



## RESEARCH ARTICLE

# Identifying the association of women's empowerment with reproductive and maternal health practices using a cross-sectional study in the context of self-help groups in rural India [version 1; peer review: 2 not approved]

Laili Irani <sup>1</sup>, Supriya Verma<sup>2</sup>, P. S. Mohanan<sup>3</sup>, Avishek Hazra<sup>2</sup><sup>1</sup>Independent Researcher, Formerly with Population Council, New Delhi, 110003, India<sup>2</sup>Population Council, New Delhi, 110003, India<sup>3</sup>Rajiv Gandhi Mahila Vikas Pariyojana, Gorakhpur, Uttar Pradesh, 273001, India

**V1** First published: 14 Jun 2022, 6:72  
<https://doi.org/10.12688/gatesopenres.13468.1>  
Latest published: 14 Jun 2022, 6:72  
<https://doi.org/10.12688/gatesopenres.13468.1>

## Abstract

**Background:** Globally, women's empowerment is captured through different combinations of indicators related to their collective and individual empowerment. In this paper, the association of diverse domains related to women's collective and individual empowerment on their reproductive and maternal health practices were assessed. Collective empowerment referred to a cluster of indicators measuring mutual support, rights, and access to services women received, as a result of membership in self-help groups (SHGs) focused on micro-finance activities. Women's individual empowerment was measured through their perception to make decisions on their own, be mobile, financially self-reliant, self-confident in expressing themselves, having self-esteem and being free from spousal violence.

**Methods:** Cross-sectional data were collected in 2017 from 2,197 SHG members across 57 administrative blocks of Uttar Pradesh, India. Using exploratory and confirmatory factor analysis, the sub-domains of individual and collective empowerment were developed. The reproductive and maternal health indicators included antenatal care, delivery preparedness, postnatal care and current contraceptive use. Bivariate and multivariate analyses, using logistic regression, were carried out to measure the association of sub-domains of women's empowerment with health practices.

**Results:** Collective and individual empowerment were independently and jointly associated with correct health practices. Women with greater empowerment through independent mobility, high self-esteem, access to financial resources, and confidence in interacting with a frontline worker, were more likely to access antenatal care. Similarly, delivery preparedness—which entailed deciding on the place of delivery, arranging for transportation during labor, and managing

## Open Peer Review

Approval Status  

	1	2
<b>version 1</b>		
14 Jun 2022	<a href="#">view</a>	<a href="#">view</a>

1. **Kathryn M. Yount** , Emory University, Atlanta, USA  
Emory College of Arts and Sciences, Emory University, Atlanta, USA
2. **William T. Story** , The University of Iowa, Iowa City, USA  
**Kaniz Fatema**, The University of Iowa, Iowa City, USA

Any reports and responses or comments on the article can be found at the end of the article.

expenses for the delivery—was positively influenced by collective support from fellow SHG members. Receiving postnatal care was positively associated with self-confidence and financial autonomy, and current family planning method use was positively associated with self-confidence, lower spousal violence and confidence in support from the group.

**Conclusions:** Women's collective and individual empowerment were independently and jointly positively associated with health outcomes among SHG members.

## Keywords

self-help groups, women's empowerment, collective empowerment, individual empowerment, maternal health

**Corresponding author:** Laili Irani ([laili.ir@gmail.com](mailto:laili.ir@gmail.com))

**Author roles:** **Irani L:** Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Supervision, Validation, Visualization, Writing – Original Draft Preparation, Writing – Review & Editing; **Verma S:** Formal Analysis, Investigation, Writing – Review & Editing; **Mohanan PS:** Methodology, Writing – Review & Editing; **Hazra A:** Investigation, Methodology, Validation, Writing – Review & Editing

**Competing interests:** No competing interests were disclosed.

**Grant information:** This study was supported by the Bill and Melinda Gates Foundation [grant number OPP1141832]. The primary evaluation agency, Population Council, designed and conducted the study on their own. The collaboration with colleagues from the program implementing organization was around the analyses and interpretation of the findings while writing this manuscript. *The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.*

**Copyright:** © 2022 Irani L *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

**How to cite this article:** Irani L, Verma S, Mohanan PS and Hazra A. **Identifying the association of women's empowerment with reproductive and maternal health practices using a cross-sectional study in the context of self-help groups in rural India [version 1; peer review: 2 not approved]** Gates Open Research 2022, 6:72 <https://doi.org/10.12688/gatesopenres.13468.1>

**First published:** 14 Jun 2022, 6:72 <https://doi.org/10.12688/gatesopenres.13468.1>

## Introduction

The United Nation's Sustainable Development Goals identify gender equality as a key development indicator achieved if men and women enjoy equal rights, opportunities, and freedoms (European Institute for Gender Equality. *Concepts and definitions*. Vilnius, Lithuania: European Institute for Gender Equality; 2019). However, women continue to be disproportionately disempowered in terms of freedoms, power dynamics, and autonomy<sup>1</sup>. A growing body of literature acknowledges the nuances and complexities in measuring women's empowerment as a key measure of gender equality<sup>2</sup>. Dimensions of equality vary in significance according to local contexts, which evolve at their own pace<sup>3</sup>. Research strongly indicates the need to bridge gaps between theoretical constructs and empirical research to better understand the association of women's empowerment with health and other development outcomes<sup>3,4</sup>. This paper identifies key domains of women's empowerment and measures their associations with reproductive and maternal health practices in a rural Indian context and thereby contributes to bridging those gaps.

Recent literature synthesizes existing evidence on the various measures of women's empowerment<sup>3-7</sup>. Mandal *et al.*, acknowledge that women's empowerment can be measured at household, service delivery, and community levels<sup>7</sup>. Huis *et al.*, categorize women's empowerment within three dimensions: micro, referring to personal empowerment; meso, capturing relational empowerment; and macro, measuring empowerment within societies<sup>3</sup>. A review of empirical evidence reveals over nineteen domains that have measured women's empowerment in sixty studies<sup>4</sup>, ranging from individual characteristics such as age, education, household wealth, and employment, to constructs such as decision-making, freedom of movement and mobility, financial autonomy, gender attitudes, and self-efficacy; the two most common constructs of women's empowerment being women's participation in household decision-making and their mobility. Different combinations of questions in each of these studies measured women's empowerment.

Literature also documents the association of empowerment with the health and wellbeing of women and their children. An analysis of India's 1998–1999 National Family Health Survey-2 shows that increased mobility and decision-making, opposition to spousal violence, and financial autonomy were associated with a higher number of antenatal care visits, utilization of postnatal care, and institutional deliveries; the results were further substantiated by more recent studies in Ethiopia and Nepal<sup>8-11</sup>. Another study in Nepal shows that increased household decision-making is associated with improved postnatal care but not antenatal care<sup>12</sup>. Studies have also established associations of various measures of women's empowerment with family planning method use<sup>13-17</sup>. Generally, women's empowerment in these studies is linked to increased method use. Women are more likely to use family planning services if they enjoy increased mobility, greater financial autonomy, freedom from violence, better spousal communication, and increased decision-making autonomy for various aspects

of their individual and familial lives<sup>13,15-22</sup>. In addition to these studies, three recent extensive literature reviews examining the relationship between women's empowerment, and maternal and child health practice show that increased household decision-making, lack of exposure to spousal violence, financial autonomy, and increased mobility are associated with correct healthy behaviors such as antenatal care, skilled attendance at birth, contraceptive use, and reduced maternal mortality<sup>17,23,24</sup>.

Women's empowerment and its impact on health practices has been captured by two measures at the aggregate/community level. First, some studies aggregate individual characteristics of women within communities, showing that communities with higher-than-average education or employment among women are more likely to exhibit healthy behaviors than communities with lower-than-average education or employment among women<sup>10,25</sup>. Second, few other studies acknowledge the role of women's microfinance collectives, called self-help groups (SHGs), in increasing women's individual empowerment or improving health practices<sup>26-32</sup>. SHGs organize 10 to 12 women within a community to attend regular meetings and save small amounts of funds every week; the funds are used for mutual lending. Groups also facilitate bank loans at small interest rates for family emergencies and entrepreneurial activities. SHGs also engender social cohesion among members, encouraging them to demand their rights and services while developing a support structure that women and their families can rely upon in times of need. SHGs are also considered a means through which various health-related interventions or activities can be integrated to improve the practice of healthy behaviors among member households<sup>26,28,31,32</sup>.

Evidence on the effect of women's collectives or SHGs in improving women's authority and resources in their own lives or supporting their individual practice of healthy behaviors is limited, with variation among studies<sup>27,29,30,33</sup>. A systematic review showing that SHG membership increased women's individual empowerment for financial autonomy and mobility did not show consistent good health practices<sup>30</sup>. A recent Ethiopian study examining the effect of SHGs on women's health and wellbeing showed that SHGs helped increase women's awareness of their rights, as a collective, but with no increased access to services or greater financial autonomy within their households<sup>27</sup>. In other studies, interventions through SHGs increased antenatal care coverage and institutional delivery but without other health benefits or increased individual empowerment<sup>26,34-36</sup>.

Aggregating the individual characteristics of women in communities and examining the characteristics of SHGs may need to be performed separately. Aggregated values of individual characteristics represent the general condition of women in that community, while the characteristics of women's SHGs represent the support structures and social networks women create among themselves that they can utilize in times of need. There remains a great deal to learn about the interplay of women's collective empowerment through SHGs

and women's individual empowerment within their own homes and personal lives, and particularly how these expressions of empowerment are affected by SHG membership, further associated with access to health services, and improved maternal and child health practices.

This paper examines the association of women's empowerment with their reproductive and maternal health practices, in relation to women's SHGs. Women's empowerment is captured in two broad dimensions: 1) collective empowerment, measured as women's empowerment within SHGs for access to services, exercising of rights, and mutual support in times of need, and 2) individual empowerment, measured through women's personal experiences and perceptions of support within their households and relationships. It is critical to consider both collective and individual empowerment simultaneously, as they do not change in isolation but represent a general trend of increased awareness of one's rights and entitlements through increased access and utilization of opportunities, such as health services. We hypothesize that these two domains of empowerment – collective and individual – are correlated, and that greater levels of women's empowerment are associated with improved health practices. This paper also examines the relationship between collective and individual empowerment and their association, independently as well as jointly, on selected health practices.

## Methods

### Study settings

This study is part of an ongoing evaluation of 'Uttar Pradesh Community Mobilization Project' implemented by Rajiv Gandhi Mahila Vikas Pariyojana, a non-governmental organization based in Uttar Pradesh, India that supports a network of SHGs across the state (rgmvp.org). Since 2002, these SHGs have been established primarily among the most marginalized women in the community to address gender inequality, improve women's access to microfinance credits, and share livelihood information and opportunities. Each SHG meets weekly to address savings, microfinance, and livelihood matters. With external support since 2011, Rajiv Gandhi Mahila Vikas Pariyojana expanded its scope and established SHGs for over 1.7 million poor women in over 49 districts of Uttar Pradesh. In these groups, the organization integrates discussions of reproductive and maternal health in the weekly meetings in addition to community outreach events, strengthening links between local women and their frontline workers.

### Evaluation approach

This study uses data from a cross-sectional survey conducted during September 2017 to January 2018 of eligible women who were currently married, aged 15 to 49 years, and had a live birth in the 12 months preceding the survey. If a woman under eighteen was interviewed, she was considered an emancipated minor, as per Indian guidelines, and hence parental permission was not sought. The study sample comprises SHG members from 57 sampled blocks in 20 districts of Uttar Pradesh. In order to address the potential selection bias of the sampled respondents, a two-stage sampling design

was applied to select the study participants: blocks sampled in the first stage, and gram panchayats in the second. Blocks were first arranged in ascending order by percent of scheduled caste or tribe populations and following a systematic random sampling technique the required number of blocks were selected. Gram panchayats with varying proportions of their populations covered by SHGs were included by dividing them into three strata. The required number of panchayats were drawn randomly and equally from each stratum. Within each selected gram panchayat, all households with an SHG member were mapped and listed. All eligible women were identified and approached for a face-to-face interview. If more than one eligible woman was in a household, one woman was randomly selected for the interview. Being a cross-sectional survey, eligible women were not followed up after the initial interview.

The study sample comprises of 2,197 eligible women, which is a sub-sample of the original evaluation and has more than 90% power and 95% confidence interval to examine the relationship between the reproductive and maternal health outcomes of interest and the key independent variables related to collective and individual empowerment. Information was collected from three sources for this study – the eligible woman, the head of her household, and her SHG leader. Information on housing characteristics was collected from the heads of the household, eligible women provided information on reproductive and maternal health practices and empowerment, and SHG leaders were asked about their groups' characteristics and functioning. Written informed consent in local language Hindi was obtained from all study participants to participate in the study and share the findings from this study. A hard copy of the consent form was left with the participant for their records. The tools were also administered in Hindi.

The study was reviewed and approved by the institutional review board of the Population Council, the organization conducting the evaluation, and recorded as protocol number 764.

### Measurements

The health practices examined in this paper are: 'four or more antenatal care visits during last pregnancy', 'at least one activity to prepare for delivery, such as deciding on a place of delivery, identifying mode of transportation, and saving adequate funds for delivery', 'postnatal care visit from a frontline worker or SHG member within seven days of delivery' and 'using a family planning method' at the time of the survey. These indicators were based on the World Health Organization guidelines and were asked of each eligible woman during her individual interview<sup>37,38</sup>. Delivery preparedness includes accomplishing at least one of three activities: deciding on a place of delivery (home or health facility), identifying and arranging the mode of transportation to a facility for delivery, and saving or arranging money for delivery expenses or emergency. A woman is said to have received postnatal care if a frontline worker or SHG member conducted a home visit, or if the woman herself visited a frontline worker or health facility within seven days of delivery. Each of these variables were dichotomized for analysis.

The primary independent variables of interest are collective empowerment and individual empowerment, which were collected during the interview with the eligible woman. Collective empowerment was measured through four key sub-domains: *social cohesion*, referring to a woman's belief that her SHG will support her in times of need (captured through 12 questions/items in the tool); *efficacy*, referring to the belief that women work together for positive changes in health (measured through seven questions in the tool); *agency*, referring to women assisting other members for local health and administrative services (measured through five questions in the tool); and *action*, capturing the respondent's own experiences in creating social change within the past year (captured through 12 questions in the tool) (refer to the Extended data<sup>39</sup> for the full list of questions and responses). Formative research validated these sub-domains of collective empowerment in previous studies of SHGs in similar settings of Bihar and elsewhere<sup>36,40,41</sup>.

Individual empowerment was measured through six key sub-domains: *confidence*, referring to a woman speaking in public and recognizing a health emergency (captured through nine pre-tested questions in the tool); *mobility*, referring to the ability to leave the house for various chores and activities (captured through 12 questions in the tool); *decision-making*, referring to engagement in major decision-making within the household for health services, making purchases, determining major life decisions, etc. (captured through 26 questions in the tool); *self-esteem*, capturing a respondent's perception of her own worth (captured through seven questions in the tool); *financial inclusion*, capturing a woman's ability to obtain a loan from the SHG, own her own assets and resources, and make basic financial decisions independently (captured through 12 questions); and *freedom from violence*, capturing a respondent's reported experience of any kind of physical, emotional, or sexual violence from her spouse within the past 12 months (captured through 14 questions) (refer to the Extended data for the full list of questions and responses). This holistic approach to understanding women's empowerment enabled a determination of which characteristics influence the practice of reproductive and maternal health behaviors. Formative research refined questions related to mobility from the recent National Family Health Survey<sup>42</sup>, while other domains were taken from tools administered in multi-state SHG evaluations over the past five years<sup>31,36</sup>.

### Analytical approaches

A reliability test for each sub-domain tested for internal consistency within the dataset. Methodologists recommend a minimum alpha coefficient between 0.65 and 0.8 (or higher in many cases)<sup>43,44</sup>. The Cronbach alpha score of more than 0.7 for the items in each scale, except for collective agency, indicates good internal consistency (see Table 1 for details on scores)<sup>45-48</sup>. We identified potential measures using exploratory factor analysis with factor loading (0.5) followed by *a priori* confirmatory factor analysis. We then tested these models using goodness of fit tests, which help identify an acceptable

model that is the best fit. The goodness of fit tests included the Root Mean Square Error of Approximation ( $<0.8$ )<sup>49</sup>, Comparative Fit Index ( $>0.9$ )<sup>50</sup>, Tucker Lewis Index ( $>0.9$ )<sup>51</sup>, and Standardized Root Mean Square Residual ( $<0.8$ ) test<sup>52</sup>. In instances where models did not fit the data well, confirmatory factor analysis was repeated including additional model parameters (allowing measurement errors to covary among specific items) to improve the model fit. We identified the best model using Root Mean Square Error of Approximation, Comparative Fit Index, Tucker Lewis Index, and Standardized Root Mean Square Residual in consonance with relevant expert literature<sup>53,54</sup> (see Table 2 for goodness of fit statistics obtained by confirmatory factor analysis). Following these tests, specific items with lower factor loadings (allowing measurement errors to covary) were dropped while constructing the sub-domains (16 items were dropped out of 116)<sup>55</sup>. Internal consistency of each sub-domain and domain was measured again after the model fit. Although the Cronbach alpha did not improve for collective agency, we accepted the confirmatory factor analysis model as a 'best fit'. This is corroborated by Nunnally<sup>56,57</sup>, who suggested that newly developed measures can be accepted with an alpha value of 0.60 compared to the norm of 0.70 and above. The Cronbach alpha for financial inclusion dropped below 0.7 after the best fit model was generated (Table 1). Similar to collective agency, we included the confirmatory factor analysis model of financial inclusion as the best fit, in accordance with Nunnally's suggestion<sup>56,57</sup>. We constructed an additive index to include all items within a sub-domain to form a continuous variable for collective as well as individual empowerment, which subsequently assessed the correlation of various domains of empowerment and were used for multivariate logistic regression analyses.

We also generated an overall combined score of women's empowerment using 36 items of collective empowerment and 80 items of individual empowerment. We then tested the model for the best fit using confirmatory factor analysis tests and identified the best model with 30 items of collective empowerment and 70 items of individual empowerment. We also ran a reliability test for the best model indicating a Cronbach alpha of greater than 0.7, hence ensuring high internal consistency. All the items derived after the model fit were summed to form a continuous variable, which was used for multivariate logistic regression analysis.

While examining the association between women's empowerment and reproductive and maternal health practice, we controlled for respondents' individual characteristics associated with empowerment and health practices in the literature<sup>4,11,25</sup>. Characteristics controlled for in regression analyses were based on single item questions in the women's questionnaire: respondent age (captured as a continuous variable), education as a categorical variable (no education, one to seven years, eight to 11 years and 12 or more years of formal schooling), caste (scheduled caste/tribe, other underprivileged castes, others), employment (employed for income/not), in addition to multiple questions assessing household wealth.

**Table 1. Internal consistency reliability analysis of empowerment domains.**

	All items		After Model Fit by confirmatory factor analysis (factor loading 0.5)	
	Chronbach's Alpha	Number of items	Chronbach's Alpha	Number of items
<b>Combined empowerment</b>	<b>0.8419</b>	<b>116</b>	<b>0.8968</b>	<b>100</b>
<b>Collective empowerment</b>	<b>0.8882</b>	<b>36</b>	<b>0.8750</b>	<b>30</b>
Social cohesion	0.8224	12	0.8109	11
Collective efficacy	0.9447	7	0.9336	6
Collective agency	0.6429	5	0.6494	4
Collective action	0.8747	12	0.8382	9
<b>Individual empowerment</b>	<b>0.7639</b>	<b>80</b>	<b>0.8835</b>	<b>70</b>
Confidence	0.8572	9	0.8421	8
Mobility	0.9260	12	0.8954	9
Decision-making	0.7621	26	0.7601	24
self esteem	0.7601	7	0.7281	6
Financial inclusion	0.7013	12	0.6607	11
Freedom from violence	0.8684	14	0.8384	12

**Table 2. Statistics for fitness index based on confirmatory factor analysis<sup>b</sup>.**

Domains/sub domains of empowerment		Results of confirmatory factor analysis			
		Goodness of fit statistics			
		RMSEA	CFI	TLI	SRMR
<b>Collective empowerment</b>	Social cohesion	0.07	0.953	0.937	0.037
	Collective efficacy	0.05	0.993	0.988	0.015
	Collective agency	0.08	0.967	0.919	0.031
	Collective action	0.07	0.944	0.925	0.042
<b>Individual empowerment</b>	Confidence	0.07	0.962	0.946	0.039
	Mobility	0.08	0.940	0.921	0.043
	Decision-making	0.07	0.926	0.912	0.043
	self esteem	0.07	0.958	0.932	0.034
	Financial inclusion	0.04	0.953	0.933	0.033
	Freedom from violence	0.06	0.938	0.920	0.053

<sup>b</sup> Cutoffs for best fit model: Comparative Fit Index (CFI)>0.9; Tucker Lewis Index (TLI)>0.9; Root Mean Square Error of Approximation (RMSEA)<0.08 & Standardized Root Mean Square Residual (SRMR)<0.08

The household wealth index was developed through principal component analysis using information on 26 household amenities measured for six categories, five housing characteristics and one on asset ownership, taken from a nationally representative tool and administered to the head of the household<sup>41</sup>. Using these data, wealth terciles were developed based on equal proportion of the population being divided into three categories: poor as low, middle as medium, and rich as high.

Because Rajiv Gandhi Mahila Vikas Pariyojana was implementing a program to increase women's knowledge of healthy reproductive and maternal health practices, SHG women were exposed to various program activities. Some blocks received more active interventions, while others received *ad hoc* information and support from program staff. The survey captured and controlled for program exposure to measure the effect of empowerment on women's reproductive and maternal health practices as a dichotomous variable of exposure to SHG activities related to health or no exposure. The 11 SHG activities reported by SHG eligible women were: 1) accompaniment by a SHG member during antenatal care or delivery, or met SHG member during pregnancy or met SHG member at least two times after delivery; 2) advice from a SHG member on delivery preparation, pregnancy and neonatal complications, place for treatment during complication, cord care, kangaroo mother care, breastfeeding, family planning, and sanitation; 3) information through SHG outreach activities on cord care, kangaroo mother care, breastfeeding, family planning, and sanitation; 4) invitation by a SHG member to attend health meetings; 5) home visit by a SHG member who shared information on healthy maternal and newborn care practices; 6) health messages from a SHG member during pregnancy; 7) receipt of health leaflets; 8) received a congratulatory letter; 9) viewed a health video within the last three months; 10) attended a local baby shower during last pregnancy; and 11) attended community evening meetings within last three months. Group members who were exposed to any of these activities were considered exposed to SHG activities.

A group's characteristics could influence women's expressions of empowerment, exposure to health-related program activities, as well as the practice of healthy behaviors. Hence, we measured SHGs' characteristics captured through the SHG leaders' interviews and included them in the regression analysis while assessing the relationship between women's empowerment and reproductive and maternal health practices. Group characteristics were captured by six questions focusing on SHG duration (of three or more years), regular meetings (six or more in the last three months), regular weekly savings activities, regular register updates, internal lending, and regular loan repayments; the last five characteristics were key determinants of a functional SHG by Rajiv Gandhi Mahila Vikas Pariyojana, focused on group economic and administrative functioning. A Likert scale interpolated SHG strength from these six dichotomous variables, ranging from 0 to 6 and further categorized as 0 to 2 for 'needs improvement', 3 as 'moderate', and 4 to 6 as 'good'.

Bivariate analyses of individual, household, and group characteristics with each reproductive and maternal health practice tested the significance of their relationships with a t-test for age (continuous variable) and chi-square test (for categorical variables) with the covariate variables and health practices wherever relevant. We also computed correlation coefficients to determine the degrees of relationship between the sub-domains of collective and individual empowerment as well as ensuring the construct validity of the sub-domains. The sub-domains of collective and individual empowerment for correlation analysis were constructed as an additive index for all dichotomized items within each sub-domain. Finally, we ran three models of multivariable logistic regressions, followed by bootstrapping with 500 replications, to test the various combined and individual effects of empowerment on reproductive and maternal health behaviors. In Model A, we looked at the effect of the overall combined empowerment on each reproductive and maternal health practice. In Model B, we tested the effect of individual and collective empowerment as separate domains but together in the model. Model C considered the inclusion of sub-domains of collective and individual empowerment individually. In all models, we controlled for respondent age, education, caste, household wealth, employment, exposure to SHG activities, and group characteristics. All analyses used *Stata* version 13.0 (StataCorp. 2013. *Stata Statistical Software: Release 13*. College Station, TX: StataCorp LP. RRID: SCR\_012763).

## Results

The mean age of respondents was 28 years (Table 3). About 40% of respondents had no formal education, more than half were from scheduled castes or tribes, and were from low wealth index households. Only 11% of respondents were employed. About three quarters of women had been exposed to at least one health related SHG activity during their last pregnancy or following the birth of their youngest child. Approximately one-third of interviewed women belonged to SHGs that were not functioning optimally, while 41% belonged to stronger groups that met regularly for group activities. Most SHG members (84%) stated that their group had been formed more than three years ago, while around half reported that their group had conducted less than six meetings in the prior three months, less than half the expected number. Nearly all members (97%) saved money weekly as part of the group's activities. A quarter of group members (26%) had taken out a loan through the group, and another 37% belonged to a group that had recently repaid or was currently repaying a bank loan. The Chi-square test of association suggests that formal education, household asset ownership, and exposure to SHG activities are positively associated with antenatal care, delivery preparation, postnatal care, and use of a family planning method (Table 3). Overall, over a third (39.6%) of the population interviewed had at least four antenatal care visits during their last pregnancy, around three-quarters (72.6%) had performed at least one delivery preparedness, a third (31.3%) had at least one postnatal care visit within seven days of delivery and 41.3% of

**Table 3. Bivariate table showing association of sociodemographic profile of self-help group members by maternal health practice.**

Background characteristics	(N=2197)	At least four antenatal care visits (N=2197)	At least one delivery preparedness (N=2197)	At least one postnatal care visit within seven days of delivery (N=2197)	Any family planning method use (N=2166)
<b>Age</b>					
15–24 years	23.2	38.9	69.2*	31.8	40.1
25 and above	76.8	39.9	73.6	31.2	41.3
<b>Education</b>					
No education	38.9	33.1*	67.1*	27.1*	37.3*
Up to class 7	23.7	39.2	72.6	31.3	41.9
Class 8–11	23.4	43.6	75.7	30.4	40.5
Class 12 and above	14.0	52.2	82.4	44.6	52.6
<b>Caste</b>					
Scheduled Caste/ Scheduled Tribe	51.2	36.7*	70.7	26.9*	40.2
Other underprivileged classes	41.0	41.6	73.8	36.2	42.8
Others	7.5	48.9	78.1	34.8	40.5
<b>Wealth index</b>					
Low	53.9	33.6*	69.1*	26.9*	36.8*
Medium	21.0	42.7	75.1	35.6	41.9
High	25.1	50.0	77.9	37.1	50.4
<b>Currently working</b>					
No	88.7	39.4	73.1	31.8	41.6
Yes	11.3	41.4	68.7	27.3	39.2
<b>Exposed to any self-help group activities</b>					
No	27.7	27.9*	61.2*	26.3*	35.6*
Yes	72.3	43.7	76.5	33.1	43.3
<b>Characteristics of self-help groups<sup>a</sup></b>					
Needs improvement	30.9	36.6	69.8	30.1	40.6
Moderate	28.3	39.2	73.8	30.7	41.4
Good	40.8	42.3	73.8	32.7	41.8
<b>Total</b>		<b>39.6</b>	<b>72.6</b>	<b>31.3</b>	<b>41.3</b>

<sup>a</sup> composite of the questions of characteristics of self-help groups noted above

\* = p-value <0.05 when covariate is run by dependent variable of interest

respondents were using a family planning method at the time of the survey.

The correlation matrix of sub-domains of collective and individual empowerment shows that over 80% of the correlations

noted were significantly associated with one another (Table 4). Collective efficacy was positively correlated with other sub-domains of collective empowerment such as social cohesion, collective agency and action, as well as the sub-domains of individual empowerment such as self-confidence, decision-making,

**Table 4. Correlation of various domains of empowerment.**

	Social cohesion	Collective efficacy	Collective agency	Collective action	Self confidence	Mobility	Decision-making	Self esteem	Financial inclusion
Collective efficacy	0.4945*								
Collective agency	0.0868*	0.1292*							
Collective action	0.1792*	0.2349*	0.2115*						
Self confidence	0.2690*	0.3351*	0.0899*	0.1348*					
Mobility	0.0206	0.0460*	0.0469*	0.025	0.1127*				
Decision-making	0.1175*	0.1284*	0.0381	0.0735*	0.1327*	0.3099*			
Self esteem	0.1927*	0.2085*	0.0919*	0.1582*	0.3470*	0.0950*	0.1951*		
Financial Inclusion	0.0915*	0.1223*	-0.0125	-0.0538*	0.1367*	-0.0447*	-0.0341	0.0797*	
Freedom from violence	0.0490*	0.0570*	-0.0039	-0.0147	0.1064*	-0.0105	0.0021	0.1026*	0.0457*

\* = p-value <0.05

self-esteem, and financial inclusion. Similarly, self-esteem was positively associated with all reported sub-domains of collective and individual empowerment. Financial inclusion was, however, negatively associated with sub-domains such as mobility, decision-making, collective agency, and collective action, signifying that women with assets and access to funds are less likely to engage in collective action and have limited ability to exercise freedom of movement or make decisions on their own. Freedom from violence is positively associated with social cohesion, collective efficacy, self-confidence, self-esteem, and financial inclusion, indicative that women who do not experience spousal violence are more likely to have trust in their group to support them in times of need, or to work together for positive change. Those women were also more likely to perceive their own worth positively, and own assets and resources.

Results from Model A of the logistic regression show that more empowered women were associated with four or more antenatal care visits during their last pregnancy ( $\beta = 0.02$ ,  $SE = 0.004$ ), preparation for their last delivery ( $\beta = 0.03$ ,  $SE = 0.005$ ), and a postnatal care visit within a week of delivery ( $\beta = 0.01$ ,  $SE = 0.004$ ) (Table 5). Findings from Model B show that antenatal care and postnatal care visits were primarily influenced by individual empowerment, while delivery preparedness was driven by collective support from SHGs, as well as individual empowerment. In Model C, where relationships between the outcome variables and each sub-domain were tested individually, collective efficacy, women's self-confidence, freedom of mobility, self-esteem, and financial

inclusion had positive and significant associations with antenatal care. Women's preparedness for delivery during their last pregnancy was significantly associated with nearly all the sub-domains of collective and individual empowerment, except for freedom of mobility and freedom from spousal violence. Postnatal care within a week of delivery was positively associated with social cohesion, self-confidence, and financial inclusion. Generally, combined domains of collective and individual empowerment did not appear to affect family planning method use, but when we observed the specific sub-domains of empowerment, family planning method use was positively associated with collective agency, self-confidence, and experience of less spousal violence within the past 12 months.

## Discussion

This paper measures empowerment extensively to describe both collective and individual empowerment among women in SHGs. Collective empowerment encompasses *cohesion*, whereby a member believes she will be supported by her SHG in time of need; *efficacy*, when a member believes her group can work together for positive change, *agency* indicates a group has assisted its members in seeking services, and *action* denotes that a respondent has herself participated in activities for social change. An extensive array of questions also relate to women's individual empowerment within six domains: *self-confidence* in engaging with people of authority and new situations, *freedom of mobility* in leaving home for various activities, *autonomy in decision-making* within the household and in matters of the family's and a woman's own wellbeing, *self-esteem* as a measure of a woman's

**Table 5.** Logistic regression showing effect of overall combined, collective and individual empowerment on health practices.

Model <sup>b</sup>		Beta coefficients (standard error) <sup>a</sup>			
		At least four antenatal care visits (N=2197)	At least one delivery preparedness (N=2197)	At least one postnatal care visit within seven days of delivery (N=2197)	Any family planning method use (N=2166) <sup>c</sup>
Model A: Composite scores of empowerments	Overall Combined empowerment	0.02*(0.004)	0.03*(0.005)	0.01*(0.004)	0.03(0.004)
Model B: Composite scores of collective & individual empowerment	Collective empowerment	0.01(0.009)	0.05*(0.009)	0.01(0.009)	0.01(0.009)
	Individual empowerment	0.02*(0.005)	0.03*(0.005)	0.02*(0.005)	0.001(0.005)
Model C: All domains individually	Social cohesion	0.02(0.015)	0.07*(0.017)	0.04*(0.016)	0.003(0.015)
	Collective efficacy	0.04*(0.019)	0.12*(0.021)	0.03(0.026)	0.01(0.019)
	Collective agency	0.04(0.089)	0.28*(0.121)	0.03(0.087)	0.18*(0.082)
	Collective action	0.03(0.031)	0.10*(0.040)	0.01(0.030)	0.04(0.032)
	Self confidence	0.10*(0.018)	0.14*(0.019)	0.09*(0.019)	0.05*(0.019)
	Mobility	0.06*(0.019)	0.02(0.020)	0.04(0.019)	-0.01(0.019)
	Decision making	0.01(0.010)	0.04*(0.010)	0.01(0.007)	-0.003(0.007)
	Self esteem	0.09*(0.029)	0.10*(0.034)	0.03(0.031)	0.05(0.031)
	Financial inclusion	0.05*(0.020)	0.05*(0.023)	0.09*(0.021)	0.02(0.021)
	Freedom from violence	-0.01(0.020)	0.05(0.023)	0.001(0.021)	0.04*(0.021)

\* = p-value <0.05

<sup>a</sup> Beta coefficients (standard errors) generated following bootstrapping with 500 replications. Model controlled for age, education, wealth, caste, employment, program exposure and self-help group strength. Reference category of key independent variables is low score of empowerment for the specific domain/sub-domain of interest.

<sup>b</sup> Model A was run on the overall combined score of empowerment. Model B was run on only the composite scores of collective and individual empowerment as independent variables. Model C was run with each of the collective and individual empowerment domains included separately as independent variables.

<sup>c</sup> Sample size is smaller as respondents who were pregnant were not asked about current FP use

perception of her own worth, *access to financial resources* and making those decisions independently, and *freedom from experiences of violence*, specifically spousal violence. This study’s findings reveal strong correlation between collective and individual empowerment among women who belong to SHGs, suggesting that collective empowerment and individual empowerment occur simultaneously for women in self-help groups. This supports previous research that suggests SHGs increase women’s abilities to access financial resources and opportunities, which further manifest as greater autonomy and propensity for autonomous decisions<sup>58</sup>.

Women who were individually more empowered were more likely to seek four or more antenatal care visits, signifying that

a pregnant woman who is more empowered will be more likely to express greater self-confidence and leave her home to interact with a frontline health worker, in addition to having greater access to financial resources for utilizing those services. Other studies employing a few individual empowerment measures separately found similar results<sup>9,11,23,24,34–36,59,60</sup>.

Delivery preparedness was associated with both collective empowerment and individual empowerment. Women are more likely to prepare for their infant’s delivery if they express higher levels of empowerment related to self-confidence, decision-making, self-esteem, and financial autonomy. Collective support from fellow SHG members is also reflected in a positive association of social cohesion, and collective efficacy,

agency and action. SHG members are more likely to assist fellow members in delivery preparations, and those women exercise their abilities to plan, save money, and consult with others in determining next steps.

Postnatal care was associated with higher levels of overall combined empowerment, primarily driven by greater association with individual empowerment. A woman received postnatal care if she visited a frontline worker or health facility, or if a frontline worker visited her at home. Literature suggests that domains of individual empowerment such as increased self-confidence and financial autonomy are associated with a postnatal care visit<sup>9,11,12,59</sup>, which is substantiated by our findings. Our findings show association of increased social cohesion with postnatal care; other studies have not acknowledged the role of collective empowerment.

In this study, family planning is not found to be associated with any aggregate empowerment scores – overall or combined, collective or individual – but increased collective agency was positively associated with family planning use, reflecting women’s confidence in the group’s support. Individual self-confidence was positively associated with family planning use, reflecting a woman’s ability to exercise choice and will within her home. Family planning often serves as a proxy for inter-personal relationships and communication between couples; hence, women reporting lower experiences of spousal violence tend to use family planning methods more. This is corroborated by the literature<sup>14,61–63</sup>. Changing behavior around family planning use takes time, and further effort is needed – through SHGs – to meet women’s need for comprehensive services. Programs working to address reproductive and maternal health behaviors through SHGs have an opportunity to focus on family planning messages, encourage discussions of family planning practice, and strengthen links with the health system to improve women’s access to family planning services. Our findings are consistent with other studies that note positive associations of certain elements of individual empowerment, such as self-confidence and freedom from violence and family planning use<sup>13,15,16,18–21,23,24,32,60</sup>. Only one other study that looks at the association of SHG membership with family planning method use shows positive results<sup>64</sup>. These studies neither account for collective empowerment nor capture a wide array of individual empowerment elements, and as a result our study contributes to the global body of literature by studying the association of collective empowerment and individual empowerment with family planning method use.

*Limitations* – A key limitation of this study is that the associations of empowerment with health practices in relation to SHGs are from one point in time. This prevents us from looking at changes in empowerment over time, how these changes affect uptake of reproductive and maternal health behaviors among SHG members and determining the interplay of the sub-domains of collective empowerment and individual empowerment with one another. Further longitudinal studies

with SHGs are needed to observe change in empowerment patterns affecting reproductive and maternal health practices over time. In addition, exploring questions of collective empowerment with other women in a group would reduce bias from endogeneity. Adequate time and effort are needed to collect comprehensive information from respondents, through local, well-trained investigators. Our study acknowledges this need by using well-trained and experienced investigators to interview respondents in private settings.

## Conclusions

Through the deployment of an extensive tool capturing women’s empowerment both collectively and individually, we found that collective and individual empowerment are correlated when associated with women’s SHGs. Furthermore, both collective and individual empowerment are independently and jointly associated with better reproductive and maternal health practices such as antenatal care, delivery preparedness, postnatal care, and current family planning use. These results suggest that SHGs are a powerful mechanism for increasing women’s realization of their rights and opportunities, enabling them to access services and improve the quality of their lives. While this study demonstrates an association of empowerment with better reproductive and maternal health practices, these results should be interpreted with caution. While these findings are not generalizable to non-SHG populations, they may be applicable to similar sociocultural contexts and settings within India and globally. Future interventions should utilize SHGs to share messages about reproductive and maternal health practices and programs specifically encouraging women to exercise their individual and collective expression within their homes and communities to accelerate these healthy behaviors. Further research on the multi-dimensional domains of collective and individual empowerment presented in this paper is necessary for achieving the maximal effectiveness of SHGs. As women have opportunities to join SHGs and lead healthier lives, through information and support gained in SHGs, societies will be able to achieve gender equality at an accelerated pace and reap the benefits of a more equitable society.

## Data availability

### Underlying data

The underlying data have been adequately deidentified; however, due to the nature of the evaluation, they are not openly available. The data can be accessed by contacting the owner on the link in Harvard Dataverse (see below) or by emailing Ms. Christina Tse, Population Council at [publications@popcouncil.org](mailto:publications@popcouncil.org). A valid request, which will be considered by Population Council, is required to access the data.

### Extended data

Harvard Dataverse: Extended data for ‘Identifying the association of women’s empowerment with reproductive and maternal health practices using a cross-sectional study in the context of self-help groups in rural India’. <https://doi.org/10.7910/DVN/MHZ5MD><sup>39</sup>

This project contains the following extended data:

- Questionnaire: UPCMP HH midline tool.pdf
- Questionnaire: UPCMP SHG leader midline tool.pdf
- Questionnaire: UPCMP Woman midline tool.pdf

Data are available under the terms of the [Creative Commons Zero “No rights reserved” data waiver](#) (CC0 1.0 Public domain dedication).

## Consent

Written informed consent for publication of the participants’ details was obtained from the participants.

## Acknowledgements

The authors acknowledge the support from the implementing organization and the men and women who participated in this study. The authors also acknowledge Robert Pursley for copyediting the manuscript.

## References

1. Bekker MHJ, van Assen Malm: **Autonomy-Connectedness and Gender.** *Sex Roles.* 2008; **59**(7): 532. [PubMed Abstract](#) | [Publisher Full Text](#)
2. Gram L, Morrison J, Skordis-Worrall J: **Organising Concepts of ‘Women’s Empowerment’ for Measurement: A Typology.** *Soc Indic Res.* 2019; **143**(3): 1349–1376. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
3. Huis MA, Hansen N, Otten S, et al.: **A three-dimensional model of women’s empowerment: Implications in the field of microfinance and future directions.** *Front Psychol.* 2017; **8**: 1678. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
4. Upadhay UD, Gipson JD, Withers M, et al.: **Women’s empowerment and fertility: A review of the literature.** *Soc Sci Med.* 2014; **115**: 111–20. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
5. Richardson R, Schmitz N, Harper S, et al.: **Development of a Tool to Measure Women’s Agency in India.** *J Hum Dev Capab.* 2019; **20**(1): 26–53. [PubMed Abstract](#) | [Publisher Full Text](#)
6. Miedema SS, Haardörfer R, Girard AW, et al.: **Women’s empowerment in East Africa: Development of a cross-country comparable measure.** *World Dev.* 2018; **110**: 453–64. [Publisher Full Text](#)
7. Mandal M, Muralidharan A, Pappa S: **A review of measures of women’s empowerment and related gender constructs in family planning and maternal health program evaluations in low- and middle-income countries.** *BMC Pregnancy Childbirth.* 2017; **17**(Suppl 2): 342. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
8. Mistry R, Galal O, Lu M: **Women’s autonomy and pregnancy care in rural India: a contextual analysis.** *Soc Sci Med.* 2009; **69**(6): 926–33. [PubMed Abstract](#) | [Publisher Full Text](#)
9. Nguyen KH, Hoang VN, Nguyen KTB: **Are empowered women more likely to deliver in facilities? An explorative study using the Nepal demographic and health survey 2011.** *Int J Matern Child Health.* 2014; **2**(2): 74–85. [Reference Source](#)
10. Tiruneh FN, Chuang KY, Chuang YC: **Women’s autonomy and maternal healthcare service utilization in Ethiopia.** *BMC Health Serv Res.* 2017; **17**(1): 718. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
11. Adhikari R: **Effect of Women’s autonomy on maternal health service utilization in Nepal: a cross sectional study.** *BMC Womens Health.* 2016; **16**: 26. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
12. Pandey S, Lama G, Lee H: **Effect of women’s empowerment on their utilization of health services: A case of Nepal.** *Int Soc Work.* 2012; **55**(4): 554–73. [PubMed Abstract](#) | [Publisher Full Text](#)
13. Corroon M, Speizer IS, Fotso JC, et al.: **The Role of Gender Empowerment on Reproductive Health Outcomes in Urban Nigeria.** *Matern Child Health J.* 2014; **18**(1): 307–15. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
14. Prata N, Fraser A, Huchko MJ, et al.: **Women’s Empowerment and Family Planning: A Review of the Literature.** *J Biosoc Sci.* 2017; **49**(6): 713–43. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
15. Reed E, Donta B, Dasgupta A, et al.: **Access to Money and Relation to Women’s Use of Family Planning Methods Among Young Married Women in Rural India.** *Matern Child Health J.* 2016; **20**(6): 1203–10. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
16. Taubong HFG, Kincaid MM, Levy JK, et al.: **Does addressing gender inequalities and empowering women and girls improve health and development programme outcomes? Health Policy Plan. 2016; **31**(10): 1492–514. [PubMed Abstract](#) | [Publisher Full Text](#)**
17. James-Hawkins L, Peters C, VanderEnde K, et al.: **Women’s agency and its relationship to current contraceptive use in lower- and middle-income countries: A systematic review of the literature.** *Glob Public Health.* 2018; **13**(7): 843–58. [PubMed Abstract](#) | [Publisher Full Text](#)
18. Daniel EE, Masilamani R, Rahman M: **The Effect of Community-Based Reproductive Health Communication Interventions on Contraceptive Use among Young Married Couples in Bihar, India.** *Int Fam Plan Perspect.* 2008; **34**(4): 189–97. [PubMed Abstract](#) | [Publisher Full Text](#)
19. Feldman BS, Zaslavsky AM, Ezzati M, et al.: **Contraceptive Use Birth Spacing, and Autonomy: An Analysis of the Oportunidades Program in Rural Mexico.** *Stud Fam Plann.* 2009; **40**(1): 51–62. [PubMed Abstract](#) | [Publisher Full Text](#)
20. Heckert J, Fabric MS: **Improving Data Concerning Women’s Empowerment in Sub-Saharan Africa.** *Stud Fam Plann.* 2013; **44**(3): 319–44. [PubMed Abstract](#) | [Publisher Full Text](#)
21. Pallitto CC, O’Campo P: **The relationship between intimate partner violence and unintended pregnancy: analysis of a national sample from Colombia.** *Int Fam Plan Perspect.* 2004; **30**(4): 165–73. [PubMed Abstract](#) | [Publisher Full Text](#)
22. Yaya S, Uthman OA, Ekholuenetale M, et al.: **Women empowerment as an enabling factor of contraceptive use in sub-Saharan Africa: a multilevel analysis of cross-sectional surveys of 32 countries.** *Reprod Health.* 2018; **15**(1): 214. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
23. Pennington A, Orton L, Nayak S, et al.: **The health impacts of women’s low control in their living environment: A theory-based systematic review of observational studies in societies with profound gender discrimination.** *Health Place.* 2018; **51**: 1–10. [PubMed Abstract](#) | [Publisher Full Text](#)
24. Pratley P: **Associations between quantitative measures of women’s empowerment and access to care and health status for mothers and their children: A systematic review of evidence from the developing world.** *Soc Sci Med.* 2016; **169**: 119–31. [PubMed Abstract](#) | [Publisher Full Text](#)
25. Mahmud S, Shah NM, Becker S: **Measurement of Women’s Empowerment in Rural Bangladesh.** *World Dev.* 2012; **40**(3): 610–9. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
26. Saha S, Kermode M, Annear PL: **Effect of combining a health program with a microfinance-based self-help group on health behaviors and outcomes.** *Public Health.* 2015; **129**(11): 1510–8. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
27. Alemu SH, Van Kempen L, Ruben R: **Women Empowerment Through Self-Help Groups: The Bittersweet Fruits of Collective Apple Cultivation in Highland Ethiopia.** *J Hum Dev Capab.* 2018; **19**(3): 308–30. [PubMed Abstract](#) | [Publisher Full Text](#)

28. Hazra A, Atmavilas Y, Hay K, et al.: **Effects of health behaviour change intervention through women's self-help groups on maternal and newborn health practices and related inequalities in rural India: A quasi-experimental study.** *EClinicalMedicine*. 2019; **18**: 100198. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
29. Laverack G: **Improving Health Outcomes through Community Empowerment: A Review of the Literature.** *J Health Popul Nutr*. 2006; **24**(1): 113–20. [PubMed Abstract](#)
30. Orton L, Pennington A, Nayak S, et al.: **Group-based microfinance for collective empowerment: a systematic review of health impacts.** *Bull World Health Organ*. 2016; **94**(9): 694–704A. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
31. Saggurti N, Porwal A, Atmavilas Y, et al.: **Effect of behavioral change intervention around new-born care practices among most marginalized women in self-help groups in rural India: analyses of three cross-sectional surveys between 2013 and 2016.** *J Perinatol*. 2019; **39**(7): 990–999. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
32. Saha S, Annear PL, Pathak S: **The effect of Self-Help Groups on access to maternal health services: evidence from rural India.** *Int J Equity Health*. 2013; **12**: 36. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
33. Gram L, Fitchett A, Ashraf A, et al.: **Promoting women's and children's health through community groups in low-income and middle-income countries: a mixed-methods systematic review of mechanisms, enablers and barriers.** *BMJ Glob Health*. 2019; **4**(6): e001972. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
34. Midhet F, Becker S: **Impact of community-based interventions on maternal and neonatal health indicators: Results from a community randomized trial in rural Balochistan, Pakistan.** *Reprod Health*. 2010; **7**(1): 30. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
35. Mushi D, Mpembeni R, Jahn A: **Effectiveness of community based safe motherhood promoters in improving the utilization of obstetric care. The case of Mtwara Rural District in Tanzania.** *BMC Pregnancy Childbirth*. 2010; **10**(1): 14. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
36. Saggurti N, Atmavilas Y, Porwal A, et al.: **Effect of health intervention integration within women's self-help groups on collectivization and healthy practices around reproductive, maternal, neonatal and child health in rural India.** *PLoS One*. 2018; **13**(8): e0202562. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
37. WHO: **Global reference list of 100 core indicators: WHO 2015.** [Reference Source](#)
38. WHO: **WHO recommendation on maternal health: Guidelines approved by WHO guidelines review committee, 2017 Updated 2017.** [Reference Source](#)
39. Irani L: **Tools to assess the impact of the Uttar Pradesh Community Mobilization Project in improving maternal and child health behaviors in self-help groups in Uttar Pradesh, India.** Dataset. Harvard Dataverse. <http://www.doi.org/10.7910/DVN/MH25MD>
40. Kuhlmann AS, Galavotti C, Hastings P, et al.: **Investing in Communities: Evaluating the Added Value of Community Mobilization on HIV Prevention Outcomes Among FSWs in India.** *AIDS Behav*. 2014; **18**(4): 752–66. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
41. Saggurti N, Mishra RM, Proddutoor L, et al.: **Community collectivization and its association with consistent condom use and STI treatment-seeking behaviors among female sex workers and high-risk men who have sex with men/transgenders in Andhra Pradesh, India.** *AIDS Care*. 2013; **25**(Suppl 1): S55–S66. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
42. IIPS, ICF: **National Family Health Survey (NFHS-4), 2015-16: India.** Mumbai: International Institute for Population Sciences (IIPS). 2017. [Reference Source](#)
43. Taber KS: **The Use of Cronbach's Alpha When Developing and Reporting Research Instruments in Science Education.** *Res Sci Educ*. 2018; **48**: 1273–1296. [Publisher Full Text](#)
44. van Griethuijsen RALF, van Eijck MW, Haste H, et al.: **Global Patterns in Students' Views of Science and Interest in Science.** *Res Sci Educ*. 2015; **45**(4): 581–603. [Publisher Full Text](#)
45. DeVellis R: **Scale development: theory and applications: theory and application.** Thousand Okas, CA: Sage; 2003. [Reference Source](#)
46. Joseph A, Gliem AJ, Gliem RR: **Calculating, Interpreting, and Reporting Cronbach's Alpha Reliability Coefficient for Likert-Type Scales.** Midwest Research to Practice Conference in Adult, Continuing, and Community Education. 2003. [Reference Source](#)
47. Tavakol M, Dennick R: **Making sense of Cronbach's alpha.** *Int J Med Educ*. 2011; **2**: 53–55. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
48. Bland JM, Altman DG: **Cronbach's alpha.** *BMJ*. 1997; **314**(7080): 572. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
49. Browne MW, Cudeck R: **Alternative ways of assessing model fit.** In: Bollen KAL, J.S., editor. *Testing structural equation models*. Newbury Park, CA: Sage; 1993; 136–62. [Reference Source](#)
50. Bentler PM: **Comparative fit indexes in structural models.** *Psychol Bull*. 1990; **107**(2): 238–46. [PubMed Abstract](#) | [Publisher Full Text](#)
51. Bentler PM, Bonett DG: **Significance tests and goodness of fit in the analysis of covariance structures.** *Psychol Bull*. 1980; **88**(3): 588–606. [Publisher Full Text](#)
52. Hu L, Bentler PM: **Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives.** *Struct Equ Model*. 1999; **6**(1): 1–55. [PubMed Abstract](#)
53. Hooper D: **Structural Equation Modelling: Guidelines for Determining Model Fit.** *Electron J Bus Res Methods*. 2008; **6**(1): 53–60. [Reference Source](#)
54. Kline RB: **Methodology in the social sciences. Principles and practice of structural equation modeling.** Second ed: Guilford Press; 2005. [Publisher Full Text](#)
55. Zainudin A: **Chapter 3. Validating the measurement model: CFA. A handbook of SEM.** Second ed: Universiti Sultan Zainal Abidin; 2012. [Reference Source](#)
56. Nunnally JC: **Psychometric theory.** Second ed. New York: McGraw-Hill; 1978. [Reference Source](#)
57. Nunnally JC: **Psychometric Theory.** Engelwood-Cliffs, NJ: McGraw-Hill Book Company; 1988. [Reference Source](#)
58. Bali Swain R, Wallentin FY: **Factors empowering women in Indian self-help group programs.** *Int Rev Appl Econ*. 2012; **26**(4): 425–44. [Publisher Full Text](#)
59. Mistry R, Galal O, Lu M: **"Women's autonomy and pregnancy care in rural India: A contextual analysis".** *Soc Sci Med*. 2009; **69**(6): 926–33. [PubMed Abstract](#) | [Publisher Full Text](#)
60. Ahmed S, Creanga AA, Gillespie DG, et al.: **Economic Status, Education and Empowerment: Implications for Maternal Health Service Utilization in Developing Countries.** *PLoS One*. 2010; **5**(6): e11190. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
61. Gee RE, Mitra N, Wan F, et al.: **Power over parity: intimate partner violence and issues of fertility control.** *Am J Obstet Gynecol*. 2009; **201**(2): 148. e1–7. [PubMed Abstract](#) | [Publisher Full Text](#)
62. Mundhra R, Singh N, Kaushik S, et al.: **Intimate Partner Violence: Associated Factors and Acceptability of Contraception Among the Women.** *Indian J Community Med*. 2016; **41**(3): 203–7. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)
63. Williams CM, Larsen U, McCloskey LA: **Intimate partner violence and women's contraceptive use.** *Violence Against Women*. 2008; **14**(12): 1382–96. [PubMed Abstract](#) | [Publisher Full Text](#)
64. Saha S, Annear PL, Pathak S: **The effect of Self-Help Groups on access to maternal health services: evidence from rural India.** *Int J Equity Health*. 2013; **12**: 36. [PubMed Abstract](#) | [Publisher Full Text](#) | [Free Full Text](#)

## Open Peer Review

Current Peer Review Status:  

---

### Version 1

Reviewer Report 03 August 2023

<https://doi.org/10.21956/gatesopenres.14726.r33749>

© 2023 Story W et al. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



**William T. Story** 

The University of Iowa, Iowa City, Iowa, USA

**Kaniz Fatema**

The University of Iowa, Iowa City, Iowa, USA

### Summary

This is an interesting study exploring how women empowerment measured through different domains (as a result of membership in self-help groups) is related to reproductive and maternal healthcare practices in Uttar Pradesh, India. Empowerment is measured at the collective and individual levels. The study team found that women with collective and individual empowerment are significantly associated with reproductive and maternal healthcare practices. Despite the importance of the topic, this study needs significant improvements before it can be considered for publication.

### Abstract

Minor: The authors can bring up one significant implication of the study in the conclusion sections of the abstract. For example, governmental and non-governmental organizations can invest in women's empowerment activities in rural India in order to improve maternal health practices and, ultimately, well-being.

### Introduction

Major: The authors have mostly describe women's empowerment in the Introduction and they need to motivate the public health problem related to reproductive and maternal health practices in rural India as well.

Major: The study hypothesis, as it is currently stated, is too broad a general. The authors should focus on making specific claims about the types of empowerment and the relations to maternal health practices.

Minor: It would also be great if the authors drew on a theoretical framework/model to support the dimensions of empowerment. Authors can describe the domains of women's empowerment

based on a variety of theories related to empowerment or power dynamics.

Minor: From whose perspective is empowerment being measured? I assume it is from the woman's perspective, but it is important to understand empowerment from the perspective of the spouse and other family members. Autonomy isn't always seen as an indicator of a healthy relationship in the context of marriage, especially in South Asian cultures. Women's autonomy may be an indication of marital distress, unless the perspectives of spousal autonomy are consistent between spouses. This may need to be considered in the motivation the study.

### **Methods**

Major: Why was "at least one activity to prepare for delivery" used for delivery preparedness? Aren't all three aspects critical for the use of health services? Also, why didn't the authors assess actual use of a skilled provider during delivery? These measures should be changed or justified.

Major: The authors say that they "constructed an additive index to include all items within a sub-domain to form a continuous variable for collective as well as individual empowerment." Why didn't the team use factor scores, which are also continuous and a better estimate of the factors for each sub-domain? It is also not clear why the team would combine all of the items into one "women's empowerment" score when they clearly justified the need to separate them into individual scores.

Major: The authors controlled for program exposure using a dichotomous variable of exposure to SHG activities or no exposure. However, they measured 11 activities that someone may have been exposed to. One should assume that someone who was exposed to 11 activities would be very different than someone who was exposed to 1 activity. The team should consider using the SHG exposure variable as continuous or at a minimum as an ordinal variable.

Major: Did the authors control for exposure to any other interventions outside of the SHGs?

Major: Did the authors consider including religion, husbands' education, or social norms/beliefs as possible cofounders in the study? For example, husbands with higher education can support women's empowerment and decision-making in reproductive and maternal healthcare practices. Similarly, readers would also be interested in knowing whether religion has any restrictions in allowing women to make decisions regarding their reproductive and maternal healthcare behavior.

Minor: Please define terms "scheduled caste" and "scheduled tribe" for those who are unfamiliar with the Indian context. Also, please describe what is meant by "If a woman under eighteen was interviewed, she was considered an emancipated minor, as per Indian guidelines, and hence parental permission was not sought."

Minor: The authors say, "specific items with lower factor loadings (allowing measurement errors to covary) were dropped while constructing the sub-domains." Please be specific about the cut-off for making the decision to drop an item.

Minor: In Model C, were all sub-domains included in the model all at once? This needs to be clarified.

**Results**

Major: The authors should describe the reproductive and maternal health outcomes before describing the Chi-square tests for association with the demographic and household characteristics.

Major: The authors present beta-coefficients rather than odds ratios for the logistics regression results. Please justify this decision as odds ratios are easier to interpret.

Major: The coefficients for Table 5 do not include the covariates, so it is hard to evaluate the magnitude of the effect. The coefficients seem small, so are they meaningful from a public health perspective?

Major: Due to the way in which the empowerment indicators were assessed (see Methods), the results are difficult to evaluate. For example, if the authors had used rotated factor scores, then there would be no within level correlation and they could have included them in the same model. This must be addressed if the authors resubmit.

**Discussion/Conclusion**

Major: The authors do not need to redefine each of the empowerment measures as they have already been defined in the Methods. Instead start by describing the most salient findings from the study.

Major: The authors need to be more precise with the types of empowerment and how they are related to each outcome. The magnitude of the association is also important for the reader to understand the implications. The authors should also give a more thorough analysis of why some types of empowerment are associated with some of the outcomes and not others. This will help move the field forward by helping people focus on specific empowerment activities rather than making generalizations (because the relationship between empowerment and health care use is already well established). This was done well with the section on family planning, but the discussion of other outcomes could be improved.

Minor: The authors could include more relevant limitations of the study, such as recall/reporting biases, maintaining validity/reliability in measurement, and social desirability/informational biases. For example, the authors collected data from women who had a live birth in the 12 months preceding the survey. Therefore, women may not properly recall the actual number of antenatal care visits. Similarly, the authors did not mention whether they collected data privately from women. If they ask women in front of their husbands or their family members; then they may not get accurate information from women.

**Is the work clearly and accurately presented and does it cite the current literature?**

Partly

**Is the study design appropriate and is the work technically sound?**

Partly

**Are sufficient details of methods and analysis provided to allow replication by others?**

No

**If applicable, is the statistical analysis and its interpretation appropriate?**

Partly

**Are all the source data underlying the results available to ensure full reproducibility?**

Yes

**Are the conclusions drawn adequately supported by the results?**

Partly

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Reproductive, maternal, and child health; social capital; India

**We confirm that we have read this submission and believe that we have an appropriate level of expertise to state that we do not consider it to be of an acceptable scientific standard, for reasons outlined above.**

Reviewer Report 15 August 2022

<https://doi.org/10.21956/gatesopenres.14726.r32194>

© 2022 Yount K. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



**Kathryn M. Yount** 

<sup>1</sup> Hubert Department of Global Health, Rollins School of Public Health, Emory University, Atlanta, GA, USA

<sup>2</sup> Department of Sociology, Emory College of Arts and Sciences, Emory University, Atlanta, GA, USA

Comments on "Identifying the association of women's empowerment with reproductive and maternal health practices using a cross-sectional study in the context of self-help groups in rural India"

Thank you for the opportunity to review the paper, entitled "Identifying the association of women's empowerment with reproductive and maternal health practices using a cross-sectional study in the context of self-help groups in rural India [version 1]" Understanding the relationship of women's participation in self-help groups (SHGs) with their individual and collective empowerment and in turn, the health of women and children is a critically important focus of evaluation efforts. This study assesses the relationship between women's participation in SHGs in multiple measures of their individual and collective empowerment and MCH outcomes in the context of a large evaluation study in India. I hope my comments below contribute to strengthening this important work further.

First, the authors do a nice job summarizing aspects of the literature on women's empowerment. I encourage them to refer to existing theoretical literature as a way to organize the measures of

empowerment that they use, and in turn, to identify measures of empowerment that may be missing. Seminal work by Naila Kabeer identifies two major dimensions of women's empowerment—claims on resources (human, economic, and social) and agency (intrinsic, instrumental, and collective). Providing definitions of these major elements of empowerment and then organizing the measures used in this study would help the reader to understand to what extent critical dimensions of empowerment are captured. This exercise is important because as the authors point out empirically, dimensions of women's empowerment tend to be correlated, and so estimating relationships of sub-domains of women's empowerment with health-related outcomes require thorough measurement of all dimensions.

Second, the authors might consider citing recent, related empirical studies on the relationship between women's participation in various forms of microfinance/economic empowerment programming and dimensions of women's empowerment—including their 'individual agency' (intrinsic and instrumental dimensions) and collective agency (intrinsic and instrumental dimensions). A potentially useful article to cite, which explicitly defines and measures several dimensions of women's intrinsic, instrumental, and collective agency, would be: Kathryn M. Yount, Yuk Fai Cheong, Zara Khan, Stephanie S. Miedema, Ruchira T. Naved, Women's participation in microfinance: Effects on Women's agency, exposure to partner violence, and mental health <sup>1</sup>.

Third, the measurement of women's collective agency is particularly important and nascent. That said, some effort already has been invested in conceptualizing and measuring women's collective agency. The authors might consider citing some of this empirical work, as well. A useful example is: Delea, Maryann, and Sinharoy, Sheela and Cheong, Yuk Fai and Heckert, Jessica and Seymour, Greg and Meinzen-Dick, Ruth S. and Yount, Kathryn M., The Group-Related Collective Agency Scales (GCAS-23 and GCAS-12) – Full and Short Form Scales for Construct Measurement (December 22, 2021)<sup>2</sup>.

Fourth, the authors are to be applauded for using factor analysis to assess the psychometric properties of the various scales for women's empowerment they use in subsequent analyses. I encourage the authors to be more transparent regarding the nature of the original items (e.g., their response options, any recoding of the original response options, and univariate distributions of the original items). Second, given the authors' use of exploratory and confirmatory factor analyses for psychometric validation of the women's empowerment scales, I encourage the authors to be transparent about the findings of those analyses. Also, when a phased EFA then CFA approach is used, these analyses normally are performed on independent (random split) samples so the findings in the exploratory factor analysis can be confirmed or disconfirmed in the confirmatory factor analysis in an independent sample. This use of split half samples is a way of creating independent samples within the same study. Once these analyses are performed, it is important to present those findings so the reader is assured that the EFA and CFA results do, in fact, confirm the conceptual and empirical coherence of the scales that are used in subsequent analyses. I strongly recommend that the authors present the full findings of the EFA and CFA analyses, and in that process explain what items in the original sets may not have performed well and were dropped.

Fifth, it is unclear to me, based on the correlation table that the authors present, that the creation of an overarching unidimensional women's empowerment summary scale is warranted. As the correlation table shows, several of the subscales are not significantly correlated, and the magnitudes of some correlations is low. The results of the EFA and CFA, if presented, would

provide additional evidence in support of or against the creation of a unidimensional women's empowerment scale.

Sixth, I encourage the authors to organize the women's empowerment exposure variables conceptually according to the dimension of empowerment each scale is measuring, and to consider the findings using the unidimensional scale that is created, in light of the comment, above.

Finally, in the Discussion, it may be important to reflect on the dimensions of women's empowerment (either dimensions of resources and/or dimensions of agency) that may not be captured at all or that may not be captured fully. What are the implications, for example, of including a disproportionate number of individual collective agency items in the unidimensional scale? Might there be any benefit to combining individual-level agency measures, and separately, collective agency measures for understanding how these broad constructs may operate in tandem, as is alluded to in the introduction.

I hope the reflections, above, are helpful considerations for future work on this important topic as we work to move the field forward.

### References

1. Yount KM, Cheong YF, Khan Z, Miedema SS, et al.: Women's participation in microfinance: Effects on Women's agency, exposure to partner violence, and mental health. *Soc Sci Med.* **270**: 113686 [PubMed Abstract](#) | [Publisher Full Text](#)
2. Delea M, Sinharoy S, Cheong Y, Heckert J, et al.: The Group-Related Collective Agency Scales (GCAS-23 and GCAS-12) – Full and Short Form Scales for Construct Measurement. *SSRN Electronic Journal.* 2021. [Publisher Full Text](#)

**Is the work clearly and accurately presented and does it cite the current literature?**

Partly

**Is the study design appropriate and is the work technically sound?**

Partly

**Are sufficient details of methods and analysis provided to allow replication by others?**

No

**If applicable, is the statistical analysis and its interpretation appropriate?**

Partly

**Are all the source data underlying the results available to ensure full reproducibility?**

Yes

**Are the conclusions drawn adequately supported by the results?**

Partly

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** women's and girls empowerment; women's health; prevention of gender-based violence; social and gender norm change.

**I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.**

---