Investigating a Mechanism in Which Education, Early Marriage, Decision-making, and Gender-role Attitudes Influence Fertility in Senegal: A Structural Equation Modeling Approach

Background. Fertility remains high in sub-Saharan Africa, despite the demographic transition observed in other low-and middle- resource settings. The proportion of women using contraceptives is showing an increase in Africa; however, over one quarter of African women perceive the unmet need for family planning (UN, 2014). Although the latest Total Fertility Rate (TFR) and progress in decreasing TFR vary by country, in many African countries, women continue to deliver around five or more children.

Among a set of complex factors affecting fertility, women's empowerment has been identified as one of the key determinants of fertility intention, contraceptive use, and actual fertility. Evidence generally indicates the positive influence of empowerment on reproductive health including lower fertility (Malhotra, et al. 2002; Upahdyay, et al. 2014). Yet the evidence of empowerment is not consistent possibly due, at least in part, to several methodological limitations. Despite the empowerment definition by Kabeer (2001) that highlights multiple dimensions, the influence of each empowerment dimension, as well as their comparative magnitude, is not well studied. There are few studies on empowerment and fertility in Africa (Hindin, 2000; Upahdyay&Karasek, 2010), yet the pattern of this association is not consistent across countries. Additionally, theory suggests a sequential pathway from women's status, various forms of power, and then to reproductive health behaviors and outcomes (Blumberg, 1984). However, examination of the complex mechanism affecting fertility, which involves multiple pathways and mediators, remains as a research gap.

Aim and Hypotheses. This study assesses a mechanism in which women's education, early marriage, decision-making power, and gender-role attitudes influence fertility. Specific hypotheses include: 1) women's education is associated with lower likelihood of early marriage; 2) low education and early marriage are negatively related to decision-making and gender-role attitudes; 3) education, marriage at age 18 or above, decision-making, and gender-role attitudes are related to lower fertility; and 4) the relationship between women's education and fertility is mediated, by early marriage first and then decision-making and gender-role attitudes.

Data and Methods. The study employs the 2010-2011 Demographic and Health Survey in Senegal. The study sample includes currently married women age 15-49 (weighted n=10,176). Dependent variable is fertility, operationalized as the total number of children ever born. The analysis is also conducted using the number of living children, and the results are almost identical.

The analysis consists of descriptive statistics, bivariate association tests, Explanatory Factor Analysis, Confirmatory Factor Analysis, and Structural Equation Modeling (SEM). Factor analysis has defined the structure of empowerment dimensions as: early marriage (i.e., first marriage below age 18); household decision-making power (3 indicators); attitudes against violence (5 indicators); and attitudes for sex negotiation (2 indicators). SEM is employed first as a measured variable SEM that includes summative variables for decision-making and gender-role attitudes, and then a latent variable SEM that includes latent constructs/factors. Five equations are tested simultaneously in each SEM model. Path coefficients are standardized for comparison of the magnitude of effect among all the explanatory variables. This analysis controls for sociodemographic characteristics of women and households.

Results. *Women's lower education is related to early marriage, and then to higher fertility – that is, early marriage significantly mediates the relationship between education and fertility*. Higher education is related to lower fertility, while early marriage is associated with higher fertility (standardized b=-0.062 for education; b=0.232 for early marriage). The standardized path coefficient indicates that the magnitude of effect of early marriage is much more substantial than most of the predictors in the model. Total indirect effect of education on fertility is significant (b=-0.041), and the majority of this indirect effect is specifically through early marriage (b=-0.036).

Additionally, education is positively associated with decision-making and gender-role attitudes against violence and for sex negotiation. Yet early marriage is associated with each of these three empowerment measures differently. Specifically, early marriage is related to permissive attitudes against violence (b=-0.053). Early marriage is also associated with higher decision-making power (b=0.034) at borderline significance, while there is no significant association with attitudes for sex negotiation.

Moreover, attitudes for sex negotiation is not significantly related to fertility in terms of the direct or mediating effect, while the direct effect of decision-making and attitudes against violence shows a borderline significance (p<0.10). In particular, attitudes against gender violence are related to lower fertility (b=-0.020), while unexpectedly household decision-making is related to higher fertility (b=0.021). None of these three empowerment measures is a significant intervening variable in the model. Magnitude of these direct effects is much lower relative to education and early marriage as they relate to fertility.

Discussion. The results show a potential causal mechanism in which women's education and early marriage affect fertility, employing a useful approach, SEM, to investigate complex

pathways. In particular, the evidence suggests a sequential pathway that women's lower education is associated with higher likelihood of early marriage, which in term is related to higher fertility in Senegal. The results demonstrate the substantial influence of early marriage on fertility relative to other explanatory variables. The comparison between the two SEM models, using measured variables versus latent constructs, highlights the relative advantage of the latter, especially when a complex construct such as empowerment is examined, which comprises multiple dimensions/aspects and several indicators.

Among the tested four empowerment dimensions, it is only early marriage that is significantly related to fertility. Other three empowerment dimensions – namely decision-making, attitudes against violence, and attitudes for sex negotiation – are all positively related to education; however, they are related distinctly and unexpectedly to fertility, as well as to early marriage. Thus the hypothesized pathway is only partially supported. This is contrary to the general understanding of empowerment from theory and research, such that empowerment influences reproductive health including fertility as a direct and intervening determinant. Yet this result stands in accordance with the inconsistent evidence of empowerment and reproductive health across African countries.

This study demonstrates the complex mechanism in which women's status and empowerment influence fertility. In Senegal, education has a potential to prevent early marriage, and then lead to lower fertility, thus policy and programs should further focus on women's rights for education and marriage. The mechanism in which women's empowerment – that is a multi-dimensional and contextual construct – influence fertility should be further investigated in future African studies.

Reference

Blumberg, R. L. (1984). A general theory of gender stratification. *Sociological Theory*, *2*, 23-101.

Kabeer, N. (2001). Resources, agency, achievements: reflections on the measurement of women's empowerment', Sida Studies No. 3. *Discussing women's empowerment - theory and practice. Stockholm: Swedish International Development Agency*.

Hindin, M. J. (2000). Women's autonomy, women's status and fertility-related behavior in Zimbabwe. *Population Research and Policy Review*, *19*(3), 255-282.

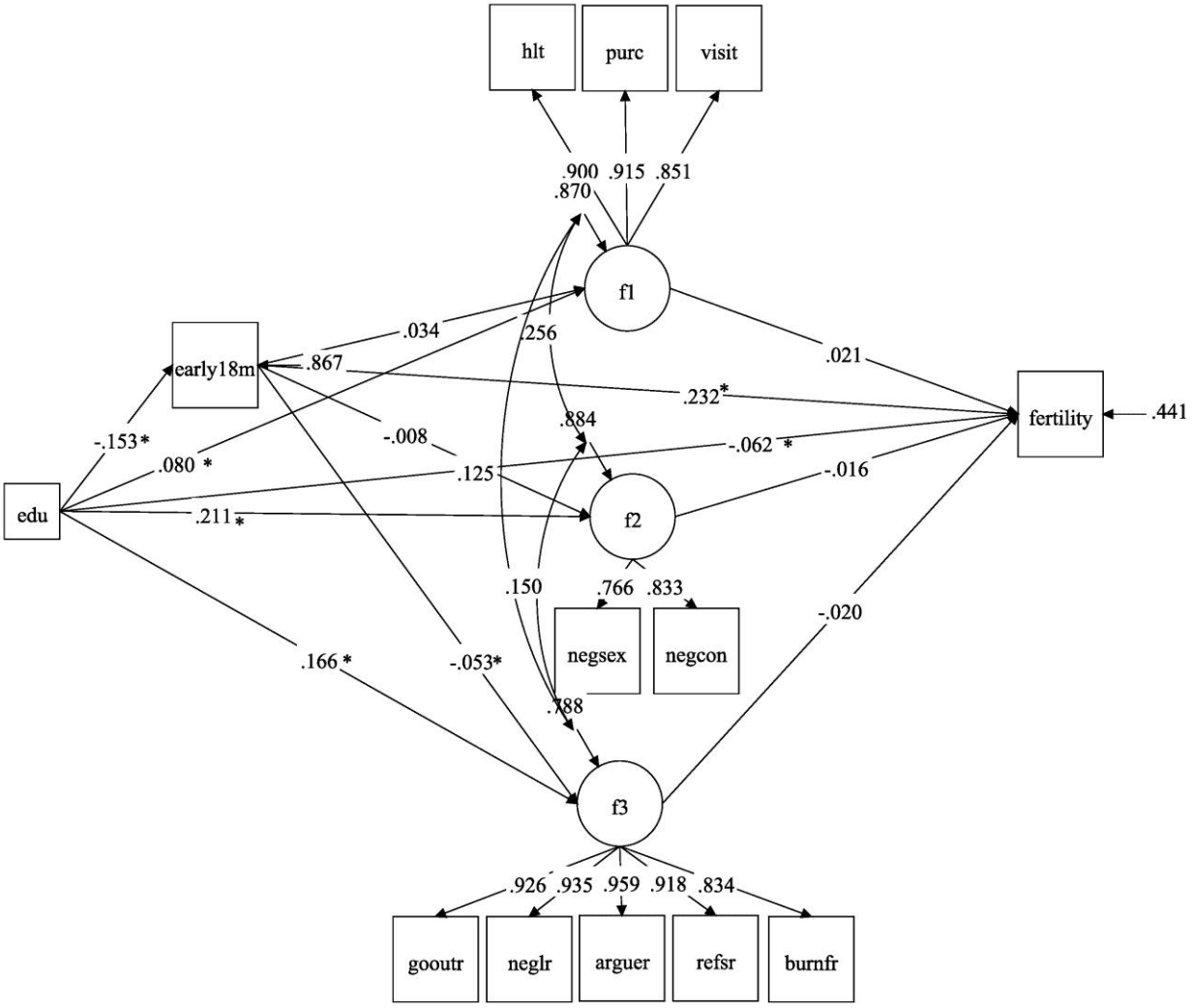
Malhotra, A., Shuler, S. R., & Boender, C. (2002). *Measuring women's empowerment as a variable in international development*. Paper presented at the World Bank workshop on poverty and gender: New perspectives.

Upadhyay, U. & Karasek, D. (2010). Women's empowerment and achievement of desired fertility in sub-saharan Africa. DHS Working Papers No. 80.

Upadhyay, U. D., Gipson, J. D., Withers, M., Lewis, S., Ciaraldi, E. J., Fraser, A., et al. (2014). Women's empowerment and fertility: A review of the literature. *Social Science & Medicine, 115*, 111-120.

United Nations. (2014). The Millennium Development Goals Report 2014. New York.

Figure 1: Diagram for the latent variable SEM on fertility in Senegal (by Mplus).



Note: *p<0.05. DF=134, RMSEA=0.012, CFI=0.993, TLI=0.988, WRMR=1.103.

f1=decision-making power; f2=gender norms for sex negotiation; f3=gender norms against violence; early18m= first marriage below age 18.

Standardized path coefficients are presented. Control variables (e.g., sociodemographic characteristics of women and households) are not included in the figure for simplicity.