

Impact of Mobile Money Access on Household Expenditures: A Case Study from Kenya

Mussa Deme¹, Ghulam Dastgir Khan², MD. Abdul Bari³

^{1,2}Graduate School of Social Sciences and Humanities, International Economics Development Program, Hiroshima University, Japan

³Graduate School of Innovation and Practice for Smart Society, Hiroshima University, Japan

Corresponding Author: moussademe2014@gmail.com

Received: September 2024 | Revised: November 2024 | Accepted: December 2024

Abstract

This paper investigates the impact of access to mobile money services on household expenditure patterns in Kenya – focusing on essential expenditures: food, rent, cellphone, and transport – using data from the 2021 FinAccess household survey, which includes 22,024 households (6,134 with mobile money access and 15,890 without), we employ propensity score matching (PSM) and inverse probability weighted regression adjustment (IPWRA) to address potential selection biases. The results demonstrate that access to mobile money services increases spending on food, cellphone, rent, and transport. This indicates that mobile money can be further promoted, and relevant stakeholders or policymakers may work to increase financial literacy. However, further research is necessary to assess the impacts of expanding mobile services on household welfare, especially in disadvantaged, remote, and vulnerable communities.

Keywords: Impact Assessment; Mobile Money; Household Expenditures; Kenya

JEL Classification: G21

How to Cite: Deme M., Khan G. D., Bari M. A. (2024). Impact of Mobile Money Access on Household Expenditures: A Case Study from Kenya, 25(2), 282-293. doi:<https://doi.org/10.23917/jep.v25i2.24199>

DOI: <https://doi.org/10.23917/jep.v25i2.24199>

1. INTRODUCTION

Mobile money has transformed the payment landscape in developing countries by offering transactions and digitizing these payments to enhance accessibility, affordability, and security for account holders (Demirgüç-Kunt et al., 2015). Adopting mobile money can help bridge the gap and improve the well-being of marginalized individuals in developing countries (Demirgüç-Kunt et al., 2018). Mobile money is supposed to enhance livelihoods even in remote and disadvantaged regions (Wieser et al., 2019). As mobile money becomes more pervasive, it has become increasingly important for policymakers and academics to comprehend its effect on household socioeconomic status. While the impact of mobile money

access has been widely studied, particularly in developing countries, there is still room to explore less-examined outcome variables. This study contributes to the growing literature by investigating the impact of mobile money on household expenditure patterns in Kenya. Specifically, it focuses on essential expenses such as food, rent, cellphones, and transport, using data from Kenya's 2021 FinAccess Household Survey, which includes 22,024 households.

Many studies examined the impact of mobile money on household welfare and economic behavior in various developing countries, particularly in Africa. In Ghana (Cobla & Osei-Assibey, 2018) found that mobile money affects student spending patterns. (Twumasi et al. 2021) demonstrated its influence on internal remittances and household consumption, especially among impoverished households. Similarly, (Ondoa et al., 2023) observed favorable impacts on household welfare in Cameroon through propensity score estimation. Research in Uganda has consistently shown positive effects, with (Murendo et al., 2016) using instrumental variable regressions to link mobile money to reduced food insecurity and improved household welfare. Studies in other African countries reinforce these findings. For example, (Kikulwe et al. 2014) noted the transformative effects of mobile money on Kenyan smallholder farm households, boosting purchases and reducing poverty, while (Munyegera et al. 2016; Tabetando et al. 2022) emphasized its role in increasing consumption and agricultural income in Uganda.

Mobile money's broader benefits are also observed in Nigeria (Apiors et al., 2018; China Zhao et al., 2022; Bangladesh Islam et al., 2022), enhancing household consumption and economic stability. The impact on women's empowerment and poverty reduction is another critical area. (Dorffleitner & Nguyen 2024) found positive effects on women's economic empowerment, and (Hussen & Mohamed 2023) highlighted their role in Ethiopia in boosting spending on essential goods like food and education. Furthermore, mobile money has been associated with reduced consumption volatility, especially during economic shocks, as seen in studies by (Apeti, 2022; Combes & Ebeke 2011). Several studies also explore mobile money's role in agricultural development and productivity. For instance, (Kikulwe et al. 2013) found it improved farm input usage in Kenya, while (Kilombe et al. 2023) showed higher maize productivity in Tanzania. Similarly, (Brune et al. 2016) linked financial inclusion to improved crop sales and household expenditures in Malawi.

Mobile money's benefits extend beyond rural areas. Studies in China (Li et al., 2020; Lai et al., 2020; Mexico Renteria, 2015) show how digital finance boosts household expenditure and reduces commuting costs. In South Asia, (Pantano et al. 2016; Shaikh et al. 2023) emphasized mobile money's positive effect on consumer behavior. Furthermore, financial inclusion via mobile money has been shown to improve household economic resilience. Research in Ghana (Danquah & Iddrisu, 2018; Arday, 2017; Bangladesh Ahmad & Wongsurawat, 2023) links it to reduced poverty and increased household income. Moreover, (Osabohien et al. 2024) identified a positive relationship between mobile money and household welfare in Malaysia, especially concerning medical costs. The growing body of evidence underscores mobile money's vital role in enhancing household welfare, reducing

poverty, and stimulating economic growth, particularly in rural and low-income households across Africa and beyond.

Although previous studies have explored a wide range of outcomes influenced by mobile money use, this paper provides additional empirical evidence from Kenya by evaluating its impact on specific household expenditures—food, rent, cellphones, and transport—using PSM and inverse probability weighted regression adjustment (IPWRA) to address selection bias (Bari et al., 2024).

Kenya's policy landscape is essential, especially given the government's focus on digital financial inclusion, and subsequently, assessing whether mobile money delivers the intended results effectively is crucial. Kenya's mobile money service is dominated by four major companies: Safaricom, Airtel, Essar Telecom, and Telkom Kenya. Safaricom, the largest among them, introduced M-PESA in 2007, a mobile payment service that quickly became popular, especially among unbanked and low-income populations. This is because it provides a secure and convenient way of managing finances without requiring a traditional bank account. The study relies on cross-section data, which limits the ability to explore long-term effects. Future research could use randomized controlled trials to capture mobile money impact adoption influences expenditure patterns over time, offering a more comprehensive understanding of its impact on household economic trajectories. The paper identifies a gap in exploring broader well-being aspects, such as food, transport, cellphone, and rent expenditures.

The rest of the paper is organized as follows: Section 2 details the materials and methods, Section 3 explores the results, and Section 4 offers the conclusion.

2. MATERIALS AND METHODS

2.1. Data and Summary Statistics

This study uses cross-sectional, nationwide data from Kenya's 2021 FinAccess Household Survey, comprising 22,024 households. Of these, 6,134 have access to mobile money, and 15,890 do not. Additionally, we have demographic and socioeconomic characteristics for each household, including age, gender, mobile phone ownership, educational level, marital status, and area of residence. Table 1 summarizes the variables used in this study.

Table1. Variables

Variables	Description
Outcome variables	
Food expenditure/Week	Amount for food expenses
Cellphone expenditure/week	Amount for cellphone
Transport expenditure/week	Amount for transport expenses
Rent expenditure/monthly	Amount for rent expenditure

Variables	Description
Treatment variable	
Mobile Money Access	1 if a household has access to mobile money, and =0 otherwise
Matching Covariates	
Age of the respondent (years)	Age of the household head (years)
Female	Dummy (1 = if household head is female and 0 = male)
Own phone	Dummy (1 = if household head owns a mobile phone and = 0 does not own)
Educated	Dummy (1 = if household head has education up to primary school and above and 0 = not educated)
Single	Dummy (1 = if household head is single and 0 = otherwise)
Rural	Dummy for the area (1 = household resides in rural area and 0 = urban area)

Table 2 displays summary statistics of the paper. Households in the treatment group spent more on rental purposes than the control group by 892.5 Kenyan Shilling (14.61 USD), with high statistical significance (often $p < 0.01$). Similarly, the treatment group's food spending surpassed the control group's by approximately 308.2 Kenyan Shilling (2.38 USD), indicating statistical significance. Moreover, households in the treatment group allocated approximately 142.6 Kenyan Shillings (1.10 USD) more to cellphone expenditure than those in the control group, representing a statistically significant difference. There was also a substantial difference in transportation spending, with the treatment group investing approximately 191.1 Kenyan Shilling (1.48 USD) more than the control group. Additionally, the control group had a 9% higher proportion of females than the treatment group, which was statistically significant. The treatment group had a higher percentage of educated individuals (97%) than the control group (76%), indicating a substantial gap of 21 %. Although the control group had a slightly higher proportion of single individuals (2 %), this difference was statistically significant. The treatment group owned a phone (97%) compared with the control group (74%), suggesting a noticeable contrast (Table 2).

Table2. Summary statistics

Variables	Treatment group	Control group	Difference
Treatment variable			
Mobile Money	1	0	
Outcomes Variable			
Rent Expenditure	3730.7	2838.14	892.5***
Food Expenditure	1819.01	1510.72	308.2***
Cellphone Expenditure	330.15	187.53	142.6***
Transport Expenditure	699.14	508.03	191.1***
Covariates			
Gender of Head (Female = 1)	0.51	0.60	-0.09***
Head Education (Educated = 1)	0.97	0.76	0.21***
Head Marriage (Single = 1)	0.25	0.27	-0.02***
Ownership of phone	0.97	0.74	0.23***
Location (Rural = 1)	0.50	0.72	-0.21***
Household Head Age	36.12	39.97	-3.85***
Observations	6134	15890	22024

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Moreover, the treatment group had a 21% lower proportion of rural households than the control group, with a statistically significant difference. Household age of the treatment group was approximately 3.85 years lower than that of the control group, demonstrating a statistically significant variance. A large sample size enhances the reliability of statistical analyses. The treatment group with access to mobile money exhibited significantly different expenditure patterns and demographic characteristics from the control group.

2.2 Identification Strategy

Access to mobile money is non-random, meaning that comparisons between those with access and those without access could be influenced by self-selection. To address this potential selection bias, we employ a matching method, which pairs treated individuals (those with access to mobile money) with untreated individuals (those without access) who share similar pre-treatment attributes (Bari et al., 2024; West et al., 2014). This approach assumes conditional independence (CIA), meaning that, after controlling for pre-treatment covariates (i.e., X), the treatment assignment (mobile money access) is as good as random. This assumption allows us to estimate treatment effects by comparing outcomes between matched individuals who have similar characteristics, regardless of whether they have access to mobile money.

The equation for the Average Treatment Effect on the Treated (ATET) is as follows:

$$ATET(x) = E[Y_1 | D=1, X=x] - E[Y_0 | D=0, X=x] \dots \dots \dots (1)$$

In the given scenario, Y denotes four expenditures: food, rent, transportation, and cellphone expenses (results). X represents the set of pretreatment covariates, and D is the treatment dummy variable that characterizes a household's use of mobile money. $D = 1$ means that a household has access to mobile money, and $D = 0$ means that it does not have. $E[Y_1 | D=1, X=x]$ refers to the expenditure of treated households, whereas $E[Y_0 | D=0, X=x]$ refers to the expected expenditure for the best untreated match.

The equation used to estimate the ATET under the propensity score $P(x)$ is as follows:

$$ATET = E[Y_1 | D = 1, P(x)] - E[Y_0 | D = 0, P(x)] \dots\dots\dots (2)$$

Table 1 presents the variables used in this study. The dependent variables encompass expenditures on food, cell phone usage, rent, and transportation, while the independent variable is the utilization of mobile money.

3. RESULTS AND DISCUSSIONS

3.1 Main results

Table 3 reports Caliper and Kernel Matching results of the impact of access to mobile money. The result consistently shows that access to mobile money significantly increases spending on food, rent, cellphone, and transportation, at a 1% significance. According to Caliper and Kernel Matching, the food expenditure increased by 207.47 and 146.18 Kenyan Shillings (1.60 and 1.13 USD), respectively. According to Caliper and Kernel Matching, the rent expenditure increases by 653.17 Kenyan Shilling (5.04 USD) and 598.59 (4.62 USD) Kenyan Shilling, respectively. Moreover, according to Caliper and Kernel Matching, cellphone spending increased by 112.67 Kenyan Shillings (0.87 USD) and 110.81 Kenyan Shillings (0.86 USD). Further, transport spending increases by 134.43 Kenyan Shillings (1.04 USD) and 149.83 Kenyan Shillings (1.16 USD), according to Caliper and Kernel Matching.

Table 3: Impact of mobile money on expenditures

Outcomes Variable	Caliper Matching	Kernel Matching
Food Expenditure	207.47***	146.18***
Rent Expenditure	653.17***	598.59***
Cellphone Expenditure	112.67***	110.81***
Transport Expenditure	134.43***	149.83***

Note: ***, **, and * shows significance at the 1%, 5%, and 10% levels.

We employed the IPWRA estimation to evaluate the robustness of the results. The results in Table 4 are consistent with our primary findings, demonstrating that financial inclusion contributes to an overall increase in expenditures. Table 4 summarizes the influence of mobile money on food, cellphone, rent, and transport expenses, as identified through the IPWRA approach. The ATET analysis indicates that mobile money positively impacts these expenses, as noteworthy p-values indicate.

Table 4. Inverse probability weighting regression adjustment (IPWRA) estimation

Outcomes variable	IPWRA estimation
Rent expenditure	583.49***
Food expenditure	150.14 ***
Cellphone expenditure	111.19***
Transport expenditure	151.81***

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

3.2 Balance Check

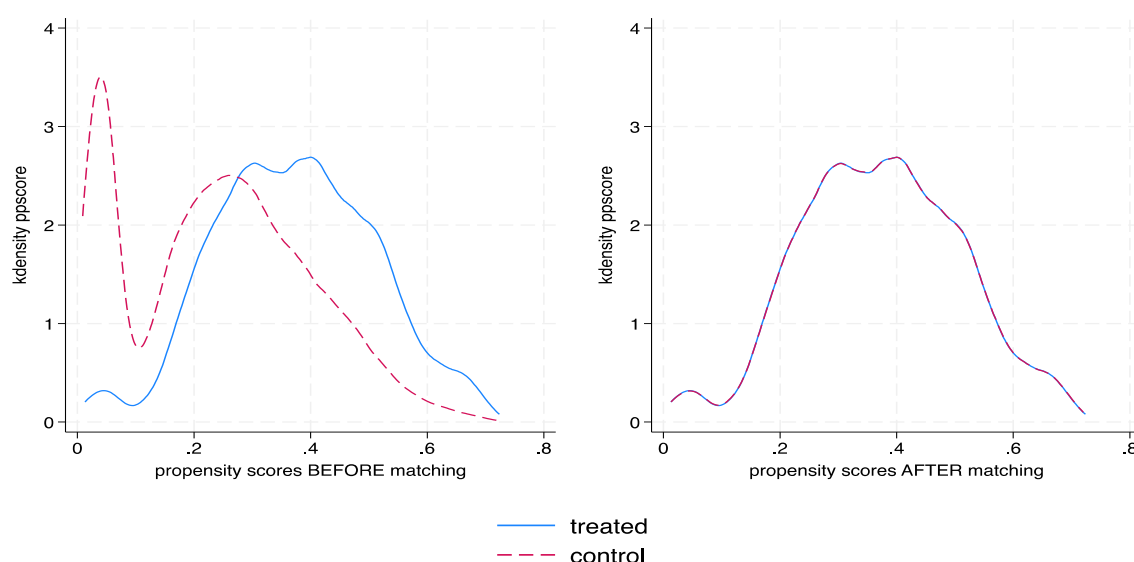


Figure 1. Distribution of covariates before and after matching

Balancing the covariates in PSM is essential to accurately estimating the impact. The matching process successfully equalized the covariates between the two groups. Any significant biases present before matching were significantly reduced, as evidenced by the substantial decrease in bias percentages and nonsignificant p-values after matching. The findings demonstrated that the treatment and control groups are now more comparable, thus enhancing the validity of the subsequent analyses.

The propensity score matching method requires assessing the balance between the covariates used in the estimation. Table 5 summarizes the balancing check of the treatment and control groups before and after matching. Table 5 shows that all the matching covariates were statistically different between the control and treatment groups before the match. After matching, the mean values of the covariates were not significantly different. Figure 1 shows the propensity score distributions of the covariates. The propensity score indicated a slight overlap between the two groups. Before matching, the graphs showed that the distributions

of the covariates were inconsistent between the control and treated groups. However, after the matching process, the distribution became more uniform.

Table 5: Covariates balance check

Before matching	Mean		Bias reduction (%)	P-value
	Treated	Control		
Female	0.51	0.59		0.000
Educated	0.97	0.76		0.000
Single	0.24	0.26		0.003
Ownphone	0.96	0.74		0.000
Rural	0.50	0.71		0.000
HHage	36.12	39.96		0.000
After matching				
Female	0.51	0.52	91.5	0.419
Educated	0.97	0.97	99.8	0.870
Single	0.24	0.24	83.4	0.674
Ownphone	0.97	0.97	99.0	0.447
Rural	0.50	0.51	93.2	0.113
HHage	36.12	36.31	95.2	0.446

The results demonstrated that access to mobile money services leads to an increase in spending on food, cellphone, rent and transport purposes respectively. These findings suggest that access to mobile money can promote household level expenditures. Our findings align with those of (Suri et al., 2016), who investigated the enduring effects of mobile money on household consumption in Kenya using M-Pesa. Their research revealed that mobile money positively affects Kenyan household consumption patterns and reduces poverty rates.

3.3. Discussion

Moreover, our study corroborates the findings of (Djahini-Afawoubou et al., 2023), who demonstrate that mobile money effectively alleviates poverty among low-income individuals in developing countries. Their study suggests that mobile money significantly reduces multidimensional poverty, benefiting rural residents, women, and those with lower literacy levels. Our findings align with those of (Suri et al., 2016), who investigated the enduring effects of mobile money on household consumption in Kenya using M-Pesa. Their research revealed that mobile money positively affects Kenyan household consumption patterns and reduces poverty rates.

However, while previous research has focused on the impact of money on financial issues, this study explores the impact of mobile money on household expenditure. Our findings are consistent with a survey conducted by (Dube & Chummun, 2019) in Zimbabwe,

which found that mobile money positively influenced household livelihoods. This indicates that mobile money can improve food security, enabling households to maintain consistent consumption patterns and avoid interruptions in purchasing critical items. Furthermore, this study underscores the importance of boosting financial literacy to empower households to handle their finances through mobile monetary platforms. From a policy perspective, these findings highlight the need to promote mobile money as an integral part of holistic financial inclusion. Governments and financial institutions must continue to enhance the mobile money infrastructure, particularly in underserved areas.

Additionally, integrating financial literacy programs with mobile money services has the potential to mitigate potential risks and maximize the benefits for households. The study's limitations stem from possible biases in self-reported data, difficulties establishing causation, and the limited applicability of the findings beyond Kenya. A more extensive examination of the broader economic and policy landscape and behavioral shifts linked to mobile money usage could also enhance this study. Therefore, future research should explore the prolonged impact of mobile money on household expenditure and its effect on other facets of household well-being, such as education and health. Overcoming these challenges may necessitate alternative methodological strategies, such as randomized controlled trials, to establish causation definitively.

4. CONCLUSION

This research explores the impact of mobile money on household expenditure in Kenya, drawing on data from the 2021 FinAccess Survey. Our analysis reveals that adopting mobile money significantly influences household spending across crucial categories, such as food, transport, communication, and housing in Kenya. This thorough analysis provides a fresh perspective compared with the existing literature, which often presents the effects of mobile money more uniformly. These results underscore the innovative nature of mobile money as a service in developing countries, particularly in enhancing household financial management. Policymakers can leverage these insights to design targeted interventions that ensure the distribution of mobile money benefits, thereby promoting inclusive economic growth.

The positive influence of mobile money on household expenses underscores the need for policymakers to expand these services to underserved areas. Governments and NGOs must also invest in digital literacy programs to educate citizens on the secure and efficient use of mobile money, thereby promoting financial inclusion. The effectiveness of mobile money in financial transactions suggests its potential for integration into government cash transfer programs, which could improve the distribution of social protection payments and emergency aid. Thus, expanding small businesses' access to microfinancing and fostering digital entrepreneurship is crucial. Continuous research and data collection are essential for monitoring the long-term impacts of mobile money and refining policies.

Integrating financial literacy programs with mobile money can help mitigate risks and maximize benefits for households. The study's limitations include potential biases in self-reported data, reliance on cross-sectional data, and limited generalizability beyond Kenya. Future research should examine the long-term impact of mobile money on household

expenditure and other well-being factors like education and health, potentially using alternative methods like randomized controlled trials to better establish causation.

5. REFERENCES

- Ahmad, S. W., & Wongsurawat, W. (2023). Mobile financial services and household welfare in a developing economy: Boon and bane. *Journal of Science and Technology Policy Management*, 14(6), 1-20.
- Apeti, A. E. (2022). Mobile money and household consumption volatility. *World Development*, 156, 105946. <https://doi.org/10.1016/j.worlddev.2022.105946>
- Apiors, E. K., & Suzuki, A. (2018). Mobile money, individuals' payments, remittances, and investments: Evidence from the Ashanti Region, Ghana. *Sustainability*, 10(5), 1409.
- Arday, R. N. (2017). The effects of mobile phone technology on financial inclusion in Ghana (Doctoral dissertation, University of Ghana).
- Bari, M. A., Haque, M. N., Khan, A., Uddin, M. A., Khan, G. D., & Yoshida, Y. (2024). Impact of cash assistance on food insecurity: A snapshot from Rohingya camps during COVID-19. *Development in Practice*, 34(6), 720–735. <https://doi.org/10.1080/09614524.2024.2361004>
- Brune, L., Giné, X., Goldberg, J., & Yang, D. (2016). Facilitating savings for agriculture: Field experimental evidence from Malawi. *Economic Development and Cultural Change*, 64(2), 187-220.
- Cobla, G. M., & Osei-Assibey, E. (2018). Mobile money adoption and spending behavior: The case of students in Ghana. *International Journal of Social Economics*, 45(1), 29-42.
- Combes, J. L., & Ebeke, C. (2011). Remittances and household consumption instability in developing countries. *World Development*, 39(7), 1076-1089.
- Danquah, M., & Iddrisu, A. M. (2018). Access to mobile phones and the wellbeing of non-farm enterprise households: Evidence from Ghana. *Technology in Society*, 54, 1-9.
- Demirgüç-Kunt, A., Klapper, L. F., Singer, D., & Van Oudheusden, P. (2015). The global finindex database 2014: Measuring financial inclusion around the world. *World Bank Policy Research Working Paper*, (7255).
- Demirguc-Kunt, A., Klapper, L., Singer, D., & Ansar, S. (2018). The Global Finindex Database 2017: Measuring financial inclusion and the fintech revolution. *World Bank Publications*.
- Dorfleitner, G., & Nguyen, Q. A. (2024). Mobile money for women's economic empowerment: The mediating role of financial management practices. *Review of Managerial Science*, 18(7), 1807-1836.
- Finaccess Kenya 2021 consumer survey.

- Hussen, M. S., & Mohamed, M. A. (2023). Impact of financial inclusion on household welfare in Ethiopia. *Future Business Journal*, 9(1), 67.
- Islam, A. H., Basher, S. A., & Enamul Haque, A. K. (2022). The impact of mobile money on long-term poverty: Evidence from Bangladesh. *Journal of Social and Economic Development*, 24(2), 436-455.
- Kikulwe, E. M., Fischer, E., & Qaim, M. (2014). Mobile money, smallholder farmers, and household welfare in Kenya. *PloS One*, 9(10), e109804.
- Kikulwe, E. M.; Fischer, E.; Qaim, M. (2013): Mobile money, market transactions, and household income in rural Kenya, GlobalFood Discussion Papers, No. 22, Georg-August-Universität Göttingen, Research Training Group (RTG) 1666 - GlobalFood, Göttingen, <https://doi.org/10.22004/ag.econ.155847>
- Kilombe, H., Feleke, S., Abdoulaye, T., Cole, S., Sekabira, H., & Manyong, V. (2023). Maize productivity and household welfare impacts of mobile money usage in Tanzania. *International Journal of Financial Studies*, 11(1), 27.
- Lai, J. T., Yan, I. K., Yi, X., & Zhang, H. (2020). Digital financial inclusion and consumption smoothing in China. *China & World Economy*, 28(1), 64-93.
- Li, J., Wu, Y., & Xiao, J. J. (2020). The impact of digital finance on household consumption: Evidence from China. *Economic Modelling*, 86, 317-326.
- Munyegera, G. K., & Matsumoto, T. (2016). Mobile money, remittances, and household welfare: Panel evidence from rural Uganda. *World Development*, 79, 127-137.
- Murendo, C.; Wollni, Meike (2016): Mobile money and household food security in Uganda, GlobalFood Discussion Papers, No. 76, Georg-August-Universität Göttingen, Research Training Group (RTG) 1666 - GlobalFood, Göttingen
- Ondoa, H. A., Bella, G. L. A., & Bindop, K. M. M. (2023). Mobile money, family assistance, and welfare in Cameroon. *Telecommunications Policy*, 47(1), 102457.
- Osabohien, R., Jaaffar, A. H., Akpa, A. F., & Jakovljevic, M. (2024). Mobile money, medical cost anxiety and welfare of individuals within the reproductive age in Malaysia. *Humanities and Social Sciences Communications*, 11(1), 1-10.
- Pantano, E., & Priporas, C. V. (2016). The effect of mobile retailing on consumers' purchasing experiences: A dynamic perspective. *Computers in Human Behavior*, 61, 548-555.
- Renteria, C. (2015). How transformational mobile banking optimizes household expenditures: A case study from rural communities in Mexico. *Information Technologies & International Development*, 11(3), pp-39.
- Shaikh, A. A., Glavee-Geo, R., Karjaluoto, H., & Hinson, R. E. (2023). Mobile money as a driver of digital financial inclusion. *Technological Forecasting and Social Change*, 186, 122158.

- Suri, T., & Jack, W. (2016). The long-run poverty and gender impacts of mobile money. *Science*, 354(6317), 1288-1292. <https://doi.org/10.1126/science.aaf5401>
- Tabetando, R., Matsumoto, T., & Fani, D. C. R. (2022). Mobile money, agricultural intensification, and household welfare: Panel evidence from rural Uganda. *Journal of Agricultural and Applied Economics*, 54(3), 515-530. <https://doi.org/10.1017/aae.2022.7>
- Twumasi B., P., Abdul R., W., & Mohammed, I. (2021). Impact of mobile money access on internal remittances, consumption expenditure, and household welfare in Ghana. *Journal of Economic and Administrative Sciences*, 37(3), 337-354. <https://doi.org/10.1108/JEAS-10-2020-0172>
- West, S. G., Cham, H., Thoemmes, F., Renneberg, B., Schulze, J., & Weiler, M. (2014). Propensity scores as a basis for equating groups: basic principles and application in clinical treatment outcome research. *Journal of consulting and clinical psychology*, 82(5), 906.
- Wieser, C., Bruhn, M., Kinzinger, J. P., Ruckteschler, C. S., & Heitmann, S. (2019). The impact of mobile money on poor rural households: Experimental evidence from Uganda. *World Bank Policy Research Working Paper*, (8913). <https://doi.org/10.1596/1813-9450-8913>
- Zhao, C., Wu, Y., & Guo, J. (2022). Mobile payment and Chinese rural household consumption. *China Economic Review*, 71, 101719. <https://doi.org/10.1016/j.chieco.2022.101719>