Beyond Informality: The Importance of Residential-based Business *

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Morgan Hardy, Gisella Kagy, Monica Lambon-Quayefio,Jiayue Zhang

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Abstract

We conduct an inclusive enterprise census, capturing visible non-residential based firms and residential-based firms found through household-based enumeration, in Aburi Ghana. We find residential-based informal enterprises (RIE) to be the majority of the informal sector. Using nationally representative household survey data, we show this pattern generalizes across sub-Saharan Africa. A two-year follow-up in Aburi shows 73% of RIE are still in operation, and the vast majority are still operating from their residences. These findings highlight residential-based informality as a meaningful and persistent share of the informal sector. RIEs are disproportionately female-owned. Female RIE owners report more household children and higher rates of childcare performed while at work, while male RIE owners report higher productivity, relative to non-RIE owners. These stark gendered characteristics of RIEs have important implications for policy interventions targeting informal enterprises and women's economic empowerment.

JEL Codes: C81, C83, O12, O17

*Hardy: New York University Abu Dhabi, morgan.hardy@nyu.edu. Kagy: University of Wisconsin-Madison, gkagy@wisc.edu. Lambon-Quayefio: University of Ghana, mplambon-quayefio@ug.edu, Zhang: Brown University, jiayue_zhang@brown.edu. We are grateful to Charles Sefenu, owner of Data Pivot Ghana, and his excellent enumeration team for their invaluable assistance with fieldwork. We thank Patricia Naluwooza, Jonathan Atta-Aidoo, Mercy Darkwah, Poorvi Goel, Angela Orozco, and Yunyu Shu for excellent research assistance. We thank Christopher Woodruff, Kathleen Beegle, the World Bank's Living Standards Measurement Study (HHS data collection) team and the WBES team (especially David Francis) as well as seminar participants at Oxford University, Brown University, University of Wisconsin - Madison, and Shanghai University of Finance and Economics for helpful comments. We gratefully acknowledge funding from New York University Abu Dhabi and The World Bank. Fieldwork received ethics approval from the New York University-Abu Dhabi Research Ethics Committee (protocol HRPP-2022-75). All errors are our own.

1 Introduction

For several decades, economic research and policy discussions on firms in developing-country contexts have been structured around the distinction between, and relative importance of, formal and informal firms. Research has highlighted the overwhelming importance of the informal sector in many contexts (La Porta and Shleifer, 2014, 2008, Ulyssea, 2020, Maloney, 2004). Within the informal sector, a growing body of work has pushed forward our collective understanding of the productivity of these firms (Amin and Islam, 2015, Islam and Amin, 2023), performance (Adoho and Doumbia, 2018), labor hiring practices (Ulyssea, 2018) and their decision to formalize (De Mel et al., 2013). An unexplored area is understanding where informal firms operate from, particularly the distinction between those operating from within a household and those in a separate non-residential location. Analyzing these differences is inherently difficult as residential-based informal businesses (RIEs) are often not included in standard enterprise data collection protocols (Hardy et al., 2025). Even when datasets include RIEs, this category of firms are often not delineated from non-residential-based informal enterprises in analysis.[1]

This paper pushes our understanding of the informality sector forward by documenting the size and persistence of RIEs and the intersection of owner gender with these trends, highlighting the importance of business location as a key dimension of enterprise heterogeneity within the informality sector. Using original census data from Aburi, Ghana, which covers both residential and non-residential enterprises, we show that RIEs are far from marginal or transitory. Quite the opposite is true: they are numerous, important for overall economic activity, persistent, and demonstrate stark gendered patterns, consistent with gendered differences in owner constraints and optimization strategies.

Our empirical evidence utilizes a novel inclusive enterprise census conducted in Aburi, Ghana in May 2022, designed to capture the full distribution of firms regardless of formality status or location. We enumerate all non-residential business structures, all households with business signage, and every fifth households without signage

[1]For example, Ulyssea (2018) notably includes the full set of informal enterprises, but analysis pools together RIEs with their non-residential counterparts.

within which we identify all business owners and their enterprises. This approach allows us to capture both non-residential business structures and "hidden" residential businesses that are typically excluded from standard enterprise surveys because they require household based sampling to find. We construct a panel by re-surveying all firm owners after two years, enabling us to study firm survival, and transitions across enterprise location and formality status. To assess external validity, we complement these data with the World Bank's Living Standards Measurement Study (LSMS) surveys from all available countries across Sub-Saharan Africa, which provide comparable information on enterprise location and ownership.

Our findings are fourfold. First, RIEs are a quantitatively important share of the informal sector in several ways. In Aburi, they account for approximately 39% of all firms or 60% of all informal firms. They also contribute to over a quarter of total sales and total profits in Aburi, comparable to that of informal non-residential firms. This pattern is not unique to our Aburi Data. Using all publicly available nationally representative household data from Sub-Saharan Africa from LSMS, we find similar patterns that RIEs constitute a large share of informal enterprises. In these data, RIEs account for approximately 49% of enterprises. For many countries and years, they represent the single largest category of all non-farm enterprises. These patterns suggest that household-based production is a central, yet underappreciated, feature of informal economies across diverse settings.

Second, we show that RIEs are highly persistent. Over a two-year period, 3 out of 4 RIEs still persist. Conditional on survival, there is also minimal switching to a non-residential structure or to being a formal firm by the RIEs, with only 1.5% of RIEs switching to being formal and 3.4% switching to being non-residential. These findings indicate that business location is not a transitory choice but rather reflects stable underlying constraints or preferences within the informal sector.

Thirdly, owners of RIEs are distinct from those of informal non-residential-based firms and those of formal firms. RIEs tend to be operated by more marginalized individuals. RIE owners are 18.6 percentage points more likely to be women, have 2 years less education, and 19 percentage points less likely to be married than owners of formal enterprises. Such entrepreneurs also operate from a narrower customer base,

are less integrated into business networks, and report lower sales, profits, assets, and labor inputs.

Finally, we document systematic gender differences in sorting into residential-based businesses and in firm characteristics. Female owners of RIEs are more likely to face the dual responsibility of care-taking and business operation at the same time. Female RIE owners have more children and are more likely to provide care at the workplace than their female formal firm and informal non-residential firm counterparts. In contrast, male-owned RIEs are not more likely to provide care-work at their business location in comparison to other types of male-owned firms and do not have more children. When exploring two measures of firm productivity, gross profit per sales and profit per sales, we find that male-owned RIEs exhibit higher productivity compared to their male formal and informal non-residential counterparts, but that women-owned RIEs do not experience the increase in productivity. These patterns suggest that women's business location choices reflect trade-offs between market opportunities and household responsibilities, while men operating in residential settings are more selected on productivity.

Our paper makes two important contributions. First, we push the literature on enterprise owner gender and it's relationship with enterprise characteristics and performance, forward by documenting systematic sorting of female entrepreneurs into RIEs and linking this sorting to care-taking responsibilities. Our findings provide new evidence on how household constraints shape firm location and performance, complementing existing work on gender gaps in productivity, profitability and occupational choice (De Mel et al., 2009, Blau and Kahn, 1996, Stern and Madison, 2022, Calderon et al., 2015, Hardy and Kagy, 2020, 2018). Second, we document the scale and persistence of RIEs, highlighting that these businesses are numerous and important. Not including them in data collection protocols, and not delineating them in subsequent analysis, is an important source of measurement and policy bias in existing firm datasets and research, with implications for how the informal sector is understood and targeted.

By shifting the lens to focus on the heterogeneity by structure type as an important source of nuance within the informality literature, we document both compositional

and performance-based differences that reflect gendered patterns of segmentation and optimization. We offer a richer understanding of the trade-offs informal entrepreneurs face and the structural barriers they navigate. Based on these findings, we call for an expansion of policy and research to consider structure type in understanding the informal enterprise sector more broadly. Without such an expansion of the concept of informal enterprises, equity concerns arise in the representativeness of data, specifically for women, which previous literature has documented and can lead to ineffective policy choice and national resource distortion (Alsan et al., 2024, Wang and Yang, 2021, Alfonsi et al., 2023).

The remainder of the paper is organized as follows. Section 2 describes the study context and data. Section 3 discusses the characteristics of RIEs. Section 4 discusses the gendered sorting in business structures. Section 5 concludes.

2 Context and Data

2.1 Context - Aburi, Ghana

The key source of data for this paper comes from an enterprise census in Aburi, Ghana. Aburi is the capital of the Akwapim South municipality of Eastern Region, approximately a 45-minute drive from Accra, the capital of Ghana. About 18,000 or 60% of the urban population of the municipality lives in Aburi. The recent national census in 2021 shows that, in the municipality, more than half of the population are self-employed, with the private informal sector being the largest employer.

2.2 Aburi Data Collection

Data collection includes a representative firm listing and a baseline survey with owners during June and July 2022, and a follow-up with baseline firm owners during August and September 2024. The Aburi township boundaries and our representative firm listing efforts spanned 10.81 square kilometers. We split Aburi into 43 enumeration areas, varying from 0.01 to 1.35 square kilometers based on structure density (Appendix Figure A1). During the firm listing, enumerators were assigned to one of the 43 geo-

graphic areas and started at a randomly determined place within their respective map, proceeding to canvas the entire map area in a snake-like pattern.

With the goal of onboarding a representative sample of the universe of firms in Aburi, we conducted a firm listing exercise to identify eligible owners in structures, and conducted a baseline survey to identify eligible firms owned by these owners. We approached three different structure types with different sampling weights: (1) every non-residential enterprise structure, (2) every household structure with signage of business, and (3) every fifth household structure without signage. When approaching the non-residential structures and households with signage, we onboarded every business owner that operated a business in this location. [2] When approaching households without signs, we onboard owners who operate enterprises within their households, including mobile businesses and businesses operated within the household[3]. This sampling strategy yields three enterprise structure types: (1) formal enterprises, (2) informal non-residential enterprises, and (3) informal residential enterprises.

With each sampled owner, we conducted a baseline survey to collect owner-level information and to inquire about every business they own in Aburi that was operating in May 2022 and anticipated to operate for at least a month during the subsequent six months.[4] This endeavour identified all formal businesses as well as non-residential and informal residential businesses. The listing exercise identified 1710 businesses, including 1284 businesses operating in a permanent structure or a household with signage for business, and 426 businesses operating within households without any signage or mobile (representing an estimated number of 2130 businesses from this category after weighting).

For the purpose of this paper, we exclude all mobile businesses and all schools in the analysis going forward. This leads to an analysis sample of 1,495 firms and 1,385

[2]This includes co-owners of the same business, and separate owners of different businesses sharing the same location.

[3]A business operating within the household means the sales process happens within the household. If a business owner produces goods within a household and brings them to a non-residential structure for sale (e.g. a market place), it is considered operating in a non-residential structure. In Aburi, there are no specific market days. Our sampling strategy covers all market places to capture this type of non-residential structure enterprises.

[4]A careful de-duplication exercise was conducted at the end of the data collection to exclude duplicated entries from co-owned businesses.

owners in Aburi as of May 2022. We exclude mobile businesses because our sampling strategy only allows us to identify all mobile business owners who live in Aburi, missing those who commute to Aburi from elsewhere while including those who commute from Aburi to elsewhere to operate their mobile businesses. We exclude the six schools (3 in non-residential structures) because the operational nature is distinctly different from the typical enterprises.

During the follow-up, we tracked every firm owner to inquire about the businesses identified during baseline. We were able to reach 95.1% of the firm owners, where 2.8% refused and 1.9% passed away. In this way, we tracked 96.4% of the 1710 firms.

We collected firm-level data with respect to May 2022 and July 2024. A key indicator we are interested in is formality status. During the baseline and follow-up surveys, owners reported whether their firm was registered with any government institution or authority.[5] We consider an enterprise formal if it is registered with any government institution or authority.

2.3 LSMS Data

To validate the prevelance of RIEs outside of our setting, we compiled a cross-country dataset from 47 Living Standards Measurement Study (LSMS) household surveys from 15 African countries between 2009 and 2023. The LSMS surveys implemented by the World Bank in collaboration with each country's national statistical office, are designed to produce high-quality, nationally representative data for low- and middle-income countries.

All LSMS surveys follow a similar two-stage stratified cluster sampling design. In the first stage, primary sampling units (usually enumeration areas or comparable geographic clusters) are selected from the national sampling frame, stratified by region and urban–rural status. In the second stage, a random sample of households is drawn within each selected primary sampling unit, yielding a representative cross-section of households at the national level. For the purpose of this study, we focus on the non-

[5]Government institutions and authorities include Ghana Revenue Authority (GRA), District Assembly, NBSSI/ Ghana Enterprise Agency (GEA), Ministry of Works and Housing, Registrar General's Department, and other (if so, specify).

farm enterprise module. For each enterprise, the survey collects detailed information on the structure/location of the business (for example, whether it operates from the household dwelling, a market stall, or a separate fixed premise), its formalization status (such as registration with tax authorities or other government agencies), and its ownership structure.

Hardy et al. (2025) show that LSMS is a valuable source of enterprise information, particularly for informal sector businesses not commonly captured by the World Bank Enterprise Surveys. However, the LSMS misses to sample a country's largest firms, largely due to their rarity, rendering them at a near-zero statistical chance of representation in a sampled dataset through household means. For this reason, although firm counts are likely to be most accurate using the LSMS, Hardy et al. (2025) suggests that sales shares calculated using the LSMS will likely understate the sales contributions of formal sector firms. However, within the informal sector, the comparison in sales values between RIEs and their non-residential counterparts using the LSMS data can be taken quite seriously.

3 Residential Businesses in the Informal Sector

3.1 Scale

RIEs are a quantitatively important component of the economy. Figure 1 shows that RIEs make up the largest share, constituting 39.2% of the total companies in Aburi. Informal non-residential businesses and formal businesses represent 26% and 34.8% of economic activities, respectively. In terms of economic contribution, RIEs account for slightly larger share of total sales (26.7%), profits (28.3%) and pay out 18.6% of the total wage bill compared to their informal non-residential counterparts, whose contribution to sales, profit, and wages are 26.2%, 26.8% and 16.9% respectively. Formal enterprises contribute close to half of total sales (47.1%) and profits (44.9%) and pay more than half (64.5%) of the total wage bill in the local economy.

The prominence of RIEs in the informal sector is not unique to our study context. RIEs form a consistently non-trivial share of the businesses identified from house-

hold surveys across 15 countries in Sub-Saharan Africa, based on harmonized LSMS data, as shown in Figure 2. The cross-country evidence confirms that residential-based production is a pervasive feature of informal economies, rather than a context-specific phenomenon. At the same time, enterprise surveys that focus on fixed, non-residential establishments are likely to undercount this segment, suggesting that existing measures of firm activity may be systematically biased.

3.2 Persistence

Operating an informal business in a residential structure is not a transitory choice. Figure 3 shows that over the two-year period of our data collection, about 80% of firms remained open. While the survival rate for informal residential firms is modestly lower than that of non-residential and formal firms, the difference is economically small, indicating that these businesses are not short-lived (Appendix Table A1).

Strikingly, we observe very little switching across structure types conditional on survival, as the vast majority of firms remain in their initial structure type. Fewer than 4% of RIEs transition to operate in non-residential structures; only 1% are formalized over the study period while similarly low rates are observed in the opposite direction (Appendix Table A1). While non-residential informal enterprises are more likely to formalize, it remains an economically small proportion. These patterns suggest that business location is highly persistent and reflects stable constraints or choices, rather than temporary adjustment.

3.3 Distinct Characteristics

Informal residential businesses constitute a distinct segment characterized by different constraints and trajectories. Owners of informal residential businesses are more likely to be marginalized. We find that RIE owners are more likely to be female, have less education and come from households with lower per capita income and liquidity (Appendix Tables A2 and A3). RIEs operate at systematically smaller scales: They are less likely to employ workers, and, conditional on employing labor, hire fewer workers relative to both non-residential informal enterprises and formal firms (Appendix

Table A4). Consistent with this, their total wage bills are significantly lower. RIEs also serve neighborhood customers who are within shorter walking distances from the business location, and are less likely to have non-Aburi customers (Appendix Table A4 and Figure A5). This suggests that RIEs are less integrated in larger market networks compared to formal firms.

Asset holdings also vary substantially by structure type and formality (Appendix Table A4). While both RIEs and NRIEs report significantly less assets than formal firms, RIEs' assets are much lower. These differences are both statistically and economically significant, reflecting the constrained capital endowments under which RIEs operate. However, the likelihood of having a loan does not differ significantly across the different firm categories.

4 Gendered Sorting across Structures

We document systematic gender differences in business structure types. RIEs account for a disproportionately large share of female-owned businesses, at 44% compared to 18% among male-owned ones (Appendix Figures A2 and A3). Sales and profits from RIEs owned by females also contribute to over half of the informal sector owned by females. In contrast, men are more likely to operate formal enterprises. This gender difference is also reflected in the cross-country data from LSMS (Appendix Figure A4).

Female and male owners who operate their businesses in their households display different characteristics. Female owners of RIEs are significantly more likely to provide care at their place of work and to come from households with more children, compared with female owners of formal businesses and NRIEs (Figure 4). Male owners on average are less involved in carework at their businesses, and this status is not different across structure types. This suggests that female entrepreneurs may be optimizing over objective functions that incorporate household welfare and firm profit, whereas male owners are not burdened by household responsibilities when making business decisions.

In contrast, male-owned RIEs exhibit higher productivity than NRIEs, measured by gross and net profits per dollar of sales (Figure 5). They are also more likely to

operate in higher-value activities such as artisanal manufacturing (Appendix Table A5 and Figure A6). Female-owned businesses earn less gross profit per dollar on average, and this productivity measure does not differ across structure types.

Together, these findings point to distinct constraints and preferences behind the optimization for firm location. Female entrepreneurs appear to trade off firm scale and market access for compatibility with household responsibilities, while male entrepreneurs operating in residential settings are more selected on productivity. These differences help explain both the persistence of residential-based businesses and the observed gender gaps in firm performances.

5 Conclusion

This paper documents that residential-based businesses are an important component of the informal sector. Using a novel inclusive firm census in Aburi, Ghana, combined with cross-country evidence from LSMS surveys, we show that these firms account for a large share of businesses and economic activity, are highly persistent over time, and exhibit minimal transition across organizational forms. These patterns indicate that residential-based businesses are a distinct and stable segment within the informal economy.

A key insight of the paper is that this segment is strongly gendered. Female-owned businesses are disproportionately concentrated in residential structures, and their firms are more closely integrated with household responsibilities. In contrast, male-owned residential firms are more likely to operate in higher-value activities and exhibit higher productivity. These differences point to the needs for female entrepreneurs to internalize household constraints in business operation.

These findings have important implications for both measurement and policy. First, conventional firm datasets that focus on non-residential establishments are likely to undercount an important and sizable share of economic activity, particularly that generated by women. This raises the importance of redesigning the widely used data collection protocols to adjust for biased inference about firm dynamics and productivity. Second, policies designed to support informal enterprises may be less effective

for residential-based firms if they do not account for the constraints associated with household responsibilities. Future works on interventions that relax time, care, or spatial constraints may be more effective than those only targeting productivity enhancement.

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Figures

Figure 1: Share of Economic Activities in Aburi by Formality and Structure Type

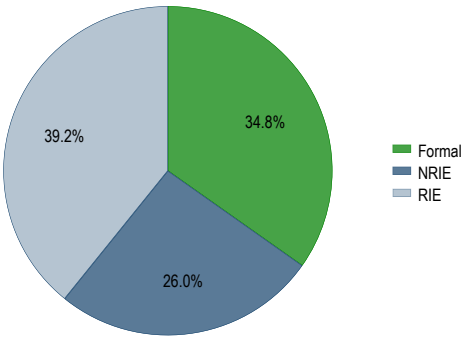


Figure (1a): Number of businesses

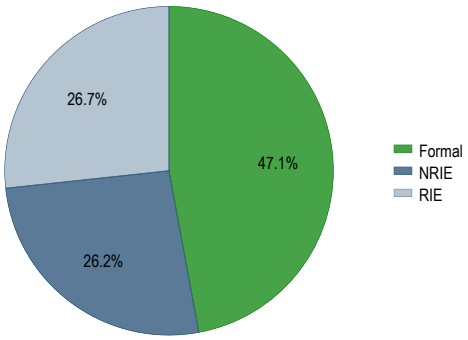


Figure (1b): Total sales

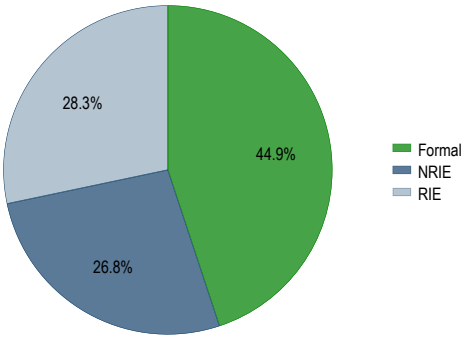


Figure (1c): Total profits

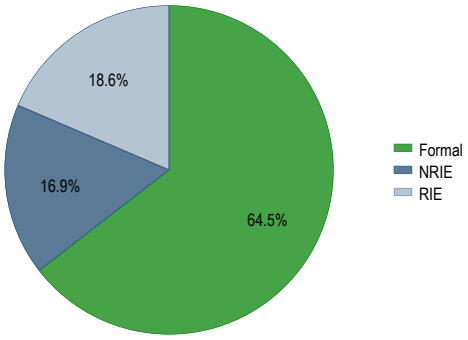
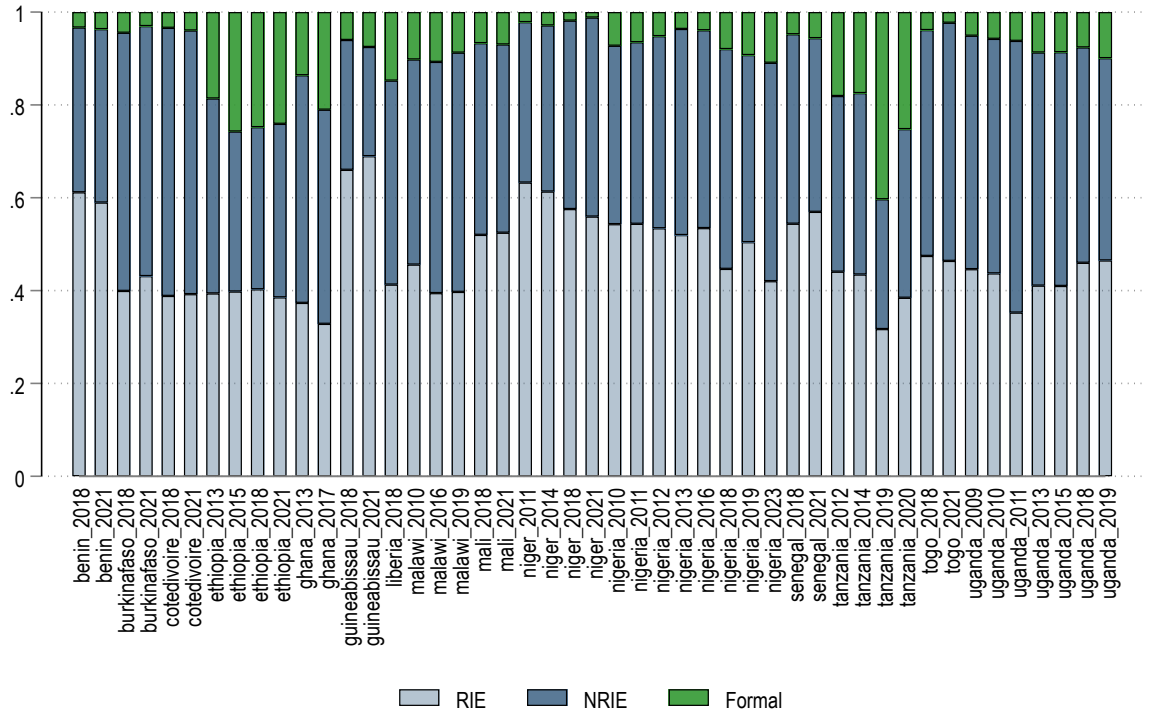


Figure (1d): Total wagebill

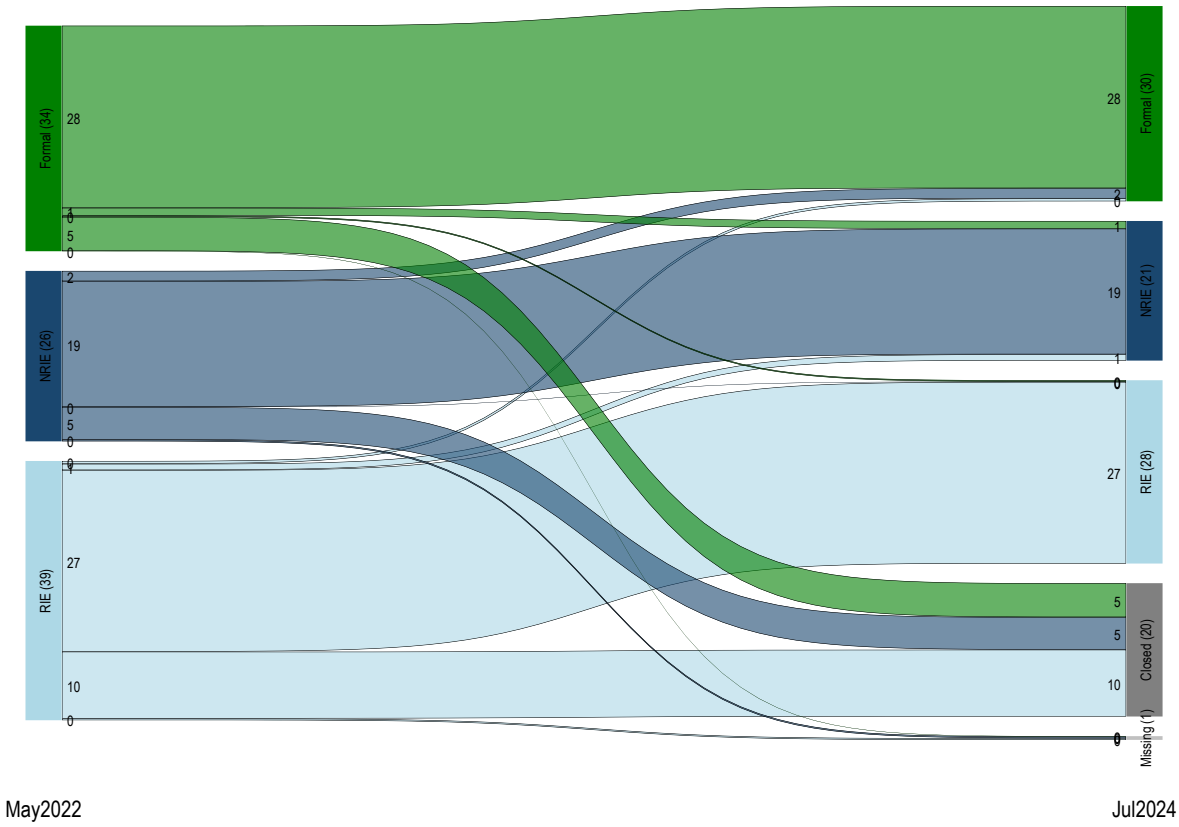
Note: This figure shows the distribution of economic activity in Aburi as of May 2022, by firm formality and structure type. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. Panel (a) shows the distribution based on the number of businesses, panel (b) on total sales, panel (c) on total profits, and panel (d) on the total wage bill. Businesses identified through households without signage, as well as mobile businesses, are weighted by 5, while all other businesses are weighted by 1.

Figure 2: Share of Firms in Sub-Saharan Africa by Structure Type



Note: This figure shows the share of firms, by formality and structure type, according to nationally representative household surveys with enterprise modules from across Sub-Saharan Africa by country and year. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with a central or local government authority. LSMS survey weights are applied.

Figure 3: Dynamics in Firm Category



Note: This figure shows the share of firms that closed or transitioned across groups between May 2022 and July 2024. *"Formal businesses"* are those registered with a central or local government authority. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. *"Closed"* refers to businesses that were no longer operational as of July 2024. *Missing* observations reflect owner refusals during the follow-up survey conducted in August 2024 and the observational survey on operational status conducted in November 2024. Businesses identified from households without signage and mobile businesses are weighted by 5, whereas the rest are weighted by 1.

Figure 4: Owner Carework Burden by Gender

Figure (4a): Owner Providing Carework at Business Location

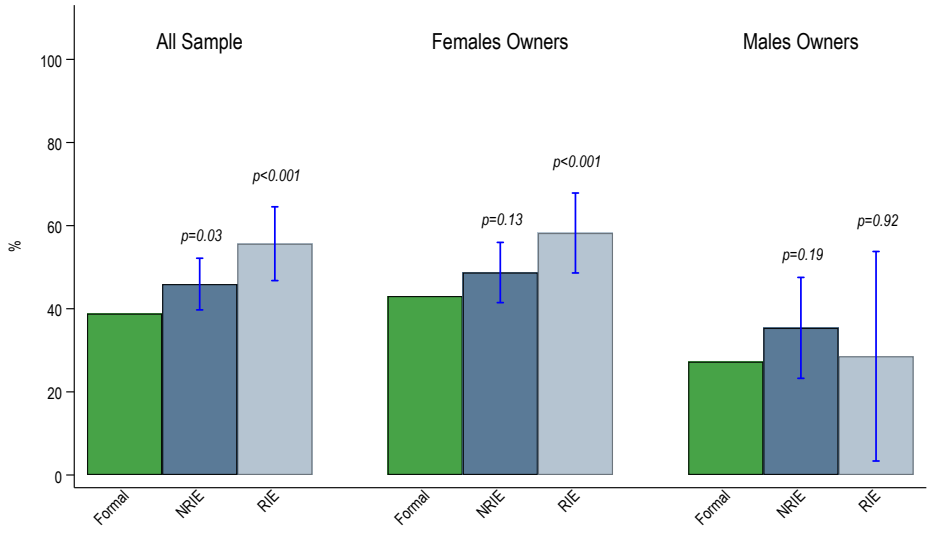
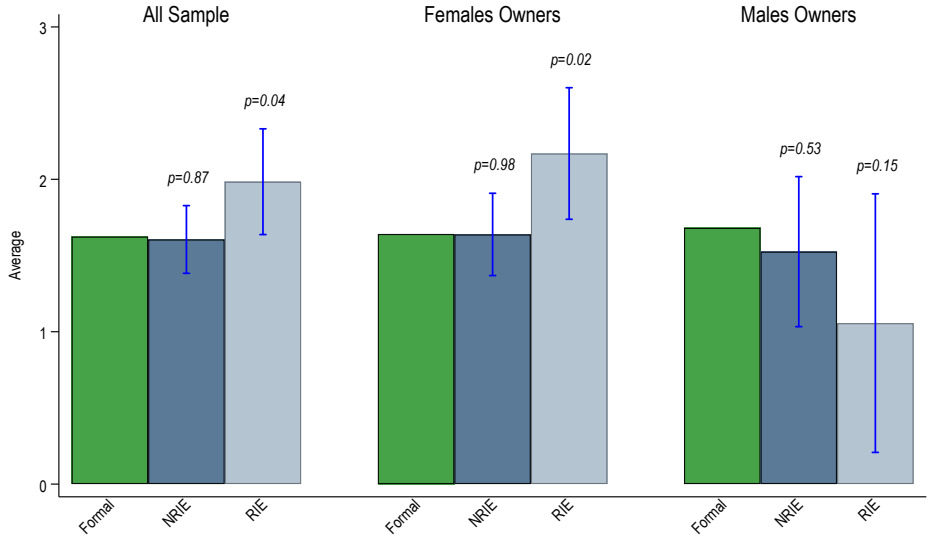


Figure (4b): Number of Kids



Note: Panel (a) shows the share of firm owners who provided care for a child or another family member at their place of work. Panel (b) shows the number of children of firm owners. The first panel reports results for the full sample, the second for female firm owners, and the third for male firm owners. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. Bars report sample means. Confidence intervals and p-values are compared against the mean of Formal.

Figure 5: Firm Productivity

Figure (5a): Gross Profit per Sales

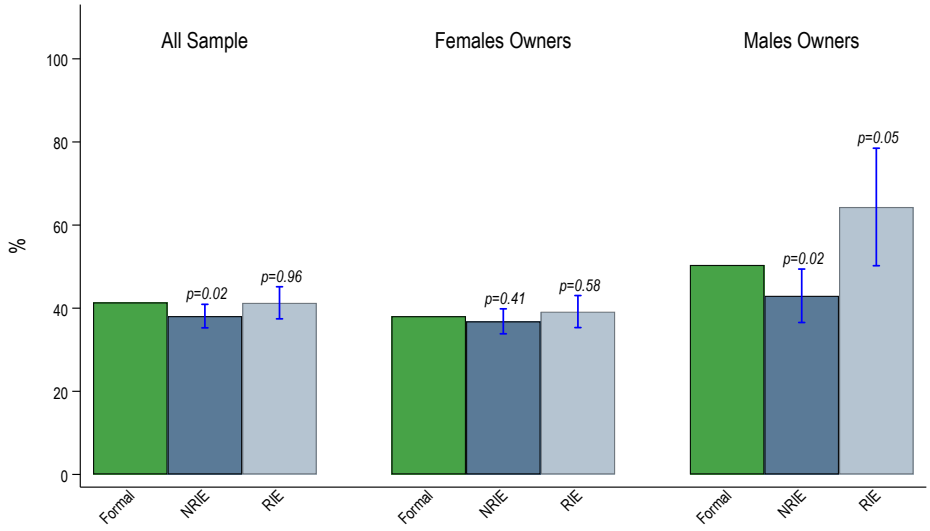
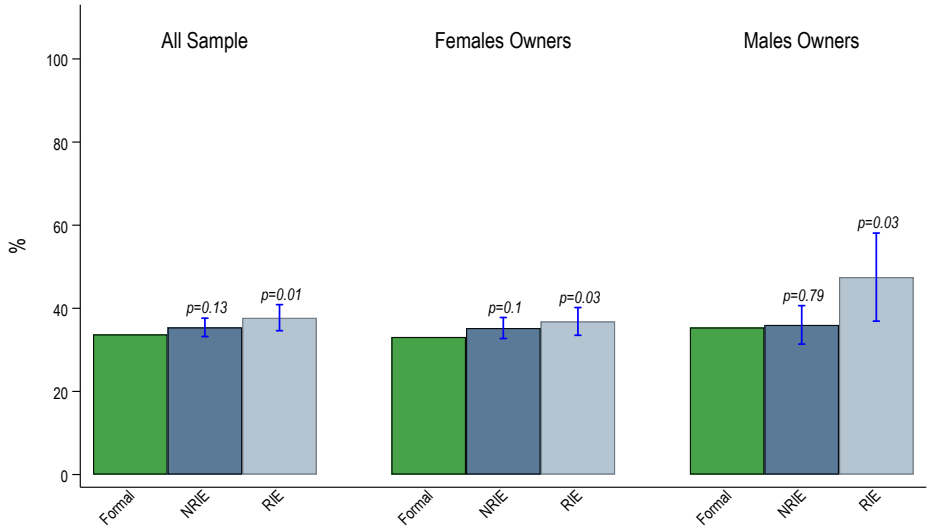


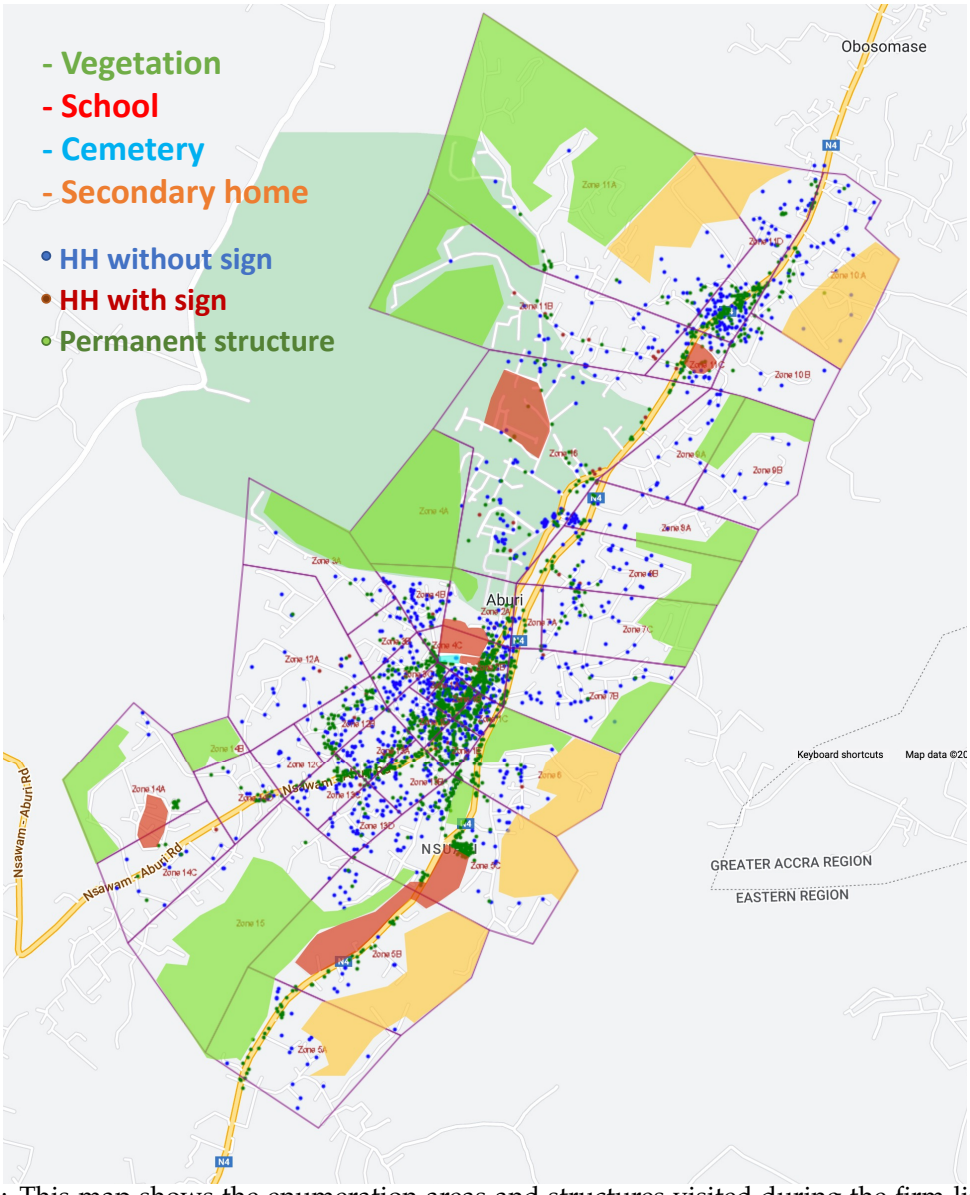
Figure (5b): Profit per Sales



Note: Panel (a) shows gross profit per sales, defined as the sum of total profits and the wage bill divided by total sales, by firm type. Panel (b) shows profit per sales, defined as total profits divided by total sales, by firm type. In each panel, the first set of bars reports results for the full sample, the second for female firm owners, and the third for male firm owners. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. Bars report sample means. Confidence intervals and p-values are compared against the mean of Formal.

A Appendix: Figures and Tables

Figure A1: Map of enumeration areas in Aburi



Note: This map shows the enumeration areas and structures visited during the firm listing exercise. Note that some household structures without signage may not have any owners residing in the household.

Figure A2: Female-Owned Firm Share of Economic Activities

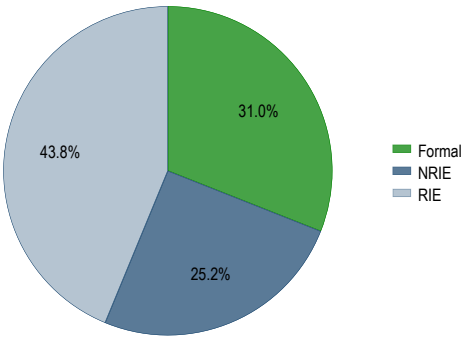


Figure (A2a): Number of businesses

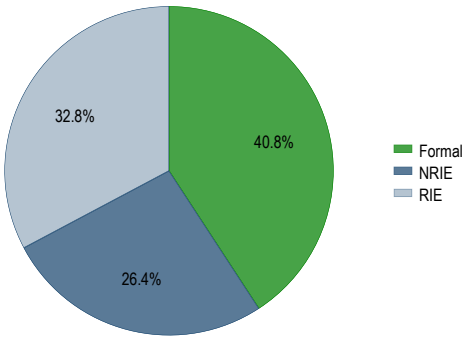


Figure (A2b): Total sales

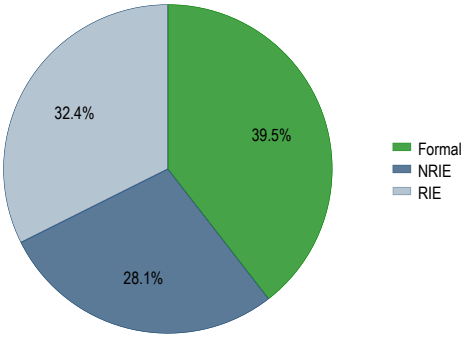


Figure (A2c): Total profits

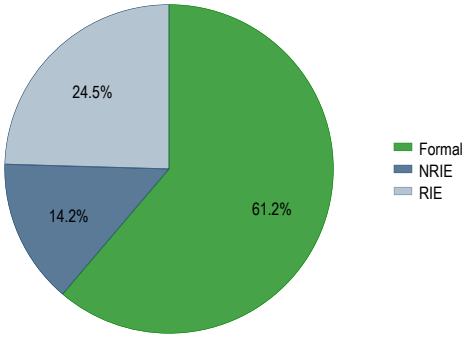


Figure (A2d): Total wagebill

Note: This figure shows the distribution of economic activity in Aburi among female-owned enterprises as of May 2022, by firm formality and business structure. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. Panel (a) shows the distribution based on the number of businesses, panel (b) on total sales, panel (c) on total profits, and panel (d) on the total wage bill. Businesses identified through households without signage, as well as mobile businesses, are weighted by 5, while all other businesses are weighted by 1.

Figure A3: Male-Owned Firm Share of Economic Activities

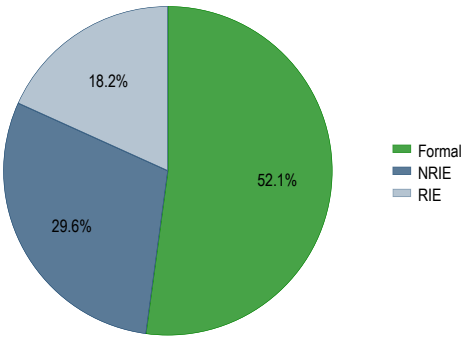


Figure (A3a): Number of businesses

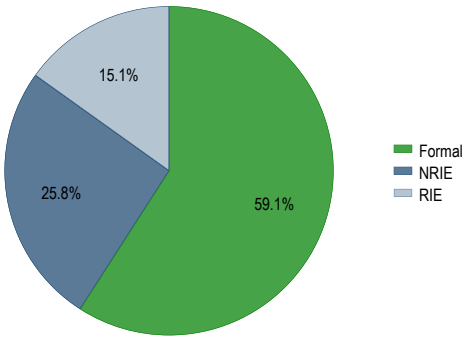


Figure (A3b): Total sales

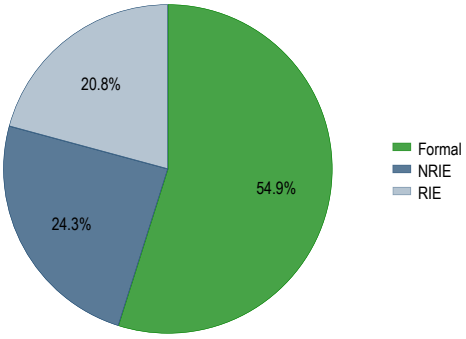


Figure (A3c): Total profits

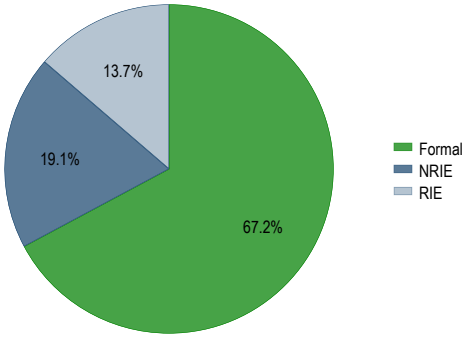


Figure (A3d): Total wagebill

Note: This figure shows the distribution of economic activity in Aburi among male-owned enterprises as of May 2022, by firm formality and business structure. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. Panel (a) shows the distribution based on the number of businesses, panel (b) on total sales, panel (c) on total profits, and panel (d) on the total wage bill. Businesses identified through households without signage, as well as mobile businesses, are weighted by 5, while all other businesses are weighted by 1.

Figure A4: Share of Economic Activities in Sub-Saharan Africa by Structure Type

Figure (A4a): Female-Owned Enterprises

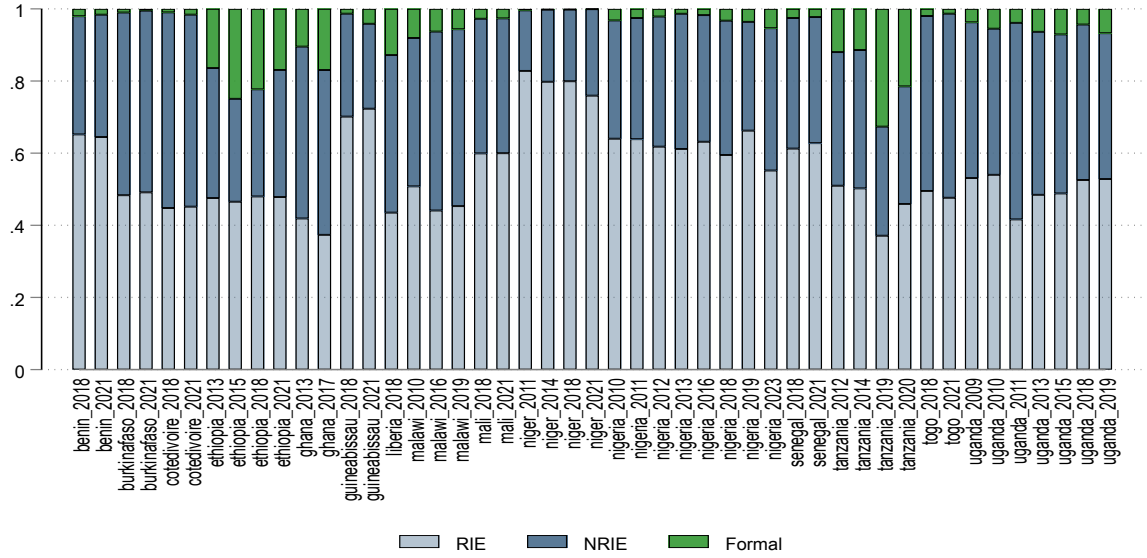
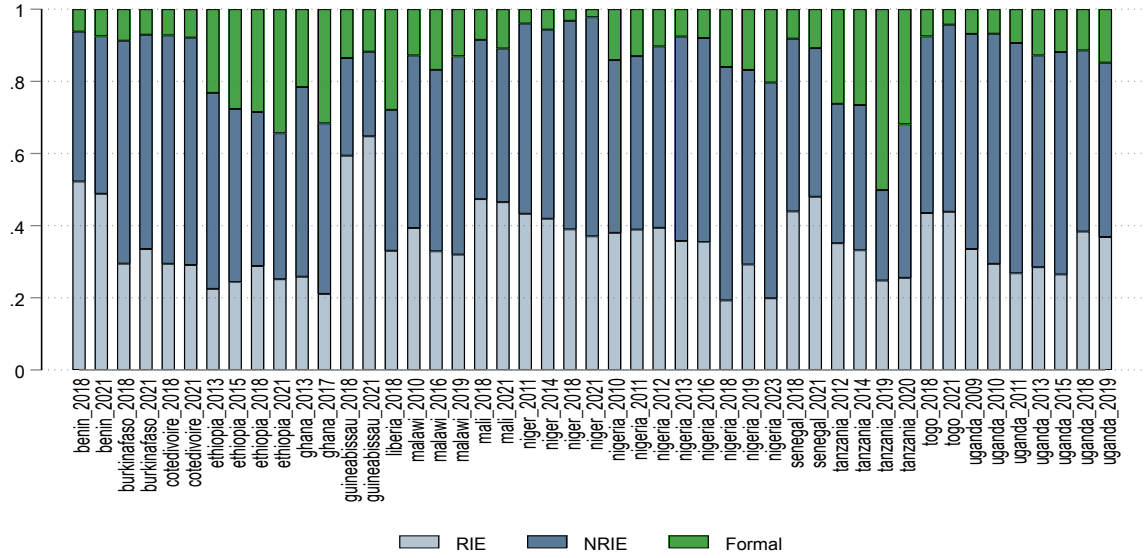
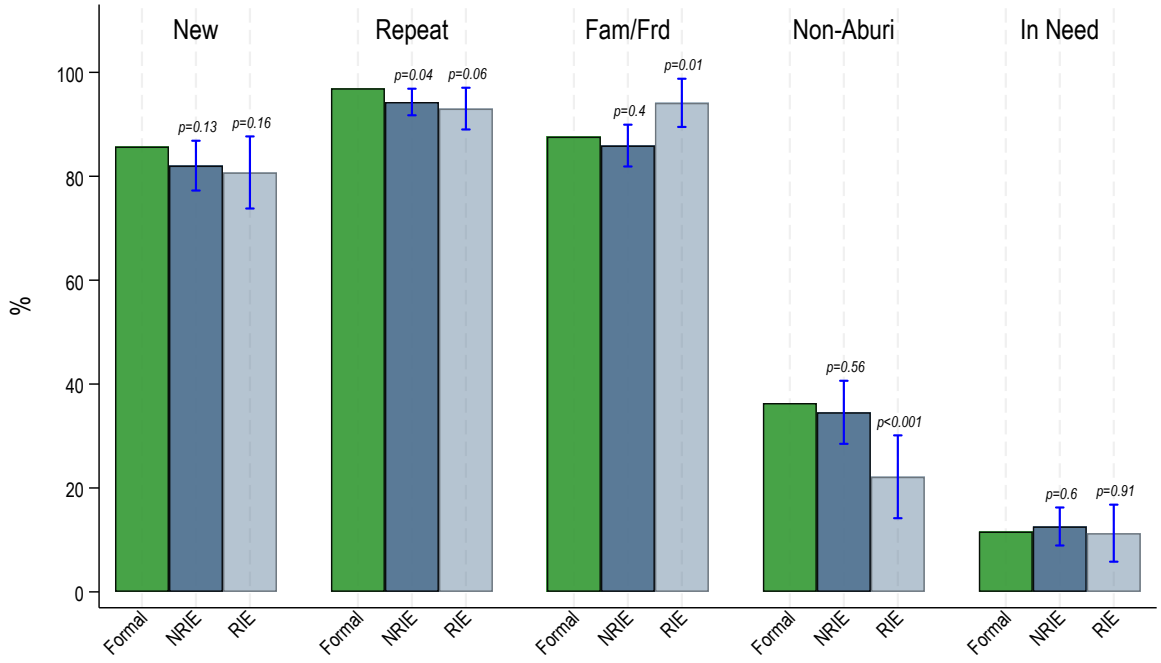


Figure (A4b): Male-Owned Enterprises



Note: Panel (a) shows the share of female-owned firms, by formality and business structure, using nationally representative household surveys with enterprise modules from countries across Sub-Saharan Africa, by country and year. Panel (b) shows the corresponding share of male-owned firms. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with a central or local government authority. LSMS survey weights are applied.

Figure A5: Customer Characteristics in Aburi by Formality and Structure Type



Note: This figure shows the firm customer characteristics comparison in Aburi, by formality and structure type. *"Formal"* enterprises are registered with any central or local government organization. *"NRIE"* refers to unregistered Non-Residential Informal Enterprises operating from permanent, non-residential structures, while *"RIE"* refers to unregistered Residential Informal Enterprises operating from within a household. Businesses identified from households without signage are weighted by 5; businesses identified from permanent structures and households with signs are weighted by 1. "New" indicates if the firm has any new customers. *"Repeat"* indicates if the firm has any repeat customers. *"Fam/Frd"* indicates if the firm has any customers that are family or friends of the firm owners. *"Non-Aburi"* indicates if the firm has any customers traveling from outside of Aburi. *"In Need"* indicates if the firm has any customers in need. All outcome variables refer to May 2022.

Figure A6: Main Products Offered by Residential-based Informal Enterprises

Figure (A6a): Main Products for Female Owners

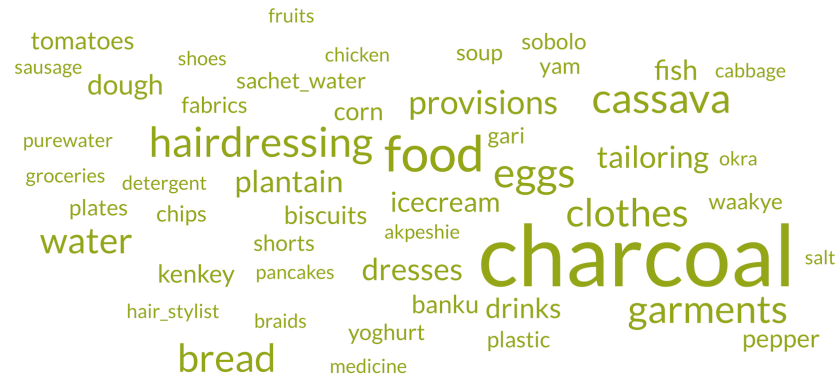
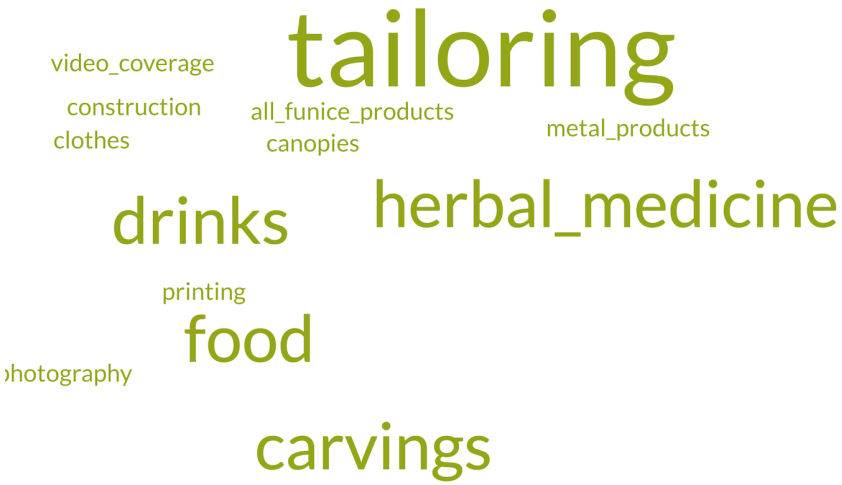


Figure (A6b): Main Products for Male Owners



Note: Panel (a) shows the main product or service accounting for the largest share of sales among female-owned Residential-based Informal Enterprises in May 2022. Panel (b) shows the corresponding distribution for male-owned Residential-based Informal Enterprises.

Table A1: Firm Dynamics in Aburi by Formality and Structure Type

	(1)	(2)	(3)	(4)
	Firm Survival	Conditional on Survival		
		Switched	Switch Formal	Switch NRIE
		Panel A: All Sample		
NRIE	-0.046*	0.017	0.073***	-0.039***
	(0.024)	(0.020)	(0.012)	(0.007)
RIE	-0.115***	-0.025	0.015	-0.006
	(0.036)	(0.025)	(0.010)	(0.016)
Observations	1486	1224	1224	1224
Mean (Formal)	0.85	0.09	0.00	0.04
Pr > F(NRIE=RIE)	0.05	0.09	0.00	0.03
		Panel B: Female-Owned Firms		
NRIE	-0.066**	0.032	0.080***	-0.040***
	(0.026)	(0.022)	(0.014)	(0.009)
RIE	-0.141***	-0.010	0.016	-0.004
	(0.038)	(0.027)	(0.011)	(0.018)
Observations	1162	953	953	953
Mean (Formal)	0.87	0.08	0.00	0.04
Pr > F(NRIE=RIE)	0.05	0.13	0.00	0.03
		Panel C: Male-Owned Firms		
NRIE	0.017	-0.034	0.049**	-0.034**
	(0.053)	(0.042)	(0.021)	(0.014)
RIE	0.042	-0.112***	0.000***	-0.034**
	(0.098)	(0.033)	(0.000)	(0.014)
Observations	324	271	271	271
Mean (Formal)	0.81	0.11	0.00	0.03
Pr > F(NRIE=RIE)	0.80	0.00	0.02	.
Pr > Chi2(F–M)	0.52	0.06	.	0.03

Note: This table compares firm dynamics between May 2022 and July 2024 across the main analysis groups using enterprise-level data from Aburi. The reference group is formal enterprises, defined as firms registered with a central or local government authority. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. *Firm Survival*, reported in column (1), indicates whether a firm remained operational between May 2022 and July 2024. Column (2) indicates whether a firm switched across the three categories: Formal, NRIE, or RIE. Column (3) reports transitions from informal into formal status. Column (4) reports transitions from non-residential into residential structure. Columns (2)-(4), report estimates conditional on firm survival. *Pr > F (NRIE = RIE)* reports the p-value for the test of whether the coefficients on NRIEs and RIEs differs significantly from formal firms. *Pr > Chi^2 (F–M)* reports the p-value for the test of whether the differences relative to formal firms vary significantly between female- and male-owned enterprises. Businesses identified from households without signage and mobile businesses are weighted by 5, whereas the rest are weighted by 1. Robust standard errors are reported in parentheses. *p< 0.1, **p< 0.05, ***p< 0.01.

Table A2: Aburi Owner Characteristics by Category

	(1) Female	(2) Owner age	(3) Owner education	(4) Married	(5) Has wage job	(6) Has other income
			Panel A: All Sample			
NRIE	0.059**	-1.321*	-1.520***	-0.104***	-0.001	-0.012
	(0.027)	(0.798)	(0.247)	(0.032)	(0.006)	(0.014)
RIE	0.186***	1.237	-2.061***	-0.194***	0.006	-0.023
	(0.030)	(1.252)	(0.335)	(0.044)	(0.011)	(0.017)
Observations	1409	1406	1405	1409	1406	1409
Mean (Formal)	0.73	45.06	10.59	0.58	0.01	0.05
Pr > F(NRIE=RIE)	0.00	0.04	0.10	0.03	0.52	0.48
			Panel B: Female Owners			
NRIE		-1.132	-1.482***	-0.108***	-0.003	-0.007
		(0.876)	(0.281)	(0.037)	(0.004)	(0.014)
RIE		0.694	-1.779***	-0.182***	0.014	-0.016
		(1.297)	(0.346)	(0.048)	(0.011)	(0.017)
Observations		1095	1094	1096	1095	1096
Mean (Formal)		45.45	10.14	0.56	0.01	0.04
Pr > F(NRIE=RIE)		0.16	0.37	0.10	0.13	0.53
			Panel C: Male Owners			
NRIE		-2.425	-1.194**	-0.074	0.013	-0.023
		(1.779)	(0.487)	(0.064)	(0.022)	(0.035)
RIE		3.986	-1.267	-0.187	-0.029**	-0.011
		(4.718)	(1.524)	(0.138)	(0.012)	(0.073)
Observations		311	311	313	311	313
Mean (Formal)		44.00	11.83	0.62	0.03	0.08
Pr > F(NRIE=RIE)		0.17	0.96	0.41	0.02	0.87
Pr > Chi2(F–M)		0.24	0.96	0.59	0.01	0.81

Note: *Female, Owner age, Owner education, Married, Has wage job, and Has other income* in columns (1)- (6) respectively are all dummy outcome variables generated from the Aburi enterprise data. The reference group is Formal enterprises, defined as firms registered with a central or local government authority. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. *Pr > F (NRIE = RIE)* reports the p-value for the test of whether the coefficients on NRIEs and RIEs differs significantly from formal firms. *Pr > Chi^2 (F–M)* reports the p-value for the test of whether the differences relative to formal firms vary significantly between female- and male-owned enterprises. Businesses identified from households without signage and mobile businesses are weighted by 5, whereas the rest are weighted by 1. Robust standard errors are reported in parentheses. *p< 0.1, **p< 0.05, ***p< 0.01.

Table A3: Aburi Owner Household Characteristics by Category

	(1) Household size	(2) Num. kids	(3) Num. adults	(4) HH income p.c.	(5) HH liquidity p.c.
			Panel A: All Sample		
NRIE	-0.242	-0.038	-0.206*	-93.259**	-159.029*
	(0.191)	(0.117)	(0.122)	(41.199)	(86.649)
RIE	0.421	0.398**	0.023	-246.253***	-285.178***
	(0.328)	(0.198)	(0.188)	(41.228)	(85.567)
Observations	1408	1409	1408	1402	1391
Mean (Formal)	3.67	1.65	2.03	492.57	544.00
Pr > F(NRIE=RIE)	0.04	0.02	0.21	0.00	0.01
			Panel B: Female Owners		
NRIE	-0.206	-0.003	-0.207	-88.455**	-205.708*
	(0.208)	(0.135)	(0.134)	(44.866)	(105.306)
RIE	0.508	0.500**	0.008	-214.441***	-274.603***
	(0.346)	(0.217)	(0.194)	(44.367)	(105.355)
Observations	1095	1096	1095	1091	1083
Mean (Formal)	3.67	1.63	2.03	427.71	515.38
Pr > F(NRIE=RIE)	0.03	0.01	0.25	0.00	0.14
			Panel C: Male Owners		
NRIE	-0.369	-0.160	-0.210	-43.432	42.568
	(0.452)	(0.244)	(0.285)	(99.935)	(158.306)
RIE	-0.489	-0.620	0.131	-63.651	-166.547
	(1.143)	(0.429)	(0.760)	(168.978)	(192.991)
Observations	313	313	313	311	308
Mean (Formal)	3.69	1.68	2.01	668.84	622.51
Pr > F(NRIE=RIE)	0.92	0.28	0.65	0.91	0.29
Pr > Chi2(F–M)	0.68	0.11	0.76	0.80	0.38

Note: Household income per capita is the owner's best guess of the total income from all household members divided by household size. Household liquidity per capita is the owner's best guess of the amount of money they could raise in case of emergency divided by household size. All values refer to May 2022 measures. The reference group is Formal enterprises, defined as firms registered with a central or local government authority. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. *Pr > F (NRIE = RIE)* reports the p-value for the test of whether the coefficients on NRIEs and RIEs differs significantly from formal firms. *Pr > Chi^2 (F–M)* reports the p-value for the test of whether the differences relative to formal firms vary significantly between female- and male-owned enterprises. Businesses identified from households without signage and mobile businesses are weighted by 5, whereas the rest are weighted by 1. Robust standard errors are reported in parentheses. *p< 0.1, **p< 0.05, ***p< 0.01.

Table A4: Firm Inputs and Customer Distance by Formality and Structure Type

	(1) Owner Hours	(2) Num. Workers	(3) Wagebill	(4) Assets	(5) Has a Loan	(6) Customer Distance
			Panel A: All Sample			
NRIE	-3.433**	-0.455***	-152.876***	-4966.508***	-0.027	-21.711*
	(1.439)	(0.071)	(27.975)	(957.154)	(0.017)	(12.973)
RIE	-10.098***	-0.574***	-175.305***	-9134.702***	-0.032	-56.231***
	(2.061)	(0.072)	(30.163)	(918.218)	(0.023)	(12.680)
Observations	1494	1495	1495	1493	1494	1493
Mean (Formal)	54.77	0.77	235.45	11831.62	0.10	95.64
Pr > F(NRIE=RIE)	0.00	0.02	0.30	0.00	0.83	0.00
			Panel B: Female-Owned Firms			
NRIE	-4.857***	-0.391***	-98.034***	-3938.592***	-0.028	-4.757
	(1.685)	(0.076)	(22.702)	(944.511)	(0.022)	(10.708)
RIE	-10.756***	-0.463***	-98.286***	-7328.678***	-0.048*	-26.006***
	(2.273)	(0.078)	(24.151)	(831.374)	(0.027)	(9.640)
Observations	1168	1169	1169	1168	1168	1167
Mean (Formal)	55.23	0.63	137.25	9365.18	0.12	57.69
Pr > F(NRIE=RIE)	0.00	0.13	0.99	0.00	0.42	0.03
			Panel C: Male-Owned Firms			
NRIE	1.571	-0.542***	-250.978***	-6108.126**	-0.043**	-43.055
	(2.831)	(0.170)	(83.384)	(2630.270)	(0.020)	(39.269)
RIE	-6.691	-0.656***	-209.961	-8624.804*	0.006	-74.446
	(6.257)	(0.248)	(162.411)	(4716.014)	(0.065)	(67.162)
Observations	326	326	326	325	326	326
Mean (Formal)	53.51	1.15	502.82	18577.73	0.06	198.82
Pr > F(NRIE=RIE)	0.19	0.63	0.79	0.58	0.45	0.63
Pr > Chi2(F–M)	0.40	0.74	0.79	0.86	0.37	0.75

Note: Column (1) reports the number of hours the owner worked in the business. Column (2) reports the number of workers employed by the business. Columns (3) and (4) report the business's total wage bill and asset value, measured in Ghana cedis and winsorized at the top 1 percent. Column (5) is an indicator for whether the owner obtained a loan for business purposes. Column (6) reports customer distance, measured in walking minutes. The reference group is Formal enterprises, defined as firms registered with a central or local government authority. *"NRIE"* refers to unregistered Non-Residential Informal Enterprises operating from permanent, non-residential structures, while *"RIE"* refers to unregistered Residential Informal Enterprises operating from within a household. *Pr > F (NRIE = RIE)* reports the p-value for the test of whether the coefficients on NRIEs and RIEs differs significantly from formal firms. *Pr > Chi^2 (F–M)* reports the p-value for the test of whether the differences relative to formal firms vary significantly between female- and male-owned enterprises. Businesses identified from households without signage and mobile businesses are weighted by 5, whereas the rest are weighted by 1. Robust standard errors are reported in parentheses. *p< 0.1, **p< 0.05, ***p< 0.01.

Table A5: Aburi Firm Industries by Formality and Structure Type

	(1) Retail	(2) Services	(3) Manufacturing	(4) Professional
		Panel A: All Sample		
NRIE	0.071**	-0.048**	-0.008	-0.015*
	(0.030)	(0.019)	(0.031)	(0.009)
RIE	0.162***	-0.076***	-0.072	-0.014
	(0.044)	(0.024)	(0.044)	(0.011)
Observations	1495	1495	1495	1495
Mean (Formal)	0.32	0.15	0.51	0.02
Pr > F(NRIE=RIE)	0.03	0.21	0.13	0.90
		Panel B: Female-Owned Firms		
NRIE	0.060*	-0.061***	0.003	-0.003
	(0.035)	(0.020)	(0.036)	(0.004)
RIE	0.141***	-0.056**	-0.086*	0.001
	(0.048)	(0.026)	(0.048)	(0.007)
Observations	1169	1169	1169	1169
Mean (Formal)	0.37	0.13	0.49	0.01
Pr > F(NRIE=RIE)	0.07	0.84	0.05	0.54
		Panel C: Male-Owned Firms		
NRIE	0.050	0.024	-0.037	-0.037
	(0.053)	(0.051)	(0.064)	(0.031)
RIE	-0.039	-0.135*	0.186	-0.012
	(0.094)	(0.072)	(0.123)	(0.068)
Observations	326	326	326	326
Mean (Formal)	0.18	0.20	0.54	0.08
Pr > F(NRIE=RIE)	0.36	0.03	0.07	0.70
Pr > Chi2(F–M)	0.19	0.03	0.03	0.73

Note: This table compares the industry distribution of firms across the main analysis groups using enterprise-level data from Aburi. The control group is formal businesses, i.e., registered with any central or local government organization. *"NRIE"* refers to Non-Residential Informal Enterprises operating from permanent, non-residential structures. *"RIE"* refers to Residential Informal Enterprises operating from within a household. *"Formal"* enterprises are registered with The Registrar General's Department, Department of Cooperatives, and/or District Assembly. *Pr > F (NRIE = RIE)* reports the p-value for the test of whether the coefficients on NRIEs and RIEs differs significantly from formal firms. *Pr > Chi^2 (F–M)* reports the p-value for the test of whether the differences relative to formal firms vary significantly between female- and male-owned enterprises. Businesses identified from households without signage and mobile businesses are weighted by 5, whereas the rest are weighted by 1. All values refer to May 2022 measures. Robust standard errors are reported in parentheses. *p< 0.1, **p< 0.05, ***p< 0.01.