

ORIGINAL RESEARCH ARTICLE

Women's economic empowerment through chamas: Evidence from a maternal health program in Kenya

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Abstract

The Chamas for Change (*Chamas*) program in western Kenya combines health education, peer support, and microfinance to address both maternal health and economic barriers. We conducted a secondary analysis of a cluster randomized controlled trial (N=1550) to examine *Chamas*' effect on women's economic empowerment and its relationship with maternal health outcomes. Using an adapted Women's Empowerment Scale, *Chamas* participants (n=822) showed higher overall empowerment than controls (n=728) (adjusted risk ratio=1.28, 95% CI=1.03-1.58), with greater cash savings (aRR=1.36) and income-generating activities (aRR=1.56). Participants were also 32% less likely to face restrictions on working outside the home. Although women's empowerment improved, these economic gains did not explain the maternal health benefits previously reported. The health improvements were likely primarily driven by *Chamas*' health education and peer-support components. The *Chamas* model illustrates how community-based platforms can simultaneously strengthen women's empowerment and health outcomes, offering practical lessons for integrated interventions in resource-limited African settings. (*Afr J Reprod Health* 2026; 30 [3]: 13-23).

Keywords: Women's economic empowerment, community-based interventions, maternal health, microfinance, Africa

Résumé

Le programme Chamas for Change (*Chamas*) dans l'ouest du Kenya combine éducation sanitaire, soutien par les pairs et microfinance pour lutter contre les obstacles économiques et liés à la santé maternelle. Nous avons mené une analyse secondaire d'un essai contrôlé randomisé en grappes (N=1550) afin d'examiner l'effet de *Chamas* sur l'autonomisation économique des femmes et son lien avec les indicateurs de santé maternelle. À l'aide d'une échelle d'autonomisation des femmes adaptée, les participantes à *Chamas* (n=822) ont présenté une autonomisation globale supérieure à celle du groupe témoin (n=728) (risque relatif ajusté = 1,28, IC à 95 % = 1,03-1,58), avec une épargne plus importante (RRa = 1,36) et davantage d'activités génératrices de revenus (RRa = 1,56). Les participantes étaient également 32 % moins susceptibles de se voir imposer des restrictions quant à leur activité professionnelle hors du domicile. Bien que l'autonomisation des femmes se soit améliorée, ces gains économiques n'expliquent pas les bénéfices observés précédemment en matière de santé maternelle. Ces améliorations sont probablement dues principalement aux composantes d'éducation sanitaire et de soutien par les pairs du programme *Chamas*. Le modèle *Chamas* illustre comment les plateformes communautaires peuvent simultanément renforcer l'autonomisation des femmes et améliorer leur santé, offrant ainsi des enseignements pratiques pour des interventions intégrées dans des contextes africains aux ressources limitées. (*Afr J Reprod Health* 2026; 30 [3]: 13-23).

Mots-clés: Autonomisation économique des femmes, interventions communautaires, santé maternelle, microfinance, Afrique

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Introduction

Rural Kenyan women face disproportionate risks of maternal and infant mortality, with national rates of 362 deaths per 100,000 live births and 37.2 deaths per 1,000 live births respectively in 2020.^{1,2} These statistics reflect broader challenges across Africa, which accounts for approximately 70% of global maternal deaths and 50% of global infant deaths despite declining rates worldwide.³⁻⁴ In rural Kenya, women's access to maternal healthcare is limited by structural barriers, including poverty, restricted decision-making power, limited control over resources, and disrespectful care.⁵ These challenges are particularly acute in Trans-Nzoia County, where gender norms limit both economic opportunities and healthcare access. Evidence suggests that addressing gender inequities through women's empowerment is crucial for improving maternal and child health outcomes in such settings.⁶⁻⁸

Addressing gender inequities in maternal health requires a focus on women's empowerment, a priority highlighted in both the United Nations' Sustainable Development Goal^{5,7,9} and Kenya's National Policy on Gender and Development (2019).¹⁰ Women's empowerment comprises both extrinsic factors (such as societal promotion of gender equality and access to resources) and intrinsic factors (including an individual's decision-making power and belief in their abilities).¹¹ These components of empowerment can create pathways to better health outcomes by enhancing women's agency and capacity to access healthcare services.¹² Indeed, studies from similar settings have demonstrated that enhanced women's agency and decision-making power are associated with improved access to health services and better maternal health outcomes.¹¹⁻¹⁵ However, in rural African settings like Trans-Nzoia County, programs that effectively address both women's empowerment and maternal health remain scarce.

In response to these challenges, the Academic Model Providing Access to Healthcare (AMPATH), in partnership with the Kenyan Ministry of Health and other key institutions, launched the *Chamas for Change* (*Chamas*) program in 2012.^{16,17} This gender-responsive,

community-based intervention uniquely combines maternal health education with economic empowerment activities.¹⁸ Through regular group sessions led by community health workers (CHWs), *Chamas* provides health education and peer support while offering opportunities for savings and microfinance activities. The program builds on traditional Kenyan social support systems to create sustainable community networks that address both health and economic barriers. Recent evidence has shown *Chamas*' effectiveness in improving maternal health outcomes, including increased facility deliveries and exclusive breastfeeding.¹⁶⁻¹⁸

Between 2018 and 2019, we evaluated *Chamas* through a cluster randomized controlled trial in Trans-Nzoia County, Kenya.¹⁶⁻¹⁸ Our primary analyses demonstrated significant improvements in maternal and child health: *Chamas* participants were more likely to deliver in health facilities, receive timely postpartum care, exclusively breastfeed, and complete infant immunizations.^{17, 18} While these health benefits are well-documented,¹⁷⁻¹⁹ the program's impact on women's economic empowerment - a key component of its integrated approach - remains unexplored. Understanding this economic dimension is crucial for comprehending the full potential of integrated maternal health programs, given the need for evidence on scalable interventions addressing both economic and social factors in maternal health.^{9,20}

This secondary analysis examines how *Chamas* influences women's empowerment in Trans-Nzoia county. We investigated whether this community-based program enhanced women's economic empowerment and autonomy, and whether these gains were associated with the documented improvements in MNCH outcomes. We hypothesized that *Chamas* participants would demonstrate higher levels of empowerment, particularly in economic aspects and personal autonomy, compared to controls. We also expected that greater empowerment would correlate with better maternal health outcomes. These findings could inform the adaptation of maternal health programs across similar resource-limited settings in Africa.

Methods

Study design

We conducted a secondary analysis of the data from a two-arm cluster randomized controlled trial conducted between 2018 and 2019. The trial included 74 community health units across four sub-counties (Cherangany, Kwanza, Kiminini, and Saboti). Cluster randomization prevented contamination between intervention and control villages. The trial methodology and primary outcomes are detailed elsewhere.¹⁷ Our trial followed the Consolidated Standards of Reporting Trials (CONSORT) guidelines for reporting the results of cluster randomized controlled trials.²¹

Study participants

The trial included pregnant women who met the following criteria at enrollment: presented for their first antenatal care (ANC) visit at less than or equal to 32 weeks' gestation and resided in one of the 74 selected CUs in Trans-Nzoia County. We included all participants who completed the empowerment assessments at baseline and endline. The community Units (CUs) were randomly assigned to either the intervention arm (*Chamas*) or the control arm (standard of care monthly CHW home visits).²²

Intervention

The *Chamas* program^{17, 18} is a group-based, CHW-led health promotion program designed to empower pregnant and parenting women during their child's first 1000 days of life. The program combines health and social education sessions covering topics pertinent to antenatal, postpartum, and early childhood experiences. The social education curriculum is designed to build female empowerment through capacities in financial literacy, decision-making, and income-generating activities. The group-based format fosters a supportive environment where women can share experiences and collectively address challenges. Following the CHW-facilitated discussions and coaching sessions, members can participate in the microfinance component of the *Chamas* program. This optional program, called

Group Integrated Savings for Health and Empowerment (GISHE), is a form of table-banking—an informal community-based savings and credit system. GISHE participation is voluntary to avoid deterring women with financial constraints from joining *Chamas*. Members are encouraged to use GISHE funds to finance health interventions (e.g., enrolling in health insurance or paying for transportation to health facilities), early childhood education, or launching small businesses. Participants in the control arm received the Kenyan Community Health Strategy (CHS) recommended antenatal and postnatal standard of care,²² consisting of monthly individual CHW home visits without the group-based empowerment components of *Chamas*.

Data collection procedures

We designed our questionnaires, and intervention activities based on qualitative feedback from *Chamas*' pilot study participants.¹⁸ Data collectors evaluated eligibility during the first ANC visit. Eligible women who were willing to participate were contacted for *Chamas* enrollment. CHWs located and enrolled eligible women within their respective CUs. Data collectors accompanied CHWs and collected baseline information at enrollment. One week after the enrollment period ended, all CUs were randomly assigned to either the intervention or control arm. After 3 weeks, CHWs began facilitating *Chamas* in intervention clusters.

We collected participants' socio-demographic (age, marital status, maternal education, occupation) and empowerment data using protected electronic questionnaires at recruitment and 12 months post-intervention. We also obtained information on their poverty probability index (PPI) scores at the endline. We used the Kenya 2015 PPI questionnaire and the national poverty line scorecard, which are routinely used measures in the county to estimate the likelihood of poverty among participants. The PPI is a comprehensive, contextually-sensitive poverty measurement tool used to characterize a The *Chamas* program^{17, 18} is a group-based, CHW-led health promotion program designed to empower pregnant and parenting women during their child's first 1000 days of life. The program combines health and social education sessions covering topics

pertinent to antenatal, postpartum, and early childhood experiences. The social education curriculum is designed to build female empowerment through capacities in financial literacy, decision-making, and income-generating activities. The group-based format fosters a supportive environment where women can share experiences and collectively address challenges.

Following the CHW-facilitated discussions and coaching sessions, members can participate in the microfinance component of the *Chamas* program. This optional program, called Group Integrated Savings for Health and Empowerment (GISHE), is a form of table-banking—an informal households' asset ownership and probability of living below the poverty line.²³ The poverty line is the predefined income level required for an individual or household to meet basic living expenses. The PPI questionnaire comprises questions about household characteristics and asset ownership. After the study, data collectors visited *Chamas* participant residences to collect data. Study outcome measures were self-reported. We classified participants as lost to follow-up after unsuccessfully attempting contact three times over a 2-week period. If participants moved outside of Trans-Nzoia County, we conducted abbreviated telephone-based endline surveys.

Outcomes

Our primary outcome was changes in women's perceived empowerment levels measured using an adapted version of Schuler et al.'s Women's Empowerment Scale,²⁴ a validated scale designed for reproductive health and family planning contexts. We chose this scale for its ease of administration and adaptability to our cultural context. The adapted scale focused on two subscales: economic security and contribution to family support, and freedom from family domination. The economic security and contribution to family support subscale had four items with a 0–4-point scale, covering land ownership, productive assets, cash savings, and business use of savings. One point was awarded for each positive response.

The freedom from family domination subscale comprised four items about financial control, property deprivation, parental visitation

restrictions, or work prevention by their husband or another family member in the previous 12 months. Participants were classified as 'empowered' on this subscale and assigned a code of 1 if none of these items had occurred to her, and 0 if any had occurred. A composite empowerment score was calculated, with a participant considered empowered overall if they scored 2 on both subscales.

We also investigated the associations between empowerment scores and key MNCH indicators. These included: attending adequate antenatal care (defined as attending at least four visits, as per Republic of Kenya Ministry of Health guidelines), receiving a 48-hour postpartum home visit, exclusively breastfeeding for 6 months, adopting a modern contraceptive method, and facility-based delivery. All outcomes were measured at the individual level.

Data analysis

We used descriptive data including medians and interquartile ranges (IQRs) for continuous variables and counts, along with percentages for categorical variables, to summarize the characteristics of participants by trial arm. To assess the impact of *Chamas* on women's empowerment, we calculated the number of women with a positive composite empowerment score and positive responses to each empowerment subscale question. These calculations were stratified by trial arm with the total number of women in each arm serving as the denominator. We compared the rates using robust Poisson regression adjusting for baseline empowerment score, age, occupation status, and marital status cluster (as a random effect); these were identified as *a priori* confounders.²⁵ We summarised these models as adjusted risk ratios (aRRs) between trial arms with corresponding 95% confidence intervals.

In our primary models, we included all women with responses to the endline empowerment questionnaire. We handled missing covariate data using multiple imputation by chained equations (MICE). We imputed 20 datasets and pooled them using Rubin's rules.²⁶ We conducted several sensitivity analyses of the above including: 1) an unadjusted model, 2) expanding the previous imputation to include those missing endline empowerment scores (13.5% in control and 6.5% in

intervention) and 3) including only complete cases while not adjusting for baseline empowerment scores (due to missing data). To examine the relationship between empowerment and MNCH outcomes, we assessed these associations in the combined trial arms using similarly adjusted robust Poisson models. We summarized results as aRR comparing empowered versus not empowered women, adjusting for the trial arm. All analyses were conducted using R statistical software (V.4.0.3).

Ethical considerations

Ethical approval was obtained through the Institutional Research and Ethics Committee at Moi University School of Medicine and Moi Teaching and Referral Hospital (IREC/2013/76), the Office of Research Administration at Indiana University (#1306011628), and the Research Ethics Board at the University of Toronto (#2907). Signed approval was obtained from the Trans-Nzoia County leadership and community leaders. Written informed consent was obtained from all participants. Data collectors were also trained to provide culturally safe approaches to raising sensitive topics.

Results

The baseline characteristics of participants in this study (n=1550) were similar in the control and intervention groups (Table 1).

Most participants were married (83%), unemployed (63%), had finished primary school (85%), and had previously been pregnant (>75%). Cluster demographics were generally well balanced. Baseline rates of economic empowerment and freedom from family domination were higher in the control group and both arms had a sizable amount (~30%) of missing data on the baseline empowerment survey. The mean PPI score for our study population was 55.13 (SD 20.11) at endline. Endline PPI scores differed between trial arms, with control participants having a higher probability of living below the poverty line than *Chamas* participants (control: 56.79, SD 20.69; intervention: 53.61, SD 19.45). Women's empowerment outcomes (economic and freedom subscales) are summarized in Table 2.

Chamas participants showed higher overall empowerment levels than the control group (51.2% vs 40.2%; aRR = 1.28, 95% CI = 1.03 to 1.58). The largest differences were observed in economic indicators: participants reported more cash savings (56.4% vs 39.2%; aRR = 1.36, 95% CI = 1.13-1.65) and higher engagement in income-generating activities (45.4% vs 27.3%; aRR = 1.56, 95% CI = 1.24-1.96).

However, fewer *Chamas* participants reported owning property or productive assets compared to controls. Freedom from family domination was slightly higher among *Chamas* participants (66.5% vs 60.2%; aRR = 1.13, 95% CI = 0.96-1.32). The most notable difference was in workplace autonomy: *Chamas* participants were 32% less likely to face restrictions on working outside the home (aRR = 0.68, 95% CI = 0.48-0.96).

Economic and freedom empowerment results were similar across sensitivity analyses including complete case models, exclusion of baseline empowerment as a covariate (due to high missing data) and inclusion of imputation for missing outcome data (Table S1). The association between women's empowerment levels and MNCH indicators is shown in Table 3. There were no associations between the empowerment subscales and the MNCH outcomes examined in our analysis. For example, facility delivery rates were 78% among women empowered on the freedom scale and 77% among those who were not (aRR = 1.02, 95% CI = 0.95 to 1.09). Results were similar for all other outcomes with tight confidence intervals around 1.

Discussion

This study builds upon previous findings demonstrating *Chamas for Change's* effectiveness in improving maternal, newborn, and child health (MNCH) outcomes in Trans-Nzoia County Kenya.^{17,18} In the context of sub-Saharan Africa's ongoing challenges with maternal health and women's economic inclusion, this secondary analysis shows how *Chamas* enhances women's empowerment through increased cash savings, participation in income-generating activities, and greater freedom to work outside the home.

Table 1: Participant demographics by trial arm.

	Control (N = 728)	Intervention (N = 822)
N cluster	37	37
Maternal age	26.63 (6.21)	27.10 (6.55)
Marital status		
Divorced/separation	11 (1.5%)	17 (2.1%)
Married	606 (83.2%)	686 (83.5%)
Single	109 (15.0%)	115 (14.0%)
Widowed	2 (0.3%)	4 (0.5%)
Maternal education		
College or higher	91 (12.5%)	46 (5.6%)
Secondary or post-primary	211 (29.0%)	250 (30.4%)
Primary	313 (43.0%)	420 (51.1%)
Pre-primary or none	113 (15.5%)	102 (12.4%)
Missing	0 (0.0%)	4 (0.5%)
Occupation		
Contract/temporary worker	49 (6.7%)	48 (5.8%)
Permanently employed	22 (3.0%)	10 (1.2%)
Self employed	201 (27.6%)	247 (30.0%)
Unemployed	456 (62.6%)	516 (62.8%)
Missing	0 (0.0%)	1 (0.1%)
Mean poverty probability index (PPI) score	56.79 (20.69)	53.61(19.45)
% poverty likelihood at National Poverty Line	22.6%	25.7%
Sub-county		
Cherangany	229 (31.5%)	211 (25.6%)
Kiminiini	145 (19.9%)	172 (20.9%)
Kwanza	193 (26.5%)	216 (26.2%)
Saboti	161 (22.1%)	223 (27.1%)
Had a previous pregnancy	584 (80.2%)	623 (75.8%)
Parity	2.29 (1.62)	2.58 (1.57)
Previous modern contraceptive use		
Yes	322 (55.1%)	381 (61.2%)
No	214 (36.6%)	210 (33.7%)
Missing	48 (8.2%)	32 (5.1%)
Previous facility delivery		
Yes	228 (39.0%)	279 (44.8%)
No	162 (27.7%)	161 (25.8%)
Missing	194 (33.2%)	183 (29.4%)
Total ANC visits in previous pregnancy		
0	6 (1.0%)	21 (3.4%)
1	18 (3.1%)	22 (3.5%)
2	29 (5.0%)	39 (6.3%)
3	119 (20.4%)	128 (20.5%)
4	135 (23.1%)	172 (27.6%)
>4	74 (12.7%)	54 (8.7%)
Missing	203 (34.8%)	187 (30.0%)
Baseline peer support and empowerment scores		
Peer support	16 [13,19]	17 [0,19]
Economic (empowered) *	250 (52.2%)	241 (42.2%)
Freedom (empowered)*	393 (80.9%)	409 (71.4%)
Scores and % poverty likelihood calculated using validated 2015 Kenya Poverty Probability Index.		
*Denominators are number of respondents (486 in control, and 573 in intervention).		

Table 2: Freedom and economic empowerment responses by trial arm.

Economic	Control (N = 622)	Intervention (N = 770)	Adjusted risk ratio (95% CI)
Empowered (composite)	250 (40.2)	394 (51.2)	1.28 (1.03, 1.58)
Do you, in your own name, own any land, your homestead land, or your house?	187 (30.1)	204 (26.5)	0.88 (0.64, 1.22)
Do you yourself own any productive assets (for example, cattle or sewing machine)?	201 (32.3)	208 (27.0)	0.84 (0.62, 1.12)
Do you have any cash savings?	244 (39.2)	434 (56.4)	1.36 (1.13, 1.65)
Have you ever used your savings for business or moneylending?	170 (27.3)	350 (45.5)	1.56 (1.24, 1.96)
Freedom	Control (N = 630)	Intervention (N = 771)	Adjusted risk ratio* (95% CI)
Empowered (composite)	379 (60.2)	513 (66.5)	1.13 (0.96, 1.32)
Husband/other family member took your money when you didn't want him to.	104 (16.5)	116 (15.0)	0.88 (0.57, 1.36)
Husband/other family member took your land/jewelry/poultry/livestock when you didn't want him to.	70 (11.1)	74 (9.6)	0.84 (0.48, 1.48)
Husband/other family member prevented you from visiting your parents.	82 (13.0)	88 (11.4)	0.86 (0.52, 1.43)
Husband/other family member prevented you from working outside the home.	164 (26.0)	136 (17.6)	0.68 (0.48, 0.96)

*Pooled from 20 imputed datasets.
CI = confidence interval.

Table S1: Sensitivity analyses of the primary empowerment outcomes.

Analyses	Risk ratio for economic empowerment (95% CI)	Risk ratio for freedom (95% CI)
Unadjusted	1.27 (1.02, 1.58)	1.11 (0.94, 1.29)
Primary ^{1,2}	1.28 (1.03, 1.58)	1.13 (0.96, 1.32)
All women ^{1,3}	1.25 (1.02, 1.54)	1.10 (0.94, 1.29)
Complete cases ¹	1.28 (1.04, 1.57)	1.11 (0.95, 1.30)

¹ Adjusted for age, occupation, and marital status.
² Includes imputation for baseline empowerment score in women missing this value.
³ Includes imputation baseline empowerment score in women missing this value and imputation for women missing endline scores.
CI = confidence interval.

Table 3: Relationship between freedom and economic empowerment and trial MNCH outcomes.

Outcome	Economic			Freedom		
	Empowered	Not empowered	Adjusted risk ratio (95% CI)	Empowered	Not empowered	Adjusted risk ratio (95% CI)
Facility delivery	474/624 (76.0 %)	576/732 (78.7 %)	0.97 (0.91, 1.04)	677/869 (77.9 %)	382/496 (77.0 %)	1.02 (0.95, 1.09)
Adequate ANC care	446/644 (69.3 %)	534/748 (71.4 %)	0.98 (0.91, 1.06)	629/892 (70.5 %)	360/509 (70.7 %)	0.99 (0.93, 1.06)
Exclusive breastfeeding for 6 months	358/597 (60 %)	458/703 (65.1 %)	0.91 (0.83, 1.00)	520/829 (62.7 %)	300/480 (62.5 %)	1.01 (0.92, 1.12)
Postnatal CHW visit	139/630 (22.1 %)	161/732 (22 %)	1.01 (0.80, 1.28)	198/869 (22.8 %)	108/502 (21.5 %)	1.08 (0.84, 1.39)
Contraceptive use	429/634 (67.7 %)	516/740 (69.7 %)	0.98 (0.92, 1.05)	619/879 (70.4 %)	330/504 (65.5 %)	1.07 (1.00, 1.14)
Long term contraceptive use	231/429 (53.8 %)	278/516 (53.9 %)	1.01 (0.89, 1.14)	339/619 (54.8 %)	174/330 (52.7 %)	1.01 (0.87, 1.17)

These findings align with previous research on group-based economic activities,^{11,27,28} and build on Africa's strong tradition of communal support systems, an approach consistent with Kenya's goals for gender equity and women's economic inclusion¹⁰. To better understand the link between women's empowerment and health outcomes, we analyzed MNCH indicators among empowered and non-empowered women across both study arms, rather than solely comparing intervention and control groups. This approach directly tested whether empowerment status independent of program exposure, was associated with improved health outcomes. Notwithstanding *Chamas'* success in improving empowerment and MNCH outcomes separately, we found no significant association between empowerment and MNCH outcomes. This suggests that the relationship between economic empowerment and health outcomes may be more complex than we initially hypothesized.²⁹ Several factors may explain this finding. First, the 12-month follow-up may have been too short to detect the effects of economic empowerment on health decision-making. Second, the empowerment measures used may not have captured all domains relevant to women's health, such as gender-based violence, intra-household power, or reproductive autonomy.¹¹ Third, improvements in MNCH outcomes may have stemmed primarily from *Chamas'* health education

and peer-support components rather than its economic activities.

The multisectoral nature of *Chamas* directly addresses the social determinants of maternal, neonatal and child health,^{20, 30} a critical factor in African settings where gender norms often constrain women's economic and social participation. Adapting traditional African group support systems into formal health platforms demonstrates how culturally grounded, community-driven models can address complex health challenges. *Chamas* therefore illustrates how existing Community Health Worker (CHW) networks can be leveraged to implement scalable, sustainable interventions within Kenya's Community Health Strategy and beyond.⁸ Effective scale-up will require strengthened CHW training, county-level integration with maternal health services, and stronger referral linkages with primary healthcare facilities.

Consistent with Kenya's communal traditions, *Chamas* groups nurture supportive spaces that enhance participants' agency, confidence, and financial independence. Exposure to structured health education and microfinance opportunities helps women address both social and financial barriers to care.^{17,18} These results highlight the gender-transformative potential of *Chamas* in improving the lives of women in rural Kenya, especially experiencing economic vulnerability.³¹

The intervention's impact on household dynamics and health outcomes provide important insights about the complexity of empowerment.¹¹ The modest gains in freedom from family domination further highlight the challenge of shifting entrenched gender norms. As empowerment is a gradual process, longer engagement may be needed for economic improvements to translate into greater autonomy and sustained health benefits.

Strengths and limitations

This study's strengths include its randomized design, large sample size, and use of an adapted empowerment scale validated in similar settings. However, several limitations must be acknowledged. Self-reported data may be subject to social desirability bias, particularly regarding gender roles and family relations.

Pregnancy itself represents a vulnerable period that may influence empowerment perceptions and health behaviors.³² Furthermore, focusing exclusively on rural Trans-Nzoia women may limit generalizability to urban or more socio-economically diverse populations. Finally, the 12-month timeframe may not have been sufficient to observe long-term interactions between empowerment and health outcomes.

Implications for policy and practice

Our findings support integrating empowerment-focused components within community health platforms, such as Kenya's Community Health Strategy, to strengthen women's agency and resilience. *Chamas* demonstrates a scalable model that can inform similar maternal health and microfinance programs across sub-Saharan Africa. Future research should examine the temporal relationship between empowerment and health outcomes, test longer follow-up periods, and explore mechanisms linking economic and health pathways.

Strengthening partnerships between health and gender sectors will be key to achieving sustainable improvements in both women's empowerment and MNCH outcomes.

Conclusion

While *Chamas* has demonstrated effectiveness in improving MNCH outcomes, this analysis highlights its additional contribution to women's empowerment. The program exemplifies how community-based, gender-responsive interventions can enhance women's agency within existing health systems. The Kenyan experience offers a transferable model for other African settings, showing that economic empowerment and health education can coexist and reinforce one another. Future iterations should continue to explore how empowerment evolves over time and how culturally grounded interventions can best support gender equity and maternal health.

Contributions of authors

AC-D, LJR, and JS conceptualized, obtained funding for this study, and contributed equally as senior authors. LYM and MLS drafted the study protocol, developed data collection tools, and oversaw all data management processes led by GA. JNB and LYM developed the statistical analysis plan, with critical feedback provided by all coauthors. AJ, JEI, SM, and SC oversaw all research activities and coordinated research staff throughout the trial.

JNB conducted all statistical analyses with significant input from AA, GA, and AC-D. All authors assisted in interpreting results. AA and JB authored the first draft of this article. All authors contributed to reviewing and editing the final draft of this article for intellectual content. All authors approved submission of this manuscript for publication.

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Conflict of interests

The authors declare that they have no competing interests.

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