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Does Financial Inclusion Improve the Welfare of Informal-Worker Households? Evidence from Ghana

Derrick Delali Atiase

atiasedelali@gmail.com

University of Ghana

Research Article

Keywords: Financial inclusion, informal sector, household welfare, food security, Ghana, account use, financial exclusion

Posted Date: November 24th, 2026

DOI: https://doi.org/10.21203/rs.3.rs-11282920/v1

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Additional Declarations: No competing interests reported.

Abstract

Informal workers lack employment-based protection against income shocks, yet evidence on whether financial inclusion improves their welfare is limited. Using the seventh round of the Ghana Living Standards Survey (2016/17), this study examines 9,867 households headed by informal workers. Comparisons within enumeration areas show that inclusion is associated with 0.235 log points higher consumption per adult equivalent, an 8.5-percentage-point lower probability of poverty, an 11.7-point lower probability of moderate or severe food insecurity and more durable assets. The results are robust across doubly robust, entropy-balancing, and preference-adjusted specifications. Households that actively use their accounts gain more than those with dormant accounts. Among unbanked informal-worker household heads, 74 per cent cite insufficient or irregular income as the main reason for exclusion, while fewer than 6 per cent cite distance, procedures or lack of awareness. Inclusion policies for informal workers therefore need to address income irregularity, not only access.

1. Introduction

Informal employment is the dominant form of work in low- and lower-middle-income economies. Informal jobs make up 58.2 per cent of all jobs globally and 81.5 per cent in lower-middle-income countries and, by definition, lack the legal or social protections that accompany formal employment (International Labour Organisation [ILO], 2023). Ghana is a case in point where at least 8 out of every 10 people in employment work in the informal sector, which accounts for approximately 27 per cent of Gross Domestic Product (GSS, 2025).

Financial inclusion is widely promoted as a way to strengthen these households' economic security. In Ghana, ownership rose from 29 per cent in 2011 to 58 per cent in 2017 and 68 per cent in 2021 (World Bank, 2022). The welfare evidence is nevertheless mixed. Mobile money protected Kenyan households' consumption against shocks by lowering the cost of transfers (Jack & Suri, 2014) and raised long-run consumption (Suri & Jack, 2016), while free savings accounts raised saving and investment among Kenyan market vendors (Dupas & Robinson, 2013).

Studies using the seventh round of the Ghana Living Standards Survey (GLSS7) report that inclusion lowers poverty and vulnerability (Koomson et al., 2020), raises welfare, especially among poor households (Iddrisu & Danquah, 2021), improves several dimensions of well-being (Sakyi-Nyarko et al., 2022) and reshapes household spending (Abokyi, 2025). These studies analyse the household population as a whole. The only GLSS7 study of informal-sector households examines energy poverty in a sample of 990 wage-employee households (Kabutey-Ongor et al., 2025). Whether financial inclusion improves the consumption, poverty status, food security and assets of households headed by informal workers, the group with the least employment-based protection, therefore remains an open question. Identification is another concern, as Ghanaian studies have relied on community-level instruments such as distance to a bank (Kabutey-Ongor et al., 2025; Koomson et al., 2020) or employment-related instruments (Sakyi-Nyarko et al., 2022), whose exclusion restrictions are difficult to verify.

This question is addressed using GLSS7 data on 9,867 households whose heads hold informal jobs under International Labour Organisation (ILO) criteria, covering wage employees, own-account workers, and agricultural households. The preferred specification compares included and excluded households within the same enumeration area. Inclusion is associated with 0.235 log points higher consumption per adult equivalent, an 8.5-percentage-point lower probability of poverty, an 11.7-point lower probability of moderate or severe food insecurity and 0.38 standard deviations more durable assets. The analysis also distinguishes active account use from dormant ownership, using records of deposits and withdrawals, and examines the reasons household heads give for not having an account, not borrowing and not having insurance. Households that actively use their accounts gain more than those with dormant accounts, and exclusion among informal workers reflects insufficient and irregular income far more than distance or procedures.

The paper contributes in four ways. First, it provides nationally representative evidence on the welfare correlates of financial inclusion for informal-worker households, extending studies that pool all households (Abokyi, 2025; Iddrisu & Danquah, 2021; Koomson et al., 2020; Sakyi-Nyarko et al., 2022) and earlier work on financial inclusion and household income (Zhang & Posso, 2019). Second, it examines four welfare dimensions jointly and separates bank accounts from mobile-money-only accounts, complementing evidence on mobile money use (Hamdan et al., 2022). Third, it applies a zero-first-stage falsification test (van Kippersluis & Rietveld, 2018) to the community-level instrument typical of this literature. Fourth, it moves beyond access by showing that welfare gains rise with account use and by documenting why informal-worker households remain excluded, responding to evidence that account ownership often does not translate into use (Dupas et al., 2018; Hamdan et al., 2022).

The rest of the paper is organised as follows: Section 2 reviews the literature, Section 3 describes the methodological approach including the context, data and model estimation, Section 4 reports the results, Section 5 discusses them, and Section 6 concludes the study.

2. Literature review

2.1 Channels from financial inclusion to welfare

The literature identifies several channels through which financial inclusion affects household welfare. First, lower transfer transaction costs strengthen informal insurance. In Kenya, shocks reduced the consumption of households that did not use mobile money by about 7 per cent, while users' consumption was unaffected; users were also more likely to receive remittances after a shock (Jack & Suri, 2014). Greater access to mobile money agents raised per capita consumption and moved about 194,000 Kenyan households out of extreme poverty (Suri & Jack, 2016).

Savings are a second channel. Removing the cost of opening a savings account raised uptake, saving and business investment among Kenyan market vendors (Dupas & Robinson, 2013), and replications in Uganda, Malawi and Chile raised formal saving. However, part of the increase was offset by lower informal saving (Dupas et al., 2018). Credit is a third channel, but six randomised evaluations of microcredit found modestly positive, not transformative, effects (Banerjee et al., 2015). A fourth channel works through assets: in South Africa, the welfare advantage of financial inclusion operates through the accumulation of durable goods (Nanziri, 2016).

2.2 Household evidence

Observational studies generally report positive associations, though gains vary. Using data on more than 6,200 Chinese households, Zhang and Posso (2019) find a strong positive effect of inclusion on income, larger for low-income households. Account ownership raised consumption in China, especially in urban areas and for food (Mallick & Zhang, 2019), and inclusion diversified non-food consumption in India (Chakrabarty & Mukherjee, 2022). In rural Nigeria, middle- and high-income households gained more than the low-income households targeted by policy (Sani Ibrahim et al., 2019), while further Nigerian evidence also points to positive effects (Joan et al., 2022). These findings have been challenged: the Kenyan mobile money results have been disputed (Bateman et al., 2019), and the randomised microcredit evidence cautions against expecting transformative effects (Banerjee et al., 2015).

2.3 Evidence from Ghana and on informal workers

Four GLSS7 studies analyse the general population. Koomson et al. (2020) report that inclusion reduces the likelihood of poverty by 27 per cent and of future poverty by 28 per cent, with larger reductions for female-headed households. Iddrisu and Danquah (2021) find larger effects for poor households using propensity score matching. Sakyi-Nyarko et al. (2022) report gains across several measures of well-being, and Abokyi (2025) finds that formal inclusion shifts spending toward food, human capital, and physical capital, while informal financial inclusion shifts it toward immediate needs. Kabutey-Ongor et al. (2025) classify GLSS7 wage-employee heads as informal if they lack a written contract, social security, or paid leave, and find that inclusion reduces energy poverty; they note that informal workers often lack the collateral and credit histories formal lenders require.

2.4 Barriers to inclusion and the gap between ownership and use

Cross-country survey evidence identifies why adults remain unbanked. In the first round of the Global Findex survey, the most common reason for not having a formal account, cited by 65 per cent of adults without one, was not having enough money to use it, followed by cost (25 per cent) and distance (20 per cent) (Demirgüç-Kunt & Klapper, 2012). In 2021, lack of money, distance to the nearest financial institution and insufficient documentation remained among the main reasons given by the 1.4 billion unbanked adults, and about two-thirds of the unbanked said they could not use an account at a financial institution without help (Demirgüç-Kunt et al., 2022). Financial diaries from Bangladesh, India and South Africa show that poor households face a 'triple whammy' of low incomes, irregular and unpredictable cash flows, and financial instruments ill-suited to these conditions (Collins et al., 2009). For insurance, randomised experiments in rural India show that demand is sensitive to price and constrained by lack of trust and by liquidity constraints (Cole et al., 2013).

Owning an account does not guarantee using it. When basic bank accounts were offered free of charge in Uganda, Malawi and Chile, only 17, 10 and 3 per cent of the treated individuals made five or more deposits over two years, and there were no discernible average effects on savings or downstream outcomes, although large effects among active users could not be ruled out (Dupas et al., 2018). In Uganda, most microentrepreneurs owned a mobile money account, but only about half used it actively (Hamdan et al., 2022). Evidence based on use rather than ownership points to welfare gains: across eight Sub-Saharan African countries, rural households using mobile banking services had higher per-capita food and non-food consumption (Kouandou & Legras, 2025).

2.5 Conceptual framework and expectations

These strands suggest five expectations. First, if accounts allow informal-worker households to save, borrow and receive transfers at lower cost, inclusion should be associated with higher consumption and assets and with lower poverty and food insecurity (Dupas & Robinson, 2013; Jack & Suri, 2014; Nanziri, 2016). Second, the channel likely differs by account type. Mobile-money-only accounts are expected to operate mainly through remittances, as in the risk-sharing mechanism documented by Jack and Suri (2014) and Apeti (2023), whereas bank accounts operate more through saving and asset accumulation (Dupas & Robinson, 2013; Nanziri, 2016). Third, the size of the gains may

vary across groups of informal workers. The direction is ambiguous a priori, because some studies report larger gains for poorer households (Iddrisu & Danquah, 2021; Zhang & Posso, 2019) and others for better-off households (Sani Ibrahim et al., 2019). Fourth, if welfare gains depend on using financial services rather than merely holding them (Dupas et al., 2018; Kouandou & Legras, 2025), households that actively use their accounts should gain more than those with dormant accounts. Fifth, because the incomes of people experiencing poverty are low and irregular (Collins et al., 2009) and lack of money is the most commonly reported reason for being unbanked (Demirgüç-Kunt & Klapper, 2012), exclusion among informal-worker households is expected to reflect income constraints more than distance or procedures.

3. Method

3.1 Study context

Paid employment subject to national labour standards accounts for only 20.2 to 27.4 per cent of employment in Ghana; vulnerable employment accounts for 62.9 to 74.9 per cent; and informal-sector activity is dominated by own-account work (GSS, 2025). The national poverty rate fell from 32 per cent in 2005 to 24 per cent in 2012 and stood at 23.4 per cent in 2016 (World Bank, 2023).

Account ownership more than doubled in a decade, from 29.4 per cent of adults in 2011 to 57.7 per cent in 2017 and 68.2 per cent in 2021 (World Bank, 2022). After revised agent-banking and electronic-money guidelines allowed mobile network operators to offer mobile money accounts, the share of Ghanaian adults with such accounts tripled between 2014 and 2017 (World Bank, n.d.). The GLSS7 survey year therefore falls within the period of fastest mobile money growth, allowing comparison of bank-based and mobile-money-based inclusion.

3.2 Data

The Ghana Statistical Service fielded GLSS7 from October 2016 to October 2017. It is nationally representative, covers 14,009 households and underpins Ghana's official poverty statistics (GSS, 2018). The consumption and poverty file is combined with modules on demographics, education, employment, time preferences, food security, durable assets, remittances and financial services. All estimates use the GLSS7 sampling weights, and standard errors are clustered at the enumeration area level, the primary sampling unit.

Each employed household head's main job is classified using ILO criteria (ILO, 2023). Wage employees are classified as informal if they lack a written contract, paid leave, or employer social-security contributions, following Kabutey-Ongor et al. (2025). Non-agricultural self-employed heads are informal if their enterprise keeps no audited accounts, and agricultural self-employed heads and contributing family workers are treated as informal. Of 11,138 employed heads, 9,970 hold informal jobs, 1,162 hold formal jobs, and 6 cannot be classified. Excluding 103 households with missing information on financial services or the head's education leaves 9,867 households in 994 enumeration areas. This represents 36.6 per cent agricultural self-employed, 34.7 per cent non-agricultural self-employed, 26.8 per cent informal wage employees and 1.9 per cent family workers. A sample restricted to wage employees would therefore exclude almost three-quarters of informal-worker households.

3.3 Measurements

Welfare outcomes

The main outcome is the logarithm of real annual consumption per adult equivalent, the welfare measure used for official poverty statistics (GSS, 2018). A household is poor if consumption per adult equivalent is below GH¢1,760.80 and extremely poor if below GH¢982.10; the poverty gap is the shortfall from the absolute line as a percentage of the line. Food insecurity is measured using the eight items of the Food Insecurity Experience Scale (FIES) (Cafiero et al., 2018). The analysis uses the raw score (0–8) and indicators for scores of at least four (moderate or severe) and seven (severe); these thresholds approximate, but are not identical to, the Rasch-based calibration used for official estimates (Cafiero et al., 2018). Following Filmer and Pritchett (2001), the asset index is the first principal component of ownership of 47 working durable goods, standardised in the full sample. For mechanisms, the analysis uses indicators for receiving remittances in the past 12 months and receiving through mobile money.

Financial inclusion and controls

The treatment, FI, equals one if any household member has an account at a financial institution, holds insurance, or has applied for a loan in the past 12 months, covering the access, insurance and credit dimensions used in earlier GLSS7 studies (Iddrisu & Danquah, 2021; Koomson et al., 2020). Accounts include banks, non-bank financial institutions (NBFIs), susu collectors and mobile money providers. For channels, the analysis distinguishes households with a bank or NBFI account, a mobile money account only, a susu or other account only, and no account. A depth measure counts the dimensions used (0–5), corresponding to: account, savings account, loan application, insurance, and digital finance. Controls are the head's age and its square, sex, marital status and education; household size; urban residence; and the head's employment type, following the determinants used in earlier work (Hussen & Mohamed, 2023; Koomson et al., 2020). Robustness checks

add the head's mobile phone ownership and two preference indices elicited through hypothetical choices between smaller-sooner and larger-later payments (impatience, 0–3) and between safe and risky payments (risk aversion, 0–3). Supplementary Table S1 defines all variables.

Account use and reasons for exclusion

Two additional sets of measures capture financial service use and reasons for exclusion. GLSS7 records, for each savings account held by a household member, the current balance and the amounts deposited and withdrawn in the 12 months before the interview. A household is classified as an active user if any account recorded a deposit or withdrawal in that period, and as a dormant owner if it holds an account but recorded no such transaction; use intensity is measured by the logarithm of one plus annual deposits. This module does not record mobile money transactions, so active use refers to savings accounts. GLSS7 also asks each adult without an account for the main reason for not having one (not necessary, not aware of an institution, cumbersome process, institution too far away, not enough money, no regular income, or other), each adult who did not apply for a loan for the main reason for not applying, and each adult without insurance for the main reason for not having it. The analysis uses the household head's responses and groups lack of awareness, cumbersome procedures and distance as supply barriers, and insufficient money and lack of a regular income as income-related reasons.

3.4 Model estimation

Within-community comparisons

The central threat to identification is that included households differ from excluded ones in ways that also affect welfare. Some of these differences are local, as distance to formal institutions shapes access (Hussen & Mohamed, 2023), and the same local conditions may directly affect welfare. The preferred specification therefore compares households within the same enumeration area:

$$W_{icm} = \alpha + \beta\, FI_{icm} + X'_{icm}\,\gamma + \mu_c + \tau_m + \epsilon_{icm} \qquad (1)$$

where W is a welfare outcome of household *i* in enumeration area *c* interviewed in month m, X contains the controls, μ are enumeration-area fixed effects, and τ are survey-month fixed effects. β compares included and excluded informal-worker households in the same community and month. Binary outcomes are estimated using linear probability models. Correia's (2016) high-dimensional fixed-effects estimator is used with sampling weights and standard errors clustered at the enumeration-area level. Areas with a single-sample household are dropped, leaving 9,863 households in 990 areas, as area effects absorb urban residence and region.

Robustness to the estimation method

Equation (1) assumes that, conditional on the controls and area effects, inclusion is unrelated to unobserved determinants of welfare. This assumption is assessed in four ways. First, area effects are replaced with region effects. Second, the average treatment effect on the treated is estimated by inverse-probability-weighted regression adjustment (IPWRA), which is consistent if either the treatment or the outcome model is correctly specified (Wooldridge, 2010), as robust standard errors are reported. Third, entropy balancing reweights excluded households so that their covariate means match those of included households exactly (Hainmueller, 2012). Fourth, the specification adds the head's phone ownership and elicited impatience and risk aversion, which are plausible sources of joint selection into finance and higher welfare.

Sensitivity to unobserved selection

Following Oster (2019), the analysis computes δ, the degree of selection on unobservables relative to observables that would reduce the coefficient to zero, by comparing the coefficient and R^2 of uncontrolled and fully controlled regressions, with the maximum attainable R^2 set to 1.3 times the controlled R^2. The analysis also reports the bias-adjusted coefficient under equal selection ($\delta = 1$). Values of δ above one imply that unobservables would need to matter more than all observed controls to eliminate the estimate (Oster, 2019).

Instrumental variables and a falsification test

A natural instrument is the share of other households in the enumeration area that are financially included, which is closely related to the community-level instruments used in earlier Ghanaian work (Kabutey-Ongor et al., 2025; Koomson et al., 2020). Its exclusion restriction is tested with the zero-first-stage approach because, in a subsample in which the instrument cannot affect the treatment, any association between the instrument and the outcome reveals a direct effect (van Kippersluis & Rietveld, 2018). Formal-job households provide such a subsample because 99.1 per cent are already included. Among them, the instrument does not predict inclusion (coefficient 0.028, standard error 0.023) but strongly predicts consumption (0.452, standard error 0.106), indicating that it captures community affluence. Alternative

instruments based on the share of unbanked adults citing distance or other supply barriers are weak, with first-stage F-statistics of 4.6 and 11.5. Instrumental-variable estimates are therefore reported only in Supplementary Table S15.

Channels and heterogeneity

To examine channels, FI is replaced with indicators for the three account types, and remittance receipt is added as an outcome. To examine heterogeneity, FI is interacted with the head's employment type and with urban residence in Eq. (1), and the equality of the group-specific effects is tested. All analyses are done using Stata version 18.

Account use and reasons for exclusion

To examine whether use matters beyond ownership, FI in Eq. (1) is replaced with indicators for active use and dormant ownership, with households without an account as the reference group, and a Wald test compares the two coefficients. Among account holders, the logarithm of annual deposits replaces FI to measure use intensity. To examine why households are excluded, linear probability models are estimated for all employed household heads, in which each outcome equals one if the head has no account and gives a particular main reason. These models include indicators for the four informal employment types, with formal-job heads as the reference group, the controls in Eq. (1) other than employment type, and region and survey-month fixed effects.

Use of artificial intelligence tools

The author used AI to assist with drafting and editing the manuscript and cross checked the accuracy and consistency. The author reviewed and revised all AI-assisted text, verified all reported results against the Stata output and all statements against the cited sources, and takes full responsibility for the content of the article

4. Results

4.1 Descriptive statistics

Supplementary Table S16 summarises the sample. Some 69.2 per cent of households are financially included, and 60.6 per cent hold an account; 43.8 per cent hold a bank or NBFI account, 26.5 per cent have insurance, and 9.5 per cent have applied for a loan. Mean consumption per adult equivalent is GH¢5,023; 16.0 per cent of households are poor and 39.7 per cent moderately or severely food insecure. Thirty per cent received remittances, and 17.8 per cent received them through mobile money.

4.2 Financial inclusion across the labour market

Table 1 shows that inclusion is almost universal among formal-job households (99.1 per cent) and declines as wage employees lose protections, from 93.5 per cent for those lacking one protection to 69.6 per cent for those lacking all three. It is lowest among agricultural self-employed households (56.7 per cent). Bank and NBFI accounts follow the same gradient, from 95.9 to 27.7 per cent, whereas mobile money use varies little (16.9 to 25.0 per cent). Welfare follows the same ordering: consumption per adult equivalent falls from GH¢9,324 in formal-job households to GH¢3,249 among agricultural self-employed households, and poverty rises from 1.5 to 31.4 per cent. Conditional on household characteristics, an informal main job lowers the probability of inclusion by 13.1 percentage points (standard error 1.2).

Table 1
Financial inclusion and welfare across labour-market status (all employed household heads)

Indicator	Formal job	Informal wage, 1 missing	Informal wage, 2 missing	Informal wage, 3 missing	Non-agric. self-employed	Agric. self-employed	Family worker
Financially included (%)	99.1	93.5	86.6	69.6	78.3	56.7	63.5
Account, any institution (%)	98.9	92.3	81.2	63.5	71.2	44.4	48.7
Bank/NBFI account (%)	95.9	87.1	72.4	45.0	53.1	27.7	33.5
Mobile money (%)	19.8	24.6	18.9	25.0	21.8	16.9	17.6
Savings account (%)	81.8	71.2	53.1	35.3	47.4	24.5	30.7
Applied for loan (%)	14.5	10.5	5.4	6.2	11.3	9.8	9.1
Insurance (%)	47.1	35.5	29.9	22.3	28.7	25.0	33.5
Consumption per adult equivalent (GH¢)	9,324	8,331	6,313	5,292	6,246	3,249	4,839
Poor (%)	1.5	2.4	3.5	9.8	5.9	31.4	14.1
Moderate or severe food insecurity (%)	13.0	20.2	19.2	36.4	29.8	54.1	53.6
Households (N)	1,157	321	313	1,563	2,945	4,550	189

Notes: Weighted means. 'Missing' counts the protections (written contract, paid leave, social security) that a wage employee lacks.

Within the analysis sample, included households consume GH¢1,758 more per adult equivalent than excluded households, and their poverty and food-insecurity rates are 14.2 and 19.9 points lower. They are also more urban, more educated and less often agricultural (Supplementary Table S2), so the raw gaps overstate the welfare differences attributable to inclusion. Pre-estimation diagnostics show no multicollinearity concern: the mean variance inflation factor, excluding the mechanically related age terms, is 1.66, and that of FI is 1.17 (Supplementary Tables S3 and S4).

4.3 Who is financially included?

Table 2 reports probit average marginal effects. Education is the strongest correlate: relative to heads without completed primary schooling, junior high, senior high and post-secondary education raise the probability of inclusion by 17.4, 24.3 and 30.6 percentage points. Urban residence adds 9.3 points and marriage 5.3 points. Non-agricultural self-employed heads are 4.6 points more likely, and agricultural self-employed heads 10.3 points less likely, to be included than informal wage employees. Mobile phone ownership adds 18.5 points, whereas impatience and risk aversion have small and insignificant effects, suggesting that selection on these traits is limited.

Table 2
Determinants of financial inclusion: probit average marginal effects

Variable	(1) Baseline	(2) With phone and preferences
Age of head	0.001**	0.002***
	(0.000)	(0.000)
Female head	−0.015	−0.003
	(0.014)	(0.014)
Married head	0.053***	0.042***
	(0.014)	(0.014)
Household size	0.020***	0.020***
	(0.002)	(0.002)
Urban	0.093***	0.076***
	(0.025)	(0.025)
Education: primary	0.047**	0.023
	(0.021)	(0.020)
Education: JHS/middle	0.174***	0.140***
	(0.017)	(0.017)
Education: SHS	0.243***	0.208***
	(0.022)	(0.023)
Education: post-secondary/tertiary	0.306***	0.271***
	(0.023)	(0.024)
Non-agricultural self-employed	0.046***	0.038**
	(0.017)	(0.017)
Agricultural self-employed	−0.103***	−0.088***
	(0.023)	(0.023)
Contributing family worker	−0.031	−0.024
	(0.051)	(0.049)
Owns mobile phone		0.185***
		(0.017)
Impatience (0–3)		−0.002
		(0.005)
Risk aversion (0–3)		0.004
		(0.007)
Region and survey-month fixed effects	Yes	Yes
Pseudo R^2 (unweighted probit)	0.121	0.134
Observations	9,867	9,723

Notes: Dependent variable: FI. Average marginal effects (discrete changes for binary and categorical variables) from weighted probit models. Reference categories: no or incomplete primary education; informal wage employee. Standard errors clustered by enumeration area in parentheses. *** $p < 0.01$, ** $p < 0.05$.

4.4 Main results

Table 3 reports the preferred estimates of Eq. (1) with all controls. Inclusion is associated with 0.235 log points higher consumption per adult equivalent, about 26 per cent. It lowers the probability of poverty by 8.5 percentage points, more than half the sample rate of 16.0 per cent, the probability of extreme poverty by 3.0 points and the poverty gap by 3.1 points. It is associated with 0.74 fewer food-insecurity experiences, an 11.7-point lower probability of moderate or severe food insecurity (from a base of 39.7 per cent), a 7.4-point lower probability of severe food insecurity and a 0.38 standard deviation higher asset index. All coefficients are significant at the 1 per cent level, consistent with the first expectation in Section 2.5.

Table 3
Financial inclusion and household welfare: enumeration-area fixed-effects estimates

Financial inclusion (FI)	(1) ln consumption	(2) Poor	(3) Extremely poor	(4) Poverty gap	(5) FIES score	(6) Moderate/severe food insecure	(7) Severe food insecure	(8) Asset index
	0.235* **	**−0.085*** **	**−0.030*** **	**−3.064*** **	**−0.743*** **	**−0.117*** **	**−0.074*** **	**0.384*** **
	(0.015)	(0.012)	(0.005)	(0.361)	(0.077)	(0.014)	(0.011)	(0.024)
Age of head	0.004	−0.003**	−0.000	−0.051	−0.024**	−0.006***	−0.000	0.017***
	(0.003)	(0.001)	(0.001)	(0.048)	(0.011)	(0.002)	(0.002)	(0.004)
Age²/100	−0.003	0.002	0.000	0.040	0.018*	0.005**	−0.000	−0.015***
	(0.003)	(0.001)	(0.001)	(0.051)	(0.010)	(0.002)	(0.002)	(0.004)
Female head	−0.007	0.002	−0.007*	−0.235	0.336***	0.066***	0.018*	−0.070***
	(0.015)	(0.008)	(0.004)	(0.252)	(0.075)	(0.014)	(0.009)	(0.023)
Married head	−0.027	−0.014	−0.011***	−1.029***	−0.242***	−0.035***	−0.029***	0.206***
	(0.017)	(0.009)	(0.004)	(0.271)	(0.069)	(0.013)	(0.009)	(0.024)
Household size	−0.112***	0.034***	0.011***	1.179***	0.052***	0.010***	0.002	0.016***
	(0.004)	(0.002)	(0.001)	(0.081)	(0.011)	(0.002)	(0.002)	(0.004)
Education: primary	0.082***	−0.020	−0.010*	−1.171***	−0.342***	−0.060***	−0.039***	0.147***
	(0.018)	(0.016)	(0.005)	(0.387)	(0.087)	(0.016)	(0.012)	(0.026)
Education: JHS/middle	0.148***	−0.045***	−0.012**	−1.489***	−0.580***	−0.082***	−0.061***	0.282***
	(0.016)	(0.011)	(0.005)	(0.341)	(0.080)	(0.013)	(0.011)	(0.022)
Education: SHS	0.201***	−0.066***	−0.008	−1.555***	−0.845***	−0.113***	−0.083***	0.540***
	(0.024)	(0.013)	(0.007)	(0.401)	(0.118)	(0.020)	(0.017)	(0.048)
Education: post-secondary/tertiary	0.355***	−0.056***	−0.010**	−1.566***	−1.200***	−0.170***	−0.112***	0.871***
	(0.032)	(0.012)	(0.005)	(0.371)	(0.124)	(0.020)	(0.016)	(0.063)
Non-agricultural self-employed	0.108***	−0.036***	−0.011***	−1.217***	−0.448***	−0.068***	−0.048***	0.214***
	(0.017)	(0.009)	(0.004)	(0.259)	(0.082)	(0.016)	(0.010)	(0.034)
Agricultural self-employed	0.003	0.012	0.003	0.516	0.004	0.002	−0.006	−0.049
	(0.022)	(0.012)	(0.006)	(0.389)	(0.090)	(0.017)	(0.014)	(0.033)
Contributing family worker	0.085**	−0.050	−0.003	−0.214	0.067	0.045	−0.013	0.044
	(0.040)	(0.031)	(0.012)	(0.724)	(0.241)	(0.065)	(0.036)	(0.074)
Enumeration-area and survey-month fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of outcome	8.231	0.160	0.048	5.185	2.785	0.397	0.185	0.097
R^2	0.719	0.504	0.459	0.593	0.581	0.513	0.487	0.568

Notes: Linear models with enumeration-area and survey-month fixed effects, weighted by GLSS7 sampling weights. Consumption is per adult equivalent. Urban residence is absorbed by the area fixed effects. Reference categories: no or incomplete primary education; informal wage employee. Standard errors clustered by enumeration area in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

Financial inclusion (FI)	(1) ln consumption	(2) Poor	(3) Extremely poor	(4) Poverty gap	(5) FIES score	(6) Moderate/severe food insecure	(7) Severe food insecure	(8) Asset index
	0.235* **	**−0.085*** **	**−0.030*** **	**−3.064*** **	**−0.743*** **	**−0.117*** **	**−0.074*** **	**0.384*** **
Observations	9,863	9,863	9,863	9,863	9,830	9,830	9,830	9,853
Enumeration areas	990	990	990	990	990	990	990	990

Notes: Linear models with enumeration-area and survey-month fixed effects, weighted by GLSS7 sampling weights. Consumption is per adult equivalent. Urban residence is absorbed by the area fixed effects. Reference categories: no or incomplete primary education; informal wage employee. Standard errors clustered by enumeration area in parentheses. *** p < 0.01, ** p < 0.05, * p < 0.1.

The controls behave as expected. Post-secondary education is associated with 0.355 log points higher consumption, 17.0 points lower food insecurity and 0.87 standard deviations more assets than incomplete primary schooling. Larger households have lower consumption per adult equivalent, female-headed households report more food insecurity (6.6 points), and non-agricultural self-employed households are better off than informal wage-employee households on every outcome. Agricultural self-employment does not differ significantly from wage employment once area effects are absorbed, suggesting that the raw welfare gap in Table 1 largely reflects where agricultural households live. Measuring inclusion by account ownership gives very similar estimates (Supplementary Table S5).

4.5 Robustness

Panel A of Supplementary Table S17 shows that the estimates change little across methods. The consumption coefficient is 0.228 with region effects, 0.248 under IPWRA and 0.259 under entropy balancing, and falls to 0.209 when phone ownership and preferences are added. Poverty effects range from − 6.8 to − 8.8 points, food-insecurity effects from − 9.8 to − 11.7 points and asset effects from 0.36 to 0.50 standard deviations. Oster's δ is 4.4 for consumption, 3.7 for poverty, 3.6 for food insecurity and 2.5 for assets, and the bias-adjusted coefficients under equal selection remain sizeable (0.176, − 0.057, − 0.082 and 0.232).

Panel B shows that the results hold for alternative measures and samples. Each additional dimension of inclusion is associated with 0.097 log points higher consumption, and a bank or NBFI account alone gives effects close to the baseline. Per-capita welfare measures, a stricter informality definition, the exclusion of agricultural households, labour-market controls, trimming and unweighted estimation leave the coefficients close to the baseline. Among informal wage employees alone, the consumption, food-security and asset effects are similar, but the poverty effect is smaller (-3.9 points). Supplementary Tables S6-S11 report full estimates with controls.

4.6 Channels: bank accounts and mobile money

Table 4 distinguishes account types. Bank and NBFI accounts are associated with the largest gains: 0.264 log points in consumption, 8.9 points lower poverty, 15.4 points lower food insecurity and 0.51 standard deviations more assets. Mobile-money-only accounts are associated with smaller gains in consumption (0.163) and assets (0.187) but a poverty reduction (7.6 points) that does not differ significantly from that of bank accounts (p = 0.210). Their distinctive feature is remittances, where households with a mobile-money-only account are 9.0 percentage points more likely to receive remittances and 12.0 points more likely to receive them through mobile money, whereas bank accounts show no association with overall remittance receipt. Susu-only accounts are associated with consumption gains similar to mobile money but smaller reductions in poverty and food insecurity. These findings are consistent with the second expectation.

Table 4
Type of account and household welfare: enumeration-area fixed-effects estimates

Bank/NBFI account (n = 3,681)	(1) ln consumption	(2) Poor	(3) Moderate/severe food insecure	(4) Asset index	(5) Received remittances	(6) Remittances via mobile money
	0.264* **	**−0.089*** **	**−0.154*** **	**0.507*** **	**0.010**	**0.029** **
	(0.018)	(0.011)	(0.015)	(0.024)	(0.015)	(0.012)
Mobile-money-only account (n = 1,122)	0.163***	−0.076***	−0.096***	0.187***	0.090***	0.120***
	(0.032)	(0.014)	(0.021)	(0.039)	(0.023)	(0.023)
Susu/other-only account (n = 645)	0.165***	−0.051***	−0.062**	0.195***	−0.016	−0.009
	(0.028)	(0.017)	(0.024)	(0.041)	(0.027)	(0.024)
Bank − mobile money difference	0.101***	−0.013	−0.057***	0.319***	−0.080***	−0.091***
Mean of outcome	8.231	0.160	0.397	0.097	0.300	0.178
R^2	0.722	0.505	0.519	0.585	0.299	0.252
Observations	9,863	9,863	9,830	9,853	9,863	9,863

Notes: Reference group: households without an account (n = 4,419). All models include the full set of controls and enumeration-area and survey-month fixed effects; full estimates are in Supplementary Table S12. Significance of the difference row is from a Wald test of equality. Standard errors clustered by enumeration area in parentheses. *** p < 0.01, ** p < 0.05.

4.7 Heterogeneity

Table 5 reports group-specific effects. Consumption, poverty and food-security effects do not differ significantly across employment types or between rural and urban households (equality p-values between 0.165 and 0.832). The poverty reduction is smaller for informal wage employees (6.0 points) than for non-agricultural (9.0) and agricultural (9.7) self-employed households, but the difference is not significant (p = 0.318). Asset effects differ, being largest for non-agricultural self-employed (0.52 standard deviations) and urban households (0.52) and smallest for agricultural self-employed (0.27) and rural households (0.27).

Table 5
Heterogeneous associations of financial inclusion: enumeration-area fixed-effects estimates

Group	ln consumption	Poor	Moderate/severe food insecure	Asset index
Panel A: Employment type of head				
Informal wage employee (n = 2,212)	0.217*** (0.028)	−0.060*** (0.014)	−0.118*** (0.023)	0.415*** (0.047)
Non-agricultural self-employed (n = 2,932)	0.230*** (0.027)	−0.090*** (0.020)	−0.124*** (0.025)	0.522*** (0.045)
Agricultural self-employed (n = 4,535)	0.255*** (0.020)	−0.097*** (0.017)	−0.115*** (0.017)	0.269*** (0.025)
Contributing family worker (n = 188)	0.087 (0.076)	−0.087* (0.052)	−0.026 (0.102)	0.382*** (0.126)
Equality across types (p-value)	0.165	0.318	0.832	0.000
Panel B: Location				
Rural (n = 5,902)	0.247*** (0.018)	−0.094*** (0.016)	−0.113*** (0.017)	0.273*** (0.023)
Urban (n = 3,965)	0.219*** (0.026)	−0.074*** (0.018)	−0.122*** (0.022)	0.524*** (0.046)
Equality rural vs urban (p-value)	0.373	0.390	0.752	0.000

Notes: Group-specific effects are linear combinations from pooled models with FI × group interactions, full controls and enumeration-area and survey-month fixed effects; full estimates are in Supplementary Table S13. Standard errors clustered by enumeration area in parentheses. *** p < 0.01, * p < 0.1.

4.8 Why are informal-worker households excluded?

Table 6 reports the main reasons household heads gave for exclusion. Among heads without an account, insufficient money or income is the most common reason in every group, cited by 47.3 to 59.5 per cent of informal-worker heads. The lack of a regular income is cited by 16.3 to 37.2 per cent of informal-worker heads, compared with 5.2 per cent of the few unbanked formal-job heads. Supply barriers (lack of awareness, cumbersome procedures, or distance) are cited by at most 7.3 per cent in any group and by 5.5 per cent of all unbanked informal-worker heads, while 74.3 per cent give an income-related reason. Among heads who did not apply for a loan, the most common reason after having no need is that interest rates are too high (14.1 to 29.3 per cent of informal-worker heads), while collateral requirements are cited by 3.2 to 5.4 per cent. For insurance, 35.8 to 47.9 per cent of informal-worker heads say they cannot afford it, and not knowing what insurance is rises from 1.2 per cent among formal-job heads to 28.6 per cent among agricultural self-employed heads.

Table 6
Reasons for financial exclusion by labour-market status of the household head (%)

Reason	Formal job	Informal wage employee	Non-agric self-employed	Agric self-employed	Family worker
Panel A: Main reason for not having an account (heads without an account)					
Not enough money or income	45.3	55.0	52.7	59.5	47.3
No regular income	5.2	21.0	16.3	16.3	37.2
Not necessary or not interested	44.3	18.3	22.5	17.9	15.2
Supply barriers (not aware, cumbersome, too far)	5.1	4.9	7.3	5.1	0.3
Heads without an account (N)	19	827	1,099	3,097	125
Panel B: Main reason for not seeking a loan (heads who did not apply)					
No need	68.3	69.9	59.2	64.6	78.1
Interest rate too high	23.9	19.9	29.3	19.8	14.1
Collateral demanded	1.8	4.8	5.2	5.4	3.2
Debt or cannot obtain amount needed	5.6	4.5	4.6	6.6	3.3
Heads who did not apply (N)	959	2,093	2,635	4,134	177
Panel C: Main reason for not having insurance (heads without insurance)					
Cannot afford it	24.8	42.5	35.8	43.5	47.9
Does not know what insurance is	1.2	10.5	16.4	28.6	19.7
Not necessary	43.9	34.2	36.1	22.8	30.2
Distrust (deceptive, low compensation, slow claims)	29.5	11.7	11.1	4.0	1.7
Heads without insurance (N)	609	1,758	2,192	3,742	135

Notes: Weighted percentages of household heads in each group giving each main reason. Only 19 formal-job heads have no account, so their distribution in Panel A is imprecise. Supply barriers: not aware of an institution, cumbersome process or institution too far away. Source: GLSS7 Section 12A.

Table 7 shows that these differences persist after controlling for household characteristics. Relative to formal-job heads, informal-worker heads are 13.2 to 34.6 percentage points more likely to be unbanked. Most of this gap reflects income-related exclusion: informal wage employees are 16.4 points, non-agricultural self-employed 7.0 points, agricultural self-employed 26.1 points and contributing family workers 30.8 points more likely to be unbanked because of insufficient or irregular income. The lack of a regular income alone accounts for 1.8 to 17.1 points. By contrast, supply barriers differ by at most 1.3 points. These results are consistent with the fifth expectation.

Table 7
Labour-market status and financial exclusion of household heads: linear probability models

Informal wage employee	**(1) No account**	**(2) No account: income-related reason**	**(3) No account: no regular income**	**(4) No account: supply barrier**	**(5) No account: not necessary**
	0.196* **	**0.164*** **	**0.048*** **	**0.002**	**0.027*** **
	(0.016)	(0.014)	(0.009)	(0.003)	(0.009)
Non-agric self-employed	0.132***	0.070***	0.018***	0.013***	0.044***
	(0.018)	(0.013)	(0.007)	(0.003)	(0.012)
Agric self-employed	0.346***	0.261***	0.054***	0.013***	0.066***
	(0.022)	(0.018)	(0.009)	(0.005)	(0.017)
Contributing family worker	0.344***	0.308***	0.171***	-0.017***	0.054*
	(0.050)	(0.050)	(0.053)	(0.005)	(0.032)
Mean for formal-job heads	0.016	0.008	0.001	0.001	0.007
Region and survey-month fixed effects	Yes	Yes	Yes	Yes	Yes
Observations	11,020	11,020	11,020	11,020	11,020

Sample: all employed household heads answering the account question. Each outcome equals one if the head has no account and gives the stated main reason, and zero otherwise; column 1 is any reason. Reference group: heads with formal jobs. Controls: age, age², sex, marital status, education, household size, urban residence, region and survey-month fixed effects. Weighted; standard errors clustered by enumeration area. *** p < 0.01, ** p < 0.05, * p < 0.1. Full estimates, including all control variables, are reported in Supplementary Table S18.

4.9 Account use versus account ownership

Table 8 distinguishes active use from dormant ownership. Of account-holding households, 64.6 per cent recorded a deposit or withdrawal in the previous 12 months; the share is 71.1 per cent among households with a bank or NBFI account and 79.4 per cent among susu-only households, but 32.7 per cent among mobile-money-only households, whose transactions are largely outside the savings module. Active users have 0.269 log points higher consumption than households without an account, compared with 0.173 for dormant owners, and the difference of 0.096 is significant at the 1 per cent level. The same ordering holds for poverty (− 9.3 against − 6.6 points), moderate or severe food insecurity (− 14.9 against − 10.4 points) and assets (0.48 against 0.29 standard deviations), and all four differences are significant at the 5 per cent level or better. Among account holders, welfare improves with the intensity of use: a 10 per cent increase in annual deposits is associated with about 0.2 per cent higher consumption, and poverty, food insecurity and assets all improve with deposits. These results are consistent with the fourth expectation.

Table 8
Account use versus account ownership and household welfare: enumeration-area fixed-effects estimates

	ln consumption	Poor	Mod./severe food insecure	Asset index
Panel A: Account use (reference: no account)				
Active use: deposit or withdrawal in past 12 months (n = 3,629)	0.269***	-0.093***	-0.149***	0.483***
	(0.017)	(0.012)	(0.016)	(0.025)
Dormant ownership: account without recorded use (n = 1,818)	0.173***	-0.066***	-0.104***	0.290***
	(0.023)	(0.011)	(0.016)	(0.031)
Active − dormant difference	0.096*** [p = 0.000]	-0.027** [p = 0.012]	-0.045** [p = 0.011]	0.193*** [p = 0.000]
Observations	9,863	9,863	9,830	9,853
Panel B: Intensity of use among account holders				
ln(1 + annual deposits, GH¢)	0.022***	-0.003**	-0.012***	0.049***
	(0.003)	(0.001)	(0.003)	(0.006)
Observations	5,384	5,384	5,367	5,383

Active use: any deposit or withdrawal on a savings account recorded in GLSS7 Section 12C in the past 12 months. Dormant ownership: an account but no recorded deposit or withdrawal. Mobile money transactions are not recorded in Section 12C. All models include the full controls and enumeration-area and survey-month fixed effects. Weighted; standard errors clustered by enumeration area. *** p < 0.01, ** p < 0.05, * p < 0.1. Full estimates, including all control variables, are reported in Supplementary Table S19.

5. Discussion

The findings reveal that, within the same community, financially included informal-worker households consume more, are less likely to be poor or food insecure and hold more durable assets than comparable excluded households. The direction of these associations matches earlier GLSS7 studies of the general population (Iddrisu & Danquah, 2021; Koomson et al., 2020; Sakyi-Nyarko et al., 2022) and evidence that mobile money access raised consumption (Suri & Jack, 2016). The food-security results complement findings that formal inclusion raises food spending in Ghana (Abokyi, 2025) and that account ownership raised food consumption in China (Mallick & Zhang, 2019), as inclusion is associated not only with spending but with fewer experiences of food deprivation, including a 7.4-point lower probability of severe food insecurity.

The contrast between account types sheds light on their mechanisms. The association of mobile-money-only accounts with remittances, and its absence for bank accounts, is consistent with the risk-sharing channel documented by Jack and Suri (2014) and with cross-country evidence that remittances underpin mobile money's stabilising effect on consumption (Apeti, 2023). The larger asset gains of bank accounts are consistent with evidence that formal savings products raise saving and investment (Dupas & Robinson, 2013), that welfare gains from inclusion operate through durable goods (Nanziri, 2016) and that formal inclusion raises spending on physical capital (Abokyi, 2025). The usage results support this, as households that actively deposit into or withdraw from their accounts gain more than those holding dormant accounts, consistent with experimental evidence that access generates little benefit when accounts are rarely used (Dupas et al., 2018) and with evidence from eight African countries that the use of mobile banking raises consumption (Kouandou & Legras, 2025).

Earlier studies disagree on whether poorer households gain more (Iddrisu & Danquah, 2021; Zhang & Posso, 2019) or less (Sani Ibrahim et al., 2019). Consumption, poverty, and food-security effects are similar across employment types, so agricultural self-employed households, the poorest group, gain about as much as others on these dimensions. Asset gains, however, are concentrated among urban and non-agricultural households, which coincides with the low rate of bank or NBFI account ownership among agricultural households (27.7 per cent; Table 1), the account type most strongly associated with asset gains (Table 4).

The exclusion analysis clarifies why informal-worker households remain outside the financial system. Their heads overwhelmingly cite insufficient or irregular income rather than distance, procedures or lack of awareness, mirroring the dominance of lack of money among the reasons for being unbanked worldwide (Demirgüç-Kunt & Klapper, 2012; Demirgüç-Kunt et al., 2022) and the irregular cash flows

documented in financial diaries (Collins et al., 2009). The importance of affordability and limited knowledge for insurance is consistent with experimental evidence that insurance demand is price sensitive and constrained by liquidity and trust (Cole et al., 2013). These patterns suggest that expanding branch networks or simplifying procedures alone is unlikely to reach most excluded informal-worker households.

Several limitations may affect the findings. GLSS7 is a cross-section, so although the within-community estimates are stable across estimators and the Oster bounds are well above one, they rest on selection on observables; reverse causality, in which better-off households open accounts, cannot be ruled out, particularly for assets. Inclusion is measured at the household level, whereas informality refers to the head of household's main job. The food-insecurity thresholds use raw scores rather than the Rasch-based calibration (Cafiero et al., 2018). The usage measures come from savings accounts and do not capture mobile money transactions, and the reasons for exclusion are self-reported and indicate perceived rather than necessarily binding constraints.

6. Conclusion

This paper asked whether financial inclusion improves the welfare of households headed by informal workers. Nationally representative GLSS7 data for 9,867 such households in Ghana show that inclusion is associated with about 26 per cent higher consumption per adult equivalent, an 8.5-point lower probability of poverty, an 11.7-point lower probability of moderate or severe food insecurity and greater durable-asset holdings. The associations hold within communities, across doubly robust, entropy-balancing and preference-adjusted specifications, and under substantial unobserved selection. The paper also shows that a community-level instrument used in earlier Ghanaian studies fails a zero-first-stage falsification test. Households that actively use their accounts gain more than those holding dormant accounts, and exclusion among informal-worker households reflects insufficient and irregular income far more than distance or procedures.

Four implications follow. First, financial exclusion is concentrated among informal and especially agricultural households, the groups with the highest poverty and food insecurity (Table 1). Second, account types serve different needs, because mobile money is mainly associated with access to remittances, whereas bank and NBFI accounts are associated with larger asset and food-security gains. Third, because education and phone ownership are the strongest correlates of inclusion and informal workers often lack collateral and credit histories, outreach that does not depend on formal documentation is likely to matter. Fourth, because most excluded informal-worker households cite insufficient or irregular income, products designed for small and irregular deposits and withdrawals are more likely to bring them into the financial system than measures that only reduce distance or paperwork, given the irregular cash flows documented in financial diaries (Collins et al., 2009); encouraging active use matters as well, because access without use yields little benefit (Dupas et al., 2018). Future research using panel data or exogenous variation in the roll-out of financial services could estimate causal effects more directly.

Declarations

Disclosure Statement on AI

Generative AI (Claude, Anthropic) assisted with drafting and editing the manuscript. The author reviewed and revised all AI-assisted text, verified all reported results against the Stata output and all statements against the cited sources, and takes full responsibility for the content of the article.

Declaration of interest statement

No potential conflict of interest was reported by the author.

Data availability statement

The GLSS7 microdata are available from the Ghana Statistical Service on request. The Stata code and the constructed analysis dataset used to produce all results are available from the author and will be deposited in a public repository on acceptance.

Author Contribution

DDA is the sole author and sole contributor

Data Availability

This study uses the Ghana Living Standards Survey Round 7 (GLSS 7) 2016/17, produced by the Ghana Statistical Service (GSS). The data are available from the GSS Microdata Catalog, title "Ghana Living Standard Survey (GLSS 7) 2017", reference ID DDI-GHA-GSS-GLSS7-2017-

v1, at https://microdata.statsghana.gov.gh/index.php/catalog/97Restrictions apply: the microdata are provided by the GSS under licence to registered users who agree to keep the data confidential, so the data used in this study cannot be redistributed by the author. They are available to researchers on request from, and with the permission of, the Ghana Statistical Service.

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