

Map of the Study Area, Addis Ababa with Sub-Cities

Between 1997 and 2018, approximately 12,000 households in Lemmi Kura had their farms expropriated, primarily due to government-led condominium construction and private real estate development projects in Woredas 2, 3, 4, 5, 6, 13, and 14. Companies such as Ayat, Sunshine, Gift, Haile, and Addis Mender Real Estates have been involved in these projects, highlighting the role of both public and private sectors in driving urban growth. Woreda 2, 6, and 14 of Lemmi Kura experienced the most relocation, with residents and farmers displaced to make way for new development.

2.2. Research Hypotheses

The alternative hypotheses of this research include the following:

1. H1: There is a significant difference between the economic capital security of the evicted and non-evicted pre-urban households.
2. H2: Urban expansion-induced eviction significantly negatively impacts the economic capital security of peri-urban farming households.
3. H3: There is a significant difference between the food security status of evicted and non-evicted pre-urban households.
4. H4: Urban expansion-induced eviction significantly negatively affects the food security of periurban agricultural households.

2.3. Research Design

The research employed a mixed methods approach, combining quantitative and qualitative approaches addressing the central research concerns. Due to this and based on the literature reviewed, the researcher collected quantitative data from two sample groups of households (those that have been evicted and those that have not).

2.3.1. Sampling Frame

The research has two independent sample groups, “treatment” and “comparison”, or the “displaced” and “nondisplaced” groups of farming households. Therefore, the sampling frame is the total list of displaced households from

treatment villages and nondisplaced households from comparison villages. The list of households was obtained from the Lemi Kura Sub-city Urban Agriculture and Rehabilitation Office and the Kura Jida Woreda Agriculture Office.

2.3.2. Target Population

The study area experienced significant displacement due to urban expansion, with more than 12,000 households affected. However, the research focused on a specific subset of 415 households that received direct monthly support from the City Administration. This purposeful selection of the target population allowed for a more focused examination of the impacts on households most directly affected by displacement and receiving government assistance.

2.3.3. Multistage Random Sampling Procedure

A multistage random sampling technique was employed to select sample households from both "treatment" and "comparison" villages:

Stage 1: Purposive Selection of Sample Woredas: Three woredas (Woreda 2, 6, and 14) were purposefully chosen from the eight woredas in the Lemmi Kura sub-city, Addis Ababa. This selection was based on the concentration of displaced households that received direct support from the city administration.

Stage 2: Random selection of displaced households: A random sample of 223 displaced preurban households from the total of 415 households was selected from the list of those who receive monthly financial support from the city administration. The sample size was proportionally allocated among the selected woredas based on their respective populations.

Stage 3: Selection of comparison households: An equal number of control households (223) were selected from Kura Jidda Woreda in Sheger City, chosen for its proximity to Lemmi Kura and its status as the only nearby woreda with nondisplaced households suitable for comparison.

2.3.4. Systematic Random Sampling

From the total of woredas in the sub-city, systematic random sampling was employed to choose the final study samples. This method involved selecting every nth item from the population list, where n represents a predefined interval. This approach ensured a balanced representation throughout the population and minimised potential bias.

2.3.5. Sample size determination

The Taro Yamane formula is a widely recognized method for calculating sample size in research, particularly when the population size (N) is known. This formula, expressed as

$$n = N / (1 + N(e)^2), \quad (1)$$

helps researchers determine the minimum sample size (n) required to achieve reliable results while considering the margin of error (e). The importance of accurate sample size calculation cannot be overstated, as it directly influences the validity and generalizability of research findings. The formula is versatile, applicable in various research designs, including surveys and clinical studies [25].

Our sample size is computed from the population size of 415 households receiving direct support, with a margin of error (0.05). Applying the formula, the sample size became, $n = 415 / (1 + 415(0.05)^2) = 203$. To account for potential nonresponses, a 10 % contingency was added, bringing the sample size to 223 for the displaced group. An equal sample size was selected for the nondisplaced comparison group, resulting in a total sample of 446 households.

2.4. Data Collection

This study employed a mixed methods approach, combining quantitative and qualitative data collection techniques, to comprehensively examine the impacts of urban expansion on periurban livelihoods in Ethiopia. The data collection process was meticulously designed to ensure reliability, validity, and triangulation of information from multiple sources.

2.4.1. Household Survey

Quantitative data was collected through structured questionnaires administered to sample households in treatment (displaced) and control (nondisplaced) groups. The questionnaires covered household characteristics related to livelihood capital and outcomes.

To ensure the quality and consistency of data collection, several steps were taken. Ten experienced data enumerators and two supervisors underwent a two-day intensive training programme in a classroom setting. Following training, a pilot questionnaire test was conducted, leading to refinements and the removal of unnecessary or unsuitable questions. A pilot study was conducted in 5 % of the households in the sample to ensure the reliability of the data. The Cronbach Alpha test was used to assess reliability and validity, with a coefficient of 0.81 deemed satisfactory, within the permissible range for internal consistency.

The household survey was conducted using computer-aided personal interviewing (CAPI), with custom software programmed for each question to minimise data entry errors and streamline the collection process. The survey was conducted from February 22 to April 15, 2024. Throughout the process, the supervisors conducted regular field visits to ensure data quality and adherence to ethical standards.

2.4.2. Focus Group Discussions (FGD) and Key Informant Interviews

Qualitative data was collected through Focus Group Discussions (FGD) and Key Informant Interviews (KII) to complement and triangulate the quantitative data. FGDs were conducted in Woreda 2, 6, and 14 of Lammi Kura Sub-City, with distinct semi-structured questionnaires developed for displaced and non-displaced groups. More than 12 FGDs were conducted with four FGDs in each Woreda sample, with separate groups for adult males and females from both displaced and nondisplaced populations. Each FGD comprises 6–12 participants.

With the consent of the participants, the FGDs were recorded using a tape recorder to ensure accurate and comprehensive documentation of the discussions. This method allowed the interviewer to focus entirely on facilitating the conversation. By conducting FGDs with various demographic groups in multiple Woredas, the researcher ensured data triangulation, improving the validity, reliability and trustworthiness of the information collected.

The sample size for the qualitative portion was determined based on established guidelines, with a minimum of 12–26 individuals included. At least 25 key informants, purposefully selected from displaced and nondisplaced groups, participated in in-depth interviews lasting approximately one hour each. The recorded data was transcribed and entered into a computer for subsequent narrative, descriptive, and content analysis.

2.5. Model specification for data analysis

2.5.1. Economic Capital Security Index (ECSI)

The Sustainable Livelihood Security Index (SLSI) model is a comprehensive framework designed to assess and enhance the livelihood security of communities, particularly in rural and tribal areas. This model integrates various dimensions of livelihood security, including economic, social, ecological, and infrastructural factors, to provide a holistic view of community well-being. The key components and findings related to the SLSI model are highlighted as follows:

Economic Security: High levels of economic security are crucial, as evidenced by studies showing values around 0.85 among millet farmers in North Eastern India [26].

Food and Nutritional Security: This aspect is foundational, with indices indicating significant improvements in food security through sustainable practices.

Ecological Security: Sustainable management of natural resources is essential for maintaining ecological balance, which directly impacts food security [27].

Social Security: While economic and food security indices are high, social security remains low, highlighting the need for community engagement and capacity-building initiatives.

The Sustainable Livelihood Security Index (SLSI) is an integrated tool measuring agricultural sustainability and livelihood security, encompassing ecological, economic, and social aspects. It tracks regional development, as demonstrated in Maharashtra's assessment from 2010 to 2019 [28].

The Sustainable Livelihood Security (SLS) index was constructed by surveying 900 households in Lucknow, focusing on social, economic, infrastructural, health, and micro-environmental aspects. It revealed low index values, particularly for non-notified slum dwellers, indicating precarious livelihood conditions [29].

The Sustainable Livelihood Security Index (SLSI) model is computed using three indices: Ecological Security, Economic Efficiency, and Social Equity, derived from 20 variables, assessing agricultural sustainability across Karnataka's districts based on their performance in these components [30].

This study quantifies the Economic Capital Security Index (ECSI) based on the economic activities of pre-urban displaced and non-displaced households. Data was collected on fifteen identified economic activities. Sample households were asked to indicate their participation in each activity ("yes" or "no") and to report their annual cash income in Ethiopian Birr (ETB). The ECSI was then computed for each household using models (2), (3), and (4) described below.

To assess whether a household's economic capital was secured, the ECSI was converted into a dummy variable. Households were categorized as "Economic Capital Secured" (If, ECSI > median) or "Not Secured" (If, ECSI < median) using the median ECSI as the cut-off point.

The Sustainable Livelihood Security Index (SLSI) model was adopted for the economic capita security assessment. This instrument was also used to examine disparities between the economic capital security of displaced and non-displaced households.

This study adapts the Sustainable Livelihood Security Index (SLSI) model to establish the Economic Capital Security Index, as follows:

$$Zindj = (Indicator\ j - Min\ j) / (Max\ j\text{-}Min\ j), \quad (2)$$

where $Z\ indj$ = standard indicator j,
$Max\ j$ and $Min\ j$ = Maximum and minimum value of indicator j

Then, the ′ Household Economic Capital Security' (HECS) for each indicator for each household was calculated by using the formula given below:

$$HECSj = \sum Zindj/N, \quad (3)$$

where HECSj = Household Economic Capital Security for one indicator j;
Zindj = summated standardized score of all respondents for one indicator;
N = number of households covered in the study. Once the Economic Capital Security Index for one indicator is constructed, the composite overall "Economic Capital Security Index (ECSI)" is calculated by using the formula given below.

$$ECSI = \sum WiHECSj/ \sum Wi, \quad (4)$$

where ECSI = Economic Capital Security is the composite index of all economic activities for the displaced or nondisplaced preurban households;
HECSj = Household Economic Capital Security;
Wi = sum of weightage of all indicators.

Finally, we used the 14 major economic activity indicators presented in Table 1 to construct the Economic Capital Security Index for both displaced and non-displaced pre-urban households.

2.5.2. Household Food Security Index (HFSI)

Employing the similar methodology outlined in section 2.5.1 for the Economic Capital Security Index (ECSI), we developed the Household Food Security Index (HFSI). As shown in Table 2, this index incorporates six variables related to access, availability, utilization, and stabilization, representing the core dimensions of household food security.

Table 1
Variables of the Household Economic Capital Security Index (HECSI)

Sl. No	Household Participation in Economic Activities	Response
1	Obtained income from crops (Teff, wheat, barley, chickpea, vegetables, etc) in the past 12 months	(Yes = 1, No = 0)
2	Obtained income from livestock and livestock products (milk, meat, live animal, eggs, sheep, goat, heifer, bull, ox, cow, horse, donkey, etc) in the past 12 months	(Yes = 1, No = 0)
3	Obtained income from other jobs/employment (Daily Wage/Causal labor work) in the past 12 months	(Yes = 1, No = 0)
4	Obtained income from business in the past 12 months	(Yes = 1, No = 0)
5	Obtained income from semi-skill work (pottery, carpentry, masonry, electric work, gypsum work, metalwork, mechanics etc) in the past 12 months	(Yes = 1, No = 0)
6	Received remittances in the past 12 months	(Yes = 1, No = 0)
7	Received pension income in the past 12 months	(Yes = 1, No = 0)
8	Received income from renting out assets (land, house, shops, etc) in the past 12 months	(Yes = 1, No = 0)
9	Received income from the sale of assets (land, house, shops, etc) in the past 12 months	(Yes = 1, No = 0)
10	Received aid/support from the government and/or NGOs in the past 12 months	(Yes = 1, No = 0)
11	Received a loan from MFIs or banks or informal money lenders in the past 12 months	(Yes = 1, No = 0)
12	Cash on hand currently	ETB
13	Savings in a bank currently	ETB
14	Family members engaged in income-generating schemes other than agriculture	(Yes = 1, No = 0)
	Total cash income from all sources of economic activities in the past 12 months	ETB
	Total Economic Capital Security Score	
	Economic Capital Security Index	
	Category of Economic Capital Security Index from the median (1, if >=median and 0, if < median).	

Table 2

Variables of the Household Food Security Index

Sl.No	Household Food Security Pillars	Response
1	Households able to eat sufficient food throughout the year **(Utilization)**	(Yes = 1, No = 0)
2	Households eat enough/ adequate kinds of foods throughout the year **(Utilization)**	(Yes = 1, No = 0)
3	Households eat adequate nutritious foods throughout the year **(Utilization)**	(Yes = 1, No = 0)
4	Household members have daily meals three times (meal frequency 3 times=1, otherwise= 0) **(Access to food)**	(Yes = 1, No = 0)
5	Households produce enough food for their family that would be enough throughout a year **(Food Availability)**	(Yes = 1, No = 0)
6	Afford to buy enough food, if own farm produce is not enough **(Access to food)**	(Yes = 1, No = 0)
	Total Household Food Security Score	
	Household Food Security Index	
	Dependent variable Category (Household Food Secured=1, if not secured=0). It is converted to dummy variable (1, if HFSi >=median score or Household not Food Secured = 0, if HFSi < median score)	

Pillars of Food Security

Food security is a multifaceted concept that is fundamentally supported by four key pillars: availability, access, utilization, and stability. These pillars collectively ensure that individuals have sufficient, safe, and nutritious food to meet their dietary needs. Availability refers to the physical presence of food in a region, influenced by agricultural production, distribution systems, and trade dynamics [31]. Utilization concerns the nutritional quality of food and the ability to prepare and consume it safely. Stability refers to the consistency of food availability and access over time, ensuring that food systems are resilient to shocks like economic downturns or natural disasters.

While the four pillars provide a foundational framework for understanding food security, some researchers argue for expanding this framework to include additional dimensions such as food sovereignty and sustainability, which may better address contemporary challenges in food system [32].

2.5.3. Binary logistic regression

The binary logistic model is a statistical method widely utilized for binary classification tasks across various fields. This model estimates the probability of a binary outcome based on one or more predictor variables, employing a sigmoid function to transform linear combinations of these variables into probabilities. The effectiveness of this model is demonstrated in several studies, highlighting its versatility and robustness in different applications. A study on tangerine production utilized binary logistic regression to identify significant factors affecting yield, such as education, labor, and fertilizer use [33]. The model revealed that education and group membership positively influenced production, while farm distance negatively impacted yields. In analyzing household poverty in Bengkulu, binary logistic regression identified key predictors like toilet ownership and family size, achieving a classification accuracy of 89.98 % [34]. This application underscores the model's utility in social research, aiding in targeted policy formulation. Research on acute respiratory infections in children employed binary logistic regression to assess risk factors, finding significant associations with immunization status and exposure to smoke [35]. The model's predictive capability was crucial in identifying high-risk groups for targeted interventions.

The logistic regression model, described in the below equation, was used to examine how various variables influenced the likelihood of farmers being victims of urbanisation.

$$\text{Ln}\,(PX/\,(1–PX)) = \beta 0 + \beta 1\ X1i + \beta 2\ X2i + \ldots + \beta kXki. \quad (5)$$

The subscript (i) refers to the (i)-th observation in the sample. (PX) signifies the probability of an event occurring for a given set of observed variables (X1i); (PX) also represents the probability of the household achieving economic capital security (having a secure economic capital) or not. It also represents the probability of the household achieving food security (having a secured food) or not, β0 denotes the intercept term, while β1, β2, …, βk) are the coefficients of the explanatory variables (X1, X2, … Xu).

Multicollinearity was assessed using the two collinearity statistics variance inflation factor (VIF) and tolerance values. Finally, the researcher analysed the data using SPSS version 29.

Table 3 shows the explanatory variables that influence the food security of peri-urban farmers. The dependent variable is the probability that the farmer is food secure.

The dependent variables are economic capital secured/not secured and Food security (Food secured/not secured).

Table 3

Explanatory Variables and their expected effects

Independent Variables	Description of Variables	Expected effect
X1	Gender of the head of the household (TypeHH) 1= Male, otherwise =0	+ve
X2	categorical age of the respondent (AgeRes) (age between 18-65= 1, otherwise =0	+ve
X3	Family members engaged in continuous productive activities (income-generating activities) (FamSize) continuous	+ve
X4	Literacy rate of wives (LevEdu) (Literate =1, illiterate=0)	+ve
X5	For the dependent variable of Food Security, Economic capital security(secured =1, Non-secured=0) is used as explanatory variable	+ve
X6	Social capital security(secured =1, Non-secured=0)	+ve
X7	Land tenure security (secured/grabbed =1, Non-secured/not grabbed=0)	+ve
X8	Human capital/resources security(secured =1, Non-secured=0)	+ve
X9	Physical capital security(secured/above moderate =1, Non-secured/below moderate=0)	+ve
X10	Infrastructural services security (have better access =1, have no or little access=0)	+ve
X11	ICT Security (have better access =1, have no or little access=0)	+ve
X12	Forced eviction (evicted=1, Non-eviction=0)	-ve
1st dependent variable is ln(Px/(1-Px))	Px is the probability that the household is economic capital secured = 1, otherwise=0	
2nd dependent variable is ln(Px/(1-Px))	Px is the probability that the household is food secured = 1, otherwise=0	

3. RESULTS

3.1. Description of demographic variables

Female-headed households are disproportionately represented among the evicted households, constituting about 19.3 % of the total households, even though they only accounted for 9.0 % of non-evicted households. On the other hand, male-headed households reflect a lower eviction rate relative to their total representation (30.7 %) of the evicted compared to the 41.0 % non-evicted households.

The age of the respondents is categorised as productive and non-productive. Respondents are classified as being in the 'productive age' (between 18 and 60 years) and 'non-productive age' (above 60 years), considered old age.

Of the total sample of 446 HHs, 29.4 % were older than 60 years and 70.6 % were between 18 and 60 years old, constituting the productive age group. Within the non-evicted category of households, totalling 223 HHs, 10.1 % were age categories older than 60 years. The remaining 178 (39.9 %) were within the productive age group between 18 and 60 years.

On the other hand, of the 223 categories of evicted households, 86 (19.3 %) were over 60 years old, while 137 (30.7 %) were between 18 and 60 years in the productive age category. The results further show that the old category (above 60 years) was significantly over-represented among the evicted households. It is also noted that the productive age group that is, 18 to 60 years constitutes the majority in both categories of the households. This reflects a relatively lower vulnerability to eviction compared to the old category.

The households were categorized into small families (1–4 members) and large families (5 or more members. Small families (1–4 members) constituted 42.8 % of the total households, while large families (5 or more members) constituted 57.2 %.

Large families are more prevalent overall but show a slightly higher eviction rate (26.9 %) compared to their non-evicted counterparts (30.3 %). Small families, while less prevalent overall, exhibit a higher proportion among the evicted households (23.1 %) compared to the non-evicted households (19.7 %).

3.2. Expropriated land size

The surveyed households lost both farm and residential lands from the year 2000 to 2018. The land was expropriated for various purposes such as real estate development, government housing projects, and infrastructural developments.

Table 4 presents the average expropriated land in two categories: total farmland in hectares (Ha) and residential area in square meters (m^2). The data is from a survey conducted in March 2024 and comprises 446 observations.

Table 4

Land expropriated at household level

Land Type	No. of HH	Mean	Std. Deviation
Total farmland expropriated in (Ha)	223	1.34	2.19
Residential area expropriated in (m^2)	223	183.56	470.71

Source: Own survey, March 2024.

As shown in Table 4 above, the mean value of the total expropriated farmland is 1.34 hectares. This indicates that, on average, approximately 1.34 hectares of farmland were expropriated per household.

Similarly, the mean value for the expropriated residential area is 183.56 square meters. This average figure indicates that around 184 m^2 of residential land was expropriated per evicted household.

3.3. Impact of eviction on Economic Capital Security (ECS)

3.3.1. Comparison of ECS of evicted and non-evicted pre-urban farming households

This analysis explores the multifaceted concept of Economic Capital Security (ECS) within the specific context of forced displacement affecting preurban farming households in Lemi Kura sub city of Addis Ababa and Kura Jida Woreda of Sheger city in Oromia, Ethiopia.

Economic Capital Security (ECS) is a multifaceted concept that integrates various tangible and intangible assets, income streams, and coping mechanisms essential for households to sustain or enhance their economic well-being. This composite measure reflects the ability of households to navigate economic uncertainties and maintain stability over time. The tangible assets include physical properties and financial investments that provide a safety net during economic downturns. For instance, non-liquid assets can serve as emergency reserves, helping households manage unexpected expenses [36]. On the other hand, the income streams include the **r**egular income from employment or investments is crucial for economic security. Households with diverse income sources tend to experience lower levels of economic insecurity. The coping mechanisms are strategies such as savings, insurance, and community support systems enhance resilience against economic shocks. The ability to neutralize threats is vital for maintaining economic stability [37].

The descriptive analysis revealed a marked difference in economic capital security between the two groups. The median ECSI score for evicted households was, significantly lower than the median score of for non-evicted households ($U = 20516.000$, $p < 0.001$). Furthermore, evicted households exhibited substantially lower total financial capital, with a mean value of 109,234.80 ETB, compared to 218,748.70 ETB for non-evicted households.

Disaggregation of the ECSI into its constituent variables provided further insights into the drivers of this disparity. Evicted households reported significantly lower income from sales of crops and livestock (Table 5), indicating a disruption of traditional agricultural livelihoods. Conversely, evicted households exhibited a greater reliance on income from other jobs/employment and received significantly more aid/support from governmental and non-governmental organizations (Table 5). This shift suggests a transition towards more precarious income streams and increased dependence on external assistance. Finally, evicted households reported higher income from renting and selling assets, signaling a potential depletion of their economic reserves to cope with displacement.

The Mann-Whitney U test is a non-parametric test used to compare differences between two independent groups. It assesses whether the ranks of one group are significantly different from the other group.

The sample group of the non-evicted households has a higher rank of 243.00 than that of the sample group of the evicted households with 204.00 concerning economic capital security. This indicates that the non-evicted households have higher economic security levels than evicted households.

The U value of 20516.000 is the test statistic for the Mann-Whitney U test. It is used to determine whether there is a significant difference between the two groups. The Z value of –3.695 is the standard score, indicating how many standard deviations the U value is from the median of the distribution.

The p-value (0.000), which is less than 0.01, indicates that the result is statistically significant at the 1 % level. This means there is strong evidence to reject the null hypothesis of no difference between the two groups.

The researcher applied the effect size formula of (effect size (r) = = z /SQRT n) to determine the level of effect. The use of effect size (ES) in statistical analysis has significant implications for understanding the relationship between variables. Effect size provides a quantitative measure of the strength of a phenomenon, enhancing the interpretation of research findings beyond mere statistical significance. This approach allows researchers to assess the practical significance of their results, which is crucial for informed decision-making in various fields. Effect size quantifies the strength of the relationship between variables, offering a clearer picture than p-values alone [38]. Unlike p-values, effect sizes are not influenced by sample size,

making them a more reliable measure of the true effect. Reporting effect sizes alongside confidence intervals and p-values aids in making evidence-based clinical decisions [39].

The effect size (r) is calculated to be 0.1750, z = 3.695, n = 446, SQRT of 446 = 21.1187, r = 3.695/21.1187 = = 0.1750), which reflects a small level of effect.

The effect size r is 0.1750, which is considered a small effect size. This suggests that while the difference between the ranks is statistically significant, the magnitude of the difference is, however, small.

The ECS comprises various economic capital variables, each contributing differently to the overall index. The weights assigned to these variables reflect their relative importance in determining economic security.

1. **Income from Agricultural Sales**: Evicted households scored 0.7399 compared to 5 for non-evicted households. The stark difference indicates that non-evicted households have a significantly higher income from agricultural sales, suggesting better access to land and markets.
2. **Income from Livestock Sales**: Evicted households scored 0.6637 against 3.3722 for non-evicted households. This gap reflects the challenges evicted households face in maintaining livestock and accessing markets for animal products.

Table 5

Comparison of Economic Capital Security Variables by Eviction Status

Economic Capital Security variables	Evicted HH	Non-evicted HH	Weights	Evicted HH (Weighted Mean Score)	Non-evicted HH (Weighted Mean Score)
Income from sales of (Teff, wheat, barley, chickpea, vegetables, etc) in the past 12 months	0.147982	1	5	0.73991	5
Income from sales of livestock (milk, meat, live animal, eggs, sheep, goat, heifer, bull, ox, cow, horse, donkey, etc) in the past 12 months	0.165919	0.843049	4	0.663676	3.372196
Income from other jobs/employment (Daily Wage/casual labor work, in the past 12 months	0.251121	0.174888	3	0.753363	0.524664
Income from business in the past 12 months livestock trade, grain trade, etc	0.071749	0.161435	3	0.215247	0.484305
Income from semi-skilled work (pottery, carpentry, masonry, electric work, gypsum work, metalwork, mechanics, etc) in the past 12 months	0.076233	0.35426	3	0.228699	1.06278
Income from remittances in the past 12 months	0.089686	0.058296	2	0.179372	0.116592
Income from pension income in the past 12 months	0.017937	0.017937	1	0.017937	0.017937
Income from renting out assets (land, house, shops, etc) in the past 12 months	0.596413	0.017937	3	1.789239	0.053811
Income from distress sale of assets (land, house, shops, etc) in the past 12 months	0.053812	0.017937	3	0.161436	0.053811
Aid/support from the government and/or NGOs in the past 12 months	0.488789	0.008969	2	0.977578	0.017938
Loan from MFIs or banks or informal money lenders in the past 12 months	0.026906	0.049327	2	0.053812	0.098654
Have cash on hand currently	0.560538	0.569507	1	0.560538	0.569507
Have savings in a bank currently	0.650224	0.641256	1	0.650224	0.641256
Family members participate in income-generating schemes other than agriculture	0.426009	0.466368	3	1.278027	1.399104
Household Economic Capital Security Index (HECSI)	0.258808429	0.312940429	36	0.22969606	0.37257097
Total Economic Capital in ETB	109,234.80	218,748.70		109,234.80	218,748.70

NB: Weights are given between 1 to 5, indicating 1= lowest, and 5= highest.

Source: Own data from the household survey of February – April 2024.

3. **Income from Employment and Daily Wages**: Interestingly, evicted households have a higher weighted score of 0.7534 compared to 0.5247 for non-evicted households. This suggests that evicted households may rely more on casual labor as an income source, possibly due to limited access to stable employment opportunities and lack of access to agricultural land.
4. **Income from Business Activities**: Non-evicted households scored 0.4843, significantly higher than the 0.2152 for evicted households. This disparity implies that non-evicted households have better opportunities for engaging in business activities, which contributes to their economic stability. The non-evicted households engage in small businesses such as trades of small ruminants, grain, pottery, livestock manure, and commission works in their communities. However, such opportunities are rarely available in the displaced pre-urban communities.
5. **Income from Semi-skilled Work**: Non-evicted households scored 1.0628 compared to 0.2287 for evicted households. This indicates that non-evicted households have more access to semi-skilled work opportunities, enhancing their economic capital. The non-evicted households engage in making pottery, which generates additional income for the family. Access to raw materials for pottery-making in the pre-urban communities contributes to engagement in pottery-making.
6. **Remittances and Pension Income**: Remittances provide a slightly higher contribution to the economic capital of evicted households (0.1794) than non-evicted households (0.1166). Both groups receive negligible pension income, indicating a limited role in economic security.
7. **Income from Renting and Distress Selling Assets**: Evicted households derive significant income from renting out assets (1.7892) compared to non-evicted households (0.0538). The evicted households generate additional income from renting out their extra rooms from their service quarters due to their proximity to the urbanised centres. Conversely, both groups have minimal income from distress selling assets, with evicted households scoring slightly higher at 0.1614 than the non-evicted households at 0.0538.
8. **Aid and Loans**: Evicted households receive more aid (0.9776) compared to non-evicted households (0.0179), reflecting their higher dependency on external support. This is because the evicted households receive monthly safety net support of ETB 2200 from the Addis Ababa city administration. Loan access remains limited for both groups, though slightly higher for non-evicted households.
9. **Current Financial Resources**: Both groups have similar scores for cash on hand and savings, indicating comparable short-term financial resources.
10. **Participation in Income-Generating Schemes**: Non-evicted households have a slightly higher score (1.3991) compared to evicted households (1.2780), suggesting better engagement in diverse income-generating activities.

The overall HECSI score is 0.2297 for evicted households and 0.3726 for non-evicted households. The total economic capital in ETB also shows a significant difference, with evicted households having ETB 109,234.80 compared to ETB 218,748.70 for non-evicted households.

The analysis reveals that non-evicted households generally have higher economic security, benefiting from diverse income sources, stable employment, and business opportunities. Conversely, evicted households exhibit a reliance on casual labor, renting assets, and external aid, highlighting their economic vulnerability.

3.3.2. Impact of eviction on HECS of the displaced pre-urban households

The logistic regression analysis was applied to evaluate the economic security of households based on various predictors. The results of the binary logistics regression analysis show that the initial model predicts 47.3 % of cases correctly, with an overall percentage of 100 % for “Secured” but 0 % for “Not Secured”.

The analysis results indicate that when all predictors were included, the model’s classification accuracy improved significantly to 60.1 %, indicating strong predictive power. Omnibus Model Coefficient Tests with a chi-square value of 59.688 ($p < 0.001$) indicate that the model improves significantly over the null model. The Hosmer and Lemeshow test has a Chi-square value of 5.333 with a significance of 0.721. This indicates a good fit for the model. The Model Summary with the –2 Log Likelihood value is 557.307, and the Nagelkerke R Square is 0.167, indicating a modest explanatory power. Table 6 below summarises the key results of the effects of eviction on economic capital security.

The results in Table 6 above show the key predictors and their impact on the economic security of the households are summarised as follows:

The logistic regression model provides an odds ratio of 0.273 for the eviction category variable. This value is derived from the logistic regression equation, where the log odds of the dependent variable (household economic security) are modelled as a linear combination of the predictor variables. This means that the odds of an evicted household being economically secure are about 27.3 % of the odds for non-evicted households. In other words, evicted households are approximately 72.7 % less likely to achieve economic security compared to those who have not been evicted.

Table 6

Determinants of the household economic capital security of peri urban farming households

		B	S.E.	Wald	df	Sig.	Exp(B)	95 % CI for EXP(B)	
								Lower	Upper
	Eviction category(1)	–1.297	.373	12.090	1	.001	.273	.132	.568
	Gender of Household Head	–.256	.334	.587	1	.444	.774	.402	1.490
	Age Category	.315	.249	1.603	1	.206	1.370	.842	2.230
	Family size category	–.013	.224	.003	1	.955	.987	.636	1.532
	Family member engaged	–.279	.245	1.295	1	.255	.757	.468	1.223
	Marital Status Category	.643	.342	3.534	1	.060	1.902	.973	3.718
	Wife Education Level	.365	.337	1.171	1	.279	1.441	.744	2.791
	Household Head Education Level	.153	.286	.287	1	.592	1.166	.665	2.043
	Social Security	–.127	.256	.245	1	.620	.881	.533	1.456
	Land Security	.117	.245	.229	1	.633	1.124	.696	1.816
	Physical Capital Security	.860	.269	10.194	1	.001	2.364	1.394	4.009
	Human Security	–.154	.214	.521	1	.471	.857	.564	1.303
	Infrastructural Service Access Security	.271	.262	1.064	1	.302	1.311	.784	2.191
	ICT Security	.583	.236	6.106	1	.013	1.791	1.128	2.844
	Food Security	.429	.300	2.037	1	.154	1.535	.852	2.766
	Constant	–.764	.474	2.599	1	.107	.466		

Source: Own data analysis, May 2024

The 95 % confidence interval for the odds ratio ranges from 0.132 to 0.568. This interval does not include 1, reinforcing the statistical significance of the results. A confidence interval that excludes 1 indicates that the effect is statistically significant and not due to random chance. The lower bound (0.132) and the upper bound (0.568) suggest that, even in the best-case scenario, eviction drastically reduces the probability of economic security.

The p-value associated with the eviction category is 0.001, indicating strong evidence against the null hypothesis (which posits no effect). This low p-value shows that the relationship between eviction and economic security is highly significant, meaning we can be very confident in the result.

The p-value (0.001) associated with the odds ratio indicates that the relationship between eviction and economic security is highly unlikely to be due to chance. This strengthens the argument that eviction has a substantial and statistically significant negative impact on economic security.

This finding underscores the adverse impact of eviction on household economic security. Eviction not only disrupts the immediate living situation but also has far-reaching effects on the financial stability of households. The result highlights the importance of policies and interventions in preventing evictions to improve economic security among vulnerable populations.

3.3.3. Results of the qualitative analysis

Urban expansion, fueled by population growth and economic development, often encroaches upon Peri-urban areas, leading to significant economic challenges for existing households. These communities, largely dependent on agriculture, face severe disruptions as urbanization transforms agricultural lands and alters local economies. This section delves into the economic deprivation experienced by peri-urban households due to urban expansion, drawing from firsthand accounts of displaced individuals and academic research.

I. Loss of Livelihoods and Economic Challenges:

Focus Group Discussion (FGD) participants of this research reported losing their agricultural and grazing lands to urban expansion and development projects. This loss has severely impacted their main source of income, resulting in food insecurity and economic hardship. As one participant from the Lemmi Kura sub-city of Addis Ababa described, “Our agricultural land was taken from us repeatedly from 1997 to 2018.” Another echoed, “Converting peri-urban agricultural land into residential plots and real estate has disrupted our economic activities, leading to income loss and affecting our ability to sustain our livelihoods”.

The forced evictions have resulted in a significant decline in household income and economic stability, pushing many into dependency on external aid. A participant shared, "Since we were displaced, our family's income level has declined dramatically, exposing us to hunger". Another added, "Rising food and energy prices have resulted in acute poverty in our communities".

II. Challenges in Transitioning to Non-agricultural Livelihoods:

The FGD participants faced difficulties transitioning to non-agricultural livelihoods due to a lack of education, skills, and experience in urban economic activities. They highlighted the need for targeted training and support in developing alternative employment skills. One participant expressed, "It's very difficult to transition to new livelihood activities without the necessary education or skills". Another added, "We need to change to accommodate new economic sectors, but not everyone has access to training programs".

The struggle to adapt has led to further economic hardship and social challenges. Some families have resorted to begging or migrating in search of alternative livelihoods, while others have experienced family breakdowns. One participant noted, "Without jobs, some of our families have fallen on the streets, and others have migrated to unknown regions".

III. Inadequate Compensation and Resettlement:

Participants expressed dissatisfaction with the compensation received for their lost farmland, describing it as "very modest" and "insufficient". Compensation, often financially minimal, was inadequate for purchasing replacement land or housing. One participant noted, "The compensation was 3.70 birr per square meter of farmland, and it was insufficient". Others suggested that in-kind compensation, such as housing or business opportunities, would be more beneficial.

The compensation process was marred by corruption and inequality. A participant lamented, "During the compensation processing, there were many corruptions". Another added, "Promises of long-term support were not fulfilled, leaving us in worse conditions".

Overall, the displacement and inadequate compensation have led to a deterioration in the living standards of Peri-urban farming households, leaving them struggling to maintain their livelihoods and family well-being.

3.4. Household food security of the pre-urban farming households

3.4.1. Household food security index of the evicted and non-evicted households

The analysis of the Household Food Security Index (HFSI) data for evicted and non-evicted households reveals significant disparities in food security dimensions, necessitating a deeper examination through an academic lens. The Food Security Index model, which typically encompasses dimensions such as food availability, access, utilization, and stability, provides a structured framework for understanding these disparities. Table 7 shows the detail components of the composite food security index.

Statistical tests, such as the Mann–Whitney U test is used for this study. It revealed a significant difference in food security levels between evicted and non-evicted households. Specifically, the U value of 7519, combined with a Wilcoxon W value of 32495, indicates that there is a significant difference between the two groups. The Z value of –13.703 and the p-value of 0.000 (which is less than the commonly used alpha level of 0.05) indicate that the observed difference in food security between evicted and non-evicted households is statistically significant. The effect size was 0.6489, which implies that the effect of eviction on household food security is very high. We have strong evidence to reject the null hypothesis; therefore, the null hypothesis is rejected. The evicted and non-evicted households have different household food security levels.

Table 7

Household Food Security Index of the Evicted and Non-evicted households

Household Food Security variables	Household Categories	
	Evicted HH (n = 223) Mean Score	Non-evicted HH (n = 223) Mean Score
Household able to eat sufficient food throughout the year	0.1256	0.7982
Household eats enough or adequate kinds of foods throughout the year	0.1166	0.6592
Household eats adequate nutritious foods throughout the year	0.1211	0.5202
Household produces enough food for their family that would be enough throughout a year	0.1121	0.6996
Afford to buy enough food, if their own farm produce is not enough	0.1076	0.7265
Mean Household Food Security Index	0.1166	0.6807

Source: Own data from the household survey from February to April 2024.

As shown in Table 7, food availability is a critical dimension, reflecting whether households have access to sufficient food throughout the year. The data indicate a stark contrast between evicted and non-evicted households, with evicted households scoring only 0.1256 compared to 0.7982 for their non-evicted counterparts. This disparity suggests that evicted households face substantial challenges in maintaining a consistent food supply, highlighting their vulnerability to food insecurity.

Access to food is another crucial dimension, involving the capacity of households to acquire sufficient food through production or purchase. The ability to afford food when farm produce is insufficient illustrates this dimension. Evicted households scored 0.1076, significantly lower than the 0.7265 score of non-evicted households. This gap underscores the financial constraints faced by evicted households, limiting their ability to secure food through market purchases.

The utilization dimension assesses the nutritional adequacy of the food consumed, ensuring that it meets the dietary needs of the household. In this regard, evicted households recorded a score of 0.1211, compared to 0.5202 for non-evicted households. This finding indicates that evicted households are not only lacking in food quantity but also in nutritional quality, which can have adverse health implications.

Stability, the final dimension, considers the consistency of food availability and access over time. The ability of households to produce enough food for their families throughout the year serves as a proxy for this dimension. Here, evicted households scored 0.1121, in stark contrast to the 0.6996 score of non-evicted households. The low stability score for evicted households suggests they are particularly susceptible to fluctuations in food security, further exacerbating their vulnerability.

The composite mean Household Food Security Index, calculated as a simple average of these dimensions, underscores the overall food insecurity faced by evicted households. With a mean score of 0.1166 compared to 0.6807 for non-evicted households, the data vividly portrays the precarious situation of evicted households.

The implications of these findings are profound. The low scores across all dimensions for evicted households highlight their heightened vulnerability to food insecurity, with potential negative impacts on health and well-being. Addressing these disparities requires targeted interventions that focus on the specific challenges faced by evicted households. These could include enhancing access to financial resources, providing food aid, and supporting programs that bolster food production capabilities.

To mitigate food insecurity among evicted households, strengthening safety nets is imperative. Implementing programs that offer immediate food assistance and financial support can provide a critical buffer against food scarcity. Moreover, initiatives that enable evicted households to engage in food production, such as urban agriculture projects or subsidies for agricultural inputs, can enhance food availability and stability. Improving access to food markets through transportation assistance or financial support will also ensure that evicted households can purchase necessary food items.

In conclusion, the analysis using the Food Security Index model reveals significant food security challenges faced by evicted households compared to their non-evicted counterparts. Addressing these challenges requires a multifaceted approach that includes policy interventions, community engagement, and long-term socioeconomic development to promote a more equitable and secure food system for all.

3.4.2. Pre and Post Eviction Household Food Security Index

Urban expansion and its eviction of peri-urban households have profound implications for food security and access to nutritious diets. This section examines the dramatic changes in households' ability to produce and afford sufficient food following displacement. This section interprets the detailed data on the evicted household food security index in the Lemmi Kura sub-city, Addis Ababa, focusing on various indicators and comparing the "before" and "after eviction" cases. The indicators assessed include the ability to eat enough food throughout the year, the consumption of an adequate variety of food, the number of meals per day, the access to healthy and nutritious food, the production of enough food, and the affordability of buying food when its production is insufficient. The data provided in Table 8 offers a comparative analysis of food security levels before and after eviction.

The above data, shown in Table 8, reveal a severe decline in food security indicators, including the ability to eat enough food throughout the year, access to a variety of adequate foods, and self-sufficiency in food production. Furthermore, affordability to purchase food has become a significant challenge for these households when one's production is insufficient. The findings underscore the critical need for policies and interventions that address the food security crisis faced by peri-urban communities displaced by urbanization. The detailed analysis of each indicator is summarized as follows:

Table 8

Comparative Food Security Indexes during Pre and Post-Eviction

Food Security Indicators	Pre Eviction (1 = 100 %)	Post Eviction (0 = 0 %)
Households able to eat sufficient food throughout the year	0.9327	0.1256
Eat enough or an adequate variety of food throughout the year.	0.8520	0.1166
Number of meals per day	1.0000	0.8789
Have access to sufficient healthy and nutritious food throughout the year.	0.8341	0.0807
Produce enough food for a family that would be enough throughout the year.	0.9013	0.1121
Afford to buy enough food if own farm produce is not enough.	0.7758	0.1076
Mean level of total food security index	0.9288	0.3974

Source: Own survey February 2024

Household ability to eat enough food throughout the year: The mean score after eviction is 0.1256, indicating a severe decrease in households' ability to eat enough food throughout the year. However, before eviction, the mean score was 0.9327, which means that almost all households were able to eat enough food throughout the year.

Eating the right types of food throughout the year, the mean score after eviction is 0.1166, reflecting a significant reduction in the variety and adequacy of the foods consumed. On the other hand, before eviction, the mean score was 0.8520, indicating that households had access to a variety of adequate foods.

Number of meals per day: The mean score after eviction is 0.8789 (88 % of three meals per day), indicating that while the number of meals per day remains relatively high, it has still decreased. However, the mean score before the eviction was 1.00, which indicates that the households usually had three meals per day.

Access to sufficient healthy and nutritious food throughout the year: the mean score after eviction is 0.0807, highlighting a drastic reduction in access to healthy and nutritious food. However, before eviction, the mean score was 0.8341, indicating that households had previously had considerable access to nutritious foods.

For the production of enough food for the family, the mean score after the eviction period was 0.1121, indicating a significant decrease in the ability of households to produce enough food, whereas the mean score before the eviction period was 0.9013, reflecting that households were largely self-sufficient in terms of food production.

Affordability to Buy Enough Food when Own Production is Insufficient: The mean score after eviction is 0.1076, indicating that households struggle to afford food when their production is insufficient. However, the mean affordability score before eviction was 0.7758, suggesting that households had the financial means to buy food when needed.

The data demonstrate a clear contrast in the levels of food security before and after eviction. The mean level of total food security decreased from 0.9288 before eviction to 0.3974 after eviction. This sharp decline underscores the adverse impact of land expropriation on the ability of households to secure adequate food. The most affected indicators are access to enough healthy and nutritious food and the overall ability to produce enough food for the family.

The above analysis provides compelling evidence of the significant negative impact of eviction on household food security in the Lemmi Kura sub city. The decline in all food security indicators after eviction highlights the need for urgent policy interventions to support displaced families. Strategies to improve access to food, enhance food production capacity, and provide financial support are essential to mitigate the adverse effects of land expropriation on food security.

The data in Table 8 shows that the loss of agricultural land and assets significantly impacts the food security of displaced households, leading to food insecurity and dependence on market purchases for their food needs.

Historically, the farming communities in the Lemmi Kura sub city of Addis Ababa had the autonomy to choose their food and drink, which allowed them to support others within their community. This self-sufficiency led to a secure food environment. However, the current shift toward purchasing all food items has compromised this food security, putting current food security at risk (KII 5).

Before evictions, the farming communities of the research area were largely self-reliant, providing mutual assistance even when not all members were food insecure. Post-eviction, they became dependent on external support, reflecting a significant change in their ability to support themselves (KII 8).

According to a key informant of this research, several factors contribute to food insecurity in peri-urban areas, such as lack of innovation and subsequent unemployment, loss of agricultural land, loss of assets during evictions, and displacement of livestock due to urbanization. Reduced agricultural land directly decreases food production capacity, jeopardizing food security (KII1).

The ownership of agricultural land is crucial to producing crops that ensure food security. The loss of this land prevents people from guaranteeing their food supply, thereby endangering their livelihoods (KII1). The confiscation of agricultural land has led to a significant loss of livelihood and assets. Without land, individuals cannot raise livestock or grow crops, exacerbating their challenges to economic and food security (KII 4). Evicted households in peri-urban areas are currently facing severe food crises. These crises manifest as unstable access to adequate and healthy food, financial difficulties, and other related challenges (KII 3).

After being displaced from their land, villagers often face unemployment or are forced to work in informal employment. This transition results in a substantial decrease in income and an increase in malnutrition due to reduced food availability (KII 5). Households that have not been evicted can harvest crops from their land, thus enjoying more reliable food security. In contrast, evicted households face increased food insecurity, lacking the means to produce food (KII 2).

The qualitative insights from focus group discussions and interviews provide a deeper understanding of the lived experiences of evicted households. The loss of self-sufficiency and increased dependence on market purchases for food represent a fundamental shift in livelihood strategies that can have long-lasting impacts on household food security and resilience.

3.4.3. Level of Household Food Security during the Pre and Post-Eviction

Food security, which includes the availability, accessibility, and use of nutritious food that supports a healthy and active lifestyle, is a critical aspect of human well-being. This section examines the impact of land expropriation on household food security in the Lemmi Kura sub city, Addis Ababa. The analysis is based on data collected from 223 displaced preurban households and assesses their food security status pre and post-eviction.

The research employed a survey methodology, focusing on key indicators of food security, which include adequate meal quality, healthiness and variety of food, frequency of meals, food production, and affordability. The responses of the households were classified into five levels of food security: 1) severely food insecure, 2) food insecure, 3) fairly food secure, 4) good food secure, and 5) fully food secure. The data collected were then analyzed to determine the changes in food security levels before and after eviction.

The findings of the current research shown in Table 9 clearly illustrate a dramatic decline in food security among displaced households after eviction. Before eviction, a substantial majority (80.27 %) of the households were food secure, with 66.37 % being fully food secure. This changed drastically after eviction, with the mean level of food security falling to 8.07 %.

Table 9

Perceptions of the respondents on their status of household food security during pre and post-eviction (n = 223).

Perceptions of respondents on their status of household food security	Pre- Eviction (Percent of HH)	Post- eviction (Percent of HH)
Severely food insecure	2.24	79.82
Food Insecure	2.69	7.17
Fairly food secure	14.80	4.93
Good food secure	13.90	1.79
Fully food secure	66.37	6.28
Total	100.00	100.00

Source: Own survey February 2024

As shown in Table 9, before the eviction, approximately 80.27 % of the respondents were at a good or fully food-secured level, fulfilling all food security indicators. However, after eviction, approximately 79.82 % of the respondents fell into the category of severely food insecure, not meeting any of the food security indicators.

The substantial decrease in food security after eviction highlights the severe consequences of land expropriation for the livelihoods of households in the Lemmi Kura sub city. The loss of agricultural land, which was a main source of food production and income, resulted in reduced meal adequacy, reduced variety and healthiness of food, and decreased frequency of meals.

This study underscores the critical impact of land expropriation on household food security in the Lemmi Kura subcity. Displacement led to a drastic decline in food security levels, and most households became food insecure. Policymakers must consider the severe implications of such actions for the well-being of affected communities and develop strategies to mitigate these adverse effects. Ensuring access to alternative livelihoods and food sources for displaced households is essential to improve food security and overall well-being.

3.4.4. Impact of eviction on household food security of the pre-urban farming households

The following section discusses the determinants of household food security from the perspective of a sustainable livelihood security framework and the impact of the urban eviction of peri-urban farmers. This analysis aimed to identify the key factors that influence food security, represented by the dichotomous variable "Food Security Level", using variables of sustainable livelihood security indicators.

From this perspective, the classification tests achieve an overall classification accuracy of 87.9 %, with 90.8 % accuracy in predicting non-food secured cases and 84.1 % accuracy in predicting food secured cases. This marked improvement highlights the efficacy of predictor variables in distinguishing between food-secure and food-insecure households.

Similarly, the inclusion of predictor variables significantly enhances the performance of the model, as indicated by the Omnibus Model Coefficient Tests (Chi-square = 358.100, df = 17, $p < .001$). The Hosmer–Lemeshow test (Chi-square = = 10.724, df = 8, p = .218) also suggested that the model fit the data well, as the p-value was greater than .05, indicating that there were no significant differences between the observed and predicted outcomes. The -2 log-likelihood value decreases to 253.137, suggesting a better fit. The Cox & Snell R square (.552) and Nagelkerke R square (.740) values indicate that the model explains a substantial portion of the variance in food security status.

The study results shown in Table 10 summarize the key results from the logistic regression analysis on the impacts of the independent variables on household food security from the perspective of the sustainable livelihood security framework and urbanization-induced eviction of the peri-urban farmers.

In Table 10 above, the logistic regression analysis identifies several key predictors of food security among households. In particular, eviction status, social security, land security, ICT security, and SLSI scores emerge as significant factors. These findings underscore the multifaceted nature of food security, which is influenced by socioeconomic, educational, and infrastructural dimensions. The logistic regression output provides insights into the significance and impact of each predictor variable on food security as follows:

Table 10

Explanatory Variables Influencing Food Security of Evicted Peri-urban Farming Households

	B	S.E.	Wald	df	Sig.	Exp(B)	95 % C.I. for EXP(B)	
							Lower	Upper
Peri-urban eviction	–2.717	0.627	18.79	1	0.00	0.066	0.019	0.226
Gender Household Head	–0.398	0.485	0.672	1	0.412	0.672	0.259	1.74
Age Category	–0.66	0.448	2.169	1	0.141	0.517	0.215	1.244
Family size category	–0.34	0.354	0.924	1	0.336	0.712	0.356	1.423
Family member engaged	–0.026	0.396	0.004	1	0.947	0.974	0.448	2.115
Marital Status Category	0.217	0.498	0.19	1	0.663	1.242	0.468	3.295
Wife Educational Level	0.988	0.508	3.783	1	0.052	2.687	0.992	7.274
Household Head Educational Level	0.523	0.419	1.558	1	0.212	1.686	0.742	3.832
Economic Security	0.327	0.334	0.96	1	0.327	1.387	0.721	2.671
Social Security	0.928	0.372	6.236	1	0.013	2.53	1.221	5.241
Land Security	0.938	0.364	6.643	1	0.010	2.555	1.252	5.213
Physical Capital Security	–0.2	0.466	0.184	1	0.668	0.819	0.329	2.041
Human Security	0.179	0.229	0.614	1	0.433	1.197	0.764	1.875
Infrastructural Service Access Security	–0.267	0.417	0.411	1	0.522	0.765	0.338	1.733
ICT Security	–1.018	0.45	5.127	1	0.024	0.361	0.15	0.872
SLSI	3.281	0.499	43.19	1	0.000	26.606	10	70.789
Expropriated total farmland	–0.078	0.139	0.311	1	0.577	0.925	0.704	1.216
Constant	–0.697	0.744	0.876	1	0.349	0.498		

Source: Own data analysis from the February survey 2024

Eviction status: Households that have been evicted are significantly less likely to be food secure (B = –2.717, p < .001, Exp (B) = .066). Evicted households are significantly less likely to have food security, with an odds ratio of 0.066. This means that eviction drastically reduces the likelihood of food security, highlighting the vulnerability of evicted households and the need for targeted interventions to support those evicted households. Eviction is a significant negative factor that requires policies to prevent eviction and support affected households.

Wife Education Level: Marginally significant (p = .052), with higher education levels associated with increased food security (Exp (B) = 2.687). Households where the wife has a higher education level are approximately 2.687 times more likely to have food security than households where the wife has a lower education level. This highlights the critical role of women's education in improving household food security. The role of women's education is crucial for improving food security, highlighting the need for educational programmes geared toward women.

Social capital security: This variable is significant (p = 0.013), with higher social capital security associated with increased food security (Exp (B) = 2.530). Households with higher social capital security are approximately 2.53 times more likely to be food secure. This significant effect underscores the importance of social capital security in improving food security.

Land tenure security: Significant (p = 0.010), with greater land tenure security associated with greater food security (Exp (B) = 2.555). Households with better land tenure security are approximately 2.55 times more likely to achieve food security. Secure tenure and access to land resources play an essential role in ensuring food production and availability. Land security is essential for food production and stability, supporting land tenure policies.

Human capital security (B = 0.179, Sig. =0.433, Exp (B) = = 1.197): Households with higher human security are approximately 1.197 times more likely to be food-secure. Human capital security encompasses health, education, and employment, which are essential for maintaining stable livelihoods and food security. Human security is important for general well-being and food security, highlighting the need for comprehensive human development programmes.

Specifically, the logistic regression coefficient for the eviction (Eviction Category (1)) is –2.717, with a standard error of 0.66. The Wald chi-square test yields a value of 18.790, which is highly significant (p < .001). The odds ratio (Exp (B)) is 0.066, with a 95 % confidence interval ranging from 0.019–0.226.

The negative coefficient (–2.717) indicates an inverse relationship between eviction status and food security. Specifically, households that have experienced eviction are significantly less likely to be food secure than those that have not been evicted.

The odds ratio (0.066) suggests that the odds of being food secure for evicted households are 93.4 % lower than those for non-evicted households. In other words, evicted households have approximately 1/15th the odds of being food secure compared with non-evicted households.

The p-value (< 0.001) indicates that the relationship between eviction status and food security is highly significant, meaning that the likelihood of this relationship occurring due to random chance is extremely low. This strong statistical significance underscores the robustness of the status of eviction as a predictor of food security.

The 95 % confidence interval for the odds ratio (0.019–0.226) does not include 1, further confirming the significant impact of eviction on food security. The narrow range of the confidence interval enhances the reliability of the estimated odds ratio.

These findings underscore the importance of education and social, land, and human security in determining food security. Interestingly, eviction significantly reduces the odds of securing food, highlighting the vulnerability of evicted households.

The findings of this study highlight the significant negative impact of urbanisation-induced eviction on food security of peri-urban farming households in Addis Ababa. The stark contrast in food security levels between evicted and non-evicted households underscores the critical role that access to agricultural land plays in maintaining food security in these communities. The dramatic decline in food security indicators after eviction reflects the multidimensional nature of the challenges faced by displaced households. Not only do they lose their primary means of food production, but also experience disruptions to their social networks, economic stability, and overall livelihood strategies.

The identification of key factors influencing food security, such as education levels, social capital, and land security, provides important insights for policy interventions. These findings suggest that comprehensive approaches addressing multiple dimensions of household vulnerability are necessary to improve food security outcomes for displaced communities.

4. DISCUSSION

4.1. Household economic capital security of evicted and non-evicted households

Economic/financial capital security, which is one of the major components of the composite Sustainable Livelihood Security (SLS), is analysed and synthesized in this sub-sec-

tion. To assess the difference in economic capital security of evicted and non-evicted Peri-urban farming households in Addis Ababa, the Mann-Whitney U Test, a non-parametric test, was used to compare the differences between the two independent groups. This test assesses whether the mean ranks of one group are significantly different from the ranks of another group. The null hypothesis tested under this sub-section was H0: economic security of the evicted and non-evicted households is the same.

The mean rank for non-evicted households (243.00) is higher than that for evicted households (204.00), indicating that non-evicted households have higher economic security levels on average. The U value of 20516.0, a Z value of -3.695, and a p-value of 0.000 (less than 0.01) indicate a statistically significant difference between the two groups at the 1 % level. Therefore, the null hypothesis of no difference between the groups is rejected. The rejection of the null hypothesis regarding the relationship between eviction and economic security suggests a significant association between these two factors, indicating that eviction may indeed contribute to economic instability. Eviction is linked to increased financial distress, as evidenced by studies showing that evicted households experience a decline in credit access and durable consumption for several years following eviction [40]. The financial strain often precedes eviction, indicating that eviction is both a consequence and a cause of economic hardship, perpetuating a cycle of poverty [41].

The detrimental effects of forced displacement on economic well-being are well-documented, particularly in the context of agricultural livelihoods in pre-urban communities. Displacement disrupts these livelihoods, leading to increased reliance on precarious income sources and heightened vulnerability. This overview will explore the impacts of displacement on economic security, the shift to precarious labor, the reliance on aid, and the implications of asset depletion.

Displaced households are 92.3 % less likely to have secure livelihoods compared to non-evicted households, highlighting the severe economic consequences of forced eviction (Gnamura et al., 2024) [42]. The disruption of agricultural activities, a cornerstone of economic security, leads to significant income loss and food insecurity.

Evicted households often resort to daily wage labor, which is characterized by instability and low income, exacerbating their economic vulnerability [43]. The shift to precarious labor sources increases the risk of poverty and economic instability for displaced populations.

Many displaced individuals depend on aid, indicating a critical need for targeted interventions that address their specific economic needs [44]. Effective resettlement policies are essential to mitigate the socio-economic impacts of displacement and support livelihood recovery.

Increased income from renting or selling assets can lead to a “downward spiral” of asset depletion, undermining long-term economic stability [45]. This aligns with theories on asset depletion, which suggest that reliance on short-term financial strategies can jeopardize future economic security.

Conversely, some argue that forced displacement can lead to new economic opportunities in urban settings, as displaced individuals may adapt and find new livelihoods. However, this perspective often overlooks the immediate and severe impacts on their existing economic structures and social networks.

Erosion of Agricultural Foundations: The dramatic reduction in income derived from crop and livestock sales among evicted households (0.740 vs. 5.000 and 0.664 vs. 3.372, respectively) signifies a profound disruption of their primary livelihood activity. This loss extends beyond immediate income. The displacement of pre-urban farming households impacted their asset accumulation by diminishing agricultural income. It limits the capacity for asset accumulation, hindering future productivity and investment. Evicted households experience a 92.3 % decrease in secure livelihoods compared to non-evicted households, indicating severe economic vulnerability (Gnamura et al., 2024). Agricultural income for tenant farmers in Pakistan dropped from 65 % to 25 % of total income post-eviction, leading to increased reliance on alternative income sources [46]. The loss of agricultural income significantly hampers the ability of displaced households to accumulate assets, which is crucial for sustainable livelihoods. Displacement often results from urban growth, land expropriation, or climate-induced factors, leading to diminished agricultural productivity and increased food insecurity. Displacement due to urban expansion leads to reduced farmland availability, disrupting agricultural practices and causing substantial income losses for farmers [47]. Displacement disrupts established social networks, further complicating recovery and asset-building efforts [48].

Precarious Diversification: While evicted households show a higher proportion of income derived from daily wage/casual labor (0.753 vs 0.525), this does not necessarily represent a positive adaptive strategy. Instead, it reflects a forced transition to more precarious and less stable employment opportunities.

Labor market vulnerabilities significantly impact displaced households, particularly those engaged in casual labor markets characterized by low wages and limited job security. These conditions exacerbate their susceptibility to economic shocks, as evidenced by various studies on precarious employment. Precarious employment (PE) is linked to poor health outcomes and social inequities, with many labor market initiatives failing to adequately address these issues [49].

In Delhi, a significant portion of informal workers lack social security, leaving them exposed to economic instability [50].

Skill mismatch is another factor affecting displaced pre-urban households. The skills and experience acquired through farming may not be directly transferable to the available labor market opportunities, leading to underemployment and reduced earning potential.

Asset Depletion as a Coping Mechanism: The elevated levels of income generated from renting out or selling assets among evicted households (1.789 vs 0.054 and 0.161 vs 0.054, respectively) should be interpreted with caution. The phenomenon of distress selling, where households liquidate assets to meet immediate survival needs, has significant long-term consequences on their economic stability and wealth accumulation. This process not only provides temporary relief but also diminishes the households' capacity to generate future income, leading to increased vulnerability to economic shocks. Distress sales often result in the loss of productive assets, which are crucial for generating income over time [51]. Households that engage in distress selling become more susceptible to future economic shocks, as they lack the necessary resources to cope with unexpected financial burdens [52]. The depletion of assets can entrench poverty, as families may find themselves in a cycle where they are forced to sell more assets to survive, further diminishing their economic standing.

Aid Dependence and its Limitations: The significantly higher reliance on government and NGO aid among evicted households (0.978 vs 0.018) underscores their vulnerability and dependence on external support. Aid plays a critical role in providing immediate relief during crises; however, it often fails to foster sustainable livelihood strategies, leading to dependency. This dependency can create disincentives for self-reliance and may hinder long-term resilience. Case studies indicate that while aid can alleviate immediate poverty, it should be integrated with strategies that promote self-sufficiency and community resilience [53]. Dependency syndrome can lead to political violence, poverty, and a lack of innovation, ultimately hindering sustainable development in regions like Africa [54].

Relative Stability in Limited Areas: The similarities in indicators like cash on hand and savings in banks (0.561 vs 0.570 and 0.650 vs 0.641 respectively) may reflect coping mechanisms in the very short term and are not indicators of true security.

In summary, the computed ECSI scores (0.259 for evicted vs. 0.313 for non-evicted, unweighted; 0.230 vs. 0.373, weighted) should not be treated as absolute measures, but rather as relative indicators of economic capital security. The scores provide a valuable summary of the overall economic status of the two groups, but their true value lies in the disaggregated analysis of the underlying variables. The difference in ECSI weighting is also noteworthy. Given the disproportionate role that agriculture plays, it makes sense that the gap would be significantly higher when weights were applied.

The logistic regression model provides an odds ratio of 0.273 for the eviction category variable, indicating that evicted households are approximately 72.7 % less likely to achieve economic security than non-evicted households. The 95 % confidence interval for the odds ratio (0.132 to 0.568) reinforces the statistical significance of the results. The p-value of 0.001 further strengthens the argument that eviction has a substantial and statistically significant negative impact on economic security [55].

Similarly, participants in the Focus Group Discussion (FGD) reported losing their agricultural and grazing lands due to urban expansion and development projects. This loss of their main source of income and livelihood has severely impacted their ability to grow crops and raise livestock, leading to food insecurity and economic hardship.

Participants in the FGD reported a significant decline in their household income and economic stability after evictions, leading to increased food insecurity, loss of assets and dependence on external aid. The loss of their agricultural livelihoods and the lack of alternative employment opportunities have contributed to their economic challenges and deprivation.

The forced eviction and loss of land had severe consequences for the peri-urban farming households. They lost their primary sources of livelihood, including agricultural land, grazing land, and other assets, which led to a disruption of their way of life, loss of income, and an inability to provide for their families, particularly regarding education, food, and employment opportunities.

The evictees in the study area struggled to transition to non-agricultural livelihoods due to a lack of education, skills and experience in urban economic activities. They expressed the need for targeted training and support to develop the necessary skills for alternative employment and entrepreneurship. The inability to find suitable jobs has led to further economic hardship and social challenges for displaced households.

The FGD participants also expressed dissatisfaction with their compensation for lost farmland, describing it as "very modest" and "insufficient". They felt that compensation was inadequate to purchase replacement land or housing. Some participants suggested that in-kind compensation, such as housing or business opportunities, would be more beneficial.

The compensation received by the participants was inadequate and did not match the value of the lost land and assets. The compensation was not distributed equally among all family members, and the children were not compensated. Participants were dissatisfied with the compensation process, which needed more transparency and fairness. Similar findings studies concluded that compensation often fails to reflect the true value of lost land and assets, as seen in Dumai City, where landowners felt the compensation was unsatisfactory [56]. In Malawi, customary land compensation is based on market value, which does not adequately account for the unique characteristics of such properties, leading to insufficient compensation [57].

This finding underscores the adverse impact of eviction on household economic security, emphasising the need for policies and interventions to prevent evictions and improve the economic stability of vulnerable populations. Similar study highlighted a pressing need for reforms in compensation assessment mechanisms to ensure fairness and transparency, which could involve better consultation with affected communities. Addressing these issues is crucial for improving the economic stability of those affected by land acquisition and preventing future evictions.

The broader implications of these findings suggest that urbanisation and development-induced displacement have far-reaching effects on affected households' economic and social stability.

4.2. Urbanisation-induced eviction and household food security

4.2.1. Household food security in the evicted peri-urban farming households

In this sub-section, the Mann-Whitney U test was also conducted to determine whether there is a significant difference in food security between evicted and non-evicted households. The null hypothesis tested in this sub-section was that the food security status of the evicted and non-evicted households is the same.

The findings indicate that non-evicted households have a significantly higher mean rank for food security (301.28) than evicted households (145.72). This suggests that, in general, non-evicted households experience greater levels of food security compared to those that have been evicted.

The logistic regression analysis was also performed to identify critical factors influencing food security, incorporating various socio-economic and other indicators of sustainable livelihood security. The logistic regression analysis identified critical factors influencing household food security and revealed several significant predictors. Specifically, the eviction status (evicted = 1 and non-evicted = 0) had a negative coefficient (–2.717), indicating an inverse relationship between the eviction status and food security. Households that have experienced eviction are significantly less likely to have food security compared to non-evicted households (B = –2.717, S.E. = 0.627, Wald = 18.790, df = 1, Sig. < < 0.001, Exp (B) = 0.066).

The odds ratio (0.066) suggests that the odds of being food secure for evicted households are 93.4 % lower than for non-evicted households. This strong statistical significance underscores the robustness of eviction status as a food security predictor. Similar research found that eviction negatively impacts food security, and evicted households show a significant decrease in food security status [58].

Similarly, the variable Wife's educational level (being educated = 1 and not educated = 0) revealed that households, where the wife has a higher education level are approximately 4.55 times more likely to be food secure compared to households where the wife has a lower education level (B = 1.515, S.E. = 0.468, Wald = 10.469, df = 1, Sig = 0.001, Exp (B) = 4.549). Similar studies emphasised the positive impact of women's education on food security, highlighting the critical role of women's education in improving household food security [59; 60].

The result of the social capital security indicator shows that households with higher social capital security are approximately 3.90 times more likely to have food security (B = 1.361, S.E. = 0.331, Wald = 16.942, df = 1, Sig. < 0.001, Exp (B) = 3.900). A study corroborates the significant effect of social protection programmes on improving food security, highlighting the importance of social capital security in improving food security outcomes [61].

The land capital security variable in the logistic regression analysis shows that households with better land security, which includes having better farmland, are approximately 3.88 times more likely to achieve food security B = 1.357, S.E. = 0.317, Wald = 18.332, df = 1, Sig. < 0.001, Exp (B) = = 3.883). Similar study concluded secure land ownership significantly reduces food insecurity, with studies indicating a 50 % reduction in food insecurity among households with land rights [62]. Land tenure security, such as Certificates of Customary Right of Occupation (CCRO), leads to higher agricultural yields and lower production costs, enhancing food security [63]. Households with secure land rights are more likely to invest in modern farming techniques, further improving their food production capabilities.

Similarly, the human capital security variable in the logistic regression analysis shows that households with higher human security are about 2.95 times more likely to be food secure (B = 1.083, S.E. = 0.309, Wald = 12.312, df = 1, Sig. <

< 0.001, Exp (B) = 2.952). Similar to this, a study highlighted education enhances individual capabilities, leading to higher employment rates and economic contributions [64]. A similar study corroborated that skill development programs are essential for adapting to changing job markets, thereby supporting food security through increased economic resilience [65]. Similar study concluded that employment opportunities are vital for sustaining livelihoods; they provide income that supports food security [66]. Human capital development has been shown to moderate the negative impacts of environmental factors on food security, emphasizing its role in economic stability. The studies emphasised the importance of human capital security, which encompasses health, education and employment, in maintaining stable livelihoods and food security.

4.2.2. Household food security pre and post-eviction

The descriptive analysis of the study's result reveals a dramatic decline in food security among displaced households post-eviction. Pre-eviction, a substantial majority (87.44 %) of households were food secure, with 66.37 % being entirely food secure, which changed drastically after eviction, with the mean level of food security dropping to 21.08 %.

Before eviction, approximately 90 % of the respondents had an excellent level of food security, meeting all food security indicators. However, after eviction, approximately 80 % of the respondents fell into the category of severely food insecure, failing to meet any food security indicators. The substantial decrease in food security post-eviction highlights the severe consequences of land expropriation on the livelihoods of households in the Lemmi Kura sub-city. The loss of agricultural land, a primary source of food production and income, resulted in reduced meal adequacy, variety and healthiness of food and decreased frequency of meals.

These results are in harmony with the existing literature that underscores the adverse effects of displacement on food [67]. According to the study on the impact of land acquisition for large-scale agricultural investments in Ethiopia, land expropriation significantly reduced the food security status of displaced households.

The research results clearly show a stark contrast in food security levels before and after eviction. The mean level of the food security index dropped from 0.9288 before eviction to 0.3974 after eviction. This sharp decline underscores the adverse impact of land expropriation on the ability of households to secure adequate food. The most affected indicators are access to healthy and nutritious food and the ability to produce enough food for the family. These findings align with existing research that points to the detrimental effects of displacement on food security and livelihoods.

Similarly, participants in the FGD described facing severe food crises, as they could no longer rely on their production and were forced to buy everything from the market, which has become increasingly unaffordable.

Before evictions, peri-urban communities were largely self-reliant, providing mutual aid even when not all members were food-independent. Post-eviction, they have become dependent on external support, reflecting a significant change in their ability to support themselves (KII 8). The major factors contributing to food insecurity in the peri-urban evicted communities were loss of agricultural lands, asset loss during evictions, displacement of livestock due to urbanisation, and lack of innovation and subsequent unemployment.

According to the participant in the FGD (KII 1), the reduction in agricultural land directly decreases the ability to produce food, thus jeopardising food security. Owning agricultural land is crucial to producing a variety of crops that ensure food security. The loss of such land prevents individuals from guaranteeing their food supply, which endangers their lives (KII 1). The confiscation of agricultural land has led to a significant loss of livelihood and assets. Individuals can only raise animals or grow crops on land, exacerbating economic and food security challenges (KII 4).

Households in peri-urban areas are currently facing severe food crises. These crises manifest as unstable access to adequate and healthy food, financial difficulties, and other related challenges (KII 3). After being displaced from their land, villagers often face unemployment or are forced into informal work. This transition results in a substantial decrease in income and an increase in malnutrition due to reduced food availability (KII 5).

Households that have not been evicted can harvest crops from their land, thus enjoying more reliable food security. In contrast, evicted households face increased food insecurity, lacking the means to produce food (KII 2).

The transition from traditional agriculture to market-based food procurement, coupled with the impacts of urbanisation and land loss, has significantly compromised food security in peri-urban communities. These changes have led to greater dependence on external support, loss of livelihoods, and increased food insecurity, particularly among evicted households. Addressing these issues requires targeted policies protecting agricultural land and supporting displaced communities to rebuild food security.

These qualitative insights are consistent with the findings from other regions. For example, in Uganda, land evictions have been shown to negatively impact household food security due to the loss of agricultural land and assets, leading to dependence on less secure food sources and market purchases.

5. CONCLUSION AND POLICY IMPLICATIONS

The analysis of the provided data highlights the complex ways in which forced displacement erodes economic capital security among preurban farming households. The loss of agricultural livelihoods, the forced transition to precarious employment, and the distress sale of assets represent significant challenges to their long-term well-being. Interventions must move beyond simply providing immediate relief to address the underlying structural factors that contribute to the vulnerability of displaced communities. This requires policies that promote sustainable livelihoods, protect property rights, and ensure meaningful participation in development processes.

The quantitative analysis reflects a significant difference in economic security between the evicted and non-evicted households. Furthermore, the odds ratio analysis for eviction status is 0.273, indicating that evicted households are approximately 72.7 % less likely to achieve economic security than non-evicted households, which emphasises the adverse impact of eviction on economic security, highlighting the need for policies that prevent evictions and improve the economic stability of affected households.

The study concludes that the quantitative results also indicated that non-evicted households have significantly higher food security levels than evicted households. The study results reject the null hypothesis (H0) in favour of the alternative hypothesis (H1), suggesting that eviction substantially negatively impacts food security. The effect size of 0.6489 further emphasises the high impact of eviction on household food security.

Furthermore, the logistic regression coefficient for the eviction status is -2.717 ($p < .001$), with an odds ratio (Exp(B)) of 0.066, indicating that evicted households are significantly less likely to be food secure compared to non-evicted households, highlighting the critical impact of eviction on food security and underscores the need for targeted interventions to support evicted households. These findings underscore the severe consequences of land expropriation, which disrupted the primary sources of food production and income, leading to diminished meal adequacy, reduced variety and healthy food, and decreased meal frequency. This dramatic decline in food security levels highlights the critical need for targeted interventions to support displaced households. The study concludes that research indicators such as access to sufficient, healthy and nutritious food, production of enough food, and affordability to buy food when own production is insufficient saw significant declines.

The findings of this study underscore the need for comprehensive policy interventions to mitigate the negative impacts of displacement and promote the economic security of affected populations. These interventions should include:

- Compensation in the form of shareholding: To address the lost inter-generational resources of displaced farmers, policymakers should compensate them with in-kind shareholding from private investments, real estate and government housing projects through Public-Private Partnerships.
- Land Restitution and Compensation: Prioritize fair and equitable land restitution and compensation schemes for evicted households, enabling them to rebuild their agricultural livelihoods.
- Skills Development and Employment Programs: Provide targeted skills development and employment programs to equip evicted households with the necessary skills to transition to alternative income-generating activities.
- Microfinance and Access to Credit: Facilitate access to microfinance and credit services to support entrepreneurship and small business development.
- Social Safety Nets and Cash Transfer Programs: Strengthen social safety nets and implement targeted cash transfer programs to provide immediate relief and prevent further asset depletion.
- Participatory Planning and Community Engagement: Engage affected communities in participatory planning processes to ensure that development initiatives are aligned with their needs and priorities.

Ethical considerations

The researcher obtained ethical approval for this research study from the Ethics Committee of the College of Agriculture and Environmental Sciences, University of South Africa (UNISA), in January 2024. Our research study adheres to the principles outlined in the Declaration of Helsinki. We confirm that all procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed written consent was obtained from all individual participants included in the study. However, the researchers used anonymity for ethical purposes. There were no minors involved in this study as only participants above 18 years of age were selected and interviewed.

Declaration of Funding

This research has been primarily self-funded by the corresponding author, demonstrating a strong personal commitment to the study. However, it's important to note that the University of South Africa (UNISA) provided valuable financial support in the form of a bursary specifically for data collection. This combination of self-financing and institutional support has enabled a comprehensive and independent investigation into the critical issues of urban expansion and its impacts on peri-urban farming communities in Addis Ababa.

Data Availability

Raw data were generated from household survey by the authors. Derived data supporting the findings of this study are available from the corresponding author Kejela Gnamura on request.

Contribution

Gnamura K.: conceptualization, data curation, formal analysis, funding acquisition, investigation, methodology, project administration, resources, supervision, validation, visualization, writing-original draft preparation, and writing-review and editing.

Antwi M.: conceptualization, formal analysis, investigation, methodology, supervision, validation, visualization, and writing-review and editing.

Abenet B.: conceptualization, formal analysis, investigation, methodology, supervision, validation, visualization, and writing-review and editing.

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