Diffusion of Family Size Preferences and Acceptability of Contraceptive Use between Migrants and Non-Migrants in Rural Senegal

Although lower and middle income countries in Asia and Latin America are nearing the end of fertility transitions begun in the 1970's, many countries in sub-Saharan Africa continue to have fertility levels well above replacement. Though declines began in the region in the 1980's and 1990's, they have been unusually slow by both historical and contemporary standards, with periodic or temporary stalls or reversals of downward fertility trends in a number of countries (Bongaarts & Casterline, 2013; Schoumaker, 2019; Shapiro & Hinde, 2017). As of this writing, the median average total fertility rate (TFR) across the 33 countries in the region for which data was available Demographic and Health Surveys (DHS) conducted after 2010 was 5.1 children per woman. (ICF, 2012).

There have been a number of explanations proposed for sustained high fertility and anemic declines in the region. On one side, proponents of family planning programs suggest part of the cause is relatively low contraceptive utilization associated with lack of access to or knowledge of contraception, its cost, concerns about potential side-effects, and at a more basic level, the moral and social acceptability of contraceptive use (Bongaarts & Casterline, 2013). Some of these, while important in the past, have waned in significance in the region. In the 33 DHS surveys available in the region that asked the question since 2010, the median percentage of both men and women who knew of at least one modern contraceptive method was 96% (ICF, 2012). Across all of Africa in DHS surveys conducted between 2006 and 2012, less than 25% of women between the ages of 15 and 49 were classified as having an unmet need for contraception. Only 6% of these indicated they were unaware of any method of contraception, only 8% reported difficulty accessing services. In contrast, approximately 28% cited potential side effects, and 25% cited opposition to use as reasons for not intending to do use contraception (Sedgh & Hussain, 2014).

What remains as the probable main cause of slow or stalled declines is the undeniably high demand for children in the region. In countries with DHS surveys there after 2010, the median average ideal family sizes for women age 15-49 and men age 15-54/59, respectively, were 4.8 and 5.5. The median 'wanted' total fertility rate (TWFR), considered a more accurate measure of desired fertility than ideal family size, was 4.5. In only one country in the region was it below replacement (ICF, 2012).

This demand may be induced in part, or in combination, by a variety of factors including, among other things, stagnant or slowing economic growth, low levels of female education, infant and child mortality, religious beliefs, and relative lack of dependence on non-familial institutions. A major driver of both the demand for children and perceptions of the safety and moral acceptability of contraceptive use that may act independently of or in interaction with these factors, however, is diffusion of information and social influence. The diffusion of beliefs and behavioral innovation with regard to family building though social learning and influence mechanisms has long been hypothesized as a central mechanism driving fertility transitions (Bongaarts & Watkins, 1996; Caldwell, 1976; Casterline, 2001). A main focus of both the theoretical and empirical literatures in this regard has been on the diffusion of contraceptive knowledge (including of potential side effects) and use through social networks (Behrman, Kohler, & Watkins, 2002; Bongaarts & Watkins, 1996; Rutenberg & Watkins, 1997; Valente, Watkins, Jato, Van Der Straten, & Tsitsol, 1997). No prior empirical literature, to our knowledge however, has investigated diffusion or influence processes associated with the perceived moral acceptability of contraceptive use, or the more fundamental demand for children.

One particular diffusion mechanism with regard to ideal family size and achieved fertility, however, does have a prominent place in the theoretical literature. It has also long been known that fertility and fertility preferences of rural-urban migrants in less developed countries are often lower than for non-migrants (Brockerhoff & Yang, 1994; Lee & Farber, 1984; Zárate & Zárate, 1975). This phenomena has been at least partially attributed to adaptation of migrants' preferences, behaviors, and norms to those prevalent in urban areas (Hervitz, 1985; Lee & Pol, 1993; Lindstrom & Saucedo, 2002). Following this, it has been hypothesized that the fertility and fertility preferences of members of origin populations may be influenced by lower fertility and fertility preferences of returned migrants from areas with lower fertility, especially urban areas, through social learning and influence mechanisms. This hypothesis has received some support in both historical studies of European populations (Creighton, Matthys, & Quaranta, 2012) as well as in at least one contemporary less-developed context (Lindstrom & Muñoz-Franco, 2005).

Such diffusion of fertility and preferences from returned migrants to members of the origin population may occur as a function of direct exposure to different preferences and experiences of migrants, or as a function of the relative position of migrants within members of the origin populations' social networks. For example, tightly interconnected, or dense social networks may exert greater influence over their members' beliefs and behaviors, providing a strong normative context with pressure to conformity (Burt, 1982; Kohler, Behrman, & Watkins, 2001). When more dense networks contain a large proportion of migrants, then, the normative context may be more strongly in favor of views they hold concerning family size and contraceptive practice.

Prior evidence in support of such a hypothesized ideational diffusion mechanism however, has largely relied either on the associations between aggregate rates of return migration and fertility in the historical case, or in the contemporary case, simple measures of social association with current migrants (such as having migrants in the immediate family). In this paper, for the first time, we use data from a unique and extensive social network survey conducted in a high-fertility, rural Senegalese population that has been under continuous demographic surveillance for over 50 years to directly test for diffusion of family size ideals and the moral acceptability of contraceptive use through social networks.

Data and Method

The data used here come from the first panel of the Niakhar Social Networks and Health Project (NSNHP) conducted in 2014. The NSNHP is a large scale social network project conducted in collaboration with the Niakhar Demographic and Health Surveillance System (NDHSS) (Delaunay et al., 2019).[1] The NDHSS is a prospective longitudinal surveillance system maintained for over 50 years by *the Institut de Recherche pour le Développement* (IRD). The NSNHP survey collected information on the presence and characteristics of social network ties across 15 distinct types of interaction, linking both respondents and their network alters to their records in the NDHSS, including full migration histories. The survey also contains an extensive respondent questionnaire covering a number of substantive topics, including fertility preferences and the moral acceptability of contraception. We restrict the present analysis to the subset of the NSNHP data in which all residents over the age of 16 in one village (the 'sociocentric village') were interviewed. This is done in order to test for mediation of any association between the outcomes and migrant exposure through migrant alters' own achieved fertility, health ideation, and beliefs concerning ideal family size and contraceptive acceptability, as well as for interactions with structural characteristics of respondents' networks.

Dependent variables

Respondents (and their network alters, if also resident in the village) were asked a question concerning the ideal number of children they would recommend a newly married couple should have. We model here both numeric vs. non-numeric response ('up to God' or 'don't know) and ideal family size for those giving numeric responses. Next, we consider perceived moral acceptability of contraceptive use, measured through a question as to whether respondents believed married women using contraception were 'respectable', an idiomatic expression for being morally appropriate.

Independent variables

We operationalize exposure to migrants in two ways. In one set of models, we consider the simple proportion of prior migrants to Dakar in respondents' networks. Because migrant adaptation to urban values and norms concerning fertility likely increases with the amount of time they have spent there, in a second set of models we consider a measure of average number of years alters have lived in the capital. Since returned migrants are not the only source of information within social networks concerning urban ideals and beliefs, in all models we also consider exposure to natives of the capital who have not ever lived in the village, operationalized as a simple proportion of network alters. Measures of migrant alters' average number of children ever born, adherence to traditional health and reproduction ideation (Sandberg et al., 2019) and average for each dependent variable are employed to test for meditation. Network density omitting ego (the ratio of ties between two dyads to the total number of dyads possible) and transitivity (the degree to which relationships between one individual and two others imply a tie between the latter two) are used to test for social influence effects in interaction with migrant exposure.

[1] A complete description of project components is available at www.nsnhp.org.

Estimation

For each combination of the three dependent and two migrant exposure variables, we use a nested modeling strategy testing for main effects, and conditional effects controlling for individual characteristics and homophilous network composition (including respondents' age, sex, number of children ever born, educational attainment, household agricultural and material wealth, religion, traditional health ideation, years of migration to Dakar and average residential compound years of migration to Dakar). We then test for mediation of any identified association working through migrant alters' fertility, health ideation and own characteristics for the dependent variable, and social influence effects associated with the interaction between the independent variables and network density and transitivity. All models are estimated with neighborhood fixed effects to control for community level characteristics.

Results

Numeric response to ideal family size (n=1075)

A larger association between numeric response and the proportion of migrant alters within networks is found for males than females in the presence of the controls, with a 12% point greater likelihood of men giving a numeric response estimated between the 5th to 95th percentile of that distribution. Migrant alters' own numeric response had a large effect on numeric response for both men and women (between 7 and 9 percentage points), indicative of a strong social learning effect, mediating 20% the association between proportion of network alters and numeric response for males. Network density and transitivity were found to positively interact with both measures of migrant exposure, which were found to be more responsive in more tightly-interconnected networks, explaining the lack of main effects for either sex associated with average network migration duration. In addition, the proportion of Dakar natives in respondents' networks was strongly associated with numeric response for women, but not men.

Numeric ideal family size (n=521)

Average network duration in Dakar is significantly associated with ideal family size for women (but not for men), the proportion of migrant network alters for both women and men in the presence of the controls. Each year of average migrant experience in women's networks was associated with .37 fewer ideal children, a difference of 1.4 fewer ideal children between the 5th and 95th percentile of average network migration duration. Of interest, inclusion of average network migration duration reduces the main female effect by half and to statistical insignificance, suggesting that a large part of the difference between males' and females' ideal family size can be explained by extrafamilial exposure to migrants. The difference between the 5th and 95th percentile of proportion of network alters is 1.5 ideal children for women, .62 for men. Ideal family size among men, but not women, in contrast, is found to be strongly associated with the proportions of Dakar natives in their networks. None of these associations are found to be mediated. We additionally find a large, significant interaction between network transitivity and average network duration for men, with those in the most transitive networks estimated to have ideal family sizes of 1.5 children less than those with the least transitive networks, explaining in part the lack of a main effect for men.

Contraceptive acceptability (n=1014)

Both the proportion of migrant alters in respondents' networks and average network migration duration among network members are strongly associated with the likelihood of contraceptive acceptability for men, but not women, in the presence of the controls. The proportion of Dakar natives in respondents' networks is also strongly associated with contraceptive acceptability for men, with an 11% point greater likelihood between the 5th to 95th percentile. Each year on average of migration experience in the network associated with a 3.4% point difference in the likelihood of acceptability for men. Approximately 10% of these effects are mediated by migrant alters' own beliefs about contraceptive acceptability. There are large interactions between network density and average network migration for males and females, and between network transitivity and proportion of migrant alters for females, with more dense or transitive networks being more responsive to migrant exposure than networks less so. This explains, in part, the lack of main effects for either variable for women.

Discussion

In this paper, we have found for the first time empirical evidence supportive of strong social learning and influence mechanisms operating through interaction on the individual level associated with ideal family size

and contraceptive acceptability. Estimated effects were found to vary in magnitude between men and women, and with the degree of inter-connectedness of respondents' social networks. In the context of sub-Saharan Africa, where these are among the most important impediments to fertility declines, this suggests that programmatic efforts to encourage diffusion of information about these issues from urban residents and migrants to their social networks in their rural communities of origin communities may have an important impact in accelerating those declines.

References

Behrman, J. R., Kohler, H.-P., & Watkins, S. C. (2002). Social networks and changes in contraceptive use over time: Evidence from a longitudinal study in rural Kenya. *Demography*, *39*, 713–738.

Bongaarts, J., & Casterline, J. (2013). Fertility Transition: Is sub-Saharan Africa Different? *Population and Development Review*, *38*, 153–168.

Bongaarts, J., & Watkins, S. C. (1996). Social interactions and contemporary fertility transitons. *Population and Development Review*, *29*.

Brockerhoff, M., & Yang, X. (1994). Impact of migration on fertility in sub-Saharan Africa. *Social Biology*, *41*, 19–43.

Burt, R. S. (1982). *Towards a Structural Theory of Action: Network Models of Social Structure, Perception, and Action*. Academic Press.

Caldwell, J. (1976). Toward a restatement of demographic transition theory. *Population and Development Review*, 321–366.

Casterline, J. (2001). Diffusion processes and fertility transition: Introduction. In N. R. C. (U. S.). C. on Population & J. B. Casterline (Eds.), *Diffusion processes and fertility transition* (pp. 1–35). National Academies Press.

Creighton, M., Matthys, C., & Quaranta, L. (2012). Migrants and the diffusion of low marital fertility in Belgium. *The Journal of Interdisciplinary History*, *42*, 593–614.

Delaunay, V., Douillot, L., Rytina, S., Boujija, Y., Bignami, S., Gning, S. B., ... Sandberg, J. (2019). The Niakhar Social Networks and Health Project. *MethodsX*. https://doi.org/10.1016/j.mex.2019.05.037

Hervitz, H. M. (1985). Selectivity, Adaptation, or Disruption? A Comparison of Alternative Hypotheses on the Effects of Migration on Fertility: The Case of Brazil. *International Migration Review*, *19*, 293–317.

ICF. (2012). The DHS Program STATcompiler. Funded by USAID.

Kohler, H.-P., Behrman, J. R., & Watkins, S. C. (2001). The density of social networks and fertility decisions: Evidence from south Nyanza district, Kenya. *Demography*, *38*, 43–58.

Lee, B. S., & Farber, S. C. (1984). Fertility adaptation by rural—urban migrants in developing countries: The case of Korea. *Population Studies*, *38*, 141–155.

Lee, Bun Song, & Pol, L. G. (1993). The influence of rural-urban migration on migrants' fertility in Korea, Mexico and Cameroon. *Population Research and Policy Review*, *12*, 3–26.

Lindstrom, D. P., & Muñoz-Franco, E. (2005). Migration and the Diffusion of Modern Contraceptive Knowledge and Use in Rural Guatemala. *Studies in Family Planning*, *36*, 277–288.

Lindstrom, D. P., & Saucedo, S. G. (2002). The Short- and Long-Term Effects of U.S. Migration Experience on Mexican Women's Fertility. *Social Forces*, *80*, 1341–1368.

Rutenberg, N., & Watkins, S. C. (1997). The Buzz Outside the Clinics: Conversations and Contraception in Nyanza Province, Kenya. *Studies in Family Planning*, *28*, 290–307.

Sandberg, J., Park, C., Rytina, S., Delaunay, V., Douillot, L., Boujija, Y., ... Senghor, A. (2019). Social learning, influence, and ethnomedicine: Individual, neighborhood and social network influences on attachment to an ethnomedical cultural model in rural Senegal. *Social Science & Medicine*, *226*, 87–95.

Schoumaker, B. (2019). Stalls in Fertility Transitions in sub-Saharan Africa: Revisiting the Evidence. *Studies in Family Planning*, *50*, 257–278.

Sedgh, G., & Hussain, R. (2014). Reasons for Contraceptive Nonuse among Women Having Unmet Need for Contraception in Developing Countries. *Studies in Family Planning*, *45*, 151–169.

Shapiro, D., & Hinde, A. (2017). On the pace of fertility decline in sub-Saharan Africa. *Demographic Research*, *40*, 1327–1338.

Valente, T. W., Watkins, S. C., Jato, M. N., Van Der Straten, A., & Tsitsol, L.-P. M. (1997). Social network associations with contraceptive use among Cameroonian women in voluntary associations. *Social Science & Medicine*, *45*, 677–687.

Zárate, A., & Zárate, A. U. de. (1975). On the Reconciliation of Research Findings of Migrant-Nonmigrant Fertility Differentials in Urban Areas. *International Migration Review*, *9*, 115–156.