

Beyond Optimization: Food Acquisition Strategies And Poverty Dynamics Under Institutional Fragility In Mali

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Using data from the “Enquête Modulaire Permanente auprès des Ménages (EMOP) and a pseudo-panel methodology, this study examines how food acquisition strategies shape poverty dynamics in post-conflict Mali. Multinomial logit, random effects probit, and Cox proportional hazards models assess poverty entry, exit, and duration across four strategies. Poverty is pervasive, 81.9% of households face food poverty and 71.9% multidimensional poverty. Despite 71.5% of households relying on market-based strategies, market dependence does not reliably facilitate poverty escape. Subsistence and mixed strategies improve sustained poverty exit, while gift-based transfers accelerate escape despite limited prevalence. Female-headed households exit poverty faster, challenging conventional vulnerability narratives. Overall, the findings suggest that food strategies in fragile contexts reflect adaptive responses to institutional breakdown rather than optimization behavior, calling for context-sensitive, temporally differentiated social protection policies.

Keywords: food security, poverty dynamics, post-conflict recovery, livelihood strategies, survival analysis, pseudo-panel, Mali

INTRODUCTION

Mali's development trajectory has been profoundly disrupted by cycles of political instability and armed conflict, most notably the 2012 military coup and subsequent insurgencies that engulfed the northern and central regions. Although successive international interventions have contributed to a tenuous peace, the country remains in a state of protracted fragility characterized by recurrent violence, population displacement, and deep governance challenges (UNDP, 2022). These events have left enduring “legacy effects” on livelihoods, fragmenting markets, destroying productive assets, and weakening the public infrastructure critical to food systems and welfare delivery (Justino, 2009; FAO, 2021). Post-conflict

recovery has proven highly uneven: while some areas have benefited from aid inflows and stabilization programs, large swathes of central and northern Mali continue to be excluded from public services and formal economic activity (Collier, & Duponchel, 2013; Senou, 2026). Simultaneously, households face a “double exposure” to conflict-related shocks and intensifying climate stressors such as irregular rainfall and desertification (Cissé et al., 2022; World Bank, 2023).

Poverty remains widespread and multidimensional. According to the World Bank (2023), Mali’s national poverty rate stood at 44.4% in 2021, with rural areas disproportionately affected. Food insecurity is acute: over 1.5 million people faced crisis-or-worse levels of food insecurity in 2023, even during post-harvest periods (Cadre Harmonisé, 2023). These conditions compel households to adapt their food acquisition strategies, relying on subsistence production, informal support networks, and hybrid mechanisms when market access is unreliable or prohibitively expensive. Understanding how these diverse strategies shape poverty trajectories is therefore essential for designing effective recovery and social protection policies.

Despite the salience of these issues, empirical research on the relationship between food acquisition strategies and poverty transitions in post-conflict contexts remains thin. Most studies focus on emergency aid responses during active conflict, or use cross-sectional data that fail to capture dynamic shifts in household welfare (Rohner et al., 2021; Rufino et al., 2023). Little is known about how market-dependent, subsistence-oriented, gift-reliant, or mixed food strategies shape the likelihood and duration of poverty spells in fragile post-conflict environments, and still less about whether such effects vary across poverty dimensions or evolve over the recovery timeline.

This study addresses these gaps by applying a pseudo-panel approach to nationally representative EMOP data spanning 2013–2021. Using multinomial logit models, random effects probit, and Cox proportional hazards estimation, we provide robust evidence on how different food acquisition strategies shape both short- and long-term poverty outcomes across monetary, food, and multidimensional poverty measures. To our knowledge, this is the first study to use pseudo-panel longitudinal data to assess multidimensional poverty transitions linked to food strategies in post-conflict Mali.

Our analysis contributes to three key debates: (1) the adaptive versus optimizing nature of livelihood responses in fragile settings; (2) the role of strategy diversification in enhancing household resilience; and (3) the need for differentiated, time-sensitive social protection policies in post-conflict recovery contexts. The remainder of the paper is organized as follows: Section 2 reviews the relevant literature. Section 3 describes the data and methodology. Section 4 presents the empirical findings. Section 5 concludes with policy implications.

LITERATURE REVIEW

The intersection of food security, livelihood strategies, and poverty dynamics in post-conflict settings has emerged as a critical area of inquiry in development economics (Gebrihet & Gebresilassie, 2025; Senou, 2025). Much of this work is anchored in livelihood diversification theory, which conceptualizes households as rational actors who reallocate resources and diversify activities to manage risk and improve welfare (Ellis, 2000; Scoones, 1998). In post-conflict environments, however, these choices are rarely purely strategic. They reflect constrained adaptation under institutional failure, environmental stress, and market fragmentation rather than unconstrained optimization (Justino, 2009; Verwimp et al., 2019).

Households in fragile contexts typically rely on a mix of food acquisition channels, market purchases, subsistence farming, social support transfers, and hybrid combinations. Market access plays a central role in determining the feasibility and effectiveness of different strategies. Evidence from Sub-Saharan Africa confirms that proximity to markets improves dietary diversity and reduces food insecurity (Morrissey et al., 2024; Usman & Haile, 2022; Nandi et al., 2021). However, market reliance also exposes households to price shocks: Iheonu and Oladipupo (2024) demonstrate that food price volatility is significantly correlated with rising poverty in Africa, with the poorest bearing the heaviest burden. In Mali, where both physical and institutional market access is uneven, this duality makes market dependence simultaneously a necessity and a source of vulnerability.

Gift-based and food-aid strategies provide essential relief during acute crises but their long-term poverty-reducing potential is more ambiguous. Kahsay et al. (2021) find that aid dependency can inhibit

productive investment if not paired with empowerment programs, while Fafchamps & Gubert (2007) show that kinship-based transfers offer temporary buffers that are constrained by social capital and may be inaccessible in fragmented post-conflict settings. The effectiveness of mixed strategies, those combining elements of multiple channels, has received growing attention. Barrett et al. (2001) and Mgonezulu et al. (2024) find that diversified food acquisition portfolios tend to outperform single-strategy approaches in crisis-prone regions, although the benefits of diversification depend critically on the household's capacity to manage multiple strategies simultaneously.

A parallel body of literature emphasizes the importance of analyzing poverty as a dynamic condition. Pseudo-panel methods pioneered by Deaton (1985) and Verbeek and Nijman (1992) allow researchers to track cohort-level welfare trajectories using repeated cross-sections, providing insights unavailable from standard cross-sectional analyses. Applications in Tanzania, Indonesia, and West Africa (Leyaro & Hongoli, 2024; Tantriana, 2024; Dang & Lanjouw, 2013) confirm that poverty transitions are frequent but often cyclical, with many households trapped in vulnerability. Survival analysis methods, particularly Cox proportional hazards models, further allow researchers to examine the duration of poverty spells and the factors that accelerate or retard poverty exit (Jenkins, 2005; Cappellari & Jenkins, 2004; Cleves et al., 2016).

Despite these contributions, important gaps remain. Few studies examine the relative effectiveness of different food strategies across multiple poverty dimensions simultaneously, or evaluate how strategy effectiveness evolves over the post-conflict recovery timeline. This study addresses both limitations by integrating multinomial logit, random effects probit, and Cox survival models within a pseudo-panel framework applied to a fragile, food-insecure post-conflict context.

METHODOLOGY AND DATA

Conceptual Framework

This study builds on the Sustainable Livelihoods Framework (Scoones, 1998) and the theory of household risk management in conflict-affected settings (Justino, 2009; Verwimp et al., 2019). In fragile environments like Mali, institutional breakdowns, damaged infrastructure, and ongoing insecurity undermine traditional market mechanisms, forcing households to adopt adaptive food acquisition strategies to manage risk and maintain basic welfare. Following Dercon (2002), we conceptualize these strategies as serving dual purposes: short-term consumption smoothing and longer-term poverty escape. Poverty is treated as a dynamic process, with households transitioning into or out of poverty states depending on both structural factors and the food strategies they adopt (Baulch & Hoddinott, 2000; Carter & Barrett, 2006).

We classify food acquisition strategies into four mutually exclusive categories, building on the typologies of Maxwell et al. (2003): (i) market-dependent, food primarily purchased from formal or informal markets; (ii) subsistence-oriented, food mainly produced by the household through agriculture or livestock; (iii) gift-dependent, food primarily obtained through non-market transfers including food gifts, community sharing, remittances, or food aid; and (iv) mixed strategies, no single dominant source, combining two or more acquisition methods.

Data and Pseudo-Panel Construction

The empirical analysis draws on five rounds of the *Enquête Modulaire Permanente auprès des Ménages* (EMOP) conducted in Mali in 2013, 2015, 2017, 2019, and 2021. These nationally representative household surveys provide detailed information on food acquisition strategies, consumption, demographics, shocks, and living conditions across all nine administrative regions. Since EMOP is a repeated cross-sectional survey without longitudinal follow-up, we construct a pseudo-panel following Deaton (1985) and Verbeek and Nijman (1992).

Cohorts are formed by grouping households on the basis of four time-invariant or slowly changing characteristics: (i) birth year of the household head (5-year intervals); (ii) administrative region (9 regions); (iii) urban or rural residence; and (iv) education level of the household head (none, primary, secondary and above). This approach yields 766 synthetic cohorts consistently tracked across survey waves, with a minimum cell size of 10 households per cohort-year to ensure statistical reliability. Table 1 summarizes the cohort construction strategy, and robustness checks confirm the stability of cohort characteristics over time.

TABLE 1
PSEUDO-PANEL COHORT CONSTRUCTION SUMMARY

Variable Used for Grouping	Categories	Rationale
Birth year of household head	5-year cohorts	Stable proxy for lifecycle stage
Administrative region	9 regions	Captures spatial heterogeneity
Urban/Rural residence	Urban, Rural	Structural livelihood differences
Education level of household head	None, Primary, Secondary+	Proxy for human capital and opportunities

Note: Cohorts are defined at the intersection of all four grouping variables. A minimum cell size of 10 observations per cohort-year is imposed.

Variable Definitions

Three poverty measures are employed. Monetary poverty follows national consumption-based poverty lines (Deaton & Zaidi, 2002); a household is classified as poor if per capita consumption falls below the national threshold. Food poverty is defined as the inability to meet the minimum caloric requirement of 2,100 kcal per adult equivalent per day, using household food consumption data converted to caloric values based on FAO food composition tables. The Multidimensional Poverty Index (MPI) is constructed using the Alkire-Foster methodology (Alkire & Santos, 2014), incorporating deprivations in education, health, and living standards; households are considered multidimensionally poor if deprived in at least 33% of weighted indicators. In addition to these static indicators, binary variables for poverty entry and exit and a continuous variable for poverty duration are constructed by tracking each cohort's poverty status across waves.

Control variables include household size, the dependency ratio (Lanjouw & Ravallion, 1995), the gender of the household head, rural/urban residence, regional fixed effects, and a food share variable capturing the proportion of total expenditure allocated to food (Subramanian & Deaton, 1996). Instrumental variables for food strategy include distance to the nearest market (Fafchamps & Hill, 2005; Senou, 2025) and a price shock index capturing exogenous variation in food prices (Deaton, 1989; Friedman & Levinsohn, 2002).

Estimation Strategy

Our estimation proceeds in three complementary stages. First, poverty transition matrices document the empirical patterns of poverty mobility. Second, multinomial logit models (McFadden, 1974) estimate the probability of poverty entry or exit as a function of food strategy and household characteristics. The model specifies:

$$P(Transition_{it} = j) = \exp(X_{it}\beta_j + FS_{it}\gamma_j) / \sum_k \exp(X_{it}\beta_k + FS_{it}\gamma_k) \quad (1)$$

where X_{it} is a vector of control variables, FS_{it} denotes food acquisition strategies, and j indexes transition types. Third, random effects probit models account for the pseudo-panel structure and unobserved cohort-specific heterogeneity when modeling poverty status across dimensions:

$$P(Poverty_{it} = 1) = \Phi(\alpha + X_{it}\beta + FS_{it}\gamma + \mu_i + \varepsilon_{it}) \quad (2)$$

where μ_i captures unobserved cohort heterogeneity. Finally, Cox proportional hazards models examine poverty duration and the rate of poverty exit:

$$h(t | X, FS) = h_0(t) \cdot \exp(X_{it}\beta + FS_{it}\gamma) \quad (3)$$

where $h_0(t)$ is the baseline hazard function. The proportional hazards assumption is tested using Schoenfeld (1982) residuals, and Kaplan-Meier estimators (Kaplan & Meier, 1958) are used for non-parametric analysis of survivor functions. This multi-stage approach ensures robustness across different methodological frameworks.

RESULTS AND DISCUSSION

Descriptive Statistics and Poverty Transitions

Table 2 presents summary statistics for the main variables. The poverty indicators reveal a stark picture of widespread deprivation in post-conflict Mali. Monetary poverty affects 41.4% of households, while food poverty reaches an alarming 81.9%, indicating that the vast majority of households struggle to meet minimum nutritional requirements. Most concerning is the multidimensional poverty rate of 71.9%, confirming that households face simultaneous deprivations in income, food, education, and living standards. This pattern is characteristic of post-conflict environments where infrastructure destruction, displacement, and institutional breakdown create compound poverty challenges.

TABLE 2
DESCRIPTIVE STATISTICS

Variable	N	Mean	Std. Dev.	Min	Max
Poverty indicators					
Monetary poverty	3,902	0.414	0.448	0	1
Food poverty	3,902	0.819	0.329	0	1
Multidimensional poverty (MPI)	3,902	0.719	0.388	0	1
Food acquisition strategy					
Market-dependent	3,902	0.715	0.373	0	1
Subsistence-oriented	3,902	0.103	0.236	0	1
Gift-dependent	3,902	0.009	0.065	0	1
Mixed strategies	3,902	0.171	0.274	0	1
Control variables					
Household size	3,901	7.55	6.04	1	71
Dependency ratio	3,901	4.55	5.01	1	9
Rural residence (=1)	3,901	0.563	0.495	0	1
Distance to market	3,902	0.058	0.266	0	2
Price shock index	3,902	-0.001	0.054	-0.117	0.153

Note: Authors' calculations based on EMOP 2013–2021. All statistics computed at the cohort level following pseudo-panel construction.

The distribution of food acquisition strategies confirms the dominance of market-dependent approaches, with 71.5% of households primarily relying on market purchases despite the post-conflict context. Subsistence-oriented strategies account for 10.3% of households, while gift-dependent strategies represent only 0.9%, indicating limited reliance on formal safety nets or social transfers. Mixed strategies are employed by 17.1% of households. The average household size of 7.55 members, substantially larger than in stable economies, likely reflects post-conflict family reunification or extended-family solidarity

mechanisms. The dependency ratio of 4.55 signals a high burden of non-productive household members, constraining investment in poverty-reducing activities.

The poverty transition matrix reveals deeply concerning patterns of mobility. Households initially in the lowest poverty category retain a 51.3% probability of remaining there, but 29.4% fall into the highest poverty quintile, underscoring acute vulnerability even among the relatively better-off. At the other end, households in the highest poverty bracket show a 22.9% probability of remaining in extreme poverty and a 73.9% probability of moving only one quintile upward, without achieving a meaningful escape. These patterns signal the presence of near-poverty traps, consistent with Carter and Barrett's (2006) asset-based framework, where limited productive assets and high shock exposure combine to perpetuate deprivation.

Poverty Transitions: Multinomial Logit Results

Table 3 reports marginal effects from the multinomial logit estimation. For poverty entry, both subsistence-oriented (−0.011) and mixed strategies (−0.021) show significant protective effects relative to market-dependent households, indicating that diversification away from market reliance substantially reduces the risk of falling into poverty. These findings align with theoretical expectations: subsistence strategies insulate households from market price shocks (Rufino et al., 2023), while diversification reduces dependence on any single vulnerable channel (Ellis, 2000). Gift-dependent strategies show no significant effect on poverty entry (−0.001), suggesting that social transfers function as a survival mechanism for the already-poor rather than as a preventive tool for non-poor households (Fafchamps & Lund, 2003).

TABLE 3
MARGINAL EFFECTS FROM MULTINOMIAL LOGIT ESTIMATION
(POVERTY ENTRY AND EXIT)

Variable	(1) Poverty Entry	(2) Poverty Exit
<i>Food strategy (reference: Market-dependent)</i>		
<i>Subsistence-oriented</i>	-0.011***	-0.044***
	(0.001)	(0.006)
<i>Gift-dependent</i>	-0.001	0.018***
	(0.124)	(0.006)
<i>Mixed strategies</i>	-0.021***	0.079***
	(0.002)	(0.001)
<i>Household characteristics</i>		
Household size	0.023***	0.030***
	(0.001)	(0.007)
Dependency ratio	0.034***	-0.010***
	(0.001)	(0.007)
Urban residence (ref: Rural)	-0.012**	0.336***
	(0.000)	(0.016)
Household gender (female head)	-0.000	0.168
	(0.000)	(0.241)

<i>Year dummies (reference: 2013)</i>	[object Object]	[object Object]
2015	0.303***	-0.674***
2017	0.603***	-0.774***
2019	0.436***	-0.803***
2021	-0.002	0.107
Region dummies	Yes	Yes

Observations: 1,378. Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

For poverty exit, the picture is strikingly different. Mixed strategies now exhibit the strongest positive effect (0.079), confirming that strategic diversification provides not only protection against entry but also multiple upward pathways for those already in poverty (Barrett et al., 2001). Gift-dependent strategies show a significant positive effect on poverty exit (0.018), supporting findings by Kahsay et al. (2021) that targeted transfers can facilitate welfare improvement for the already-poor even when they cannot prevent initial impoverishment. Subsistence-oriented strategies, while protective against entry, exhibit a negative effect on poverty exit (−0.044), suggesting they may trap households in low-level subsistence equilibria with limited accumulation potential, consistent with poverty trap theory (Barrett & Carter, 2013).

The temporal patterns in Table 3 reveal important dimensions of Mali's post-conflict recovery. Year effects for 2017 and 2019 show peak poverty entry rates (0.603 and 0.436) and depressed exit rates (−0.774 and −0.803), coinciding with the most acute post-conflict disruptions. By 2021, poverty entry falls close to zero (−0.002) and exit rates improve (0.107), suggesting gradual stabilization, although this modest recovery leaves fragility intact. Urban residence significantly reduces poverty entry (−0.012) and strongly promotes exit (0.336), while larger dependency ratios raise entry risk (0.034) and reduce exit probability (−0.010), confirming the welfare burden of high household dependency.

Multidimensional Poverty: Probit Results

Table 4 presents the random effects probit results for monetary, food, and multidimensional poverty. Subsistence-oriented strategies exhibit consistent negative effects across all three dimensions, with the strongest impact on monetary poverty (−1.222). This large magnitude reflects the substantial welfare improvement associated with reduced market exposure and enhanced food self-sufficiency (De Janvry & Sadoulet, 2005). Mixed strategies show strong and consistent poverty-reducing effects across food poverty (−0.370) and multidimensional poverty (−0.684), validating Barrett et al.'s (2001) portfolio theory and Nandi et al.'s (2021) evidence that diversified approaches address multiple deprivation dimensions simultaneously.

TABLE 4
RANDOM EFFECTS PROBIT ESTIMATION: FOOD STRATEGY EFFECTS ON MULTIPLE POVERTY DIMENSIONS

Variable	(1) Monetary Poverty	(2) Food Poverty	(3) MPI
Food share	-0.055***	0.081***	-0.042***
	(0.007)	(0.012)	(0.014)
<i>Food strategy (reference: Market-dependent)</i>			
Subsistence-oriented	-1.222**	-0.293***	-0.668**
	(0.472)	(0.007)	(0.281)

Gift-dependent	-0.172	-0.220***	-0.582***
	(0.419)	(0.112)	(0.120)
Mixed strategies	-0.192***	-0.370***	-0.684***
	(0.004)	(0.132)	(0.170)
Control variables			
Household size	0.033**	0.040***	0.014
	(0.007)	(0.008)	(0.010)
Female-headed household	1.968***	-0.243	0.523*
	(0.567)	(0.278)	(0.300)
Dependency ratio	0.142***	0.254***	0.083***
	(0.011)	(0.030)	(0.028)
Rural residence	0.436	0.565***	0.227
	(0.441)	(0.113)	(0.151)
Year dummies	Yes	Yes	Yes
Region dummies	Yes	Yes	Yes
Observations	1,171	1,498	1,498
Number of cohorts	766	974	974

Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Constant included but not reported.

Gift-dependent strategies significantly reduce food poverty (−0.220) and multidimensional poverty (−0.582) but show no statistically significant effect on monetary poverty. This pattern confirms that social transfers are particularly effective at addressing non-monetary welfare gaps, providing food access and improvements in health or education services, without necessarily increasing monetary income (Watson et al., 2024). The food share variable’s positive association with food poverty (0.081) but negative association with monetary and multidimensional poverty (−0.055 and −0.042) reflects an important paradox: households allocating higher budget shares to food face the most acute food access constraints in the short run, but prioritizing food expenditure ultimately supports broader welfare improvements, consistent with Jensen and Miller’s (2008) subsistence consumption framework.

Female-headed households show a strong positive association with monetary poverty (1.968), confirming their heightened monetary vulnerability, but this finding must be read alongside the duration analysis results, which reveal their significantly higher rates of poverty exit, suggesting these households exhibit superior adaptive capacity once resources are mobilized. The dependency ratio consistently amplifies all forms of poverty (0.142, 0.254, 0.083), underscoring the welfare burden imposed by high shares of non-productive household members.

Poverty Duration: Survival Analysis Results

Table 5 presents the Cox proportional hazards estimates. All three alternative food strategies show significantly negative coefficients relative to market-dependent households, indicating lower hazard rates for poverty exit, that is, longer expected poverty durations. The negative coefficient for subsistence-oriented strategies (−0.111) confirms that while these strategies protect against entry, they extend poverty spells once households become poor, consistent with asset-based poverty trap dynamics (Carter & Barrett, 2013). Mixed strategies also reduce the hazard of exit (−0.031), though the effect is smaller in magnitude, reflecting modest relative disadvantages compared to market-dependent approaches in terms of generating sustained recovery pathways.

TABLE 5
COX PROPORTIONAL HAZARDS ESTIMATION: POVERTY DURATION

Variable	Coefficient (Hazard)
<i>Food strategy (reference: Market-dependent)</i>	
<i>Subsistence-oriented</i>	-0.111***
	(0.003)
<i>Gift-dependent</i>	-1.391***
	(0.445)
<i>Mixed strategies</i>	-0.031***
	(0.011)
<i>Household characteristics</i>	
Household size	0.054***
	(0.005)
Female-headed household	1.373***
	(0.080)
Dependency ratio	-0.059***
	(0.018)
Urban residence (ref: Rural)	-0.068
	(0.047)
Region dummies	Yes
Wald chi ² (15)	1,051.94
Observations	1,489

*Robust standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Negative coefficient = reduced hazard of poverty exit (longer duration).*

The gift-dependent strategy shows the strongest negative coefficient (−1.391), indicating the lowest hazard rate for poverty exit. This apparent tension with the finding that gift strategies facilitate poverty exit (Table 3) reflects heterogeneity within this category: targeted transfers may enable rapid exit for some households while others become chronically dependent on transfers, extending poverty durations. This dual dynamic is consistent with Kahsay et al.'s (2021) finding that aid dependency varies substantially across household types and transfer modalities.

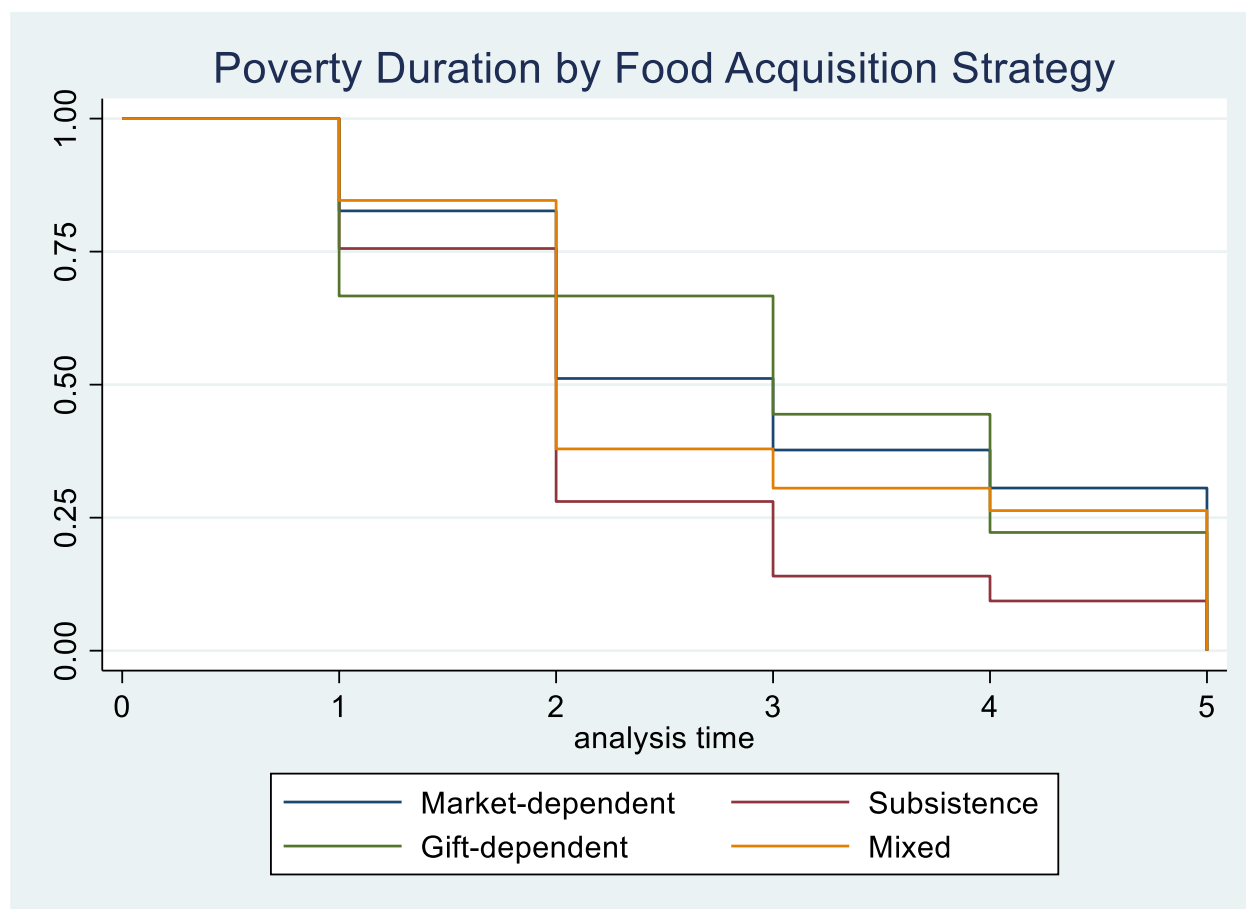
Household size shows a positive coefficient (0.054), indicating that larger households exit poverty more rapidly, likely reflecting enhanced labor supply and diversified income-generating capacity. Most strikingly, female-headed households exhibit a strongly positive coefficient (1.373), indicating that they escape poverty significantly faster than male-headed households. These finding challenges simple vulnerability narratives: while female-headed households face greater monetary poverty risk (Table 4), they demonstrate superior adaptive capacity, possibly reflecting better resource management, stronger access to community networks, or greater responsiveness to targeted support programs (Quisumbing, 1996).

The rejection of the proportional hazards assumption (global test: $\chi^2(15) = 27.95$, $p = 0.022$) confirms that food strategy effects on poverty duration are time-varying, consistent with Justino's (2009) argument that post-conflict transitions involve multiple phases with evolving opportunities and constraints. This time-

varying heterogeneity reinforces the need for dynamic, phase-sensitive policy responses rather than uniform interventions.

Figure 1 presents Kaplan-Meier survival curves by food strategy. Gift-dependent households show the steepest survival curve decline, indicating the most rapid poverty exits, while subsistence-oriented households show the flattest curve and the longest poverty spells. Market-dependent households exhibit an intermediate and gradual exit pattern. The log-rank test confirms that these differences are highly statistically significant ($\chi^2(3) = 22.90, p < 0.0001$).

FIGURE 1
KAPLAN-MEIER SURVIVAL CURVES BY FOOD ACQUISITION STRATEGY



Note: Survival function represents the probability of remaining in poverty at each time point. Differences across strategies are statistically significant (log-rank $\chi^2(3) = 22.90, p < 0.0001$).

Synthesis and Discussion

Taken together, the three estimation frameworks converge on a set of internally consistent findings that enrich the theoretical debate on livelihood strategies in fragile contexts. First, the effectiveness of food strategies depends critically on the poverty dimension considered and the temporal phase of the recovery process. Subsistence strategies protect against monetary poverty entry but generate limited upward mobility once poverty is established. Gift strategies exhibit concentrated, targeted effects on food and multidimensional poverty exit. Mixed strategies, reflecting adaptive diversification, perform consistently across entry, exit, and multiple poverty dimensions, becoming increasingly effective in later post-conflict waves as households learn to optimize diversified approaches.

Second, these patterns contradict the standard livelihood diversification model that treats mixed strategies as uniformly superior (Ellis, 2000). In early post-conflict waves (2013–2017), mixed strategy

adopters were often those facing acute shocks and were thus more vulnerable. In later waves (2019–2021), the same mixed strategy adopters show the highest sustained poverty exit rates, suggesting a time-varying adaptive advantage that emerges as institutions partially recover and households accumulate experience managing multiple channels simultaneously.

Third, the evidence underscores that household strategies in post-conflict Mali are shaped primarily by institutional constraints and adaptive necessity rather than by optimization logic. Market dependence, the dominant strategy by far, does not confer the poverty-reducing benefits that conventional market-integration narratives would predict, because markets remain volatile, fragmented, and unevenly accessible. These findings resonate with Rohner et al.'s (2021) broader argument that conflict fundamentally alters the welfare effects of market integration, and with Verwimp et al.'s (2019) emphasis on the endogeneity of household behavior to conflict exposure.

CONCLUDING REMARKS

This study provides the first longitudinal evidence on the relationship between food acquisition strategies and multi-dimensional poverty transitions in post-conflict Mali, using pseudo-panel methods applied to nationally representative EMOP data spanning 2013–2021. The findings reveal that poverty is pervasive affecting over 80% of households along the food dimension and nearly 72% along the multidimensional dimension, and that the effectiveness of food strategies varies substantially across poverty dimensions, household characteristics, and recovery phases.

Three policy implications emerge from the analysis. First, recovery programs must move beyond a singular focus on formal market integration. While market-dependent food strategies dominate, they fail to provide consistent pathways out of poverty in the volatile Malian context. Interventions that strengthen subsistence production capacities, through input support, extension services, and land security, can provide meaningful protection against poverty entry, particularly for rural and low-education cohorts. Second, mixed strategies represent the most resilient pathway to sustained poverty exit, particularly in the medium to long term. Targeted support to mixed-strategy adopters, including access to microfinance, transport infrastructure, and post-harvest storage, could accelerate and sustain the adaptive advantages this group demonstrates over time. Third, gender-differentiated social protection design is essential. Female-headed households, despite higher monetary vulnerability, exhibit superior poverty exit rates and adaptive capacity. Programs that leverage these dynamics, including community-based transfer mechanisms, women-led savings groups, and female-targeted training, are likely to yield disproportionate welfare returns.

Several limitations should be acknowledged. The pseudo-panel approach relies on cohort-level rather than individual-level longitudinal data, introducing potential bias if cohort composition changes significantly over time. Food strategies are treated as discrete categories without capturing within-category heterogeneity or the gradual transition between strategies. The absence of direct conflict intensity data at the sub-national level limits the analysis of how security conditions moderate strategy effectiveness. Future research should address these limitations by exploiting sub-national conflict exposure data, by modeling the endogenous selection into food strategies more rigorously, and by incorporating community-level social capital measures that shape the accessibility of gift-based strategies.

Ultimately, this study demonstrates that post-conflict food acquisition strategies are adaptive responses to institutional fragility rather than optimization choices, and that context-sensitive, temporally differentiated policy interventions are essential to support households navigating the complex interplay between survival, recovery, and development in fragile states.

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