Abstract

Background

The relationship between empowerment and health outcomes has been explored in some depth, including its association with contraceptive use and child mortality. Findings on empowerment’s effects on contraceptive use and family planning have been mixed, depending on how empowerment and contraceptive use is measured. The interest in discovering relationships has largely trumped the identification of meaningful measurement of empowerment, which has made it difficult to interpret positive or negative findings. This study uses the notion of concept credibility and employs statistical methods appropriate to ordinal variables, to create indices to measure specific dimensions of empowerment. Indices thus constructed have the value of explaining what aspects of empowerment do or do not have an effect on health outcomes.

Methods

This study uses data from the Demographic and Health surveys from sub-Saharan Africa for five countries representing the five regions. The study uses polychoric principal components methods to combine previously selected indicators of two key components of women’s empowerment: power over private (self-consideration) and power over family welfare (responsibility). Multivariate logistic regression analyses were used to explore the effect of empowerment on modern contraceptive use controlling for known confounders of the relationships.

Results
Empowerment when measured as “private welfare or self-consideration” and power over household welfare” showed a strong effect on contraceptive use after controlling for socio-economic and respondent and partner characteristics in four of the five countries.

**Conclusions**

There is a strong effect of empowerment in explaining contraceptive use and under-five mortality but the effect and its magnitude depend on which dimension of empowerment is being measured. Having more power to take decisions using household resources is less consistently linked with health outcomes. Having a stronger private welfare or sense of self appears to translate into better private and family welfare outcomes.
Empowerment defined and measured

There are multiple, often overlapping definitions of what constitutes women’s empowerment. Empowerment definitions used in the literature differ, but broadly focus on two elements – external assets and internal capabilities, which enable people to exercise choice, take decisions and reduce their vulnerability to events. Malhotra, Schuleer and Boender (21) present a comprehensive review of empowerment definitions in a background paper for the World Bank on empowerment and poverty, where they adopt the definition on autonomy over life choices, provided by Kabeer (22) as their guiding principle for measurement.

A substantial body of literature on empowerment and health focuses on empowerment as women’s decision-making powers or “bargaining power of the woman within the household” (23). Such studies cover a range of outcomes including the use of maternal health services such as prenatal and delivery care (14; 24), reproductive health including contraceptive use (5, 25-26), children’s educational outcomes (27), improved nutritional outcomes for children, and overall levels of investment in children (28). Decision-making power definitions typically include decisions on consumption, on leisure, financial allocations, and mobility. Household surveys such as DHS typically include various indicators to measure some of these decision making powers either explicitly or implicitly within their women’s empowerment modules.

Empowerment measurement and its association with contraceptive use

Studies on empowerment and contraceptive use find mixed results and use both individual and contextual factors to measure levels of empowerment and its impact.
The difficulties in measuring empowerment and establishing relationships with health outcomes is a direct result of the challenges faced in measurement. Studies that employ secondary data analyses of household surveys usually evaluate existing individual indicators, or some combination of indicators on which data has been collected. These methods usually do not start at the definitional issue of “what is empowerment” but begin where the data exists on various measures of empowerment. Surveys that are specifically developed to evaluate empowerment usually draw on highly context specific indictors that are identified through qualitative methods including observation, ethnographic studies and focus groups. These empowerment specific analyses therefore employ primary data collection and necessarily limited in their generalizability but theoretically more robust than those that begin with existing data from household surveys (29).

**Construct Credibility**

The review of the literature suggests two broad shortfalls in measurement that impact interpretation of results. First, is conceptual credibility. Analyses that begin with the data as opposed to constructs of empowerment cannot tell us if the relationships being observed are relevant to empowerment. This drawback is particularly true for those studies that draw on data from larger household surveys, when available indicators are assumed to accurately measure some definition of empowerment, as opposed to surveys that intentionally set out to measure empowerment and identify the indicators they will need to do so. Demographic and Health surveys which are the largest sources of empowerment data have incorporated measures that were conceptualized for south Asian countries and subsequently adopted globally. Some studies suggest that the inconsistent findings reported on empowerment and reproductive outcomes, is
because empowerment is context-specific and indicators used in one context may not apply cross-culturally (21,35,37).

**Construction**

The second issue is one of construction. Current methods of analyzing empowerment in health outcomes rely on aggregation of several indicators into one or more indices, use of factorial methods to reduce the dimensions of the data or use empowerment indicators individually. Since indicators measuring aspects of empowerment are ordinal in scale, the most appropriate method for data reduction without loss of information is the polychoric principal component method (38-40). This is because we cannot assume an equal interval scale or a linear relationship between variables for ordinal variables. Equal interval scales and a linear relationship is a requirement in factor analysis which is based on the Pearson correlation matrix. A secondary issue related to index construction is one of weights. What we currently have in the literature in empowerment is the use of either equal weighting schemes, or clustering of indicators within a sub-index with weighting scheme defined exogenously. The advantage of using principal component analysis is that it provides an endogenous weighting scheme representing the contribution of each variable to the index, while adjusting for overlapping information that highly correlated variables provide. The use of polychoric pca is recommended in the literature to combine highly correlated variables which if left unaddressed produces biased parameter estimates in a multiple regression analysis.

**A framework for construct credibility**

The only way to address construct credibility is to define what we want to measure first. One of the more powerful and recent exercises in understanding the role of women’s empowerment
takes on issue of definition directly. In their review of the empowerment literature Basu and Koolwal (41) find that current ways of measuring empowerment leave out a critical element of empowerment that underscores personal welfare. This is the concept of “true freedom”, a freedom to consider one’s self as opposed to others, which “requires some measure of self-indulgence”. They suggest that those freedoms that benefit no one other than the woman herself, are not usually included in measures of empowerment. Rather, current measurements focus on instrumental freedoms that do not specifically contribute to personal welfare but to the broader household good. To make this distinctions operational, the authors identified indicators within a household survey in India that could capture both the self-indulgent versus responsibility aspects of empowerment.

Using this approach they analysed data from the NFS2 in India and found that women with higher scores on personal freedom had better personal health outcomes but poorer child health outcomes while those who exercised more responsibility in decision making had better child welfare outcomes. The value in their analysis is that it provides a way to differentially examine those dimensions of empowerment that matter to individual health outcomes versus those contribute to child welfare outcomes. Equally important, is their use of household survey data (DHS) which allows us to test the constructions in multiple contexts.

Applying the Basu - Koowal framework

Disentangling empowerment as self-consideration from empowerment as instrumental may help us better understand what aspect of empowerment we are measuring and what implications these would have for policy. This paper will apply the Basu-Koowal framework to study the relationship between empowerment and contraceptive use to determine whether distinguishing
between different dimensions of empowerment better explains outcomes. The paper will also examine these relationships using more robust ways of combining various indicators of empowerment to create indices that can measure different and combined dimensions of empowerment using categorical variables.

Data sets

Information from five DHS recent surveys conducted between 2010 and 2013 in five sub-Saharan countries (42-46) including west, south and eastern African regions were included in this study. Sub-Saharan countries were chosen as these were contexts where we have most of the mixed results on empowerment. Countries were selected based on surveys conducted during the most recent DHS phase, with indicators of relevance to two empowerment concepts of interest, and representing the regional diversity in the sub-Saharan region. DHS survey data was chosen as they allow us to test comparability across different contexts using standardized indicators and methods of data collection.

Empowerment Indices Measuring Self-Indulgence and Responsibility

For this analysis we follow the methodology used by the OECD Development Centre in its construction of the Social Institutions and Gender Index (SIGI) which was developed to capture the “complex relationship between gender equality and discriminatory social norms” (47) The methods used for this index closely mirror the conceptual and definitional challenges described in the review above.

Two sub indices of empowerment that use indicators of “self-indulgence” and indicators of “responsibility for family welfare”. We use polychoric principal components analysis to develop indices of these two measures in order to address the high correlation between the various
indicators and because our variables are ordinal rather than continuous. As noted above, the difficulty in using the different indicators of empowerment together is that since they are highly correlated using them in a regression will mean that none of them is likely to be significant - since they all contain similar information. The aim of the polychoric or any other principal component analysis is to construct weighted "averages" of the different variables such that the first component contains some aggregate of all the relevant indicators such that it captures most of the variation. The advantage in using this methodology is that not only can we summarize the content of the multiple indicators but we do so using an endogenous weighting scheme as opposed to assuming a weighting scheme for the index.

Second, two sub-indices of empowerment were developed using the weights given from the polychoric principal component analysis and variables included in each sub-index were examined for statistical association using a Kendall Tau b rank correlation analysis. The values of the sub-indices were normalized on a scale of 0 to 1 for easy interpretation and classified into three groups, low, medium and high empowerment for each sub-index. To create the composite empowerment index, combining both the self-indulgent and responsibility dimensions, using the same methodology, a non-linear unweighted average of the two sub-indices was applied once again following the methodology used to construct the SIGI. The composite empowerment index 

$$= \frac{1}{2} (\text{Self Indulgence Index})^2 + \frac{1}{2} (\text{Responsibility})^2.$$  

Contraceptive Use and Empowerment Indices

Measurements of empowerment are examined using bivariate and logistic regression analyses with standard predictor variables for contraceptive use. These include wealth status (poor versus non poor), residence (urban vs. rural), age (in five year age groups in the bivariate analysis and
squared in the logistic), and education status of women (none, primary or secondary and higher). In the logistic regression model, additional variables are included known to confound the relationship between contraceptive use by women and empowerment. Partner education levels have been found to be a strong influence on contraceptive behavior independent of women’s education, indicators of demand measured by “un-wantedness of last birth” (wanted later, not wanted), and ideal family size (if it exceeds number of living children), access to family planning (whether visited by a FP worker in the last 12 months) and access to family information (heard information on FP on radio in the last three months).

Factors Related to empowerment and contraceptive use

In the bivariate analysis of empowerment and contraceptive using chi-square tests of association, there is a strong relationship between the composite index and contraceptive use in all countries except Uganda. For all countries we find as expected that women with higher levels of empowerment, as measured through the composite score, are more likely to be wealthier, better educated and residing in an urban area. There is a strong relationship with age in four of the five countries, which is explored further using an age-squared term to account for possible non-linear relationships between age and contraceptive use.

Appendix Tables 1a through 1e present results from the bivariate analyses for the five countries.

Effect of women's empowerment on contraception

Overall, there is a strong positive effect of empowerment on contraception, even after controlling for wealth, education of self and partner, age, access to services and information and demand for children in four of the five countries. High levels of empowerment corresponding to independent decision making, have the strongest effects on contraceptive use in the four
countries. Distinguishing between empowerment as self-consideration versus empowerment as responsibility appears to be significant in explaining contraceptive use in Malawi and to a lesser extent in Ethiopia, Kenya and Nigeria, after controlling for socioeconomic and contraceptive use characteristics.

Conclusion

This analysis is the first time disentangled elements of empowerment conceptualized for the South Asian context was applied using demographic and health survey data from sub-Saharan Africa. To the author’s knowledge it is also the first time polychoric principal component techniques were used to combine different elements of empowerment in sub-indices to measure empowerment and health outcomes. The way indicators are combined and weighted to produce summary measures of “empowerment” has been previously found to produce misleading results on the association between empowerment and health outcomes (21, 63). The polychoric principal components technique is an improvement over existing methods that use either additive or factor analysis to identify weighting schemes for ordinal level data. The sub-index construction was based on the principles of statistical association between indicators selected and on the basis of conceptual validity. The polychoric principal components method permitted aggregation of the indicators combined in the sub index such that common information contained in the indicators is captured while maximizing variance in the data.