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ORIGINAL ARTICLE

Unpacking the multidimensional impact of international remittances on women's empowerment in Africa: a quasi-experimental study

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Abstract

While research on women's empowerment in Africa has traditionally focused on education, microfinance, and the role of feminist movements and NGOs, the gendered impacts of international remittances remain underexplored. Existing studies that do engage remittances often rely on macro-level indicators or narrow outcome measures, failing to capture the multidimensional and context-specific nature of empowerment. We address this gap by providing the first micro-level and cross-country evidence on how international remittances influence women's empowerment across 34 democratic African countries, drawing on Afrobarometer Round 7 data. We construct a multidimensional empowerment index, encompassing gender equality, economic agency, political participation, and health autonomy, using Multiple Correspondence Analysis (MCA). To correct for selection bias and account for the bounded nature of our outcome variables, we employ entropy balance with fractional logit models (EB-FLM), supplemented by Inverse Probability Weighted Regression Adjustment (IPWRA) for robustness due to it doubly-robust property. Remittances are found to significantly enhance women's empowerment, with the strongest effects in economic, political, and gender equality domains. These effects are more pronounced among rural women and younger cohorts, while older women experience relatively greater gains in health-related autonomy. Our findings frames the impact of remittances on women empowerment as a context-dependent yet transformative channel for advancing gender equality, with implications for policies aimed at reducing transfer costs and expanding inclusive financial and social infrastructure.

Keywords Remittances · Women empowerment · Africa · Gender equality · Health empowerment · Multiple correspondence analysis (MCA) and fractional logit model (FLM)

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Introduction

Women's empowerment is widely recognized as a catalyst for economic growth (Agénor and Canuto 2015), poverty alleviation, and income inequality reduction (Grotti and Scherer 2016). It also promotes gender equality and sustainable environmental policies (Norgaard and York 2005). Yet, many African countries continue to grapple with pervasive gender inequalities over the past decade, positioning women's empowerment as a critical priority for states, international agencies, and nonprofits. Efforts to enhance women's empowerment have largely focused on mechanisms like education and microfinance, which foster skills development, financial independence, and entrepreneurial success (Adeel et al. 2023). Non-governmental organizations (NGOs) also play a transformative role by advocating for policy changes and implementing grassroots programs such as microcredit initiatives (Akhtar and Mostofa 2018; Longwe 2000). Additionally, feminist movements have leveraged international frameworks, such as Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW), to advance gender equity (Tamale 2001). Despite these efforts, research has overlooked the role of remittances as a specific mechanism contributing to women's empowerment in Africa.

As of 2020, there were 281 million international migrants, representing 3.6% of the global population, with 39.5 million Africans among them (McAuliffe and Oucho 2024). This surge in international migration has driven a significant increase in cash remittances sent to families left behind. As of 2022, global remittances reached $831 billion, with $647 billion flowing to low- and middle-income countries (ibid.). In Africa, remittances have become a key source of external finance, surpassing Official Development Assistance (ODA) and Foreign Direct Investment (FDI) (UNCTAD 2018). Between 2005 and 2007 and 2014–2016, remittance inflows rose from $38.4 billion to $64.9 billion, accounting for 2.8% to 14.8% of total exports. Beyond cash, migrants also transfer in-kind goods such as medicine, clothing, and consumer goods, as well as ideas, skills, and cultural norms that influence social and economic practices in recipient communities (Levitt 1998; UNCTAD 2018).

Over time, scores of literatures have probed into how these funds have become a stable driver of financial inclusion and socio-economic development, linked to outcomes such as poverty reduction, investment growth, and educational advancement (Adams and Klobodu 2016; Konte 2016). In South Asia, studies shows that remittance-receiving households report higher rates of girls' education, improved women's health, and increased entrepreneurial activities (Hassan and Jebin 2020). Female-headed households, in particular, allocate a larger share of remittances to essential needs, food, education, and health, narrowing gender gaps in financial inclusion (Abokyi 2023; Ajefu and Ogebe 2021). Similarly, research from countries like Moldova, Egypt, Angola, and Ghana highlights how remittances transform gender dynamics, challenging entrenched cultural roles and fostering new opportunities for women (Anaman et al. 2023; Kunz 2008; Lopez-Ekra et al. 2011). Despite these benefits of international remittances, other strand of the literature posit that it rather disempowers women. Ranging from factors such as cultural dynamics, the degree or score of democracy in the migrant country (Minos and Passari 2024), the pattern and magnitude of remittance (Maharjan et al. 2012) then also the dependency effect

via income substitution (Hassan and Jebin 2020). This suggest that the impact of international remittances on women empowerment is still an on-going debate in the literature.

We contribute to this debate by focusing on the African continent, a region that has been often overlooked in the remittance and women empowerment discourse. To the best of our knowledge, no empirical work has utilized micro-level data to explore the multidimensional nature of women's empowerment in Africa. The only existing study, Sambo (2016), uses macro-level data from 21 African countries, offering an aggregate national level perspective but failing to capture individual-level dynamics of remittances on women's empowerment. Additionally, global studies that include some African cases often limit empowerment to labor-force participation (e.g., Azizi 2018; Ibourk and Amaghouss 2014; Nasrin et al. 2024), neglecting its broader dimensions.

In that regard, we present micro-level empirical evidence on how remittances impact women's empowerment across 34 democratic Africa countries using Afrobarometer Round 7 data. We further deviate from the existing literature that predominantly utilize preexisting aggregated macroeconomic measure of gender (in) equality indicators across both genders, by building an individual level indicator which focuses exclusively on women using multiple correspondence analysis (MCA) on 4 key domains namely gender equality, economic, political and health and then merge all this into a composite index. This targeted approach addresses a critical gap in the literature by highlighting gender-specific dynamics and outcomes often masked in mixed-gender analyses. Finally, we proceed to conduct heterogeneity analysis based on rural-urban divide and generational lens (younger women versus older women). This extension also helps us to consider the significance of how cultural norms, labor market opportunities, and social structures vary across settings and life stages, shaping how remittances influence women's empowerment outcomes. To guide this inquiry, our study is driven by the following research questions:

1. What is the relationship between international remittances and women's empowerment across democratic African countries?
2. How does the effect of remittances vary across different dimensions of women's empowerment namely gender equality, economic agency, political participation, and health autonomy?
3. To what extent do rural-urban residence and generational differences (younger vs. older women) moderate the relationship between international remittances and women's empowerment?

Our study reveals that international remittances significantly enhance women's empowerment across 34 African countries, with stronger impacts in rural areas and distinct benefits for younger and older women. Younger women gain in gender equality, economic, and political empowerment, while older women experience improvements in economic, political, and pronounced impact on the health dimension. These findings highlight remittances as a key driver of empowerment, warranting targeted, context-specific policy interventions.

The paper proceeds as follows: the literature review situates remittances within existing empowerment strategies and identifies key research gap. The results section presents findings on remittances multidimensional impact on empowerment. Finally, the discussion and conclusion synthesize the findings, highlight policy implications, and propose directions for future research.

Conceptualizing women's empowerment

Women's empowerment has become central to achieving Sustainable Development Goal 5 (SDG5), aimed at reducing gender inequalities (Alkire et al. 2013). Given its multidimensional nature, empowerment is often conceptualized through terms like choice, power, control, agency, and options(Gram et al. 2019). Scholars have debated whether empowerment should be viewed as a process or outcome, a capacity to gain power, or an expression of agency (Mishra and Tripathi 2011; Yount et al. 2018). This conceptual framing underscores a people-centered approach, focusing on individuals as agents of change rather than passive recipients of interventions(De Haan and Zoomers 2005). In line with the sustainable livelihoods approach (Chambers and Conway 1992) and Sen's (2009) capability approach, women's empowerment is assessed based on their ability to access material resources, strategize livelihoods, and achieve their desired outcomes. Such frameworks also address culturally embedded gender concerns by examining how women, as social actors, navigate societal rules and structures to challenge and transform discriminatory norms (Ajwani-Ramchandani 2017; Endeley 2001). In relation to this, Levitt (1998), Lopez-Ekra et al. (2011), Ramírez et al. (2005) highlight that migration, and the transfer of remittances facilitate the spread of ideas, norms, and behaviors, particularly among women. These social processes empower women by enabling them to assume new roles as providers and economic decision-makers, which, in turn, challenge and break down patriarchal norms.

Development discourses on women's empowerment frequently emphasize exposure to new values and ideas pertaining to the position of women in the society whiles using key indicators gender equality, economic participation, political representation, and health outcomes (Beteta 2006; Biswas and Kabir 2004; Kabeer 2011; Yount et al. 2018). The gender equality dimension of women's empowerment focuses on addressing the discriminatory social norms that restrict women's capabilities and opportunities. Social and gender norms, widely accepted informal rules governing behavior, serve as a major barrier to women's access to economic opportunities and participation in decision-making processes (Marcus 2021; Chandramohan et al. 2023). These norms perpetuate gender discrimination, constraining women's ability to achieve valued ways of being and doing (Nussbaum 2005). By shaping behaviors, practices, and expectations, such norms limit their agency in both household and societal contexts. Hence, the gender equality framework emphasizes empowering women, particularly the marginalized, to overcome systemic barriers, achieve gender justice, and lead valued lives.

In the realm of political empowerment, women's agency is often evaluated through political and legal awareness, participation in political activities, and preferences toward women in leadership roles. Additional indicators include political

efficacy, involvement in community activities, and engagement in public protests and political campaigns (Biswas and Kabir 2004; Kabeer 2011; Malhotra and Schuler 2005b). Economic empowerment, on the other hand, focuses on attitudes toward women's economic roles, self-efficacy, and their involvement in household decision-making. This includes control over financial resources, economic decision-making, and income management (Bloom et al. 2001). Furthermore, economic empowerment, measured through access to resources and opportunities, remains a critical dimension of empowerment(Hashemi et al. 1996).

The health-related dimension of women's empowerment includes indicators such as fertility decisions, sexual and reproductive autonomy, and access to pregnancy care services and child health outcomes (Deininger and Liu 2013; Mason and Smith 2000). Critical factors shaping empowerment also include attitudes toward intimate partner violence and experiences of violence, which undermine women's health and autonomy (Gupta and Yesudian 2006; Mason and Smith 2000). Furthermore, gender norms play a pivotal role in exacerbating health vulnerabilities. For instance, studies highlight that women's subordination to men, a product of entrenched gender norms, increases their risk of HIV/AIDS infection and impedes access to treatment (Ehrhardt et al. 2009; Grown et al. 2005). Subtle cultural patterns within population subgroups further reinforce these norms, increasing women's exposure to gender-based violence and associated health risks(Gupta et al. 2013).

Revisiting the impact of remittances on women's empowerment: a comparative review and research gap

The impact of remittances on women's empowerment remains a multifaceted question that varies across global and regional contexts. While studies broadly recognize remittances as an economic lifeline, their influence on women's autonomy, labor participation, and decision-making power reveals both empowering and constraining dimensions shaped by cultural norms, institutional settings, and household dynamics. At the global level, macro-level evidence offers mixed findings. Ibourk and Amaghouss (2014), Minor and Passari (2024), and Nasrin et al. (2024) highlight the positive impact of remittances on reducing gender inequality across diverse countries. However, Azizi (2018), using data from 122 developing countries, reports a decline in female labor force participation, suggesting that remittances can reduce women's economic agency by increasing non-wage income. Similarly, micro-level studies (Al-Assaf 2022) document negative effects on female labor supply in contexts like Jordan, where remittance inflows exacerbate traditional household roles.

Contrastingly, substantial micro-level evidence, particularly from Asia, underscores how remittances empower women across dimensions such as autonomy, physical mobility, household decision-making, and health outcomes (Hassan and Jebin 2020; Fakir and Abedin 2021). For instance, remittance-receiving households in Bangladesh report reduced domestic violence, enhanced mobility, and increased ownership of assets, though women's control over asset usage remains limited (Fakir and Abedin 2021). Similar patterns emerge in India (Green et al. 2019), where the timing of remittance transfers, rather than volume, enhances women's autonomy,

challenging conventional assumptions about economic inflows as the sole driver of empowerment.

In Africa, the evidence mirrors global trends while introducing region-specific complexities. Sambo (2016), using macro-level data from 21 African countries, highlights significant improvements in women's economic and political empowerment. In particular in Sub-Saharan Africa (SSA), Sambo reveal the extent to which remittances indirectly bolster gender equality in health outcomes. These findings align with global scholarship that links remittances to improvements in maternal health, prenatal care, and education spending (Green et al. 2019). However, African contexts reveal critical nuances.

Micro-level studies expose how institutional health, cultural norms, and regional disparities mediate remittance outcomes. In Ghana, remittances enhance women's political participation, while in South Africa, Lu and Treiman (2007) show that remittances reduce intra-household gender disparities and increase educational investments for girls. Nevertheless, challenges persist: Abdelfattah, Zwick and Rostom (2023) demonstrate that in Egypt, male out-migration reduces women's labor force participation, not as a reflection of disempowerment but due to role substitution, where left-behind women absorb additional household responsibilities.

On the other hand, research on remittances in Africa reveals two contradictory effects on political participation. On one hand, remittances can enhance recipients' capacity for political engagement by improving their economic resources (Anaman et al. 2023; Maydom 2024). For instance, Maydom's (2024) study in Tunisia found that remittance recipients were more likely to engage in non-electoral political activities, such as protests, strikes, and contacting elected officials, as well as participate in electoral processes and non-political civil society organizations. Similarly, Anaman et al. (2023) findings in Ghana demonstrate that remittance recipients actively participate in governance by leveraging media platforms, such as calling into radio programs or writing letters to newspapers, to demand government action. Notwithstanding, remittances may reduce the incentive to participate politically by decreasing recipients reliance on the domestic economy for their livelihoods (Krilova 2008). In effect, in extending this discourse, Córdova and Hiskey (2021) and O'Mahony (2013) provide systematic evidence that remittance flows are influenced by home countries political and national contexts, including electoral calendars and development priorities. This suggests that migrants decisions to remit are not only economically driven but are also shaped by their home countries political dynamics.

Further, the rural-urban and age divide adds another layer of complexity in the African context. Asiedu and Chimbar (2020) find that in Ghana, rural women receiving remittance experienced more depressive effect in terms of their labor force participation compared to the urban women. This suggests that local labor market opportunities and resource access influence empowerment outcomes. Similarly, De Haas and Rooij (2010) in Morocco highlight the paradox of remittances ensuring economic stability without fundamentally challenging gender norms in the rural areas of Southern Morocco. In Mali, Ahlin and Dahlberg (2010) reveal the role of remittance sustainability and volume in shaping empowerment outcomes, with inconsistent flows limiting transformative impacts. The impact of remittances on women's empowerment varies across age groups. Acosta (2011) observes that girls tend to

increase school attendance upon receiving remittances, primarily by reducing labor activities. And Eloundou-Enyegue and Calvès (2006) further highlights that remittances can promote high fertility rates in countries where parents rely on children for old-age security.

Tying everything together, the global and African evidence both highlights shared themes and region-specific dynamics. Across regions, remittances emerge as a double-edged sword: they can foster autonomy, mobility, and health empowerment while simultaneously reinforcing traditional gender roles through labor substitution effects. While global studies emphasize dimensions like health, household decision-making, and mobility, African studies provide nuanced insights into rural-urban disparities, institutional health, and cultural constraints that shape empowerment outcomes. Our study builds on these existing insights by offering a closer examination of remittances and women's empowerment within the African context. By utilizing Afrobarometer's round 7 survey, we present the first micro-level evidence on the impact of international remittances women empowerment in Africa whilst also accounting for age and geospatial heterogeneity.

Data

We sourced data from Afrobarometer Round 7, a pan-African, non-partisan research network that conducts multinational surveys across over 30 countries. Afrobarometer employs a multi-stage, clustered, and stratified random sampling technique with probability weights to ensure representativeness by addressing over/under-sampling and non-response rates (Afrobarometer 2017). The data collected between December 2016, and June 2018 achieved cooperation and response rates of 78.8% and 96%, respectively, covering 34 countries. We selected this round for its comprehensive focus on gender equality-related questions, surpassing previous rounds, which aligns with Tchamyou et al. (2024), who used the same survey to develop a women vulnerability index for rural Africa. For our analysis, we limit the sample to women aged 18 and above, reflecting our population of interest.

Measurement of women empowerment index (Dependent variable)

Many international organizations, including the World Bank, United Nations Development Program (UNDP), and African Development Bank (ADP), as well as studies like Asaolu et al. (2018), Deutsch and Silber (2019), Ewerling et al. (2017), and Tchamyou (2017), have measured women's empowerment through varied approaches. However, macro-level data often fail to capture individual-level nuances, and classical statistical methods used by these organizations are sensitive to extreme values and only robust when all values are equally relevant (Tchamyou 2017). At the micro-level, statistical techniques like Principal Component Analysis and Factor Analysis have been employed, but these methods are suited for linear continuous variables, not categorical data. Following Nyathi and Benhura (2021), we adopt MCA, a non-parametric technique free from assumptions of multivariate normality and linearity (Alsan et al. 2017; Stata 2015), to construct a composite index for women's empowerment in Africa. Unlike Nyathi and Benhura's (2021) study, limited to 3 Southern

African countries, our analysis comprises of 34 countries with more comprehensive four core dimensions: gender equality, political, economic, and health empowerment, with corresponding questions detailed in the online appendix OA7.

MCA endogenously weights proxies for each dimension, allowing the data to determine the index structure without predefined economic models or efficiency assumptions (Bazillier and Gouret 2004; Ferrant 2014a, b). Using the Burt approach and principal normalization, we retained factor scores from the first dimension for economic and political empowerment (explaining 84% and 50% of inertia, respectively) and the first two dimensions for the composite index (51.43% inertia), gender equality (63.8%), and health empowerment (66.43%). Contributions of principal inertia and factor scores are detailed in the online appendix OA1. To mitigate the challenge of negative indices and also to ensure easy comparison across countries the respective dimensions of women empowerment indices, we leveraged the Min-Max approach[1] to normalize the composite index and then the respective sub-indices. Countries with empowerment indices close to 1 signify more empowered and those close 0 are less empowered. Readers should note that in all our analysis from this step and beyond, we incorporated survey weight developed by Afrobarometer, to address any sampling concerns and non-response rate.

As shown in Figure OA1, Mauritius, Morocco, and Cabo Verde emerge as the top-ranked countries, consistent with ADB (Mizrahi and Fraser-Moleketi 2015) and UNDP[2] rankings. High empowerment in these countries can be attributed to social protection policies promoting inclusive growth, progressive educational reforms, gender quota systems, and strong activism by women's organizations (Oboro-Offerie and Abrefa Busia 2022; Onyina and Baye 2024). Conversely, Lesotho, Malawi, and Niger rank the lowest, with political empowerment emerging as the weakest sub-dimension across all countries. In Malawi, strict adherence to matrilineal kinship widens gender gaps in political participation by prioritizing girls' education, women's asset inheritance, and household decision-making without addressing political inequalities (Robinson and Gottlieb 2021). Additionally, in both Lesotho and Malawi, weak political empowerment can be explained by gendered gaps in political participation, as women often demonstrate lower political knowledge, interest, and engagement in activities such as voting, protesting, and campaigning compared to men (Coffé 2013; Coffe and Bolzendahl 2011).

Independent variable

Our key independent variable for this study was a respondent's status of receiving remittances or not. The question we sourced from the data has been previously used in other empirical studies (e.g. Anaman et al. 2023; Sulemana et al. 2019; 2023). The exact wording of the questions reads "Considering all the activities you engage in to secure a livelihood, how much, if at all, do you depend on receiving money from

[1] $X_{norm} = \frac{X - X_{min}}{X_{max} - X_{min}}$, where X is the original value to be normalized, X_{min}, the minimum value in the dataset for the variable, X_{max} is the maximum value in the dataset for the variable and X_{norm} is normalized value scaled between 0 and 1.

[2] https://hdr.undp.org/gender-development-index#/indicies/GDI.

relatives or friends working in other countries?" The responses were 0 = Not at all/ Does not receive remittances, 1 = A little bit, 2 = Somewhat, 3 = A lot. We recoded this variable into a binary indicator to capture remittance status at the extensive margin. While measuring remittances at the intensive margin would have provided a more nuanced analysis, the limitations of the available data prevent us from doing so. Consequently, our analysis focuses solely on the extensive margin, and this is consistent with other empirical studies (see, Anaman et al. 2023; Sulemana et al. 2019; 2023). We control for other relevant variables such as respondents demographics and socio-economic status. This comprises age, education, religion, location (urban and rural) of the individual, and present living conditions, which we control for to account for baseline economic well-being and isolate the specific effects of remittances on empowerment outcomes. We further controlled for age squared to capture non-linear age effects, and country fixed effects to account for unobserved heterogeneity across countries.

Empirical strategy

We employ three main techniques to estimate the impact of international remittances on women's empowerment: Inverse Probability Weighted Regression Adjustment (IPWRA), Entropy Balancing (EB), and the Fractional Logit Model (FLM). While randomized control trials allow direct estimation of treatment effects, observational data, like ours, poses challenges, as treated (remittance recipients) and control (non-recipients) groups often differ systematically in observable and unobservable characteristics, potentially biasing the estimates.

To address this, Propensity Score Matching (PSM) is commonly used to match treated and untreated groups based on observed covariates and estimate the Average Treatment Effect on the Treated (ATET). Following Imbens and Wooldridge (2009), the ATET is specified as:

$$\mathrm{ATET} = \mathrm{E}[\mathrm{Y}_1 - \mathrm{Y}_0 | \mathrm{T} = 1] \tag{1}$$

where Y_1 and Y_0 are the respective outcome indicators (women empowerment: composite index, gender equality, economic empowerment, political empowerment, and health empowerment). T is the treatment indicator (remittance receipt). However, based on our data, we can only observe.

$\mathrm{E}[\mathrm{Y}_1 \mathrm{T} = 1]$ but not $\mathrm{E}[\mathrm{Y}_0 | \mathrm{T} = 1]$ since that is missing. Intuitively, we cannot observe women empowerment effect of women that did not receive the remittance concurrently. By extension, a simple comparison of remittance recipients against non-remittance recipients as pre-defined by our key independent variable operationalization, will introduce bias in estimated due to selection bias. The magnitude of the selection bias is presented as follows:

$$\mathrm{E}[\mathrm{Y}_1 - \mathrm{Y}_0 | \mathrm{T} = 1] = \mathrm{ATET} + \mathrm{E}[\mathrm{Y}_0 | \mathrm{T} = 1 - \mathrm{Y}_0 \mid \mathrm{T} = 0] \tag{2}$$

Now, the PSM addresses the selection bias by creating counterfactual groups for the treated individuals based on the observed characteristics, holding the unobservable

characteristics constant. That is, the PSM operates by assuming no systematic differences in the unobservable characteristics between the treated and untreated individuals. Now based on this assumption of conditional independence and the overlap conditions, ATET is given as follows:

$$\mathrm{ATET} = \mathrm{E}\left[\mathrm{Y}_1 | \mathrm{T} = 1,\ \mathrm{p}\left(x\right)\right] - \mathrm{E}\left[\,\mathrm{Y}_0 \,|\, \mathrm{T} = 0, \mathrm{p}\left(x\right)\right] \tag{3}$$

However, ATET from PSM can be biased when the propensity score model is misspecified (Wooldridge 2010). A potential remedy for addressing the misspecification buas is to exploit IPWRA. IPWRA leverages its doubly robust property, ensuring consistency and efficiency if either the treatment model or the outcome model is correctly specified (Wooldridge 2010).

To that end, we begin our first estimation leveraging IPWRA. Following Imbens and Wooldridge (2009), ATET in the IPWRA is implemented in two steps. Assume the outcome model is specified as a linear regression of the form: $Y_i = \tau_i + \phi_i x_i + \epsilon_i \, for \, i = [0\ 1]$ and the propensity scores are given by $\mathrm{p}(x;\ \gamma)$. For the first step, we compute the propensity scores as $\mathrm{p}(x;\ \widehat{\gamma})$. For the second step, we utilize linear regression to estimate (τ_0, ϕ_0) and (τ_1, ϕ_1) using inverse probability weighted least squares as

$$\min_{\tau_0, \phi_0} \sum_{i}^{N} \left(Y_i - \tau_0 - \ \phi_0 X_i\ \right) / p\left(x,\ \hat{\gamma}\right) if\ T_i = 0 \tag{4}$$

$$\min_{\tau_1, \phi_1} \sum_{i}^{N} \left(Y_i - \tau_1 - \ \phi_1 X_i\ \right) / p\left(x,\ \hat{\gamma}\right) if\ T_i = 1 \tag{5}$$

The ATET for IPWRA is then derived as the difference between Eq. (4) and Eq. (5)

$$\mathrm{ATET}\ = \frac{1}{N_w} \sum_{i}^{N_w} \left[\left(\widehat{\phi_1} - \ \widehat{\phi_0}\right) - \ \left(\widehat{\tau_i} - \ \widehat{\tau_0}\right) x_i\right] \tag{6}$$

where, $(\widehat{\tau}_i, \widehat{\phi}_1)$ are estimated inverse probability weighted parameters for treated individuals whilst $(\widehat{\tau}_0, \widehat{\phi}_0)$ are estimated inverse probability weighted parameters for untreated individuals. Lastly, N_w stands for total number of treated individuals.

To ensure robust analysis, we use EB as a robustness check. Introduced by Hainmueller (2012), EB reweights control group observations to achieve covariate balance by aligning the moments of their distributions. Unlike traditional methods like PSM, which may suffer from misspecification and iterative adjustments (Imai et al. 2008), EB non-parametrically ensures balance without the need for extensive recalibration. Additionally, it handles small control groups, improves counterfactual quality, and accommodates fixed effects to mitigate omitted variable bias (Hainmueller 2012; Kaba and Tchana 2024). By addressing issues such as propensity score tautology and limitations of Mahalanobis distance, EB streamlines the balancing process

while maintaining efficiency (Diamond and Sekhon 2013; Hainmueller 2012). In our study, the large number of untreated units ensures robust coverage of treated observations. To account for survey non-responsiveness and ensure representativeness, survey weights were integrated into the EB procedure and the inverse probability weighting regression framework. Thus, the re-weighted units following the EB are used to estimate the ATET and further be used for other estimates. Now, for the EB, counterfactual mean in Eq. (1) is specified as follows:

$$E\left[\widehat{\mathrm{Y}} \mid T = 1\right] = \frac{\sum_{\{i \mid T=0\}} Y_i \theta_i}{\sum_{\{i \mid T=0\}} \theta_i} \tag{7}$$

Where θ_i is the entropy balancing weight chosen for each control unit. We provide the supporting covariate balance for the full sample and sub-group analysis conducted in the online appendix (OA2 – OA6).

Given our dependent variable is bounded between 0 and 1 after Min-Max normalization, models like IPWRA and EB may provide consistent estimates but do not guarantee that their fitted values lie within the unit interval, nor that their partial effect estimates for extreme regressor values are reliable, potentially compromising interpretability (Nam 2012). To address this, we adopt the FLM proposed by Papke and Wooldridge (1996). FLM is a quasi-likelihood estimation method that does not rely on specific distributional assumptions but requires a correctly specified conditional mean for consistent estimation. Its likelihood function is structurally like the Bernoulli distribution, making it suitable for modeling bounded dependent variables.

$$l_i\beta = \mathcal{Y}_i \log\left[h\left(X_i\beta\right)\right] + \left(1 - \mathcal{Y}_i\right) \log\left[1 - h\left(X_i\beta\right)\right]; O \leq \mathcal{Y}_i \leq 1 \tag{8}$$

where $h(X_i\beta)$ is the logistic Cumulative Distribution Function and $\mathcal{Y}_i \in [0, 1]$ (this differs from binary logit, which restricts $\mathcal{Y}$ to values of 0 or 1). The process for obtaining parameter estimates is similar to2 the binary response model; however, a fully robust variance estimator is required. The expectation form FLM is then specified as:

$$E\left(\mathcal{Y}_i \mid \mathcal{X}_i\right) \frac{\exp\left(\mathcal{X}_i\beta\right)}{\left[1 + \exp\left(X_i\beta\right)\right]} = h\left(X_i\beta\right) \tag{9}$$

The boundary probabilities for the dependent variable is thus specified as;

$$\Pr\left(\mathcal{Y}_i = 0 \mid \mathcal{X}_i\right) > 0 \; and \; \Pr\left(\mathcal{Y}_i = 1 \mid \mathcal{X}_i\right) > 0 \tag{10}$$

We employ the FLM as the primary approach to estimate the impact of remittances on women's empowerment. To ensure clarity and practical interpretability, we present marginal effects instead of the raw coefficients. Marginal effects illustrate how changes in remittance status influence the respective empowerment indices, whereas raw FLM coefficients are expressed in log-odds and lack direct interpretive value (Perraillon 2019). However, FLM does not account for selection bias. To address

this, we leverage the entropy-balanced data, which removes confounding effects from observed covariates. This allows us to isolate the treatment effect and estimate the ATET while respecting the bounded nature of the dependent variables. Finally, we clustered standard errors at the within-country regional level to obtain correct inference by accounting for potential correlation in residuals within regions.

Empirical results

Table 1 presents weighted descriptive statistics for women across 34 African countries, comparing remittance recipients (21.1%) to non-recipients (78.9%). Remittance recipients consistently report higher scores on the composite empowerment index and all sub-dimensions, gender equality, economic, political, and health empowerment, indicating a strong positive association between remittances and empowerment outcomes. Recipients are also more likely to have attained secondary (37.6%) or tertiary (18.2%) education, suggesting that education may serve as a conduit for empowerment. They tend to reside in slightly larger female-headed households and are more

Table 1 Weighted descriptive statistics

		Remittance Status		
	Total	Non-Remittance Recipients	Remittance Recipients	Test
	(1)	(2)	(3)	
	22,118 (100.0%)	17,451 (78.9%)	4,667 (21.1%)	
Composite Index	0.541 (0.166)	0.531 (0.166)	0.578 (0.158)	<0.001
Gender Equality	0.483 (0.221)	0.479 (0.222)	0.494 (0.215)	<0.001
Economic Emp.	0.541 (0.210)	0.525 (0.210)	0.598 (0.201)	<0.001
Political Emp.	0.270 (0.179)	0.262 (0.172)	0.299 (0.202)	<0.001
Health Emp.	0.591 (0.220)	0.587 (0.220)	0.606 (0.217)	<0.001
Age	35.614 (14.022)	35.779 (13.855)	34.996 (14.615)	0.002
Age (Squared)	1,464.951 (1,216.914)	1,472.084 (1,200.804)	1,438.285 (1,275.115)	0.126
Household Size	3.688 (2.577)	3.654 (2.517)	3.814 (2.786)	<0.001
Education				
No education	4,958 (22.5%)	4,027 (23.2%)	931 (20.1%)	<0.001
Primary	6,595 (30.0%)	5,480 (31.6%)	1,115 (24.1%)	
Secondary	7,610 (34.6%)	5,870 (33.8%)	1,740 (37.6%)	
Tertiary	2,832 (12.9%)	1,987 (11.4%)	845 (18.2%)	
Religion				
Christian	12,727 (57.8%)	10,107 (58.1%)	2,620 (56.4%)	0.213
Muslim	7,171 (32.6%)	5,500 (31.6%)	1,671 (36.0%)	
Other	2,130 (9.7%)	1,779 (10.2%)	351 (7.6%)	
Location				
Rural	12,223 (55.3%)	9,925 (56.9%)	2,298 (49.2%)	<0.001
Urban	9,895 (44.7%)	7,526 (43.1%)	2,369 (50.8%)	
Living Condition	2.751 (1.255)	2.693 (1.249)	2.966 (1.254)	<0.001

Notes: Mean (Standard deviation): p-value from a pooled t-test. Frequency (Percent%): p-value from Pearson test. Source: Authors' owns construct

urban-based (50.6%), underscoring spatial disparities in remittance access. On average, recipients rate their present living conditions more favorably (mean = 2.97 vs. 2.69; $p < 0.001$), further suggesting better welfare outcomes. In contrast, religious affiliation does not differ significantly between the two groups, implying that remittance receipt is not systematically shaped by religious identity. However, the results from Table 1 cannot be used to make inferences regarding the impact of international remittances on women empowerment in Africa without controlling for our confounding factors.

Relationship between remittances and women empowerment composite index

Figure 1 shows a positive relationship between remittances and the Women Empowerment Composite Index across African countries. The upward sloping fitted line, along with the confidence interval, indicates that higher remittance inflows are generally associated with higher empowerment scores. Countries like Cabo Verde, Morocco, and Gambia with higher remittances tend to have stronger empowerment outcomes, while nations such as Malawi, Niger, and Lesotho exhibit lower remittance inflows and lower empowerment levels. Recent reports from UNCTAD (2018) shows that Gambia and Cabo Verde's remittances greatly exceed their export earnings. The confidence interval reflects some variation around the trend, emphasizing heterogeneity across countries. Notably, countries like Mauritius and Tunisia display higher empowerment levels despite moderate remittances, suggesting the influence of complementary factors such as policies, institutional frameworks, and social dynamics.

Table 2 presents the estimated effects of international remittances on women's empowerment across four dimensions and the composite index for the full sample.

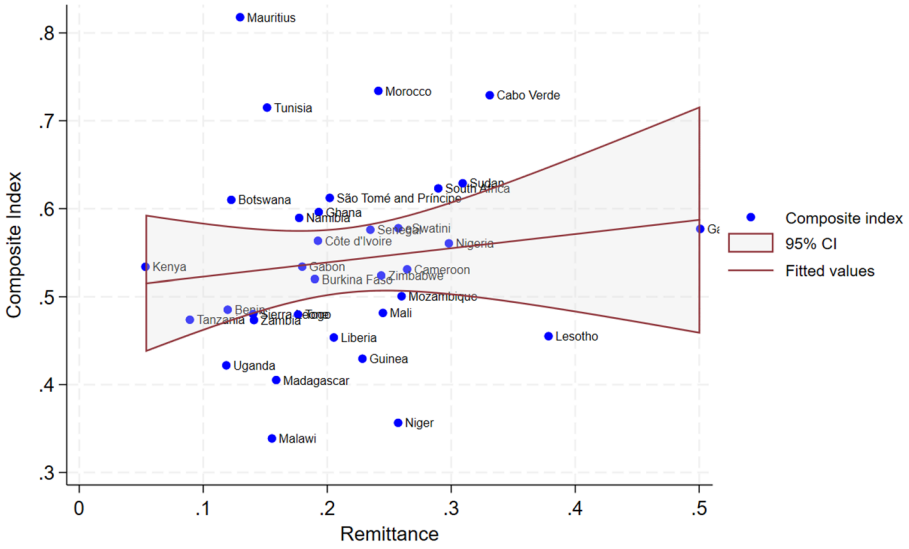

Fig. 1 Relationship between remittances and women empowerment composite index. Source: Author's own construct

Table 2 Full sample results

	Composite Index	Gender Equality	Economic Empowerment	Political Empowerment	Health Empowerment
	(1)	(2)	(3)	(4)	(5)
IPWRA	0.016***	0.018***	0.027***	0.034***	0.002
	(0.003)	(0.005)	(0.003)	(0.007)	(0.005)
EB	0.018***	0.017***	0.030***	0.034***	0.002
	(0.003)	(0.005)	(0.003)	(0.005)	(0.004)
EB-FLM	0.017***	0.017***	0.031***	0.034***	0.002
	(0.003)	(0.005)	(0.004)	(0.005)	(0.005)
N	21,861	21,861	21,861	21,861	21,861
Control Variables	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are clustered at the regional level. All models include country fixed effects. Control variables include age, age squared, education, religion, location, and living condition of respondents. ***$p<0.01$, **$p<0.05$, *$p<0.1$.Source: Authors' owns construct

The EB-FLM results, which serve as the main estimates, reveal significant positive associations between remittances and the composite index (1.7% points – pp here after), gender equality empowerment (1.7 pp), economic empowerment (3.1 pp), and political empowerment (3.4 pp). However, remittances have a small and statistically insignificant effect on health empowerment (0.2 pp). The robustness checks using IPWRA and EB align with these findings, both in direction and significance, reinforcing the reliability of the results.

Table 3 examines the effects of international remittances on women's empowerment across urban and rural subgroups. In urban areas, remittances significantly improve the composite index (1.6pp), economic empowerment (2.8 pp), and political empowerment (3.2 pp), while effects on gender equality and health empowerment remain insignificant. In rural areas, remittances have consistently stronger positive effects across all dimensions, including the composite index (1.8 pp), gender equality (1.7 pp), economic empowerment (3.1 pp), and political empowerment (3.6 pp). The effect on health empowerment in rural areas remains small but positive (0.5 pp). The results from EB-FLM, IPWRA, and EB reinforce these findings, highlighting the relatively stronger impact of remittances in rural areas compared to urban areas.

Table 4 shows how international remittances impact women's empowerment differently across age groups: young women (18–49) and older women (50+). For young women, remittances significantly improve the composite index (1.7 pp), gender equality (2.2 pp), economic empowerment (3.0), and political empowerment (3.3pp), while the effect on health empowerment remains small and insignificant (-0.2 pp). In contrast, older women experience significant gains in the composite index (1.8 pp), economic empowerment (2.7 pp), political empowerment (2.7 pp), and health empowerment (2.1 pp), although remittances have no meaningful effect on gender equality (-0.1 pp). Robustness checks using IPWRA and EB confirm these findings, highlighting the consistent impact of remittances. We reserve the discussion of these findings in the next section.

Table 3 Location heterogeneity

	Composite Index	Gender Equality	Economic Empowerment	Political Empowerment	Health Empowerment
	(1)	(2)	(3)	(4)	(5)
		Urban Heterogeneity			
IPWRA	0.017***	0.017***	0.029***	0.032***	0.001
	(0.004)	(0.008)	(0.004)	(0.006)	(0.005)
EB	0.017***	0.015**	0.030***	0.032***	0.001
	(0.003)	(0.008)	(0.004)	(0.006)	(0.005)
EB-FLM	0.016***	0.015	0.028***	0.032***	-0.000
	(0.004)	(0.030)	(0.004)	(0.005)	(0.005)
N	9,804	9,804	9,804	9,804	9,804
		Rural Heterogeneity			
IPWRA	0.019***	0.017***	0.031***	0.035***	0.005
	(0.004)	(0.007)	(0.005)	(0.007)	(0.007)
EB	0.018***	0.018***	0.029***	0.036***	0.004
	(0.004)	(0.006)	(0.005)	(0.006)	(0.007)
EB-FLM	0.018***	0.017***	0.031***	0.036***	0.005
	(0.004)	(0.006)	(0.005)	(0.006)	(0.007)
N	12,057	12,057	12,057	12,057	12,057
Control Variables	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are clustered at the regional level. Control variables include age, age squared, education, religion, and living condition of respondents. All models include country fixed effects. ***$p<0.01$, **$p<0.05$, *$p<0.1$. Source: Authors' owns construct

Discussion

This study set out to examine the micro-level impacts of remittances on women's empowerment across 34 democratic African countries, utilizing Afrobarometer Round 7 data. By constructing a composite index and disaggregating empowerment into key dimensions, gender equality, economic empowerment, political inclusion, and health outcomes, this research addresses a significant gap in understanding remittances' role in fostering women's empowerment in the African context.

Using EB-FLM as the primary empirical strategy, complemented by IPWRA and EB for robustness, our analysis reveals a significant positive relationship between remittance receipt and women's empowerment. This finding aligns with studies such as Sambo (2016), Minor and Passari (2024), and Maharjan et al. (2012), which highlight the empowering effects of remittances. Similarly, the positive relationships observed for gender equality, economic empowerment, and political empowerment, are supported by Anaman et al. (2023), Hassan and Jebin (2020), and Graham et al. (2015). Notably, the economic empowerment effect diverges from findings by Abdelfattah, Zwick and Rostom (2023), Al-Assaf (2022), and Azizi (2018), but aligns with regional evidence from Sambo (2016) and Ibourk and Amaghouss (2014) in Africa. In line with the capabilities and the sustainable livelihood approach, we argue that remittances play a transformative role by enhancing women's access to essential resources such as non-wage income, education, and healthcare. These resources

Table 4 Age heterogeneity

	Composite Index	Gender Equality	Economic Empowerment	Political Empowerment	Health Empowerment
	(1)	(2)	(3)	(4)	(5)
		Young Women (18–49)			
IPWRA	0.015***	0.024***	0.026***	0.037***	-0.002
	(0.003)	(0.006)	(0.004)	(0.006)	(0.005)
EB	0.017***	0.022***	0.022***	0.033***	-0.001
	(0.004)	(0.006)	(0.006)	(0.005)	(0.005)
EB-FLM	0.017***	0.022***	0.030***	0.033***	-0.002
	(0.003)	(0.005)	(0.004)	(0.005)	(0.004)
N	17,956	17,956	17,956	17,956	17,956
		Older Women (50+)			
IPWRA	0.017***	-0.007	0.031***	0.026**	0.018
	(0.006)	(0.011)	(0.006)	(0.010)	(0.010)
N	3,905	3,905	3,905	3,905	3,905
EB	0.019***	-0.001	0.027***	0.025***	0.021***
	(0.005)	(0.010)	(0.008)	(0.009)	(0.009)
N	3,928	3,928	3,928	3,928	3,928
EB-FLM	0.018***	-0.001	0.027***	0.027***	0.021***
	(0.006)	(0.010)	(0.007)	(0.009)	(0.009)
N	3,928	3,928	3,928	3,928	3,928
Control Variables	Yes	Yes	Yes	Yes	Yes
Country Fixed Effect	Yes	Yes	Yes	Yes	Yes

Notes: Robust standard errors are clustered at the regional level. Control variables include education, religion, location, and living condition of respondents. All models include country fixed effects. ***$p<0.01$, **$p<0.05$, *$p<0.1$. Source: Authors' owns construct

contribute to greater autonomy, increased mobility, improved household decision-making power, and an elevated standard of living. Additionally, the transfer of social remittances, comprising ideas, values, and practices (Levitt 1998), further amplifies this impact by challenging entrenched gender norms, enabling women to take on more active roles within households and beyond.

In terms of location heterogeneity, we find similar pattern of effect, where remittances significantly empower women on the composite index and then for gender equality, economic empowerment and political empowerment but again insignificant for health empowerment. Table 3, column 1 indicates that the impact was more pronounced for the rural areas than the urban centers consistent with Ahlin and Dahlberg (2010), Asiedu and Chimbar (2020) and De Haas and Rooij (2010). However, urban women experienced a stronger impact on gender equality, likely due to greater access to education, resources, and progressive norms in urban settings, while the other two dimensions, economic and political were dominated by rural areas, where remittances play a more transformative role in addressing resource gaps and traditional constraints. This highlights the contextual nature of remittance effects. The stronger impact of remittances in rural areas can be attributed to several factors. First, philanthropic initiatives, such as programs for education, healthcare, and financial inclusion, amplify remittance effects by addressing structural inequalities (Alao et al.

2022; Demedeme and Opoku 2022). Second, limited economic opportunities force rural women to rely more heavily on remittances due to restricted access to labor markets and alternative resources (Amuedo-Dorantes and Pozo 2006). For political empowerment, consistent with previous studies (Anaman et al. 2023; Maydom 2024), remittances significantly enhance women's participation in protests, civic activities, and governance by reducing economic barriers and increasing political agency, particularly in rural areas where traditional norms often restricted their roles.

Lastly, we further provide premier evidence on how lifespan contributes to how remittances empower women, specifically for younger women versus older women. As shown in Table 4, we find that both older and young women were experienced similar impact on the composite index. For the sub-indices, younger women records pronounced impact on the gender equality, economic and political empowerment. However, for older women, we find that upon remittance recipient, they experience a stronger impact in terms of health empowerment compared to the younger women which they had an insignificant effect consistent with Eloundou-Enyegue and Calvès (2006). The age-based differences in the impact of remittances can be explained by several factors. The age-based differences can be empirically justified by the varying priorities and roles across life stages. Younger women may channel remittances toward economic opportunities, education, and political participation, aligning with aspirations for upward mobility and independence. In contrast, older women are more likely to prioritize healthcare and well-being, reflecting age-related needs and responsibilities, leading to a stronger impact on health empowerment.

Conclusion and policy implications

This study employs a quasi-experimental design to present the first micro-level evidence on the relationship between international remittances and women's empowerment in Africa. Using Afrobarometer Round 7 data and MCA, we construct an individual-level empowerment index. Employing EB-FLM, supported by IPWRA and EB for robustness, our findings reveal that remittances significantly enhance women's empowerment across gender equality, economic, and political dimensions. Rural areas exhibit stronger impacts compared to urban centers, particularly in economic and political empowerment, while urban recipients show greater gains in gender equality. Additionally, younger women benefit more in economic, political, and gender equality dimensions, whereas older women experience pronounced improvements in health empowerment, signaling the need for context-specific policy interventions.

To maximize the empowerment potential of remittances, we recommend targeted policy measures. First, reducing remittance transaction costs is critical, as Africa records the highest global costs at 8.9% for sending $200, compared to 7.3% globally (UNCTAD 2018). State-level policies that hinder financial inclusion in some countries should be reevaluated. For instance, Ghana's 1.5% electronic levy (e-levy) on mobile money transfers exacerbate financial burdens and must be reconsidered to promote remittance flows. Stakeholders should also upscale financial inclusion measures to lower transfer barriers. Additionally, rural women require tailored

investments in education, healthcare, and financial inclusion to address structural inequalities and boost political engagement. Likewise, urban policymakers should prioritize empowerment programs focusing on gender equality and entrepreneurial opportunities for younger women, leveraging remittances to amplify their agency. Finally, age-specific health policies are essential for older women, as remittances significantly support their health outcomes. Reducing remittance costs and improving healthcare access can provide the financial relief necessary for older women to allocate resources effectively for their well-being.

This study is not without limitations. The Afrobarometer Round 7 dataset, while rich in gender-related questions, was not designed for migration studies, restricting analysis to remittance receipt at the extensive margin and excluding factors like intensive margin, channels, and sender characteristics. Its cross-sectional nature further limits causal inference and the ability to track changes over time or control for unobserved heterogeneity. Additionally, IPWRA and EB methods assume balanced unobserved factors, which may not fully hold, leaving potential concerns as well as other endogeneity concerns like reverse causality unaddressed. Despite these constraints, our findings offer valuable micro-level insights, paving the way for future research to explore causal analysis, incorporate panel data, and consider institutional variation in non-democratic African countries since Afrobarometer focuses on only democratic African countries. Future studies could also leverage regional analyses, qualitative methods, and intergenerational perspectives to deepen understanding of remittances' long-term and multidimensional impacts on women's empowerment.

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Declarations

Ethics approval and consent to participate This article does not contain any studies with human participants performed by any of the authors. Details on research ethics and informed consent on human subjects are available on the Afrobarometer Survey website (https://www.afrobarometer.org/surveys-and-methods/).

Consent for publication All authors have seen, reviewed, and contributed to the paper in a meaningful way and all authors have agreed to authorship.

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