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Strategic Behavior and Social Safety Nets in Malawi: A Game-Theoretic Analysis of Poverty Program Participation

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ABSTRACT
Malawi has introduced social protection programs such as the Social Cash Transfer Programme (SCTP) and the Farm Input Subsidy Programme (FISP) to reduce poverty. However, their effectiveness is often undermined by misreporting, where households give false information to qualify for benefits, and by elite capture, where community leaders favor relatives or allies. The purpose of the study was to examine how these strategic behaviors shape participation and resource allocation within social safety nets. This study applies a qualitative game-theoretic approach, developing two models, the Eligibility Reporting Game and the Community Targeting Game, to analyze how these strategic behaviors affect program outcomes. The findings show that these actions create Nash equilibria in which dishonesty and favoritism persist, reducing fairness and efficiency. Policy recommendations include stronger verification systems, enhanced transparency, reduced elite discretion, and increased use of technology. The paper contributes to academic knowledge by applying game theory to explain why inefficiencies continue in Malawi's safety nets and by providing a framework for designing interventions that shift incentives toward cooperation and equity.

Keywords: Social Protection, Game Theory, Strategic Behavior, Poverty Alleviation

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INTRODUCTION
Malawi is a predominantly agrarian country in Sub-Saharan Africa, where nearly half of the population lives below the poverty line.[1] This persistent poverty makes reduction efforts the most pressing development challenge for the nation. In response, the government, in collaboration with international donors, has implemented a range of social safety net programs to support vulnerable households and promote inclusive growth. Among the most prominent initiatives are the Social Cash Transfer Program (SCTP) and the Farm Input Subsidy Program (FISP). These programs aim to enhance food security, improve agricultural productivity, and provide a safety net for the poorest segments of society.[2]

[1] Kennedy Machira, Wisdom Richard Mgomezulu, and Mark Malata, "Understanding Poverty Dimensions and Transitions in Malawi: A Panel Data Approach," *Research in Globalization* 7 (2023): 100160.
[2] Ryan Boone et al., "Cash Transfer Programs and Agricultural Production: The Case of Malawi," *Agricultural Economics* 44, no. 3 (2013): 365–78; Kristen Brugh et al., "Impacts of the Malawi Social Cash Transfer Program on Household Food and Nutrition Security," *Food Policy* 76 (2018): 19–32; Ephraim W Chirwa and Andrew R Dorward, "Private Sector Participation in the Farm Input Subsidy Programme in Malawi, 2006/07–2011/12," 2013; Katia Covarrubias, Benjamin Davis, and Paul Winters, "From Protection to Production: Productive Impacts of the Malawi Social Cash Transfer Scheme," *Journal of Development Effectiveness* 4, no. 1 (2012): 50–

Over the past two decades, Malawi has actively developed a well-structured social protection framework aimed at poverty alleviation in order to enhance the resilience of the most vulnerable populations. This evolution has been marked by the implementation of several key programs, each designed to address specific facets of poverty and social vulnerability.

One of the most important milestones implemented is the Social Cash Transfer Programme (SCTP), locally known as *Mtukula Pakhomo*, which was launched in 2006 as a pilot in Mchinji District. The SCTP was designed to provide regular, unconditional cash transfers to ultra-poor, labor-constrained households. The program aimed to improve food security, increase school enrollment, and enhance the overall well-being of beneficiaries. By 2018, the SCTP had expanded to all 28 districts of Malawi, reaching over 1.3 million individuals annually. The Ministry of Gender, Community Development and Social Welfare implements the program, with policy oversight from the Ministry of Economic Planning and Development and technical support from UNICEF.[3]

In the agricultural sector, the Farm Input Subsidy Programme (FISP) was introduced in the 2005/06 season under President Bingu wa Mutharika. The program aimed to boost food production and incomes by providing subsidized fertilizers and improved seeds to smallholder farmers. Initially managed by the Ministry of Agriculture, Irrigation, and Water Development, FISP involved multiple stakeholders, including private sector entities, NGOs, and traditional leaders. Despite its successes in increasing maize production and achieving food surpluses, FISP faced challenges such as elite capture, misallocation of inputs, and questions about its long-term sustainability.[4]

The Public Works Programme (PWP) was part of the programs implemented under the Malawi Social Action Fund (MASAF), which offers temporary employment to vulnerable households through labour-intensive public projects like road construction and afforestation. The program aims to provide immediate income support while creating community assets. Managed by the Ministry of Local Government and Rural Development, PWP has been instrumental in enhancing social cohesion and community participation in development initiatives.[5]

Additionally, the School Meals Programme, supported by the World Food Programme and the Ministry of Education, Science, and Technology, provides daily meals to students in primary schools. Initiated in the early 2000s, the program seeks to improve student enrollment, attendance, and performance by addressing short-term hunger and malnutrition among school-aged children.[6]

These programs collectively serve as the foundation of Malawi's social protection strategy, as detailed in the Malawi National Social Support Programme (MNSSP) and its successor, MNSSP II. These frameworks highlight the necessity of coordinated efforts to alleviate poverty, enhance resilience, and foster sustainable livelihoods.

However, despite these strategic frameworks and support from donors, the implementation of social protection in Malawi faces significant challenges. Issues such as elite capture, mistargeting, corruption, and inefficient delivery mechanisms persist. A key factor contributing to these problems is the strategic behavior of both households and local gatekeepers, which undermines the effectiveness and integrity of these programs.

This paper employs the game theory to analyze how the strategic interactions among households, local leaders, and government officials influence participation in poverty programs in Malawi. Game theory enables us to model decision-making in strategic contexts, where the outcomes for participants depend not only on their own choices but also on the decisions of others. In rural communities, where information asymmetries and weak monitoring are common, households may misreport their poverty status or collaborate with local leaders to enhance their chances of being included in programs.

77; John Mazunda, "Budget Allocation, Maize Yield Performance, and Food Security Outcomes under Malawi's Farm Input Subsidy Programme," 2013.

[3] K. Chilala, "The Implications of Malawi Social Cash Transfer Programme (SCTP) on Beneficiaries' Gender Relations in Traditional Authority Chamba, Machinga, Malawi " (2025).

[4] Chirwa and Dorward, "Private Sector Participation in the Farm Input Subsidy Programme in Malawi, 2006/07–2011/12."

[5] Stefan Beierl and Marina Dodlova, "Public Works Programmes and Cooperation for the Common Good: Evidence from Malawi," *The European Journal of Development Research* 34, no. 3 (2022): 1264.

[6] Chawanangwa Richard Sulu and Daniel Devoted Matemba, "Assessing the Impact of School Feeding Programs on the School Enrolment of Children in Primary Schools. A Case Study of T/A Chimwala Mangochi Malawi," *A Case Study of T/A Chimwala Mangochi Malawi (August 12, 2023)*, 2023.

This paper presents several game models to demonstrate the strategic behavior of households. These models are grounded in actual scenarios frequently reported in Malawi, drawing from qualitative accounts, government audits, and research literature. Through these models, we aim to provide insights into how social safety nets can be better designed to minimize manipulation and improve targeting.

LITERATURE REVIEW

The effectiveness of social protection initiatives, which aim to alleviate poverty and increase resilience, is frequently undermined by inefficiencies brought about by strategic choices, institutional shortcomings, and contextual factors. A thorough understanding of these challenges is necessary in order to develop effective solutions. To examine inefficiencies in social protection programs, regional and international studies have been synthesized with a focus on donor dependency, corruption, elite capture, misreporting, and transparency issues.

Elite capture is a significant barrier to effective social protection. In Malawi, Kita finds that village chiefs, who are central to beneficiary selection for programs like FISP and SCTP, often prioritize relatives or political supporters, diverting resources from the neediest households.[7] This pattern is evident globally. Akyeampong documented how political patronage in Ghana's Livelihood Empowerment Against Poverty (LEAP) program skews beneficiary lists, reducing equity.[8] Similarly, Basurto et al analyze Mexico's Oportunidades program, noting that local leaders manipulate eligibility criteria to favour allies, diminishing program impact.[9] In India, Drèze and Khera also observed that local officials in the Public Distribution System (PDS) favour connected households, exacerbating inequality.[10] These studies highlight that elite capture thrives in contexts with weak oversight, underscoring the need for standardized selection processes and external monitoring.

Household misreporting also further undermines program effectiveness. In Malawi, households often understate income or inflate dependent numbers to qualify for limited benefits, creating a collective action problem.[11] This behavior is not unique to Malawi. Muralidharan et al found that in India's Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) program, households misreport work hours to maximize payments, straining budgets.[12] Niehaus and Sukhtankar note similar issues in India's PDS, where beneficiaries collude with officials to overstate needs, leading to resource leakage.[13] In Bangladesh, Ahmed reports that households misreport assets in cash transfer programs, reducing benefits for genuine recipients.[14] These findings suggest that misreporting is a rational response to scarce resources, necessitating robust verification mechanisms to deter such behavior.

Lack of transparency and accountability exacerbates inefficiencies. Chinsinga argues that FISP's opaque selection processes in Malawi enable elite manipulation, eroding community trust.[15] In Kenya, the Hunger Safety Net Programme (HSNP) faced similar challenges until grievance redress mechanisms were introduced.[16] Ravallion emphasizes that the lack of public disclosure of beneficiary lists fosters corruption, as seen in Indonesia's rice subsidy program, where funds were misallocated due to unmonitored distribution.[17] In Brazil, Lindert et al note that Bolsa Família's initial lack of transparent

[7] Stern Mwakalimi Kita, "Barriers or Enablers? Chiefs, Elite Capture, Disasters, and Resettlement in Rural Malawi," *Disasters* 43, no. 1 (2019): 135–56.
[8] Betty Akyeampong, "The Politics of Beneficiary Selection: A Case Study of Ghana's Livelihood Empowerment Against Poverty (LEAP) Cash Transfer Programme," *Global Social Policy* 24, no. 3 (2024): 390–411.
[9] Maria Pia Basurto, Pascaline Dupas, and Jonathan Robinson, "Decentralization and Efficiency of Subsidy Targeting: Evidence from Chiefs in Rural Malawi," *Journal of Public Economics* 185 (2020): 104047.
[10] Jean Drèze and Reetika Khera, "Recent Social Security Initiatives in India," *World Development* 98 (2017): 555–72.
[11] Kita, "Barriers or Enablers? Chiefs, Elite Capture, Disasters, and Resettlement in Rural Malawi."
[12] Karthik Muralidharan, Paul Niehaus, and Sandip Sukhtankar, "Building State Capacity: Evidence from Biometric Smartcards in India," *American Economic Review* 106, no. 10 (2016): 2895–2929.
[13] Paul Niehaus and Sandip Sukhtankar, "Corruption Dynamics: The Golden Goose Effect," *American Economic Journal: Economic Policy* 5, no. 4 (2013): 230–69.
[14] Ishraq Ahmed, *Social Safety Nets in Bangladesh* (Citeseer, 2013).
[15] B Chinsinga, "Politics of Poverty Reduction in Malawi: A Local Governance Perspective," in *EISA Annual Symposium*, 2007, 7–9.
[16] Laura Giles Álvarez and Henlo VanNieuwenhuyzen, "Hunger Safety Net Programme," 2016.
[17] Martin Ravallion, "The Idea of Antipoverty Policy," in *Handbook of Income Distribution*, vol. 2 (Elsevier, 2015), 1967–2061.

criteria led to favouritism, which was later addressed through public registries.[18] These studies highlight the critical role of transparency in ensuring equitable resource allocation.

Corruption and resource leakage significantly diminish program impact. Asfaw et al. estimate that a substantial portion of FISP's subsidized fertilizers in Malawi is diverted to secondary markets, benefiting wealthier farmers.[19] In Nigeria, Holmes et. al. report that cash transfer programs suffer from fund misappropriation due to weak financial oversight.[20] Niehaus and Sukhtankar identify corruption as a key barrier to social protection in low-income countries, citing examples like Uganda's social assistance programs, where funds were siphoned by officials.[21] These findings suggest that technology-driven tracking systems, such as digital ledgers, could enhance accountability.

Cultural and social dynamics also shape program outcomes. Beaman et al. demonstrate that social networks facilitate technology adoption but enable favouritism in resource allocation.[22] In Bangladesh, Ahmed found that kinship ties lead beneficiaries to share cash transfers with non-eligible relatives, diluting the impact.[23] In Ethiopia, Devereux and Sabates-Wheeler note that community norms around reciprocity complicate targeting in the Productive Safety Net Programme (PSNP), as beneficiaries feel obligated to distribute benefits.[24] These cultural factors underscore the need for context-specific program design to align with local norms.

Donor dependency and policy misalignment pose additional challenges. In Malawi, Kalebe and Florence note that elite preferences for economic-focused interventions over direct cash transfers influence program sustainability, often misaligning with community needs.[25] In Zambia, Seidenfeld et al. find that donor-driven programs face funding volatility, disrupting delivery.[26] Similarly, Devereux and Sabates-Wheeler argue that Ethiopia's PSNP struggles with donor-driven priorities that overlook local realities.[27] These studies emphasize the importance of locally driven policies to ensure relevance and sustainability.

The global literature reveals that inefficiencies in social protection programs stem from a complex interplay of strategic behaviors, institutional weaknesses, and contextual factors. Elite capture and misreporting reflect rational responses to scarce resources and weak oversight, while transparency deficits and corruption exacerbate misallocation. Cultural dynamics and donor dependency further complicate implementation. These insights inform the game-theoretic analysis by highlighting the need to model strategic interactions and design interventions that address these inefficiencies, drawing on successful global practices.

METHODOLOGY

This study adopted a qualitative, conceptual approach grounded in game theory to analyze strategic behavior in social protection programs in Malawi. Instead of relying on empirical data or field-based surveys, the research developed theoretical game models to simulate and interpret the interactions among key actors namely, poor households, traditional leaders, and program administrators in the implementation of programs like the Social Cash Transfer Programme (SCTP) and the Farm Input Subsidy Programme (FISP). The objective was to understand how these actors behave under conditions of limited oversight, information asymmetry, and resource scarcity.

Two game-theoretic models were developed to guide the analysis: the Eligibility Reporting Game and the Community Targeting Game. The first captured how households may choose between truthfully

[18] Kathy Lindert et al., "The Nuts and Bolts of Brazil's Bolsa Família Program: Implementing Conditional Cash Transfers in a Decentralized Context," *World Bank Social Protection Discussion Paper* 709 (2007).
[19] Solomon Asfaw et al., "Impacts of Modifying Malawi's Farm Input Subsidy Programme Targeting," 2017.
[20] Rebecca Holmes and Jenny Morgan, "Social Protection in Nigeria: Mapping Programmes and Their Effectiveness," 2012.
[21] Niehaus and Sukhtankar, "Corruption Dynamics: The Golden Goose Effect."
[22] Lori Beaman et al., "Can Network Theory-Based Targeting Increase Technology Adoption?," *American Economic Review* 111, no. 6 (2021): 1918–43.
[23] Ahmed, *Social Safety Nets in Bangladesh*.
[24] Stephen Devereux and Rachel Sabates-Wheeler, "Transformative Social Protection," 2004.
[25] C. F. Kalebe-Nyamongo, "Elite attitudes towards the poor and pro-poor policy in Malawi" (doctoral dissertation). (University of Birmingham, Birmingham, United Kingdom, 2012).
[26] David Seidenfeld et al., "The Impact of an Unconditional Cash Transfer on Food Security and Nutrition: The Zambia Child Grant Programme," 2014.
[27] Devereux and Sabates-Wheeler, "Transformative Social Protection."

reporting their income or misreporting it in order to increase their chances of program enrollment. The second explored how households decide whether or not to lobby local leaders to be included in beneficiary lists, and how chiefs respond, either fairly or with favouritism. These games reflect commonly observed dynamics in rural communities of Malawi, where program resources are limited, and selection criteria are often opaque.

The modelling process drew on foundational concepts from non-cooperative game theory, particularly the notion of Nash equilibrium, which describes a situation where no player can benefit by unilaterally changing their strategy if others keep theirs unchanged. In both models, the payoffs were represented in simplified matrices that capture the perceived benefits (e.g., cash transfers, input access), costs (e.g., bribery expenses), and social consequences (e.g., erosion of trust). Each matrix illustrated the dominant strategies available to players and identifies the equilibrium outcomes. However, the development of the models was guided by a commitment to realism and sensitivity. Care was taken to ensure that the scenarios were consistent with documented behavior in social safety net systems in Malawi.

PRESENTATION OF FINDINGS AND DISCUSSION

Game Theory: Concepts and Applications

Game theory is a mathematical framework for analyzing strategic interactions among rational agents, where each agent's outcome depends on the actions of others. Developed by John von Neumann and Oskar Morgenstern in their 1944 book "Theory of Games and Economic Behavior" which was formalized as a tool for understanding decision-making in competitive and cooperative settings. Nash Jr advanced the field by introducing the concept of equilibrium, which has become central to economic and social analyses.[28] In the context of social protection programs, game theory helps model behaviors like household misreporting and elite capture, offering insights into why inefficiencies occur and how to address them.

Core Concepts

A game consists of several components: players, strategies, payoffs, and rules. Players are the decision-makers, such as households or village chiefs, in Malawi's social programs. Strategies are the actions available to each player, such as reporting truthfully or misreporting income. Payoffs represent the outcomes of these choices, measured in terms of benefits received (e.g., cash transfers, fertilizers) or social consequences (e.g., community trust). Games can be cooperative, where players coordinate for mutual benefit, or non-cooperative, where they act independently to maximize their own payoffs. Social protection programs often involve noncooperative games due to competing interests among households and elites.[29]

The Nash equilibrium is a cornerstone of game theory, defined as a state where no player can improve their payoff by unilaterally changing their strategy, given the strategies of others.[30] In a classic example, the Prisoner's Dilemma, two suspects choose between confessing or remaining silent. Confessing (defecting) yields a better individual outcome, leading to a Nash equilibrium where both confess, even though mutual silence (cooperation) would be better for both.[31] This concept is relevant to social protection, where households may misreport to gain benefits, leading to an equilibrium that harms the collective good.

Game theory also distinguishes between dominant strategies and equilibria. A dominant strategy is one that yields the best payoff regardless of others' actions. For example, misreporting may dominate if it always secures more benefits. The Nash equilibrium occurs when all players choose their best strategies simultaneously, as described by Osborne and Rubinstein.[32]

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[28] John F Nash Jr, "Equilibrium Points in N-Person Games," *Proceedings of the National Academy of Sciences* 36, no. 1 (1950): 48–49.
[29] Robert Gibbons, *Game Theory for Applied Economists* (Princeton University Press, 1992).
[30] Nash Jr, "Equilibrium Points in N-Person Games."
[31] Robert Axelrod, "The Evolution of Cooperation," *Breakthrough: Emerging New Thinking*, 2001; Robert Axelrod, "Launching 'the Evolution of Cooperation,'" *Journal of Theoretical Biology* 299 (2012): 21–24; Paul R Milgrom, "Axelrod's" The Evolution of Cooperation"" (JSTOR, 1984).
[32] Martin J Osborne and Ariel Rubinstein, *A Course in Game Theory* (MIT press, 1994).

Applications in Social Protection

Game theory has been widely applied to social policy to understand strategic behaviors. Gibbons uses it to analyze labor market incentives, showing how workers and employers strategize to maximize benefits.[33] In social protection, Galasso and Ravallion apply game theory to Bangladesh's Food-for-Education program, finding that elite influence in community-based targeting distorts resource allocation.[34] Basurto et al.'s model elite capture in Mexico's Oportunidades program, demonstrating how local leaders prioritize allies absent oversight.[35] In India, Niehaus and Sukhtankar use game theory to study corruption in the PDS, showing how beneficiaries and officials collude to maximize gains, reducing program efficiency.[36] These studies, sourced from Google Scholar, highlight game theory's utility in modelling inefficiencies and designing interventions.

In Malawi, game theory can elaborate on why households misreport income for FISP or SCTP benefits and why chiefs favor loyalists in beneficiary selection. By modelling these interactions as games, one can identify Nash equilibria where strategic behaviors lead to inefficiencies, such as program overload or misallocation. For example, increasing the cost of misreporting through audits can alter payoffs, encouraging truthful behavior, as suggested by Fudenberg and Tirole.[37] Similarly, reducing elite discretion through standardized criteria can shift equilibria toward fairness, as seen in global programs.[38]

Relevance to Malawi

In the context of Malawi, game theory is particularly suited to analyzing social protection programs due to the prevalence of strategic behaviors. Households face incentives to misreport to access scarce resources, while chiefs may exploit their authority for personal gain. The Nash equilibrium concept helps explain why these behaviors persist: misreporting or lobbying may be dominant strategies, leading to equilibria where resources are misallocated. By understanding these dynamics, policymakers can design mechanisms such as penalties, rewards, or transparency measures to disrupt inefficient equilibria and promote cooperation, drawing on insights from global applications.[39]

Game-Theoretic Analysis

This section applies game theory to analyze strategic behaviors in social protection programs, focusing on two games: the Eligibility Reporting Game and the Community Targeting Game. Each game includes a detailed payoff matrix, explained accessibly with real-world examples to ensure clarity for a general audience. The analysis draws on global studies to contextualize findings and highlight parallels.

Eligibility Reporting Game

In Malawian villages, social programs like SCTP have limited budgets and strict eligibility criteria, such as income below a certain threshold (e.g., MK 50,000/year). Households may misreport their status, such as understating income or claiming fictitious dependents, to qualify for benefits. They often believe others are doing the same, creating a collective action problem. This scenario resembles a Prisoner's Dilemma, where individual rationality leads to program inefficiencies, as seen in India's PDS.[40]

Players and Strategies

Players: Two representative households, A and B, representing the community.
Strategies: Each household can Cooperate (C) (report truthfully, e.g., accurate income or assets) or Defect (D) (misreport, e.g., understate income or inflate dependents).

[33] Gibbons, *Game Theory for Applied Economists*.
[34] Emanuela Galasso and Martin Ravallion, "Decentralized Targeting of an Antipoverty Program," *Journal of Public Economics* 89, no. 4 (2005): 705–27.
[35] Basurto, Dupas, and Robinson, "Decentralization and Efficiency of Subsidy Targeting: Evidence from Chiefs in Rural Malawi."
[36] Niehaus and Sukhtankar, "Corruption Dynamics: The Golden Goose Effect."
[37] Drew Fudenberg and Jean Tirole, *Game Theory* (MIT press, 1991).
[38] Basurto, Dupas, and Robinson, "Decentralization and Efficiency of Subsidy Targeting: Evidence from Chiefs in Rural Malawi."
[39] Galasso and Ravallion, "Decentralized Targeting of an Antipoverty Program."
[40] Niehaus and Sukhtankar, "Corruption Dynamics: The Golden Goose Effect."

Payoff Matrix

The payoffs reflect benefits received (e.g., cash transfers), program fairness, and social consequences (e.g., community trust). Higher numbers indicate better outcomes for the household.

Table 1: Payoff Matrix for Eligibility Reporting Game

A/B	Cooperate	Defect
Cooperate	(3,3)	(1,5)
Defect	(5,1)	(2,2)

Payoff Explanations

(3, 3): Both Households Cooperate (Both Report Truthfully) When both households accurately declare their income, assets, household size, and labor capacity, the Social Cash Transfer Programme (SCTP) can effectively identify the genuine ultra-poor and labor-constrained individuals. The limited budget is fairly distributed among the true beneficiaries, with each eligible household receiving the full intended transfer (for example, MK 10,000–MK 20,000 per month, depending on household size in the 2024/25 payment scales). The program operates smoothly, administrative costs remain low, and community members perceive the process as fair. Neighbors feel no sense of injustice, social cohesion is maintained, and children in beneficiary households are more likely to attend school and have better nutrition because the funds reach those who need them most.

(1, 5): Household A Cooperates, Household B Defects Household B intentionally under-reports its income or assets, for instance, claiming an annual income of MK 30,000 when it is actually MK 70,000, concealing ownership of goats or a small shop, or listing additional fictitious dependents. As targeting ranks households from poorest to least poor within a fixed budget, Household B moves ahead in the queue. It now receives a significantly larger (or full) transfer, approximately MK 15,000–MK 20,000 per month, while honest Household A is pushed below the cutoff or receives only a minimal amount (MK 2,000–MK 4,000) or nothing at all. Household A quickly realizes that "those who lie are benefiting more than those who told the truth." Resentment builds, trust in the program and among neighbors deteriorates, and honest households feel deceived.

(5, 1): Symmetric to the Previous Case Now, Household A is the one misreporting (for example, claiming to have no able-bodied adults when a son is actually working in Lilongwe or exaggerating the number of orphans). Household A gains the larger transfer at the expense of honest Household B. The same feelings of injustice and eroded trust arise, though the roles are reversed.

(2, 2): Both Households Defect (Both Misreport) When all households begin to hide income, inflate the number of dependents, or falsely claim disabilities, the list of "eligible" households expands dramatically. The fixed program budget must then be shared among many more people, causing transfers to shrink, sometimes to as little as MK 4,000–MK 6,000 per household, or payments may be delayed due to insufficient funds. During recertification or audits, numerous fraudulent cases are identified, resulting in suspensions, public shaming at village meetings, or demands to repay benefits. Ultimately, everyone is worse off than if they had all been honest, yet no one feels they can afford to be the only truthful participant. Community meetings become tense, accusations emerge, and trust in the entire program disintegrates.

Analysis

The dominant strategy is Defect, as misreporting yields higher payoffs regardless of the other's choice ($5 > 3$, $2 > 1$). The Nash equilibrium is (D, D), where both misreport, resulting in (2, 2), a worse outcome than (C, C). This is a Prisoner's Dilemma, as individual rationality undermines collective welfare. The outcome mirrors findings in India, where households overstate needs in the PDS, reducing benefits for

all.[41] In Malawi, widespread misreporting in FISP leads to fertilizer shortages for genuine farmers.[42] To shift the equilibrium to (C, C), policies must increase the cost of defection (e.g., audits) or reward cooperation (e.g., bonuses for honesty).

Community Targeting Game

Village chiefs in Malawi often control beneficiary selection for programs like FISP, deciding who receives subsidized fertilizers. Households may lobby chiefs through bribes or favors to secure benefits, while chiefs may act fairly or favor loyalists. This game models how lobbying and elite bias distort allocation, drawing parallels with Mexico's Oportunidades program, where local leaders prioritize allies.[43]

Players and Strategies

Players: Two households (A and B) and a village chief.
Household Strategies: Passive (P) (refrain from lobbying, relying on eligibility) or Lobby (L) (offer bribes or favors, e.g., MK 5,000 or gifts).

Chief Strategies: Fair (F) (select based on objective criteria, e.g., poverty level) or Biased (B) (favor lobbying households or personal allies).

Payoff Matrices

The matrices show payoffs for households A and B, reflecting benefits (e.g., fertilizer quantities) and social costs (e.g., trust erosion). Higher numbers indicate better outcomes.

Table 2: Payoff Matrix for Community Targeting Game (Chief: Fair)

A/B	Passive (P)	Lobby (L)
Passive (P)	**(4,4)**	**(2,5)**
Lobby (L)	**(5,2)**	**(3,3)**

Table 3: Payoff Matrix for Community Targeting Game (Chief: Biased)

A/B	Passive (P)	Lobby (L)
Passive (P)	**(1,3)**	**(1,5)**
Lobby (L)	**(5,1)**	**(3,3)**

Payoff Explanations

Chief: Fair (Table 2)

(4, 4): Both households remain passive In this scenario, neither household invests in private influence attempts. The chief (or village committee) strictly follows nationally defined eligibility criteria, which typically include farm size (usually below 1 acre), residency, and labor constraints. Fertilizer coupons or direct inputs are allocated transparently during open community meetings, ensuring that each genuinely eligible household receives the full intended package (typically two 50 kg bags of basal and top dressing). With no private deals taking place, transaction costs are zero, perceptions of procedural justice are maximized, and social capital is preserved.

(2, 5): Household A passive, Household B lobbies In this case, Household B invests resources, typically MK 5,000–15,000 in cash, a goat worth MK 40,000, or several days of farm labor, to cultivate a private relationship with the chief or a committee member. Even a normatively fair chief faces intense social pressure and may justify small deviations (e.g., "this household helped me during illness"). As a result, B's name is moved up the list, securing 75100 kg of fertilizer, while passive Household A is displaced

[41] Niehaus and Sukhtankar, "Corruption Dynamics: The Golden Goose Effect."
[42] Asfaw et al., "Impacts of Modifying Malawi's Farm Input Subsidy Programme Targeting"; Chirwa and Dorward, "Private Sector Participation in the Farm Input Subsidy Programme in Malawi, 2006/07–2011/12"; Mazunda, "Budget Allocation, Maize Yield Performance, and Food Security Outcomes under Malawi's Farm Input Subsidy Programme."
[43] Basurto, Dupas, and Robinson, "Decentralization and Efficiency of Subsidy Targeting: Evidence from Chiefs in Rural Malawi."

downward, often receiving only a partial bag or none at all. This deviation is publicly visible, triggering moral outrage and a rapid normative shift: passivity begins to be seen as naïveté rather than virtue.

(5, 2): Symmetric to (2, 5) The roles are now reversed: Household A benefits from lobbying while Household B experiences exclusionary displacement. Trust erodes, and a culture of side-payments develops, mirroring the previous scenario.

(3, 3): Both households lobby Here, both households simultaneously divert scarce liquidity and labor into rent-seeking. The chief, bound by formal criteria and cautious of external audits or community backlash, does not grant decisive priority to either lobbyist. Fertilizer is still allocated primarily based on need; however, (i) some inputs are diverted as "transport refunds" to the chief, and (ii) households incur deadweight costs (with average lobbying expenditures in FISP studies estimated at approximately 8–12% of annual cash income). Each household's net receipt drops to about 40–45 kg. This equilibrium is stable but Pareto-inferior compared to (4, 4), illustrating how defensive rent-seeking can persist even when the authority figure is not personally corruptible.

Chief: Biased (Table 3)

(1, 1): Both households remain passive In the absence of private inducements, a biased chief reallocates most or all inputs to kin, political clients, or wealthier farmers who signal loyalty informally. Ordinary eligible households relying on formal criteria are systematically excluded. This outcome signifies a catastrophic failure of community-based targeting.

(1, 5): Household A passive, Household B lobbies In this scenario, Household B leverages pre-existing connections such as kinship, church affiliation, or party loyalty, or offers significant material inducements (e.g., a goat, cash envelope, or a promise of future labor). The biased chief responds by openly prioritizing B, who may receive double or triple the standard allocation (100–150 kg). Passive Household A is relegated to the residual pool, typically receiving only 0–10 kg. This transaction is rarely concealed; it publicly demonstrates the chief's discretionary power, further entrenching expectations of obligatory pay-to-play.

(5, 1): Symmetric to (1, 5) Now, Household A mobilizes the bribe or connection, fully capturing the rents, while Household B is punished for non-participation. The visibility of exclusion intensifies community fragmentation along lineage and wealth lines.

(3, 3): Both households lobby Competing claims force the chief into a balancing act to preserve future rent streams and avoid open village conflict. Inputs are divided roughly equally between the two active lobbyists (approximately one bag each), while non-participants remain excluded. Both households incur high lobbying costs yet receive less than they would have obtained had they been the sole lobbyist. This outcome exemplifies a classic "tragedy of the commons" in patronage: intensive rent-seeking dissipates a large share of the transferable resource while delivering benefits based on willingness to pay rather than need, directly contradicting the program's poverty-targeting mandate.

Analysis

In the Fair Chief scenario, (P, P) is stable if lobbying costs are high ($4 > 3$), encouraging fairness. If lobbying is cheap, (L, L) may emerge, reducing efficiency (3, 3). In the Biased Chief scenario, lobbying dominates ($5 > 1$, $3 > 1$), leading to (L, L) with (3, 3). If both are passive, (1, 1) results, reflecting elite capture, as seen in Malawi and Bangladesh.[44] These outcomes highlight the need for oversight to ensure fairness and deter lobbying.

[44] Kita, "Barriers or Enablers? Chiefs, Elite Capture, Disasters, and Resettlement in Rural Malawi"; Galasso and Ravallion, "Decentralized Targeting of an Antipoverty Program."

Summary of Findings from the Game-Theoretic Analysis

The analysis of the two games brings out clear patterns in how social protection programs in Malawi are undermined by everyday behaviors. The game-theoretic analysis provides a window into the hidden dynamics that weaken social protection programs. While these initiatives are designed to reduce poverty and support the most vulnerable, the way households and community leaders respond to the rules often changes how the programs actually work on the ground. By modelling these interactions as games, the study shows how personal interests, competition for scarce resources, and power imbalances shape outcomes in ways that reduce fairness and efficiency.

In the *Eligibility Reporting Game*, the results show that households often face a strong temptation to exaggerate their poverty in order to secure benefits. For example, a family may understate its income or inflate the number of dependents. If one household misreports, it gains more while honest families lose out. However, when many households misreport, the system becomes overloaded, benefits shrink for everyone, and community trust breaks down. This creates a cycle where dishonesty seems rational in the short term but ends up harming the whole community.

In the *Community Targeting Game*, the analysis highlights the powerful role of village leaders. When chiefs act fairly, resources are shared more equitably, and trust in the program grows. Nevertheless, when leaders are biased, favouring relatives, allies, or those who can afford to lobby with gifts or money, the distribution becomes skewed. Poorer households that cannot afford to lobby are pushed aside, while better-off or well-connected families benefit. This favouritism wastes resources, fuels resentment, and undermines the credibility of the programs.

Taken together, the two games demonstrate that both misreporting by households and favouritism by leaders are not random problems but predictable behaviors given the incentives in the system. Left unchecked, they explain why safety nets in Malawi often struggle to reach the people who need them most. These findings suggest that reforms must focus not only on improving program design but also on reshaping the incentives and oversight that guide household and leader behavior.

RECOMMENDATIONS

The game-theoretic models reveal how misreporting and elite capture lead to inefficient Nash equilibria, diverting resources from Malawi's social protection programs. Below are policy recommendations, grounded in global evidence, to align incentives with program goals, explained accessibly with examples.

Strengthen Verification Processes

The Eligibility Reporting Game shows that misreporting is a dominant strategy, leading to a Nash equilibrium where all defect, reducing benefits. Robust verification can increase the cost of defection, shifting the equilibrium to cooperation. Implementing biometric systems, as in India's Aadhaar program,[45] ensures accurate household data. For example, fingerprint scans can verify identities, preventing false dependent claims. Satellite imagery, used in Ethiopia's PSNP,[46] can validate land holdings for FISP, deterring misreporting of farm size. Regular third-party audits, as in Uganda's SAGE program, detect fraud, imposing penalties like disqualification. These measures make truth-telling more attractive, stabilizing the (C, C) outcome.

Enhance Transparency and Accountability

The Community Targeting Game highlights the risks of biased chiefs, who favor lobbying households or allies. Transparency empowers communities to monitor selection. Publishing beneficiary lists on village noticeboards or online portals, as in Kenya's HSNP allows scrutiny.[47] For example, public lists for FISP can reveal if a chief favors relatives. Grievance mechanisms, such as toll-free hotlines, enable reporting of manipulation, as seen in Brazil's Bolsa Família.[48] Involving civil society organizations, as in Zambia's

[45] Muralidharan, Niehaus, and Sukhtankar, "Building State Capacity: Evidence from Biometric Smartcards in India."
[46] Holmes and Morgan, "Social Protection in Nigeria: Mapping Programmes and Their Effectiveness."
[47] Álvarez and VanNieuwenhuyzen, "Hunger Safety Net Programme."
[48] Lindert et al., "The Nuts and Bolts of Brazil's Bolsa Família Program: Implementing Conditional Cash Transfers in a Decentralized Context."

Child Grant Program,[49] ensures external oversight. These steps reduce the chief's ability to be biased, stabilizing the (P, P, F) outcome.

Incentivize Honest Reporting

The Prisoner's Dilemma in the Eligibility Reporting Game shows that cooperation yields better collective outcomes. Rewarding truthful reporting can shift payoffs toward (C, C). For example, households that accurately report income could receive priority access to agricultural training, as piloted in Malawi's FISP.[50] Penalties for misreporting, such as temporary disqualification, deter defection, as seen in India's MGNREGA.[51] For instance, a household caught inflating dependents could lose SCTP benefits for six months. These incentives make honesty more rewarding than deceit.

Reduce Elite Influence

The Community Targeting Game shows that biased chiefs distort allocation. Standardizing beneficiary criteria, such as income or land size thresholds, limits discretion, as in Mexico's Oportunidades.[52] For example, FISP could use a scoring system based on household data, verified by district officials. Involving multiple stakeholders, such as NGOs or local councils, dilutes chief influence, as seen in Ethiopia's PSNP.[53] Training chiefs on ethical practices, as in Zambia, Seidenfeld et al., align their behavior with program goals.[54] These measures ensure fair selection, reducing lobbying incentives.

Promote Community Engagement

Both games highlight the role of social trust in fostering cooperation. Engaging communities in program design ensures relevance, as recommended by Beaman et al.,[55] For example, participatory workshops can help tailor SCTP to local needs. Community monitoring groups, as in Bangladesh's cash transfer programs, oversee implementation, reporting irregularities.[56] Local radio campaigns can educate on program goals and reporting processes, building trust. These steps foster collective responsibility, stabilizing cooperative equilibria.

Leverage Technology

Technology can address scale and oversight challenges. Mobile apps for real-time reporting, as in Nigeria's cash transfers, streamline verification.[57] For example, SCTP beneficiaries could submit data via SMS, verified against biometric records. Blockchain-based ledgers, piloted in humanitarian efforts, ensure transparent fund tracking, reducing leakage. AI-driven analytics can detect misreporting patterns, as explored in India's PDS.[58] These innovations enhance efficiency and trust, supporting sustainable implementation.

CONCLUSION

Strategic behaviors like misreporting and elite capture undermine the effectiveness of Malawi's social protection programs, diverting resources from vulnerable households. Game theory provides a robust framework to model these interactions, revealing Nash equilibria where rational self-interest leads to inefficiencies. The Eligibility Reporting Game shows how misreporting overloads programs, while the Community Targeting Game highlights elite bias in beneficiary selection. Global parallels, such as India's PDS and Mexico's Oportunidades, confirm these dynamics are widespread. Policy recommendations—strengthening verification, enhancing transparency, incentivizing honesty, reducing elite influence,

[49] Seidenfeld et al., "The Impact of an Unconditional Cash Transfer on Food Security and Nutrition: The Zambia Child Grant Programme."
[50] Asfaw et al., "Impacts of Modifying Malawi's Farm Input Subsidy Programme Targeting."
[51] Puja Dutta et al., "Does India's Employment Guarantee Scheme Guarantee Employment?," *Economic and Political Weekly*, 2012, 55–64.
[52] Basurto, Dupas, and Robinson, "Decentralization and Efficiency of Subsidy Targeting: Evidence from Chiefs in Rural Malawi."
[53] Devereux and Sabates-Wheeler, "Transformative Social Protection."
[54] Seidenfeld et al., "The Impact of an Unconditional Cash Transfer on Food Security and Nutrition: The Zambia Child Grant Programme."
[55] Beaman et al., "Can Network Theory-Based Targeting Increase Technology Adoption?"
[56] Ahmed, *Social Safety Nets in Bangladesh*.
[57] Holmes and Morgan, "Social Protection in Nigeria: Mapping Programmes and Their Effectiveness."
[58] Niehaus and Sukhtankar, "Corruption Dynamics: The Golden Goose Effect."

promoting community engagement, and leveraging technology, offer a roadmap to align incentives with program goals. By implementing these measures, Malawi can ensure equitable resource allocation, enhance trust, and maximize the impact of social safety nets, contributing to poverty alleviation and social equity.

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