UNIVERSITY OF CALIFORNIA

Santa Barbara

Women's Empowerment and Fertility in West Africa

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Geography

by

Jacqueline Lea Banks

Committee in charge:

Professor Stuart Sweeney, Chair

Professor Kathryn Grace, University of Minnesota

Professor Susan Cassels

Professor Wendy Meiring

September 2019

The dissertation of

Jacqueline Lea Banks

is approved.

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Kathryn Grace

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Susan Cassels

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Wendy Meiring

_____

Stuart Sweeney, Committee Chair

August 2019

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For River

ACKNOWLEDGEMENTS

I would like to express immense, sincere gratitude to all of the following people and organizations for believing in me and investing in this project. I earned this degree with substantial support (educational, professional, emotional, monetary etc.) without which this dissertation literally would not have been possible.

First, I would like to acknowledge the people of Senegal, the people I lived with and encountered in Dakar, the numerous anonymous women and men who participated in my interviews and focus groups, and all of the people who have responded to the Demographic and Health surveys in West Africa. Thank you for your *teranga*, and for letting me learn so much from you.

I would like to thank the Boren Awards program for funding my trip to Senegal and my participation in the African Flagship Languages Initiative (AFLI) program. I would like to thank the West African Research Center (WARC) in Dakar for hosting me and my project and say *merci* and *jerejef* to my French and Wolof instructors there. Thanks to the Broom Center of Demography for providing educational opportunities for me in demography and funding my travel to Population Association of America (PAA) annual meetings. Thanks to the PAA for allowing me the opportunity to share my work and get insightful feedback for improvement. Thanks to the Department of Geography and UCSB for the continued support through this program. Thanks to USAID and The DHS Program for providing access to free, high-quality demographic data in developing countries to students like me. I must also thank my research assistant and translator Mami Ya Cor Ndione for her significant contribution in the field.

I owe a huge debt of gratitude to Stuart Sweeney who has always fulfilled his role as an adviser and a mentor with the utmost integrity. I want to sincerely thank you for accepting me, an admittedly unconventional applicant, into this program, then for continuing to believe in me and provide counsel that always contained a perfect balance of professionalism, levity, information, critique, and compassion. You were always offering help, careful to never do so in ways that were disabling, and as consequence you taught me much about ways of knowing and learning. You seriously deserve some kind of award for mentorship.

I would like to express my deepest appreciation to my dissertation committee, for their service and input in the development of this project and continued support in this accomplishment. Kathryn Grace, your work was an early inspiration for this area of study, I look forward to working with you more in the next years. Susan Cassels, I have enjoyed our conversations inside and outside of the classroom. Wendy Meiring, thanks for your patience and compassion in teaching me statistics, your courses were perhaps the most challenging ones I have taken and the ones where I learned the most. I would also like to thank professors Shelly Lundberg, David Lawson, and Dan Montello whose instruction and coursework were integral to my doctoral education. Special thanks to all my close colleagues and friends from geography including Crystal Bae, Sari Blakeley, Sophia Arabadjis, and Sara Lafia among others.

Many thanks to those who provided support outside of school, enabling me to be present for my work. This includes those who provided affordable housing when I was in need, UCSB's Family Student Housing and all the folks at the Santa Barbara Student Housing Cooperative (SBSHC). This also includes everyone involved with providing childcare this year, namely the Isla Vista Youth Projects (IVYP). And I must include the midwives at the Santa Barbara Birth Center for empowering me through my pregnancy and birth.

On a personal note, I must thank my close friends Stephanie Solis, Chandra Sheppard, Lena Roth, Christiane Ansa, Antonia Morzenti, Trenton Doyle, Hilton Simmet, Kathy Phillips, Travis Taborek, and my sister Rebecca Banks. I am proud of us all for growing and accomplishing so much. I must thank my parents Tim and Suzanne Banks for being incredibly generous with me and sacrificing much in order to give me the opportunity to have the education and accompanying quality of life that they did not receive. I should also thank my husband Evan Crook, for his assistance in editing, coding, and data processing, technical support, domestic labor, financial stability, and loyalty.

Lastly, I am grateful for my child, River. While you were definitely not helpful in the completion of this dissertation, you certainly made it, and everything else, more meaningful.

VITA of Jacqueline Lea Banks
August 2019

EDUCATION

Bachelor of Science in Pure Statistics, University of California, Riverside, June 2011
Master of Arts in Applied Statistics, University of California, Santa Barbara, December 2012
Doctor of Philosophy in Geography, University of California, Santa Barbara, September 2019 (expected)

PROFESSIONAL EMPLOYMENT

2015, 2017: Teaching Associate, Department of Geography, University of California, Santa Barbara
GEOG 141A: Population Geography – Spring 2015, Spring 2017
2013-2019: Teaching Assistant, Department of Geography, University of California, Santa Barbara
GEOG 5: People, Places, and Environment – Fall 2014, Spring 2018, Fall 2018
GEOG 20: Geography of Surfing – Winter 2014, Winter 2017, Spring 2019
GEOG 12: Maps and Spatial Reasoning – Fall 2016
GEOG 109: Economic Geography – Winter 2015
GEOG 172: Intermediate Spatial Data Analysis – Fall 2013
2013-2014: Lab Assistant, Broom Center of Demography, University of California, Santa Barbara
2011-2012: Teaching Assistant, Department of Statistics and Applied Probability, University of California, Santa Barbara
PSTAT 5A: Statistics – Fall 2011, Spring 2012, Fall 2012
2011: Student Intern, National Science Foundation

PUBLICATIONS

Banks, Jacqueline, Scott M. Garrabrant, Mark L. Huber, and Anne Perizzolo. "Using TPA to count linear extensions." Journal of Discrete Algorithms 51 (2018): 1-11.

CONFERENCE PAPERS AND POSTERS

Jacqueline Banks. Partner Collaboration, Family Planning, and Contraceptive Efficacy in West Africa. Presentation at the Population Association of America (PAA) 2018 Annual Meeting

Jacqueline Banks and Stuart Sweeney. The Role of Men's and Women's Agency in Fertility in Dakar, Senegal. Presentation at the Population Association of America (PAA) 2017 Annual Meeting.

Jacqueline Banks, Stuart Sweeney, and Kathryn Grace. The Geography of Women's Empowerment and Gender Inequality in Burkina Faso. Poster at the Population Association of America (PAA) 2015 Annual Meeting.

ABSTRACT

Women's Empowerment and Fertility in West Africa

by

Jacqueline Lea Banks

The objective of this dissertation is to challenge a common assumption in demography and a prevailing development narrative that increases in women's empowerment is a cause of fertility decline. The association between women's empowerment and fertility is studied with a place-based approach in the context of West Africa where fertility rates are high with much variability, and where "empowerment" may not share the same meaning between researchers and research participants.

In "The Geography of Women's Empowerment in West Africa", I test the association between various putative indicators of women's empowerment contained in the Demographic and Health Surveys (DHS) in West African countries, using multivariate methods to identify classifications of empowerment to see if there is evidence of it as a unidimensional phenomenon. I test for spatial association among the empowerment classification (outcome) and determine if responses to women's empowerment questions vary significantly geographically across the region.

In “The Role of Men’s and Women’s Agency in Fertility in Dakar, Senegal” I do a more in-depth analysis of the relationship between agency and fertility focusing on Senegal and its capital region, Dakar. Using an iterative, mixed-methods approach I use fieldwork conducted in Dakar to inform the analysis and interpretation of DHS data, using statistical methods. The results of this study show no consistent significant relationship between women’s and men’s agency and either fertility preferences or fertility outcomes. Furthermore, this study sheds light on a cultural ideal and preference favoring cooperative decision-making over individual autonomy among men and women in Dakar.

In “Partner Cooperation, Family Planning, and Contraceptive Effectiveness” I investigate how the degree of cooperation that women have in their relationships with their partners may influence contraceptive effectiveness by analyzing associations between relationship cooperation and interbirth interval most proximate to the survey date. While this study failed to show an association between relationship cooperation and contraceptive effectiveness, results do show that relationship cooperation has a significant and positive effect on interbirth interval length regardless of contraceptive method use. This suggests that women in more cooperative relationships are better able to successfully postpone pregnancy, particularly when not using contraception.

Overall, this dissertation provides a compelling case against the association of empowerment and fertility in West Africa and compels future work in unpacking the empowerment concept into observable constituents that can be analyzed separately in their possible linkages with fertility. This dissertation also underscores the importance of population geography in conducting place-based research when studying fertility and associated culturally-contingent processes.

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Chapter 1 Introduction

Within demography and fertility studies for the past fifteen years, there exists a pervasive assumption that around the world when women become empowered they will have fewer children (Hartman 2016, Doepke and Tertilt 2018, Presser and Sen 2000, Upadhyay et al 2014). This purported causal link between women's empowerment and fertility decline has functioned as an axiom in the rhetoric of various actors in international development, in academia, government, non-governmental organizations and even the United Nations. Any literature on the subject of this linkage will cite the 1994 International Conference of Population and Development in Cairo as the demarcation of a paradigm shift within the field (United Nations 2014). It was at this conference that women's empowerment, gender equality, and women's health was established as a global priority, replacing the historic neo Malthusian regime that had dominated the past several decades (Presser and Sen 2000). Prior to 1994, there was widespread concern about overpopulation and the possibility of exceeding the world's carrying capacity. The apparent solution was population control in the form of antinatalism. In Cairo, Neo Malthusians were swayed by feminists who fought to establish women's empowerment as this priority with the argument that improvements in women's empowerment was a necessary and sufficient condition of fertility decline (Hodgson and Watkins 1997). Ultimately, this resulted in a consensus between those with the goal of advancing the status, health, and rights of women with those who see these as means to an ulterior goal of population control (Hartmann 2016). In the subsequent years, the world has witnessed a correlation -- both improvements in the conditions of women and the decline of fertility worldwide -- however, evidence for the assumed causal link remains tenuous.

The interdisciplinary discipline of demography is largely empirical; it has little in the way of a theoretical foundation save for the Demographic Transition Theory. This theory states that every society historically existed in a regime characterized by high mortality and high fertility that cancelled each other out resulting in stable population sizes; and that every society undergoes a process – a demographic transition—where mortality declines, followed eventually by fertility decline, and the intervening time results in population growth (Kirk 1996). According to dominant versions of this theory, this process is due to development or modernization of societies. Thus, mortality and fertility decline are considered integral aspects of development. This pattern was observed in nearly every country around the world; however, the societies in sub Saharan Africa remain as the significant exception. While fertility has declined in this region the timing, shape, and pattern of this decline does not follow that predicted by the demographic transition theory (Caldwell et al 1992, Bongaarts and Casterline 2013, Casterline and Odden 2016). Furthermore, fertility rates remain high, particularly in the West African region, and particularly in rural areas. The exceptional heterogeneity of this region, in terms of levels of fertility, aspects of development, and cultural geography makes it an ideal site for identifying any possible linkages between women's empowerment and fertility. It is in this context, which defies the demographic transition model, where one could best test other theories regarding determinants of fertility.

While there exists a well-developed suite of methods for the measurement and analysis of fertility, there does not exist a similar foundation for the study, measurement and analysis of women's empowerment. Meaningful study of the association between constructs requires valid measures. Thus, a major component of this dissertation involves an interrogation into the women's empowerment concept, operational constructs, the analysis of empowerment

data and interpretations of results that arise from these sources. Women's empowerment is an elusive concept rooted in a particular geographically situated ideology. Its emergence comes from a belief system that values women's agency and freedom of choice as an ideal, and equates the attainment of that with societal progress. I believe the intentions in the promotion of this ideal are noble, however it is important to question the universality of such a construct. As a population geographer, I know that place matters; constructs developed in one place should not be applied blindly to other places without consideration of the local context. Yet there is a desire or need among researchers and policy makers to be able to define, measure, and compare this construct across places. Due to the elusiveness of the construct, the best definitions of empowerment are likely to be the most difficult to operationalize and measure. While there is no consensus, technical definition of empowerment, a popular one, described later in this dissertation focuses on agency at its core (Kabeer 1999, 2005). This definition adds precision to help identify what is part of empowerment, such as who makes important decisions in a household, and what is not, such as education, wealth, employment, or opinions about certain topics. However, a narrow definition of empowerment may run counter to the spirit of the feminist rhetoric promoted in 1994 in Cairo, which aimed to improve many aspects of women's lives and not just those that pertains to individual agency; and its accompanying claims that it is in its improvement that we will see fertility decline.

My personal motivation in conducting this line of research, as a feminist, statistician, demographer, population geographer, and woman, comes from a sincere interest in women's wellbeing and women's reproductive freedom as a human right. I am concerned about the use of women's empowerment rhetoric as justification for antinatalist, pronatalist, or

population control measures that inherently infringe on women's reproductive freedom. I hope that concern for women will persist long after it no longer shares goals with neo-Malthusians. I am also concerned about the treatment of women as the subject of study in research in demography/fertility and the assumptions that are made by researchers about women that can both dehumanize women and impede the efficacy and usefulness of resulting research (Watkins 1993, Presser 1997). Understanding of human fertility and its associations requires a more careful understanding into other interconnected aspects of people's lives.

The objective of this dissertation is to challenge the putative causal link between women's empowerment and fertility in West Africa, which constitutes a pervasive development narrative. I do this using a combination of data sources and varied statistical methods to test specific hypotheses included in that development narrative, and hypotheses that arise from the resulting line of inquiry. Note that although my intent is to challenge the causal link, none of the models or results in this dissertation support a strict causal interpretation. This is primarily because of limitations in available data sources. While my results are not causal, it is still possible to use analysis to interrogate the putative causal link because they falsify hypotheses of association.

In chapter 2, I use data explicitly intended to measure empowerment to learn two things. The first is whether there are observed natural groupings in the responses to numerous empowerment indicators to suggest the existence of a common underlying unidimensional empowerment phenomenon. The second is if the way women answer the empowerment questionnaire could be better explained by geographic place, and if there is a spatial association among the empowerment data. This is accomplished using three stages of data

processing and analysis. First, I use a k-modes clustering algorithm, an unsupervised multivariate method intended for big data, to categorize observations into natural groupings. Then I map the resulting cluster assignments to visually assess spatial patterns. Finally, I used Bayesian structured geo-additive regression models to test for a spatial association in women's empowerment data while controlling for sociodemographic indicators to rule out the possibility that spatial variation in empowerment data can be explained by population composition effects. This study does identify a significant spatial association among the empowerment survey data, suggesting either that women's empowerment may manifest differently in different places, or that the survey questions intended to indicate empowerment might instead be picking up regional variation in culturally-embedded practices and understandings.

Chapter 2 inherently argues for place-based, contextually embedded research on connections between empowerment and fertility. It is consistent, therefore, that the following substantive chapter focuses on an individual country, Senegal, with primary data collected only in Dakar. Chapter 3 approaches the empowerment-fertility nexus using iterative mixed methods that inform each other to test the association between women's and men's agency and their fertility preferences and fertility outcomes. This study uses insights from first-hand fieldwork in the capitol region to inform the analysis and interpretation of a secondary, nationally representative data source. A major finding emerging from my fieldwork suggests the existence of a place-based cultural ideal surrounding cooperative decision-making among spouses/partners that is preferred in this region over individual agency. Additionally, the conclusions derived from the fieldwork suggests that household decision-making questions may be poor proxies for empowerment and the linkages between empowerment and fertility

are likely tenuous at best. Using a series of generalized linear models, I show that indeed there is no consistent link between agency and fertility preferences or outcomes for either men or women.

Inspired by the insights provided in chapter 3, in chapter 4 in lieu of moving forward with the empowerment-as-individual-agency concept, I examine the degree of cooperative decision-making between couples. I test a hypothesis that the contraceptive efforts will be more effective among women in relationships with a higher degree of cooperative decision-making. The idea being that contraceptives, particularly natural methods, may be more effective with a more cooperative partner. Although I do not find substantial evidence for a difference in contraceptive effectiveness, I stumble upon a more interesting result: When using no contraceptive method, women in more cooperative relationships have longer interbirth intervals than those in less cooperative relationships.

In chapter 5, I provide a discussion and summary of the results found in this dissertation. I make conclusions about the associations between empowerment and fertility in West Africa. I discuss limitations of the available data and recommend future paths of research and inquiry.

Chapter 2: The Geography of Women's Empowerment in West Africa

2.1 Abstract

Women's empowerment has been a subject of interest to the United Nations and numerous government agencies and NGO's because of its understood importance and links to development, particularly in West Africa.

In this study I address two research questions: 1) How does women's empowerment manifest itself and does it spatially vary in a systematic way across West Africa? 2) To what degree does place/region provide a systematic signal for the level of women's empowerment relative to the socioeconomic- demographic characteristics of the population?

This study uses Demographic and Health Survey data from 14 West African states over the past decade and uses statistical methods to analyze indicators of women's empowerment and its spatial variability across the West African region. First, I use cluster analysis, a multivariate method, to analyze variation in responses to numerous survey questions putatively indicating women's empowerment and categorize individuals into empowerment "clusters" which represent groups of individuals at a similar stage of empowerment. Next, the cluster assignments are mapped to visually assess spatial patterns. Finally, addressing the second research question I use a structured geo-additive regressive model to analyze empowerment clusters as a function of geographic location while controlling for socio-demographics including education level, household income, urban/rural and age.

Since women's empowerment is likely culturally structured, and since cultures vary geographically, I hypothesize that women's empowerment in this region also varies

geographically and that geographic place is important in explaining variation in women's empowerment even when other socio-demographic indicators theorized to relate to empowerment are statistically controlled for in the model.

2.2 Background

In the past half century there has been immense international interest in the development of West Africa, often with the putative goals of women's empowerment and gender equality. The International Women's Conference in Mexico City in 1975 declared it the International Year of Women and the beginning of the International Decade for Women (Kandeh and Kannon 2005). From the third UN Women's Conference in Nairobi in 1985, which focused on placing gender at the center of development, came The *Nairobi Forward-Looking Strategies for the Advancement of Women* which proposed a handful of specific goals for development (ibid). The United Nations Conference on Population and Development (ICPD) in Cairo in 1994, marked a paradigm shift in the international population community where women's empowerment replaced neo-Malthusian rhetoric as a top concern in population and development (Presser and Sen 2000).

Women's empowerment, women's status, and gender inequality are three terms that are widely used in the contexts of development and demography. They are used as criteria for ranking countries, as objectives of international aid and development projects, and are studied with relation to other demographic phenomena. It would therefore be useful to be able to measure and quantify these concepts. However, since none of these concepts are obviously directly measurable this involves developing operational measures of each latent

variable through some meaningful manifest variables. This requires clear definitions in order to ensure face validity (Montello and Sutton 2006).

Although authors define women's empowerment differently, there is a general consensus in the literature that any definitions should include ideas of both "process" and "agency". Kabeer (2005) offers the most thorough conceptualization of empowerment as "the process by which those who have been denied the ability to make choice acquire such an ability". Shuler et al. (2010) defined empowerment as "women's acquisition of resources and capacities and the ability to exercise agency in a context of gender inequality". This definition explicitly includes agency, resources, and the process by which women gain both of these. Kishor (2000) operationalizes empowerment as a process by separating the "settings" and "sources" of empowerment from "evidence" of empowerment, explaining that the settings and sources of empowerment do not represent empowerment directly but rather, represent the tools necessary for one to become empowered. In other words, they can be seen as precursors of empowerment, and indicative of the potential beginning of the process. In a review of many demographic studies measuring empowerment as a variable in international development Malhoutra and Schuler (2005) found that women's empowerment differed from other terms like "women's status" because of the two defining features of process and agency. Thus, for the purposes of this research I will define women's empowerment as *the process by which women gain agency, where agency is the power to make meaningful choices* (Kabeer 1999, 2005).

Although some authors have included indicators like paid labor and education as measures of empowerment, based on the aforementioned definition, these are not actually direct measures

of empowerment but rather would fall into the category of potential *resources* for empowerment. Resources are enabling factors for empowerment (Malhoutra and Schuler 2005), preconditions for empowerment (Kaber 1999) and are the medium through which agency is exercised (Kabeer 2005). A woman could have plenty of resources but not necessarily utilize them in order to undergo the process by which she would gain agency, but this process is something that is prohibitively difficult to do without resources. Therefore, my previous definition of empowerment implicates resources as a necessary but not sufficient precondition of empowerment (Kabeer 1999). Resources include anything that a woman could use to exercise agency. This includes education, political and legal awareness, economic security, paid labor, and self-efficacy (Schuler et al. 2010). Access to resources reflects the institutions which give certain actors the power to distribute resources (Kabeer 1999).

Women's status on the other hand, is completely different from women's empowerment. In demography the term *women's status* has been used to refer to many different things such as prestige, power, access to or control over resources, female autonomy, patriarchy, women's rights and men's situational advantage. When the term is used to describe the status of women in comparison to men this could be better described as *gender inequality*; otherwise this usage may do a disservice to women by implying that they are defined in opposition to men. Instead, the term "women's status" should be used to describe the difference among women in terms of power, prestige, or socioeconomic status. The failure to make the distinction between measurements of gender inequality and women's status has led to the confounding of class and gender (Mason 1986). By using the same term to refer to a woman's socioeconomic position compared to men or compared to other women it is unclear

whether any effect of her "status" is due to her class or gender when it is likely both. For example, PAMBÉ et al. (2014) analyzed the relationship between women's socioeconomic status and measures of empowerment. In contrast, Weitzman (2014) compares the status of women and men using educational level, participation in paid labor, and individual income as the basis for comparing the status of women to their husbands where, because comparisons were made between the statuses of spouses, these are actually measures of *gender inequality.*

Women's status and women's empowerment are not necessarily linked, and an increase in women's status does not necessarily lead to women's empowerment. Although a women's status can be related to her resources, the difference is that status is not necessarily an enabling factor or a mechanism that can potentially lead to empowerment. For example, in urban Burkina Faso a women's status -- her prestige, esteem and respect in her community -- is connected to her fertility in that women gain more prestige and respect by becoming mothers and having many children (Van de Walle and Ouaidou 1985). Because women in this context have solely this avenue as mothers to gain status, and choice implies the possibility of alternatives, the status they achieve in this way does not translate into resources for empowerment (Kabeer 1999).

It is important to note that women's status, gender equality and women's empowerment are multidimensional and these dimensions may not necessarily correlate. A woman could have a high status or be empowered in one dimension but this does not necessarily correspond to other dimensions. Empowerment and status also varies over a woman's life cycle (Mason 1986, Malhoutra and Schuler 2005).

Although women's subordination to men is essentially ubiquitous in patriarchal societies, what is different about the women in West Africa is that their subordinate status is intensified by a combination of national underdevelopment, poverty, food instability, a long history of local patriarchal cultures, a shorter history of European colonization with its own patriarchal culture, post-independence political instability, high fertility rates, urbanization and westernization. A study of the cultural attitudes toward women and of women's behavior in West Africa is challenging not only because of the region's ethnic and religious diversity but also because of the region's complex cultural geography. Historically, ethnic groups have resided in specific regions, but these do not correspond with today's administrative boundaries. Women's subordinate status is a product of local culture, which, inarguably, varies geographically.

If women's empowerment were a cultural phenomenon then one would expect that in accordance with cultural diffusion theory, it would spread geographically (Fellman et al. 2013). This would mean that ideas, attitudes, and practices of women's empowerment would spread from person to person so that they would emerge in a geographic place more and more and then spread to other places either close in proximity or over communication or migration networks. This acculturation process would be happening over heterogeneous space; as places have associated histories and institutions, certain barriers and facilitators of diffusion would emerge adding further variation to the spatial manifestation of women's empowerment as a cultural trait. Thus, if women's empowerment were due to culture rather than being merely a consequence individual level variation in education, income, or employment, than we would see a geographic pattern reflecting this because cultures are geographically situated. If women's empowerment is due to these demographic

characteristics than I would expect to see a clear distinction between rural and urban areas without seeing more regional variation. However, I expect that the observed pattern will not be purely a rural/urban difference but rather that women's empowerment may have more systematic geographic variation in other ways such that the pattern in how people answer the women's empowerment indicators may differ in different regions reflecting the different values, attitudes, or practices in those regions.

It seems reasonable to expect resources like education, household income, and earned wages to relate to individual variance of women's empowerment since, as described in the background section of this chapter, resources are theorized to be enabling factors for empowerment. These resources could be thought of as necessary but not sufficient conditions for empowerment to be exercised. However, given the indicators used in this study for empowerment, it is possible to see weak relationships between these resources and certain empowerment indicators. Although having money is likely necessary to carry out decisions such as household purchases or visiting family and friends, having negative attitudes towards domestic violence or believing that women have rights does not cost money. Conversely, education can be framed as a resource that enables a woman to have these opinions about wife-beating and the right to refuse sex if the learning that took place in school either opened women's minds to be able to form progressive opinions, or if they learned ideals of women's empowerment in schools.

2.3 Research Question

In this chapter, my principal research question is: How does women's empowerment manifest and vary geographically in West Africa? In answering this I address a more

fundamental question: What exactly is women's empowerment in West Africa, and how can it be best measured?

In order to address the question of how women's empowerment varies geographically, I need some way of measuring the multidimensional construct underlying women's empowerment. Doing this requires an examination of how women's empowerment is measured using manifest variables of empowerment and assessing how well these manifest variables actually reflect the latent variable of interest. Women's empowerment is a concept that is deceptively tricky to measure for more reasons than are obvious. The first reason is because it is often poorly defined. In the previous section I describe one specific working definition, however it is likely that the word carries much meaning that perhaps relies on its ambiguity. In that previously posited definition, women's empowerment is described as a process by which a woman gains agency, where agency is the ability to make meaningful choices. Therefore, if we followed this definition of empowerment, only data that represents women's decision-making process would be meaningful indicators of empowerment. However, it is telling that the MeasureDHS Demographic and Health Surveys have indicators that are explicitly intended to relate to "women's status and empowerment" including but not limited to: Women's experience of various forms of gender-based violence, women's opinions on whether a woman can refuse sex to her husband and when violence against women is justified, and women's participation in household decisions (Kishor and Subaiya 2008, DHS Program 2014). I would argue that only the latter is truly an indicator of women's decision-making, albeit an imperfect one. However, I think that most would agree that the other measures would be informative about a woman's position in her society, about her quality of life, or about the advancement of women if not an indicator of empowerment in the most

technical sense. Although a good operationalization of a construct requires a specific definition, the danger in constructing a definition that is too narrow is the censoring of data that could otherwise be informative in indicating what was contained in the original spirit of the construct. In other words, if the concept of women's empowerment emerged within population studies out of concern for the women's quality of life as a historically subordinated population and women's advancement, then empowerment might not just be about individual agency, and measuring it should encompass more than just indicators of personal agency. Rather than starting with a specific definition of empowerment and then finding indicators that measure just that, it is more useful and interesting to start with many indicators that likely reflect empowerment in its broader understanding and then subsequently create a more precise definition of what empowerment is based on those results. This approach has two immediate benefits. It permits using more available data, and with this extra information I can learn more about the phenomena of interest. Secondly, creating a definition out of empirical results allows researchers to define empowerment in ways that are place-specific. Since what constitutes women's empowerment is likely to be geographically context-specific, this approach would allow me to arrive at a context specific definition.

The goal is that through the proposed operationalization of empowerment, which is based on available secondhand data that was intended to indicate women's empowerment, I will be able to better describe what women's empowerment is in the West African region by how it manifests itself in the data. Then, using this operationalization and understanding of women's empowerment I can analyze its geographical variation across the region. In doing this I can determine how much of the variation in women's empowerment is explained by geographic place as opposed to other individual attributes and answer another timeless question in the

field of geography: Does geography matter? More precisely: Is geographic place important in explaining variation in women's empowerment when all else is held constant?

2.4 Data

The data used in this study come from The Demographic and Health Surveys (DHS) Program which conducts surveys across the developing world in collaboration with participating countries and is funded largely by the United States Agency for International Development (USAID). I will be using data from 19 nationally representative surveys conducted in the past decade in fourteen West African states: Benin (2011-12, 2017-2018), Burkina Faso (2010), Cameroon (2011), Cote D'Ivoire (2011-12), Gambia (2013), Ghana (2014), Guinea (2012), Liberia (2013), Mali (2012-13), Niger (2012), Nigeria (2013), Senegal (2017, 2016, 2015, 2014), Sierra Leone (2013), and Togo (2013-14). These surveys have large sample sizes ranging from 5,000 to 30,000 households. The DHS uses a stratified, two-stage probability sample design where within each stratum a primary sampling unit is selected which forms a survey cluster, and then households are randomly selected from within each survey cluster. Women from each household answer a long questionnaire that includes information regarding health, wealth, and demographics. However, there are several sets of questions in the survey that are of particular interest in this study because they were included in the survey with the explicit intention of soliciting information about women's status and empowerment (Kishor and Subaiya 2008, DHS Program 2014).

One is a set of questions regarding household decision-making. Women were asked who usually makes decisions about: a) her own health care, b) large household purchases, c) visits to family or relatives, and d) what to do with money her husband earns. Possible responses

for each can be any of the following: 1) the respondent makes the decision alone, 2) her and her husband make the decision together, 3) their husband makes the decision alone, or 4) someone else makes that decision. In the question regarding the money husbands earn, they can also respond that their husband has no earnings.

A second set of questions has to do with attitudes towards domestic violence. Women are asked if, in their opinion, a husband is justified in hitting or beating his wife in each of five proposed situations: a) if she goes out without telling him, b) if she neglects the children, c) if she argues with him, d) if she refuses to have sex with him, and e) if she burns the food. For each of these five questions the respondent can say either "yes", "no" or "don't know". There is another question included in the survey asking women when they believed women are justified in refusing to have sex with their husbands. In the standard questionnaire this question asks "Is a wife justified in refusing to have sex with her husband when she knows he has sex with other women?" to which the woman can respond with either "yes", "no" or "don't know". Other variations of this question are included in country specific surveys where each question asks about a certain situation and whether a woman can refuse sex in that situation.

Women are asked if they own a home or land and for each, if they own this property alone, jointly, or both. They are also asked if they work, and if they work if they are paid in cash, in kind, or not paid at all. If they have earnings they are asked if they think the money they earn is more than what their husband/partner earns, less, or about the same. They are also asked, similar to the household decision-making questions, who in the household makes decisions about how her earnings are used. She can respond that she alone decides, that her and her

husband/partner decide together, or that her husband/partner or someone else makes this decision.

Some of the country-surveys feature a domestic violence module which is a supplementary survey that contains much information regarding women's experience with domestic violence. First is a set of questions about "control issues" that indicate some more subtle ways that women are perhaps controlled by their husbands or partners. These questions pose situations where men are exerting control over their wives and ask if she has experienced them: a) He is jealous or angry if you talk to other men b) He frequently accuses you of being unfaithful c) He does not permit you to meet your friends d) He tries to limit your contact with your family e) He insists on knowing where you are at all times f) He does not trust you with money. The domestic violence module also asks about emotional abuse, sexual abuse, less severe violence, and more severe violence in a series of questions asking women about very specific acts of violence in the past 12 months. Acts of emotional abuse include being humiliated or threatened with harm. Acts of sexual abuse include being physically forced into unwanted sex or being forced into other unwanted sexual acts. Acts of less severe violence include being pushed, shook, had something thrown, slapped, punched with fist or hit by something harmful, or had arm twisted or hair pulled by husband/partner. Acts of severe violence include being kicked or dragged, strangled or burnt, or threatened with knife/gun or other weapon. The domestic violence module may also include country specific questions in the survey asking about other forms of emotional, sexual, or physical violence in certain countries.

Each observation, meaning the responses for each woman interviewed, is associated with a primary sampling unit (PSU), and each PSU has an associated geographic coordinate. The number of women that share a set of coordinates ranges from roughly 15 to 100 women. In addition, to protect participant anonymity, the geographic coordinates are not exact locations but are instead randomly offset by up to two kilometers in urban regions and five kilometers in rural regions. Since the geographic range of my analysis is the entire West African region and I am interested in broad patterns of coherence in the spatial pattern, the random error imposed on the coordinates should not hinder interpretation. Note that geographic coordinate data are not collected in the Gambia survey and are collected but not distributed for the surveys in Niger. Therefore, the data from Niger and Gambia are included in the cluster analysis but not included in the mapping of those clusters or the geo-additive structural regression.

Although there is an abundance of data available that could potentially be used to address my research questions, these datasets have many missing values, which poses an important problem. The core questionnaire is updated every several years and the data I will be using come from phase 6 (2008-2013) and phase 7 (2013-2018). The DHS works with each country individually to conduct a survey that will be appropriate and relevant for that country at that time. Thus, only some of the country-surveys actually contain the domestic violence module and individual questions from the core questionnaire may be either excluded or individual country-specific questions may be added. While most questions are asked of the entire sample of women or men, some questions are only asked of women or men who say they are married or in a cohabiting relationship. For instance, asking women if they earn more than their husband/partner only makes sense when asking women who have a

husband/partner and who earn an income. Similarly, only women and men in relationships are asked the household decision-making questions. Another inevitable source of missing values comes from the fact that respondents can skip a question for whatever reason. For these reasons, the missing values cannot be considered to be missing at random.

Table 1 features a diagram indicating the data available for analyzing women's empowerment in the region and the degree of missingness. Green represents questions with essentially no missing values for that survey, red indicates a question that was not included in that survey, or data that are completely missing from that survey, and yellow indicates missing values for a sizable portion of that sample. I have chosen for the purposes of this dissertation to select a smaller sample comprised of just a subset of the survey questions and a subset of the sample such that I have no missing values. This is because the clustering method used, described in the following section, is not suitable for use on data with missing values. Thus the methods and analysis described in the rest of this chapter uses only the survey questions regarding justifications of wife beating, household decisions, and if a woman is justified to refuse sex from her husband. The full sample, 234,620 respondents, is reduced to the subset of those with responses to each of those questions 145,971 respondents. Data from Gambia and Niger are used in the clustering algorithm, described in the methods section, but are not used in the subsequent stages of analysis because of the lack of geographic data. This study is a first step in analyzing the association of indicators for women's empowerment across the region, and later studies with smaller geographic scales can use more of these empowerment indicators.

2.5 Methods

I conduct the data analysis in this study in three stages. The first stage uses multivariate statistical cluster analysis on the empowerment data, in order to identify patterns in responses to empowerment questions and categorizes respondents into levels or types of empowerment. In the second stage, I construct a map of the West African region depicting the resulting empowerment clusters and do a simple visual analysis of geographic patterns. The third stage consists of using a statistical model to describe variation in an individual's membership in an empowerment cluster, in terms of socio-demographic characteristics and geographic location. The model used is a multinomial structured geo-additive regression (STAR) model which supports controlling for both socio-demographic factors and a spatial-structured random effect.

2.5.1 Stage 1 – Cluster Analysis

Cluster analysis is a class of methods that are used to categorize observations into one of several natural groupings or “clusters”; it differs from other multivariate classification methods in that it makes relaxes assumptions about the group structure or number of groups (Johnson and Wichern 2007). Clustering in general does not result in optimal solutions across all loss functions because the choice of clustering criteria is subjective and there are many clustering algorithms that use different criteria, have different advantages or disadvantages, and will produce different results. All clustering algorithms are based on calculations of “distance” from an observation to the clusters and then observations are assigned to the cluster that minimizes that distance. For this reason, clustering algorithms can be computationally costly because they often involve creating a large matrix of pairwise

distances between observations. Because my empowerment data are all nominal categorical variables, options for clustering algorithms and distance metrics available are limited.

In my analysis I chose to use an algorithm called k-modes. K-modes is a non-hierarchical method developed by Huang (1997) and is an adaptation of the better-known k-means developed by MacQueen (1967) (Johnson and Wichern 2007). The main advantages of using the k-modes algorithm is that it is intended for use with nominal data and it is computationally fast because it does not require a distance matrix. This algorithm works by comparing the "distance" of each observation to each of k different "modes" using a simple matching distance, counting the number of mismatches in all variables between an observation and a mode. This algorithm has several disadvantages. The main disadvantage is that it requires a predetermined, fixed number of clusters, k. Compared to hierarchical algorithms, it may be difficult to control the size of clusters. Its treatment of missing values is not ideal, it treats them as another nominal level. Lastly, the algorithm requires specification of k unique initial "modes" which can either be predetermined by the user or can be randomly selected from observations in the data.

I exploited this last aspect of the algorithm by priming it with five initial modes that are conceptually meaningful (see Table 2 for the values of the initial modes). The first corresponds to answers I would expect from a woman who is "more empowered", who says she makes decisions together with her partner, who does not support any of the justifications of violence, and who believes a woman is justified to refuse sex if her partner has other women. The second represents a "less empowered" woman who provides opposite responses from initial mode 1. The third represents what I will call the "modal empowered" woman,

this is constructed from the most frequent responses to each question: “no” for all justifications of violence, “partner” for all household decision questions, and “yes” for justification to refuse sex. The fourth represents a very “autonomous” woman with responses similar to initial mode 1, but who makes decisions on their own instead of with a partner. The fifth is a residual category “other” comprised of all the neutral responses: “don’t know” for the justifications of violence and refusal of sex questions and “other” for the household decision-making questions. As the algorithm iterates through each observation and categorizes each into one of the k=5 modes, these modes may change so while the initial modes may prime the categories to be meaningful, the resulting classification need not necessarily match these initial constructs.

2.5.2 Stage 2 – Mapping

After assigning respondents empowerment cluster classifications, I use this information and the geographic data provided by the DHS to construct a map of the West African region to depict empowerment and enable a simple visual assessment. Latitude and Longitude coordinates of each DHS primary sampling unit (PSU) are represented as a point on the map and the color of that point represents the relative share of respondents from that PSU that are assigned to each of the three most frequent empowerment cluster assignments. In my preliminary analysis modes 1, 2, and 3 remained unchanged during the clustering analysis and also correspond to the three most frequent empowerment clusters. Therefore, I refer to each of the corresponding clusters by their conceptually meaningful descriptions. Using blue to represent empowerment cluster 1 ("more empowered"), red to represent empowerment cluster 2 ("less empowered"), and green to represent empowerment cluster 3 ("modal

empowered") on the map, these three colors are blended at each PSU to convey the relative proportions of respondents from this PSU that were assigned to each empowerment cluster. This kind of map conveys a dense amount of information easily in one image.

2.5.3 Stage 3 – STAR Model

As the final stage of analysis, I fit a multinomial structured geo-additive regression (STAR) model to the data to examine the association between geography and empowerment while controlling for demographic covariates (Fahrmeir et al. 2004, Fahrmeir and Lang 2001, Kamman and Wand 2003). In this model, for each respondent, the response variable is their empowerment cluster assignment; the explanatory variable of interest is represented as first level administrative region within countries, and control variables consist of respondent's age, education level, household income quintile, and an indicator of rural/urban residence. I analyze only the subset of respondents assigned to one of the three dominant empowerment clusters. Using the DHS supplemental data I associate each PSU with a first level administrative region and use these regions to indicate geographic location in the model. The appeal of using a STAR model is that it very flexible: It can be used to model non-linear effects, spatial effects, and allows extension for modeling nominal, categorical responses (Umlauf et al. 2015). The model used in this study models empowerment cluster assignments as a 3-category multinomial distribution using a logit link function. Model parameters are estimated using Markov Chain Monte Carlo (MCMC) simulation techniques. The association with age is estimated using a non-linear p-spline and the other demographic indicators are included as fixed effects. The model is fit using an R package called R2BayesX which is an R interface to BayesX software (Umlauf et al. 2015, Belitz et al. 2017).

The model specifications follow a similar problem set forth by Kazembe and Namangale (2007). Let $j \in \{1, \dots, J\}$ represent region and $i \in \{1, \dots, n_j\}$ represent the i^{th} respondent within region j. Let $\boldsymbol{Y}_{ij} = (Y_{ij1}, Y_{ij2}, Y_{ij3})'$ be a random vector whose observations each contain one "1" to represent the assigned category for respondent i, in region j as well as two zero's for the other categories. Let the observation of $Y_{ijk} = 1$ if represent respondent i, in region j, is assigned to empowerment cluster $k \in \{1,2,3\}$, in which case the observation of $Y_{ijl} = 0$ for each $l \neq k \in \{1,2,3\}$. Let π_{ijk} equal the probability that $Y_{ijk} = 1$, for each $k = 1,2,3$. For reasons explained in the first paragraph of the analysis section, I only consider respondents in the dominant three categories, so $k = 1,2,3$ and $\sum_{k=1}^{3} \pi_{ijk} = 1$ for each i, j. For comparison, I set $k = 3$ as the reference level. I assume that $\boldsymbol{Y}_{ijk}$ follows a multinomial distribution denoted as $Y_{ijk} \sim Multinomial(1, \pi_{ij})$, where $\pi_{ij} = (\pi_{ij1}, \pi_{ij2}, \pi_{ij3})'$. Let x_{ij} be the row vector containing the values of the covariates income, rural/urban, and education as factors. Specifically in my model, let $x_{ij}[c]$ be the c^{th} element in vector x_{ij}. The first four elements encode levels of income, with reference category "poorest", $x_{ij}[1] = 1$ indicating "poorer", $x_{ij}[2] = 1$ indicating "middle", $x_{ij}[3] = 1$ indicating "richer" and $x_{ij}[4] = 1$ indicating "richest". The fifth element encodes urban residence (reference = rural), and elements 6 to 8 encode education (reference = "none"), $x_{ij}[6] = 1$ is "primary", $x_{ij}[7] = 1$ is "secondary" and $x_{ij}[8] = 1$ is "higher". Let a_{ij} be age, and s_{ijk} be a spatial effect for region j in cluster k. I assume a Markov Random Field structure on s_{ijk} for each category $k \in \{1,2,3\}$, using the default neighborhood definition in R2BayesX. The multinomial probabilities are modeled as

$$\pi_{ijk} = \frac{\exp(\eta_{ijk})}{1 + \sum_{l=1}^{k} \exp(\eta_{ijl})}, k = 1,2,3$$

where,

$$\eta_{ijk} = x_{ij}\beta_k + f(a_{ij}) + s_{jk}$$

With the logit link function relative to empowerment cluster 3, $\eta_{ijk} = \log\left(\frac{\pi_{ijk}}{\pi_{ij3}}\right)$ for each $k \in \{1,2\}$, whereas for $k = 3$: $\pi_{ij3} = 1 - \sum_{k=1}^{2} \pi_{ijk}$. With this model, for each $c \in \{1, \ldots, 8\}$ I interpret $\exp(\beta_k[c])$ as the relative odds ratio of $\frac{\pi_{ijk}}{\pi_{ij3}}$ with respect to the reference categories income = "poorest", residence="rural" and education = "none". This statistic is similar to an odds ratio but adapted for the multinomial case (Kazembe and Namangale 2007). I use the default priors, neighborhood definition, and hyperparameter settings in R2BayesX version 1.1-1 within a fully Bayesian analysis

In order to determine the importance of a spatial effect on women's empowerment, this model will be compared with a null model with no spatial component where:

$$\eta_{ijk} = x_{ij}\beta_k + f(a_{ik})$$

These models will be compared using the deviance information criterion $DIC = \overline{D} + p_D$ where $\overline{D}$ is the posterior mean deviance in a Bayesian model and p_D is the effective number of parameters when this number is not clearly defined (Spiegelhalter et al. 2002). A smaller value of DIC indicates a better fit.

2.6 Results

The resulting modes of the k-modes algorithm, as seen in Table 2 are almost identical to the initial modes the algorithm was primed with. The sizes of the first three modes, representing "more empowered", "less empowered", and "modal empowered" have a fairly even distribution between them and include the majority of the sample of 145,971 with 43,120, 44,325, and 48,821 respondents assigned to each cluster respectively. The 8,848 respondents assigned to clusters 4 ("autonomous empowered") and 857 respondents assigned to cluster 5 ("other") represent a small minority of the sample, so the remaining analysis focuses on the other three. The "modal empowered" cluster is used as the reference level in the model for the response as described in the previous section.

The three empowerment clusters are depicted on a map of the West African region in Figure 2. In this map, a blue point represents a primary sampling unit (PSU) where more respondents are classified as "more empowered", a red point represents a PSU where more respondents are classified as "less empowered" and a green point represents one where more are classified as "modal empowered". These colors are blended such that it is easy to visualize the proportion of the population of a PSU that is classified into each empowerment cluster. A violet point represents one that is half "more empowered" and half "less empowered", a turquoise point is half "more empowered" and half "modal empowered", a mustard yellow point is half "modal empowered" and half "less empowered" and a point with equal proportions of all three clusters is brown.

Using this map, it is evident that there is a clear spatial pattern underlying the empowerment data, and that this pattern transcends administrative boundaries at both a country and subnational level. There is a belt of "more empowered" along the southern coast, namely in

Liberia, the southern half of Sierra Leone, throughout Ghana, the coast of Togo and Benin, the southern half of Nigeria, and eastern Cameroon. The “less empowered” are congregated in the north-western part of the region, notably in Guinea, inland Senegal, and southern Mali. The “modal empowered” are scattered in various concentrations on the map but there are prominent clusterings within Burkina Faso, Benin, Togo, eastern Cote D’ivoire, and coastal Senegal. Rural and urban differences are apparent but weak. While many of the urban areas appear on the “more empowered” end of the spectrum, there are several notable exceptions. Conkary, Guinea and Bamako, Mali appear to have concentrations of “less empowered”, however these seem to reflect the populations in the encompassing country as well. The urban centers of Abidjan, Cote D’Ivoire and Koudougou and Ouagadougou in Burkina Faso appear mixed but towards the “modal” end of the spectrum. All of the major urban areas in Senegal including Dakar, St. Louis, and Ziguinchor appear “modal” which is notably different -- interpretably more empowered -- than the rest of the country, which is “less empowered”. Thus, this lends support to the notion that women in urban areas may respond to empowerment questions differently or may be more empowered than those in nearby rural areas. However, all urban areas are not consistently more empowered than all rural areas across the map. Although clear spatial patterns are apparent on this map, this information alone is not enough to conclude that geography is solely associated with women’s empowerment because it does not take into account the degree to which empowerment-related demographic or socioeconomic characteristics systematically vary by place. Or put differently, the map in figure 1 may simply reflect population composition effects rather than place/culture effects.

However, the results of the multinomial STAR model do provide evidence of a spatial pattern with women's empowerment while controlling for age, income, education, and whether the region is urban or rural. Posterior mean estimates of the elements of β_k, together with 95% credible intervals are shown in Table 3. Estimates of the smooth function of age are best depicted as a graph (Figure 2) and estimates of the Markov random field spatial variances are depicted as a map (Figure 3). The number of MCMC iterations used in simulating the posterior distribution for this chapter is 12,000 including a burn-in period of 2,000. I used a thinning parameter of 10. In this model cluster 3, the "modal empowered" cluster is used as the reference level in the multinomial response. The upper map represents estimates of log odds ratios by first level administrative region of cluster 1, the "more empowered" versus cluster 3, "modal empowered". The lower map represents the same for cluster 2, "less empowered" versus "modal empowered". In this analysis I consider a relative odds ratio estimate to be notable if the 95% credible interval associated with the posterior mean does not contain zero.

The spatial patterns on the maps in Figure 3 resemble those identified in the previous map (Figure 1) before controlling for education, income, age, and rural/urban. Blue represents greater log-odds ratios, indicating that cluster assignment is estimated to be more prevalent than the reference level cluster, and red represents lower odds ratios indicating much less prevalence of that cluster compared to the reference level. White areas are estimated to have log-odds ratios of one. In the upper map, it is apparent that the areas with the highest estimate of "more empowered" women are in regions along the south-west coast and the south coast, except Cote D'Ivoire. The regions with lowest estimates of "more empowered" fall along the northern half of the West African region, transcending national boundaries. In the lower map

there is a clear east-west divide where the western areas exhibit much higher estimates of "less empowered" and the eastern half of the region exhibiting lower estimates of "less empowered".

Table 3 presents summaries of the posterior distributions of model parameters for both models. Notable terms are highlighted, with red highlight denoting estimates in direction expected of an association with decreased empowerment and green denoting an association with increased empowerment. The estimates of the demographic control parameters vary in magnitude and are not all notable. Education is associated with higher estimates of "more empowered" and lower estimates of "less empowered" compared to the reference level, "modal empowered". The magnitude of these estimates are greater with higher levels of education. Rural/Urban differences are apparent between "more empowered" and "modal empowered" however this association is not present in the full model when spatial effects are accounted for. Similarly in the full model income is only notable at the "richest" level. However, the estimates of all covariates are lower than zero for "less empowered" indicating that urban residence, education (particularly at higher levels), and income (also at higher levels) reduces the odds of being "less empowered". This is true for both the null and full model.

The estimate of the effect of age is depicted in Figure 2. The upper figure represents the estimate corresponding to "less empowered" and the lower figure to "more empowered". The grey scale represents 95% and 99% credible intervals respectively. Age has nonlinear effects on relative odds ratio of being "less empowered" with higher estimates at later ages, and little or no effect at younger ages. The association between age and relative odds ratio estimates of

being “more empowered” are different from zero for most ages and are lower at younger ages and higher at older ages.

Deviance statistics are also presented in Table 3. The DIC is much lower in the full model despite being a much more complex model, as indicated by p_D indicating that the full model is a better fit for the data than the null model. Thus, region explains much of the variation in empowerment cluster assignment. Overall this model shows support that geographic region is spatially associated with estimates of women’s empowerment even when controlling for individual demographic attributes, and that these attributes (age, income, education, rural/urban) while notable are unable to account for much of the observed variation in women’s empowerment in the region.

2.7 Discussion

This study supports two important conclusions. First, the results of this study support the hypothesis that women’s empowerment, as measured by the DHS, varies spatially across the West African region, and moreover that geographic place explains considerable variation in how women will respond to questions about empowerment. Second, the results do not provide conclusive evidence that the various DHS indicators of empowerment all correspond to one unidimensional concept. It is possible, and likely, that empowerment is more complex and may encompass two or more distinct concepts that could perhaps be measured or analyzed separately. While there were clear natural groupings between what I labeled as “more empowered” and “less empowered” women, there was also another natural grouping, more sizable than the others, that I referred to as “modal empowered” that was distinctly different. These are the women who generally disagreed with justifications of wife-beating,

supported a woman's right to refuse sex, but generally said their partners were in charge of household decisions. These responses are inconsistent with a unidimensional concept of empowerment and do not suggest that these women fall in the intermediate position on a unidimensional spectrum of empowerment. Additionally, the fact that this pattern of responses was the most frequent, and more common than that of a consistent "more empowered" or "less empowered" pattern of responses, lends further evidence to support the notion that the empowerment questions in the DHS do not reflect a singular concept.

These results suggest that while age, income, education, and rural/urban residence has some association with how women respond to empowerment survey questions, the notable spatial association while controlling for these socio-demographic indicators suggests that how women respond to these questions has more to do with where they reside. This finding, of a broader geographic effect, also suggests that women's empowerment may be a process that is operating on a larger scale and is more likely due to an acculturation process, than merely an individual attribute. Ceteris paribus, women in different places have different attitudes about women's empowerment, agency and social or domestic roles. The implication of this result is that women's empowerment is unlikely to change through interventions that simply aim to alter socioeconomic statuses such as income or education. Instead, international development actors should cater empowerment interventions to smaller geographic regions in unique ways by identifying the local cultural meanings of empowerment and local sources of variation in attitudes and beliefs.

The DHS empowerment questions are identifying some kind of underlying phenomenon, but "empowerment" may be conceptually too vague, and more work should be done to dissect

and unpack this concept. This work should untangle the variation among women at individual and household levels, and between women at various geographic scales. This would enable a better understanding of the social, economic, and cultural transformations that are underway in the region to advance the quality of life of women.

Although the sample used in this study was quite large, it was just a small subsample of all the DHS data available about women's empowerment. Further research should also be done to corroborate and expand upon the results found in this study. Possible areas of future inquiry could include using clustering algorithms or other multivariate processes to identify patterns in more of the empowerment survey questions on smaller geographic scales to study country-specific manifestations of empowerment. In the subsequent chapters of this dissertation I continue to interrogate these empowerment indicators as I analyze their relationship between measures of fertility in the region and assess qualitative results of men's and women's understanding of the empowerment concept.

2.8 Tables

Table 1: Empowerment Data Available in the DHS for West African Countries

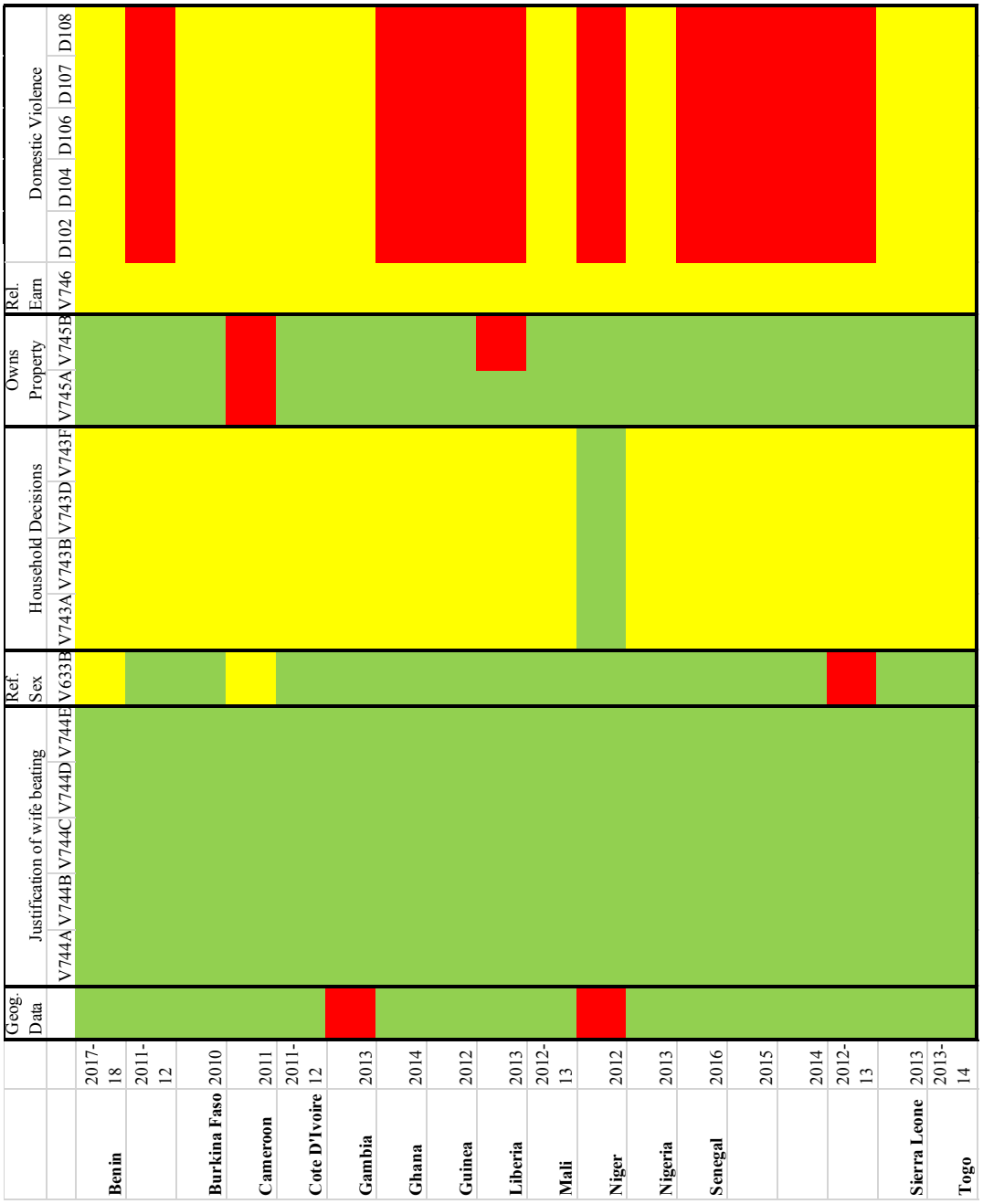


Table 2: Initial Modes for and Resulting Modes from k-modes Algorithm

Initial Modes										
	burns	refuse	argue	neglect	goout	visit	purchase	health	spend	canrefuse
mode 1	no	no	no	no	no	with partner	with partner	with partner	with partner	yes
mode 2	yes	yes	yes	yes	yes	partner	partner	partner	partner	no
mode 3	no	no	no	no	no	partner	partner	partner	partner	yes
mode 4	no	no	no	no	no	self	self	self	self	yes
mode 5	dont know	dont know	dont know	dont know	dont know	other	other	other	other	dont know
Resulting Modes										
	burns	refuse	argue	neglect	goout	visit	purchase	health	spend	canrefuse
mode 1	no	no	no	no	no	with partner	with partner	with partner	with partner	yes
mode 2	yes	yes	yes	yes	yes	partner	partner	partner	partner	no
mode 3	no	no	no	no	no	partner	partner	partner	partner	yes
mode 4	no	no	no	no	no	self	self	self	partner	yes
mode 5	dont know	dont know	dont know	dont know	dont know	partner	partner	partner	partner	no
Variable Key:										
Justifications of violence:										
	"In your opinion, is a husband justified in hitting or beating his wife in the following situations:"									
burns	"If she burns the food"									
refuse	"If she refuses to have sex with him?"									
argue	"If she argues with him?"									
neglect	"If she neglects the children?"									
goout	"If she goes out without telling him?"									
Decision-making variables:										
visit	"Who usually makes decisions about visits to your family or relatives?"									
purchase	"Who usually makes decisions about making major household purchases?"									
health	"Who usually makes decisions about health care for yourself"									
spend	"Who usually decides how your husband's/partner's earnings will be used?"									
Justifications to refuse sex:										
can refuse	"Is a wife justified in refusing to have sex with her husband when she knows he has sex with other women?"									

Table 3: Model Results, Estimates of Fixed Effects and Deviance Statistics

	Full Model						Null Model					
Cluster 1: "More Empowered"												
Variable	ROR	mean	Std. Dev.	2.5% qnt.	median	97.5% qnt.	ROR	mean	Std. Dev.	2.5% qnt.	median	97.5% qnt.
intercept	0.8146	-0.2051	0.0205	-0.2465	-0.2050	-0.1656	0.6505	-0.4300	0.0165	-0.4610	-0.4303	-0.3976
Urban	1.0076	0.0076	0.0214	-0.0373	0.0079	0.0478	1.0972	0.0928	0.0196	0.0554	0.0916	0.1338
Education: Primary	1.3194	0.2771	0.0213	0.2363	0.2774	0.3179	1.7275	0.5467	0.0192	0.5100	0.5464	0.5845
Education: Secondary	1.5599	0.4446	0.0254	0.3966	0.4442	0.4960	2.4458	0.8944	0.0223	0.8516	0.8946	0.9374
Education: Higher	2.2662	0.8181	0.0494	0.7241	0.8195	0.9134	3.5884	1.2777	0.0430	1.1905	1.2768	1.3652
Income: Poorer	1.0128	0.0127	0.0259	-0.0392	0.0114	0.0599	0.9649	-0.0358	0.0234	-0.0835	-0.0352	0.0101
Income: Middle	1.0087	0.0087	0.0285	-0.0476	0.0085	0.0633	1.0015	0.0015	0.0227	-0.0449	0.0019	0.0492
Income: Richer	0.9919	-0.0081	0.0291	-0.0649	-0.0089	0.0497	0.9379	-0.0641	0.0259	-0.1150	-0.0633	-0.0167
Income: Richest	1.1618	0.1500	0.0364	0.0751	0.1522	0.2232	0.8820	-0.1255	0.0297	-0.1813	-0.1257	-0.0681
Cluster 2: "Less Empowered"												
Variable	ROR	mean	Std. Dev.	2.5% qnt.	median	97.5% qnt.	ROR	mean	Std. Dev.	2.5% qnt.	median	97.5% qnt.
intercept	1.0574	0.0559	0.0200	0.0178	0.0552	0.0937	1.1689	0.1561	0.0148	0.1280	0.1554	0.1854
Urban	0.8300	-0.1863	0.0234	-0.2332	-0.1864	-0.1407	0.7845	-0.2428	0.0205	-0.2839	-0.2422	-0.2030
Education: Primary	0.8281	-0.1886	0.0234	-0.2342	-0.1882	-0.1433	0.7269	-0.3190	0.0198	-0.3586	-0.3194	-0.2792
Education: Secondary	0.6173	-0.4824	0.0304	-0.5392	-0.4831	-0.4226	0.5484	-0.6007	0.0259	-0.6511	-0.6011	-0.5501
Education: Higher	0.3114	-1.1665	0.0878	-1.3431	-1.1629	-0.9940	0.2791	-1.2760	0.0832	-1.4419	-1.2773	-1.1118
Income: Poorer	0.9126	-0.0914	0.0230	-0.1386	-0.0908	-0.0475	0.9255	-0.0774	0.0207	-0.1188	-0.0764	-0.0370
Income: Middle	0.8547	-0.1570	0.0256	-0.2037	-0.1567	-0.1076	0.8997	-0.1057	0.0221	-0.1459	-0.1061	-0.0610
Income: Richer	0.7539	-0.2825	0.0299	-0.3436	-0.2828	-0.2223	0.8635	-0.1468	0.0252	-0.1957	-0.1471	-0.0983
Income: Richest	0.6097	-0.4949	0.0387	-0.5726	-0.4944	-0.4183	0.7942	-0.2304	0.0318	-0.2901	-0.2300	-0.1688
Deviance Statistics												
Deviance(bar_mu):	205068.65						241784.87					
pD:	233.1992						32.0300					
DIC:	205535.05						241848.93					

2.9 Figures

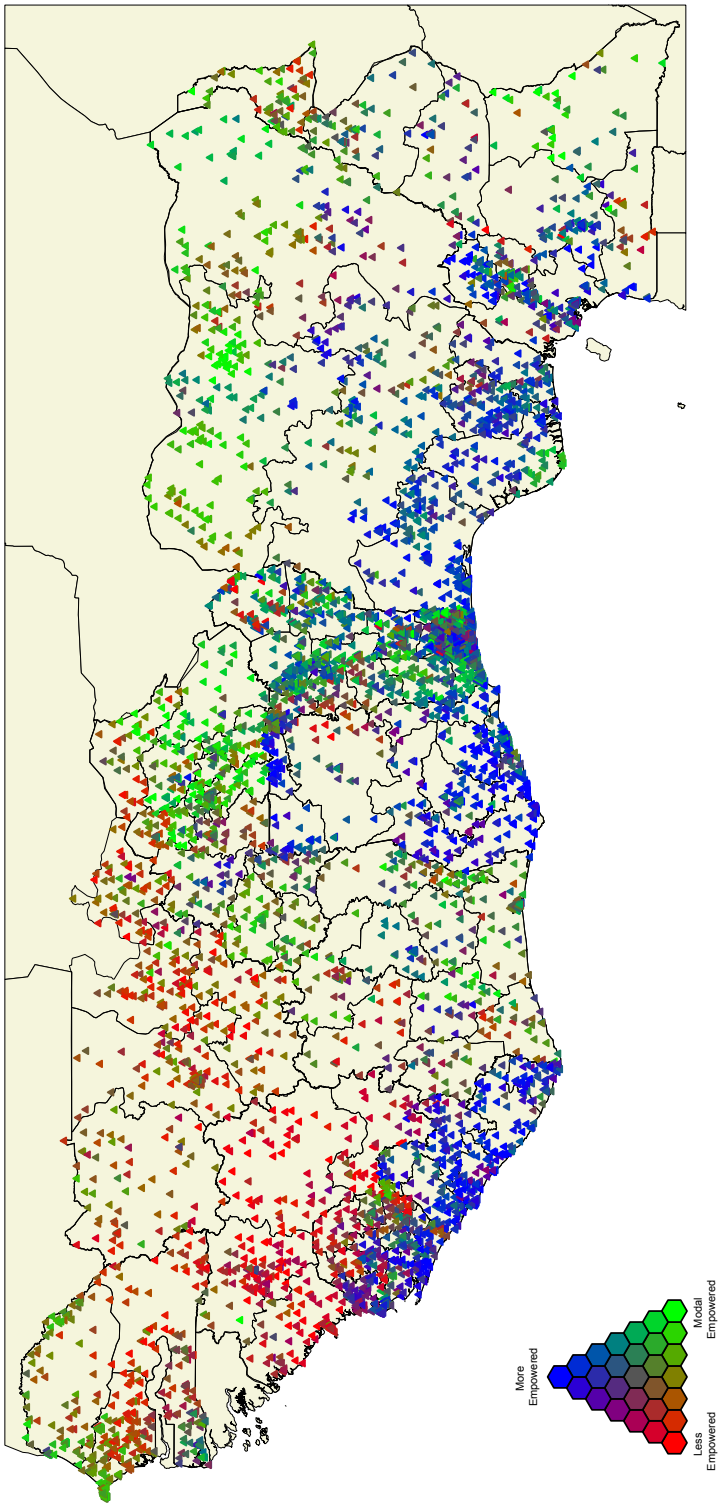
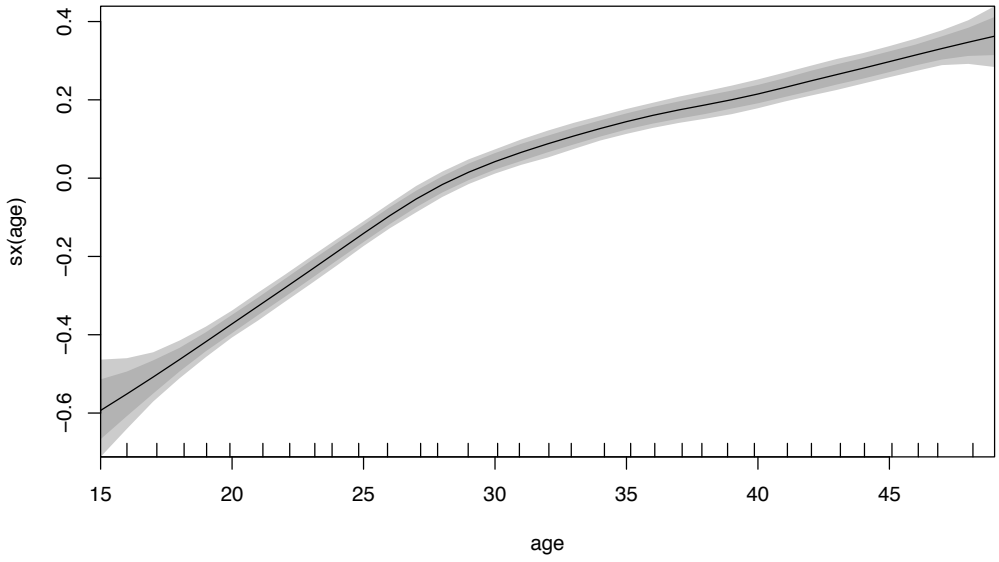
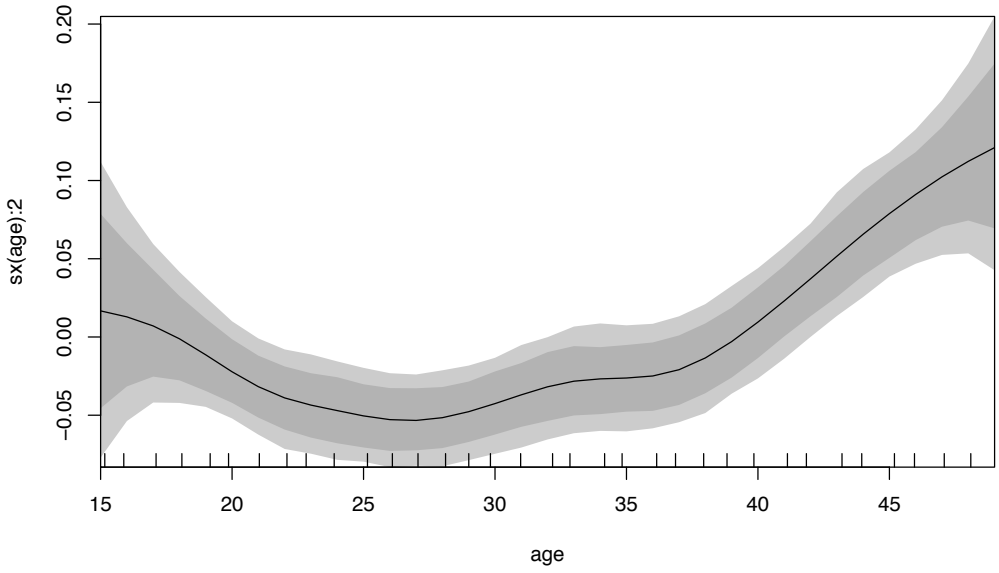


Figure 1: Map of West Africa with Empowerment Clusters

Figure 2: Smoothed Age Effect





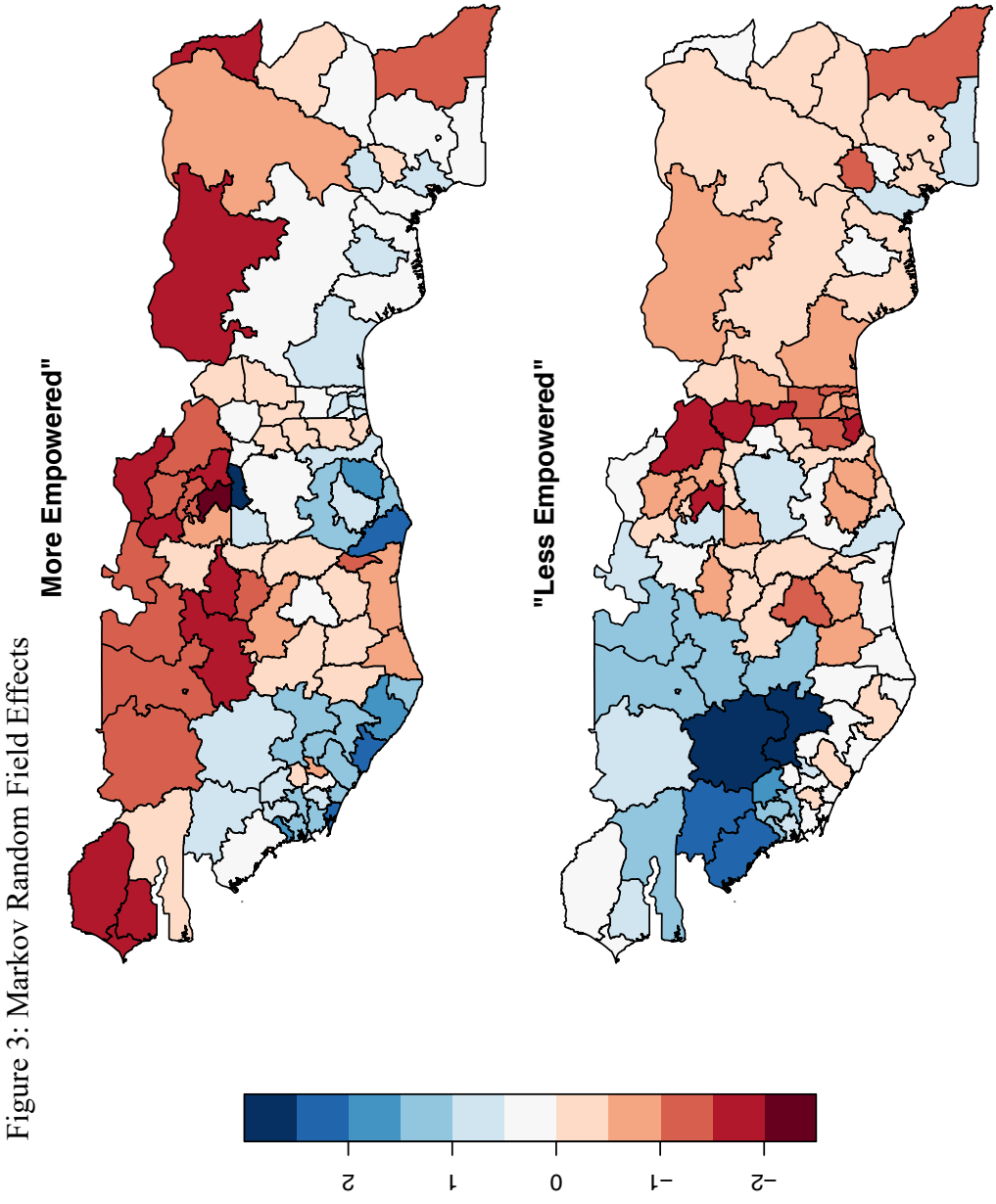


Figure 3: Markov Random Field Effects

Chapter 3 Fertility in Urban Senegal: The Role of Men's and Women's Agency

3.1 Abstract

Women's empowerment is promoted throughout the developing world and is considered to be a driving force in the slow fertility decline in the West African region. This study is part of a larger project to interrogate the putative relationship between women's empowerment and fertility change in West Africa. In order to do this, I seek definitions and operationalizations of empowerment and agency that are meaningful and relevant in this particular geographic context. Thus, this paper will operationalize empowerment and agency in Senegal using a combination of qualitative field work from interviews and focus groups conducted in Dakar in 2015-2016 and Demographic and Health Survey (DHS) data collected in 2014-2017 to analyze the relationship between men's and women's agencies and men's and women's fertility preferences and outcomes. I conclude that there is insufficient evidence to suggest a consistent relationship between men's or women's agency and their fertility preferences or outcomes. While I find various significant idiosyncratic relationships between covariates and indicators of fertility preferences and outcomes, they are inconsistent in magnitude and direction and do not support the prevailing development narrative of women's empowerment and fertility decline.

3.2 Background

Women's empowerment is a term often used to broadly describe the process of advancing women's freedom and quality of life toward gender equality. Women's empowerment is meaningful within a context of gender inequality and ubiquitous, historic subordination of

women. Although women's empowerment is often used broadly in this way, more specific and theoretical discussions of women's empowerment have defined it as a process by which women gain *agency*, where agency is the ability to make meaningful life decisions (Kabeer 1999, 2005). Therefore empowerment implies a process undergone by a person who was previously lacking agency. Empowerment describes a process, which would be difficult to observe at one period of time, however agency is something that could theoretically be more easily observed and indicated at a particular period of time. Both agency and resources are necessary for someone to be empowered, where resources are the preconditions and agency is the power at the core of empowerment. Resources need not be merely economic or financial; education, property ownership, or a supportive social environment can also be used to further women's empowerment, if they enable women to exercise agency (Kabeer 1999).

Within the field of demography, it has become axiomatic that women's empowerment is linked with population-level fertility decline. Some population scientists have attempted to show empirically and argue the idea that an improvement in women's subordinate status, relational power, individual agency or autonomy is associated with population level fertility decline (Hartman 2016, Doepke and Tertilt 2018, Presser and Sen 2000, Upadhyay et al 2014). However, an inquiry into the relationship between women's empowerment and fertility requires a consideration of both women's and men's agency and power dynamics both within couples and on a societal level (Adjamagbo and Locoh 2014).

The question of agency becomes further complicated in the context of Dakar, Senegal -- an urban center where traditional Senegalese culture and globalization interact to create a heterogeneous culture that is undergoing social change. While the West African region is

characterized by some of the highest fertility rates in the world, fertility rates are lower in Senegal, and even lower in the capitol region of Dakar. (ANSD 2017) Life in Dakar, the capital region of Senegal, is very different from life in “the village”, with widespread access to global media and products, including contraception, and exposure to other forces of cultural and social change. Due to the fact that roughly a third of the country’s population lives in this capital region, and that this is where a fertility transition is most evident, Dakar warrants a closer look to provide context to broader Senegalese fertility trends.

In order to fully understand the role of women’s agency in Dakar's low fertility regime relative to the rest of West Africa, and the pathways through which individual agency translates into fertility preferences and family planning decisions, we need to consider particular social and cultural factors specific to this geographic context. Two important examples are likely to be religious and cultural beliefs regarding the role of God in determining fertility outcomes, and men’s agency and gendered dynamics within couples.

In Senegal, when asked "How many children would you like to have?" a commonly stated belief is that God predetermines the total number of children one will have and that one either cannot, or should not, try to limit or control that number through modern contraception. Thus, in surveys like the one used in this study, when asked about one’s “ideal family size” respondents will often provide a non-numeric answer such as "it’s up to God” or “however many God gives me” (Randall and LeGrande 2003, LeGrande et al 2003). One would expect in accordance with this line of reasoning that men and women would be unlikely to exhibit reproductive agency in Dakar since they would not perceive themselves as having such agency. The definition of empowerment described previously presumes that

women gain agency in the process of empowerment but that men already have agency. However, in a context where both men and women both say that God decides how many children one has, men and women both may be surrendering some of their individual agency to God.

Despite this, there is evidence of people exercising reproductive agency through the utilization of modern contraceptives or "natural methods" (Onuoha 1992, LeGrande et al 2003, Rossier et al 2014). Although explicitly limiting the total number of children one has is denounced for the aforementioned reason, deliberately spacing or delaying births is considered acceptable by many people in Senegal and by most men in Dakar (Posner and Mbodji 1989, Nichols et al 1985). This is because, in their eyes, even if God decides a person's family size, spacing births does not prevent God from giving the total predetermined quantity eventually. Furthermore, women having children too close in succession, a phenomenon known as *nef* in Wolof, is actually stigmatized, and women actively avoid *nef* by spacing births (Duclos et al 2019). There is much evidence in the literature that fertility decline in sub-Saharan Africa is characterized by an increase in interbirth spacing (Caldwell et al 1992, Bongaarts and Casterline 2013, Casterline and Odden 2016). Couples and individuals can, and frequently do, use contraception to space births apart, and spacing births is considered by Senegalese to have some benefits, particularly for women's health. In this region, spacing and timing are much more important factors in shaping family planning preferences than an "ideal family size". (LeGrande 2003, Johnson-Hanks 2007). Men and women in this region tend to make family planning decisions with respect to their current situation rather than with respect to an ideal family size (Adjamagbo et al 2013). Considerations may include a woman's current health, financial situation, relationship and

family situation, the environment and politics (Johnson-Hanks 2007, Bledsoe et al 1998). In this region it may be more informative to ask questions about current fertility preferences, like “Do you want to have another child soon?”, since it is these current preferences that are more likely to guide family planning behavior than a static “ideal family size” (Casterline and Odden 2016).

Additionally, the translation of agency into fertility preferences which result in certain fertility outcomes is further complicated in this geographic context by discrepancies between spouses’ fertility preferences and power dynamics between men and women within households. Insofar as individuals exercise agency with respect to choosing the timing of pregnancies, differences likely exist between men and women. Couples in sub-Saharan African countries, including Senegal, often disagree on their stated fertility preferences: Married men generally want more children than their wives do, or are more often ready to have another child before their wives are. This is likely because women bear a greater cost to childbearing, especially in quick succession (Bankole and Audam 2011). While the linkages between women’s empowerment, women’s fertility preferences, and women’s fertility have been documented, men’s fertility preferences are likely just as relevant fertility determinants, if not more so, given the power that men may have over women. An investigation into the linkages between women’s empowerment and agency with women’s fertility preferences and outcomes warrants a similar look into the linkages between men’s agency and fertility preferences.

How do women’s and men’s individual agency affect fertility preferences and outcomes? Answering this main research question requires unpacking the concept of agency and

exploring its meaning within the geographic context of interest: urban Senegal. Although the survey data that I use is intended to measure personal agency of men and women in relationships, it is worth questioning whether these measures actually reliably reflect how people living and/or working in Dakar think about agency and women's empowerment. Thus, another objective of this study is to understand what empowerment and agency mean to *Dakarois* qualitatively. In doing this I also assess the construct validity of the available survey data in representing men's and women's agency in this region. Interpretations from qualitative field-work are used to inform the analysis of Demographic and Health Survey data and provide cultural and geographic context.

The paper proceeds as follows: First, I described the Demographic and Health Survey data used in the analysis. Second, I describe the data derived from my field work in Dakar and the methods used in collecting that data. Third, I discuss the results of the analysis of the fieldwork data. Fourth, I explain the methods of analysis of the Demographic and Health Survey data. Fifth, I convey the results of the Demographic and Healthy Survey data analysis. Lastly, the paper ends with a discussion of the findings and a conclusion.

3.3 Data, Methods, and Results

I use two data sources, one quantitative and one qualitative. The first is the 2014-2017 Senegalese Demographic and Health Surveys (DHS). These surveys provide comprehensive data sets that include socioeconomic variables, fertility preferences, women's birth history and questions designed to reflect evidence of women's empowerment (Kishor and Subaiya 2008). The second data source comes from fieldwork I conducted while living in Dakar, Senegal for 10 months in 2015-2016. In semi-structured interviews and focus groups with

men and women living and/or working in Dakar I gathered information about perspectives on agency, empowerment and family planning.

While these two data sources could potentially be used in two different studies, my intention is to use them in conjunction by using the information gleaned from my fieldwork to inform every step in the analysis, interpretation, and discussion of the data provided by the DHS surveys. While the DHS is to date the most comprehensive and reliable data available on basic demographics in the region, analysis based on it has certain limitations. The DHS is designed to be a standard survey that can be implemented across the world and used for cross-country comparisons. It was not designed to be used specifically for a study on women's empowerment in West Africa. Actually, DHS Program Director, Sunita Kishor, speaking during a Q&A segment on a video featured on the DHS program's website, says that the women's empowerment questions were originally designed to be used in a study in Egypt and then were later implemented globally as part of the DHS core survey (The DHS Program 2014). Thus, coupling this data source with more qualitative and region-specific information will help in understanding and interpreting the DHS data in context. Some limitations are inherent to the format of a standardized survey, like the fact that respondents can only answer survey questions with a single, usually categorical response with little to no explanation. While this data enables the use of statistical methods to observe particular relationships between different responses it provides no explanation as to why these relationships exist or suggest any possible causal pathways. Since the semi-structured interviews and focus groups allow respondents to respond freely to open-ended questions, these sources can provide information that a standardized survey cannot. While the data collected in my fieldwork cannot be used to calculate statistics or be generalized to

accurately represent the whole population because of the less-robust sampling techniques used, the DHS data can. Thus, these information sources complement one another to provide a broader view of how men's and women's agency may relate to fertility.

3.3.1 Demographic and Health Survey (DHS) Data

The DHS data used in this study comes from both individual (women) and couples (men and women in relationships) nationally representative surveys conducted annually in Senegal from 2014, 2015, 2016, and 2017. The DHS uses a stratified, two-stage probability sample design where within each stratum a primary sampling unit is selected which forms a survey cluster, and then households are randomly selected from within each survey cluster. The sample sizes for each of the individual surveys are 8,488, 8,851, 8,865, and 16,787 women respectively, and for the couples surveys 1,341, 1,516, 1,400, and 2,604 respectively. The total sample size of all four years pooled are 42,991 women in the individual survey and 6,681 couples. The women interviewed in the couples survey are a subset of those sampled in the individual survey.

The DHS empowerment indicators that I shall use in this study are those regarding who in the household makes certain decisions and attitudes towards domestic violence. Women were asked who usually makes decisions about: a) her own health care, b) large household purchases, c) visits to family or relatives, and d) what to do with money her husband earns. Possible responses for each can be any of the following: 1) the respondent makes the decision alone, 2) her and her husband make the decision together, 3) their husband makes the decision alone, or 4) someone else makes that decision. In the question regarding the money husbands earn, they can also respond that their husband has no earnings. In the men's

survey, men were asked who usually makes decisions about a) his own health care, b) major household purchases, and c) how the money he earns will be used to which he can respond, similarly, that he makes this decision alone, that his wife and him make the decision together, that his wife decides, or someone else makes that decision. The questions about whether a husband is justified in hitting or beating his wife are exactly the same in both the men's and women's survey. They are asked whether it is justified in these five situations: a) if she goes out without telling him, b) if she neglects the children, c) if she argues with him, d) if she refuses to have sex with him, and e) if she burns the food. For each of these five questions the respondent can say either yes, no, or that she or he doesn't know.

These two sets of variables indicate different dimensions of women's empowerment. The household decision-making variables reflect agency, and how much agency men and women have over decisions that affect their own lives and their partner. The questions about justifications for wife-beating do not indicate women's actual experiences with violence or reflect the limitation of her agency or the exertion of a man's agency that could result from violence. Rather, these indicate the opinions and perspectives that men and women hold regarding the value of women and may reflect what I would call "internalized gender inequality". In other words, these variables measure the degree to which people believe that women are subordinate to men and any violence from men that they experience is merited. Included in the analysis are also indicators for age, education level and land and/or house tenure.

Both men's and women's age are included as a control variable since fertility and fertility preferences should naturally vary with respect to age. Additionally, I include indicators of

men and women's education level and whether they own a house or land. Women's education is a well-documented fertility determinant (Adamchak and Ntseane 1992, Castro Martin 1995, Clelane and Rodriguez 1988, Johnson-Hanks 2006). Both education and land/home ownership can be considered the kind of resources that would enable one to exercise agency and become empowered (Kabeer 1999). Education is encoded into three categories: no formal education, primary education only, or secondary or higher level of education. The men's and women's surveys includes two questions on property tenure: Do you own this or any other house either alone or jointly with someone else? Do you own any agricultural or non-agricultural land either alone or jointly with someone else? If a respondent owns either a house or land in any form then I count that as property ownership.

3.3.2 Fieldwork in Dakar 2015-2016: Data and Methods

The field observations include focus groups and semi-structured interviews with men and women living or working in Dakar. Approximately 50-60 people participated in this study, all age 18 or older. All interviews and focus groups were conducted anonymously with the assistance of a translator and research assistant in French and/or Wolof, recorded and transcribed in their original language, with IRB approval. The IRB consent agreement was explained to each potential research participant in French and/or Wolof so that they could grant consent and ask any questions before recording and beginning the interview or focus group. Each participant was also given my contact information including my Senegalese and American phone numbers and email address. The interviews and focus groups were all only semi-structured so while there was a list of topics that was asked of each participant, the length and organization of the interviews varied depending on the respondent. This was

intended to make questions open-ended and avoid priming the respondents towards answering the questions in certain ways. I found that the way questions were asked, including the order they were asked in, seemed to affect participants' responses.

The sampling method for these semi-structured interviews and focus groups was not random, but was intended to sample from a variety of demographics in order to present a broader range of perspectives. Some people were interviewed for their experience or expertise on the subject of women's empowerment while others were interviewed simply for their perspective as a representative of the population. First, I recruited bachelors' and masters' students from the University of Cheikh Anta Diop in Dakar to participate in focus groups that were held at the West African Research Center (WARC) located in a nearby *quartier* of the city. Participants in these focus groups were compensated with 2,000 fcfa, equivalent to approximately $3.50, which covered the cost of transportation to WARC. In each focus group, the participants were either all men or all women in order for them to be more comfortable and speak more openly about these topics.

Secondly, I contacted numerous organizations from *Réseau Siggil Jigéen*, a Senegalese women's activist network and requested to do interviews with representatives of the various affiliated women's organizations that were located in Dakar (*Réseau Siggil Jigéen*). While not necessarily representative of the perspectives of the Senegalese population, these people were selected for their experience working on the advancement of women and their expertise on women's empowerment in Senegal. I and my research assistant travelled to some of these organization's locations and conducted the interviews in their offices to make it convenient for them. The number of representatives from each organization who volunteered to

participate varied from one to five people so some of these group interviews could be considered as a focus group. While some discussed the work done by their organization, many reflected on their own opinions and perspectives.

Thirdly, I went to outdoor markets and pseudo-randomly recruited women and men working at the markets to do a short interview on the spot. I chose this method because I wanted to represent people who were working in Dakar, but I learned from key informants that it would be unlikely to successfully recruit working people to participate in a focus group at another location even if they were compensated because it would be inconvenient and costly for them to leave work. I had previously noticed that often small groups of a few men or women would cluster together and chat at these markets, particularly at times when business was slow. So, in my sampling I attempted to identify either individuals or groups of 2-4 men or women who seemed like they would have time to do an interview. When I explained the study and asked if they would like to participate, they were also told that we could pause the interview at any time if a customer arrived. We were able to do more, short interviews in this way and thus sample more people.

Lastly, in an attempt to represent those who are neither educated, nor working, we went to residential neighborhoods in various *quartiers* and recruited men and women who were sitting outside near their home. This method was motivated by previous experience where I had often seen people, men, women, young and old, and children loitering outside in certain residential neighborhoods. Similar to those working in the markets, we simply approached people either sitting alone or more commonly in groups with others of the same gender, explained the study, and asked if they would like to participate.

The interview guide was comprised of questions that probed research participants about their opinions on the following topics: aspirations and goals, obstacles and external influences, defining empowerment, the importance of decision-making, the significance of existing survey data, and the relationship between empowerment and fertility. For most of the interviews I started by asking about aspirations and obstacles because if we started with discussing empowerment or fertility then they tended to only discuss their hopes in regards to family planning whereas when we started by discussing aspirations there were more variations in responses. Examples include: "Where do you hope to be in 5-10 years?", "What obstacles do you think you will have to overcome?" and "What obstacles do you think impede men/women in particular, in Dakar?". However, for interviewees that were representative of the women's activist organizations, we did not ask personal questions like these, rather we kept the conversation general.

The obvious question about defining empowerment would be "How would you define empowerment?" However, I also added a few questions inspired by a working paper which describes a participatory tool for measuring women's empowerment in African contexts called "Community Concept Drawing" where participants were asked to visually draw and describe what the most and least empowered men and women look like (McOmber et al 2015). In my interviews I asked men and women what they thought an empowered man/woman looked like or what characteristics an empowered man/woman would have. I also asked if they thought of themselves as empowered, what they thought of the idea of empowerment, if there was a better term they would suggest, or if there were a better goal in gender and development.

To clarify, the word empowerment does not have a literal translation in French or Wolof. In French the best approximation is *autonomisation* which contains the root *autonome* which translates to English as "autonomous" or "independent". Although there are other words like *emancipation* and *responsabilisation,* which could also mean empowerment, all of these words have different connotations. I chose *autonomisation* because it seemed most used in the French social science literature and because of advice from key informants. In Wolof the translation is even more complicated where the best approximation for the concept is *mënal sa bopp.* The verb *mën* means "to be able to" used here in the imperative and *sa bopp* is literally "one's head" but is used to mean "oneself". This phrase could be better understood as "taking power over oneself". Since these terms used in lieu of "empowerment" inherently incorporate the idea of agency or autonomy, this suggests that agency would indeed be implicated in the concept of empowerment in this place.

In order to assess how well the DHS decision-making questions reflect Senegalese perceptions of empowerment or agency, participants were asked about the meaning and importance of whom in the household makes decisions. First, we asked about who in the household generally makes decisions, and which household decisions they thought were important for families living in Dakar. Subsequently, we followed up by describing the decision-making questions in the DHS and asked if they thought these were good indicators of women's empowerment. For example, participants were asked a question worded like this: "Currently, researchers will ask who in the family makes household decisions in order to measure a woman's level of empowerment. A woman who makes these decisions for herself or with her husband is considered more empowered than a woman whose husband makes these decisions. For example, decisions about her own health care, visiting family or

relatives, or making major purchases. In your opinion, is this relevant to the level of women's empowerment for women particularly in Dakar? Why?"

Participants were asked questions about who in their relationship makes decisions about how many children to have, if they will have another child, decisions about contraception and family planning, and what factors they will consider before having a child or another child. Again, these personal questions were not asked of the key informants representing the women's activist organizations. However, we did follow up with this last question: "Do you think that women who are more empowered will have greater or fewer children than other women? Why? The intention with this last question was to see if Senegalese people would have an intuition about the results of our study on the relationship between empowerment and fertility. Responses to this question could inform a discussion of the results based on the statistical analysis no matter what those results are because it will provide insight as to the possible causal pathways. While the participants in the qualitative interviews were not randomly sampled and cannot be viewed as representative of all adults and couples in Dakar, their stories may suggest better ways of understanding why we observe whatever statistical relationships we observe.

3.3.3 Fieldwork in Dakar: Results

As described in the background section of this chapter, the word "empowerment" is unique to English and has no equivalent in either of the primary languages spoken in Dakar. Respondents to the qualitative interviews, when asked how they defined empowerment (in either French or Wolof) consistently associated empowerment with having money, a good job, owning a business, or having the means to take care of one's family, look for new work,

or travel. This was true for both men and women. Another reoccurring theme among women defining empowerment was having *un mot à dire* or "a word to say" in discussions and decision making. In other words, women did not necessarily want to have unilateral power over decisions, particularly those that affect others, they just wanted to participate in decision-making and have their voice heard. Generally, women that are more educated thought empowered women have a "voice" and do not have "internal barriers" but less educated women thought of empowerment mostly in the aforementioned economic terms.

In the focus groups and interviews, individuals were asked to respond to the DHS questions on empowerment. When asked if the DHS's questions regarding who in the household makes decisions regarding women's health care, major purchases, or women visiting their family were good measures of women's empowerment, respondents, including both men and women, in general actually said that this had nothing to do with empowerment. Men and women across occupations and education levels consistently said that ideally couples should consult one another and discuss all household decisions together. Although some men said that they believed it is the husband who should make household decisions, when asked if they consult their wives in their decisions they usually said "of course". One man cited a Wolof proverb "One mind alone is not enough". Women generally said that asking permission to travel, to go out, or to spend money, or even just informing one's husband that they were going to do these things was something to do out of respect and had nothing to do with empowerment.

Despite the ubiquitous ideal of consensus decision-making, women had varied responses regarding what they would do if their husband wouldn't agree with them, particularly with

regard to fertility decisions. Some women said if they wanted to use family planning and their husband disapproved then they would go along with his decision, but some women said that they would just not tell their husband if they knew he wouldn't give permission. However, this was discussed as something that was generally disapproved of and only should be done as a last resort. Women discussed the costs associated with making decisions without discussing it with their husbands, such as the "trouble" or the fights that could arise later. Thus, women did not perceive themselves as unable to make decisions covertly, rather they perceived the costs to outweigh the benefit unless it was absolutely necessary. The instances where women did this were when they desired longer birth spacing than their husband.

According to the men and women interviewed in Dakar the most important household decisions have to do with children's education which includes both formal education and how they are raised and inculcated in the home. The influence that a person has over their children and being able to provide children's education is seen as more important than the agency to decide how many children to have although these concepts were related. Corroborating with what has been well documented in the literature, Senegalese men and women say that it is God who decides how many children people will have, and otherwise do not state an ideal family size. However, people in our sample were generally in favor of spacing births for several reasons. Many said that they would like to have children but not in the near future, or not too many, because they were having financial difficulty or because they perceived the economy or the country to be in hard times. Many women also said that having children too quickly in succession is bad for one's health and will harm one's body. Other explanations for spacing birth had to do with maintaining women's livelihoods, having children back-to-back did not allow time to work or do anything else with one's life.

Although natural methods --- “the methods of our ancestors” --- were preferred by most women, many women and men were open to using modern contraception with the consent of their partners. Some women said they would use contraception covertly when their husbands wanted to have another child, however this was rare due to its social disapproval. Some women said that they believed modern methods were bad for one’s health, caused problems, or were dangerous. Some also associated the idea of family planning, having an ideal family size, or using contraception to choose the number of children one has with American/European/western influence even claiming it was for Africans who are “too influenced by modernization” or “black toubabs” (“toubab” is the term for a European or American person). One of these respondents prided themselves with their ethnic group and wanted to have however many children God gave them.

Based on the data gleaned from my fieldwork, a link between empowerment or agency and fertility seems tenuous. Those who did believe that there was a relationship qualified it with some explanation, and did not convey the relationship as causal. Some characterized the link through education, and believed that an educated woman would understand the importance of spacing, or that an educated husband would be understanding. Some seemed to think that empowered people would actually have even more children; since they understood empowerment as the ability to provide for themselves and their family, an empowered man or woman would have more means to provide.

Selected quotes from interview and focus group transcripts, sorted by theme, are located in Appendix A.

3.3.4 DHS Data: Methods and Analysis

The analysis of DHS data includes a series of sixteen separate multivariate generalized linear regression models for men and women with variables indicating fertility preferences and outcomes as response variables and variables indicating agency and gender dynamics as independent variables of interest. I construct these models with respect to twelve different response variables; four indicators of fertility preferences, for men and women in couples and for all women surveyed, and four representing women's fertility outcomes for all women surveyed. The measures of fertility preferences are questions asked of both men and women about a) if he/she wants to have another child soon (in the next two years), b) if he/she wants another child generally, and c) his/her ideal family size. Both fertility preferences a) and b) are fit to generalized linear models (GLM) with binomial link functions. Since a sizable portion of respondents provide a non-numeric response for their ideal family size, the sample is split on this response and modelled separately. In one model, I remove non-numeric responses and fit the data to a GLM with a Poisson distribution. In the other, I fit the data to a GLM with a binomial distribution representing whether they provided a non-numeric response or not.

Measuring fertility is a classic problem in Demography because the number of children a woman will have cannot be known until after she has completed her reproductive career. The more complete the fertility history data is, the more out-of-date it becomes. Thus, I constructed four measures of fertility outcomes: Each of these measures of fertility outcomes attempt to mitigate one aspect of the issue of incomplete data inherent to analyzing birth histories that are not yet finished. Each also attempts to use a measure that is as cotemporaneous as possible with the measures of agency, which occur at the date of the survey. The interval between last and penultimate birth is a construct that represents a

woman's fertility rate closest to the time that the interview took place. Since the women's empowerment questions are asking about opinions at the time the survey is conducted, it is advantageous to have a measure that best represents a woman's fertility rate at the time the survey was conducted. All of these measures attempt to control for differences in women's age while measuring the timing and spacing of births since it is known that in this context timing and spacing of births is an important consideration in family planning. In other words, these measures are intended to capture fertility outcomes that correspond to the short-term fertility preferences previously described rather than being estimates of a total fertility rate, which naturally correspond to ideal family size. Since some women have had only one child before the time of the survey, the last birth interval can be best modelled using survival analysis. Rather than treating these cases as missing values, these methods can handle censored data and incorporate the time after a birth until the survey into the model. The average inter-birth interval can be modeled using a GLM with a Gaussian link function since this can be assumed to be roughly normally distributed, whereas the other two will be modeled with a Poisson link function since they describe times until an event.

Previous research on women's empowerment using DHS data categorize a woman as empowered if for the household decision-making questions a respondent said that they made the decisions either alone or together with their partner (Pambé et al 2014). However, in light of the results from my fieldwork regarding the ideal of cooperative decision-making between partners, it is more appropriate to categorize the decision-making question responses as either cooperative or non-cooperative. Thus, in my analysis, I paid particular attention to the parameters representing the decisions that were made cooperatively. In the models of the couples survey data I used constructed variables representing cooperative decision-making in

lieu of the decision-making variables as coded in the survey. This variable codes a decision as “cooperative” if either partner says they make the decision with their partner, even if their partner’s response does not corroborate, excluding when the response was “other”. In the models of the couples survey the decision-making variables are coded based on that individuals response and I consider a decision to be made cooperatively if they say that they made that decision with their partner.

The two survey questions regarding ownership of a house or land are condensed into one proxy variable in the models representing whether the respondent owned either a house or land or both, alone or jointly or both. The five questions regarding when a man is justified in beating or hitting his partner are condensed into one discrete, numeric variable, a value of zero through five representing the number of questions in which the response was either “yes” or “don’t know”. In other words, for a person who believed that violence is justified it would have a value of five, and for one who believes that violence is never justified it would have a value of zero.

3.3.5 Results, from DHS

Descriptive statistics for all the variables used in this analysis can be found in Tables 1-3. In general the majority of the men and women in the sample had no formal education (57.7% and 63% respectively). Most women do not have any ownership of land or a house, however for men home or land ownership was much more common. The majority of women in the couples survey say their partner makes each household decision, and the majority of men say they make these decisions themselves. However, as evident in Table 4 among partners who say they make a household decision together with their partner, most of these responses are

not corroborated with their partner's response. For the majority of women who say they make decisions together, their husband/male partner says they themselves make that decision; and for the men who say they make decisions together, their wife/female partner says their partner makes that decision. This is why, as previously described, I categorize a decision as made cooperatively if either partner says they make the decision together. The cells corresponding to the responses that would count under this definition are highlighted in Table 4. As seen in Table 5 almost half of women in the couples survey support each of the justifications of violence (except one), whereas in the individual survey this proportion is much lower. Support for violence against women is much lower among men where only 5.5%-16.5% of men support each justification of violence. Figure 1 shows the number of justifications of violence supported by men and women in couples. Women who support any justification of violence are more likely to support more of them whereas men who support any may support any number. Variation in women's and men's ideal family sizes is apparent in Figure 2. Women more often report an ideal family size of four, five, or six children, whereas men are much more likely to give either a very high response, ten or greater, or provide a non-numeric response. Tables 6a-d shows all the possible responses to the fertility preference questions and weighted proportions. These statistics provide evidence that support the notion that men's fertility preferences are higher than women's. More men say they want to have another child and women more often than men said they want to have no more children. However within couples there is more agreement between men's and women's responses than there is disagreement; 68.5% of women say they want to have another child and their partner also want to have another and 13.2% of women say they want no more children while their husband wants to have another.

Summary statistics for all sixteen full fitted models can be found in Appendix B. Table 8 displays a summary of all statistically significant parameter estimates in each model with color indicating whether the respective association represents a decrease or increase in fertility or fertility preference.

While some results support previously established fertility determinants, overall I did not find convincing evidence of a consistent association between men's or women's agency and either lower fertility preferences or fertility outcomes.

Men's and women's age were not consistently associated with fertility preferences or outcomes. While women's age is generally associated with lower fertility preferences, women age 35-49 were more likely to give a non-numeric response to the question of ideal family size. Older men were less likely to want another child, but men over 40 had greater ideal family sizes and were more likely to provide a non-numeric response to the question.

Women's and men's education is associated with lower stated ideal family size and more educated men and women are less likely to give a non-numeric response. Men with at least a primary education are less likely to want another child, and men with a secondary or higher education are less likely to want another child in the next two years. Women's education, on the other hand, did not have this association for women in the couples survey. On the contrary, in the full women's individual survey sample educated women were more likely to want another child than women with no education, and the size of this parameter was greater for women with secondary or higher level of education. In terms of actualized fertility outcomes, women's education was associated with fewer births by age 25, longer interbirth intervals, and fewer births 36 months after first birth, which are all consistent with the

prevailing theory that women's education lowers fertility. However, women's education was associated with a shorter last birth interval, meaning that the most recent two births prior to the survey were closer together among more educated women, compared to women with no education.

Owning a home or land had inconsistent effects on fertility preferences and outcomes. Women and women with home/land tenure had greater reported ideal family size but were less likely to give a non-numeric response. These men also were more likely to want another child in the next two years but less likely to want another child. Women who own land or a home had longer average interbirth intervals but more births by age 25.

Cooperating on household decisions had few and inconsistent associations with fertility preferences or outcomes. Among couples who cooperate about health care decisions, these women are less likely to say that they want another child, however this relationship does not hold for other fertility preference indicators, these women are more likely to want another child in the next two years and to have a non-numeric ideal family size. Men who cooperate with their partners about health care are more likely to want another child in the next two years, have a higher ideal family size, or a non-numeric response. Cooperation on household decision-making has no association with three out of the four fertility outcomes measured, and with the fourth the association is opposite in direction. Women who make decisions about health care or major purchases with their partners had more births by age 25, but those who make decisions about visiting relatives or how to spend their partner's earnings had fewer births by age 25.

Women's approval of the justifications in wife-beating was associated with a higher ideal family size but was not associated with a non-numeric ideal family size. Men's approval for justification of violence was associated with wanting another child in the next two years and a greater ideal family size, but was also associated with a lower chance of giving a non-numeric ideal family size. Women's justifications of violence was significantly associated with an increase in fertility in three of the four measures: greater number of births by age 25, greater number of births 36 months after first birth and shorter average interbirth intervals. However, women with more justifications of violence had significantly longer last reported birth intervals.

Women's justification of domestic violence was associated with higher actualized fertility in the same three measures that women's education as associated with lower actualized fertility which may suggest that women's education and women's approval of justifications of violence are oppositional forces in their linkages with fertility. However, under closer examination, it appears that women's education and women's support of domestic violence are simply negatively correlated. Table 7 shows a cross tabulation of these two variables and it is apparent that women with no formal education support justifications of violence at a much higher rate than women with any level of formal education.

3.4 Discussion and Conclusion

This study, as part of a larger project interrogating the link between women's empowerment and fertility decline, sought evidence of a link between agency, which is at the core of definitions of empowerment, and specific measures of fertility. Overall, the results of this study do not show a consistent relationship between agency and either fertility preferences or

fertility outcomes. Agency, as indicated by cooperative participation in household decision-making, had few significant associations with any of the measures of fertility preferences and even fewer with the measures of actualized fertility. The findings of this study do not support the dominant development narrative suggesting a causal pathway where women's empowerment, defined as a process whereby women gain agency, leads to population level fertility decline.

While associations between women's education and fertility were supported in some of the models, even this association was not consistent or significant in all the models, with the exception of men with secondary or higher education level having significantly lower fertility preferences in all four measures. Education has a well-known association with fertility in demography, however, the results of this study suggest that education is likely a poor proxy for empowerment and perhaps has linkages that are more direct with fertility not mediated by agency or empowerment.

One drawback to this study is the temporal inconsistency between questions that measure constructs at the time of the survey and retrospective questions that relate to the past. This poses problems when studying the link between empowerment or agency and fertility because while theories linking empowerment or agency to fertility suppose a causal relationship, causes need to occur before outcomes and the data used in this study uses births that occurred before empowerment or agency was measured. The last birth interval, measured as either the time between the last and penultimate birth, or for women with only one birth, the time elapsed between that birth and the survey, is intended to be a fertility measure that is as temporally consistent with the time of the other survey measures, and yet

this fertility measure is inconsistent in its relationships with women's education and women's justification of violence. More research is needed to understand the meaning of this fertility measure and to develop more advanced measures of recent or current fertility.

While the findings of this study are not consistent with the prevailing development narrative of a causal pathway by which women's empowerment results in fertility decline, it did find many significant results that are likely meaningful. Further research should be done to explore the meanings behind these relationships in this geographic context. The fieldwork conducted in Dakar highlighted some common and dominant cultural narratives which are useful in understanding the existing data from this region. The empowerment indicators used in the DHS have little to do with which household decisions are important to Senegalese people or with how Senegalese understand empowerment. Better questions could be developed for use in this region with questions that better capture topics such as, how capable people feel they are to provide for themselves and their families, whether they feel like their voice is heard in decision-making, and how supportive their partner is of their fertility preferences. Education does seem relevant in shaping the kinds of responses women provided in my interviews, and also with the responses in the DHS to justifications of domestic violence. More research is needed to understand how education may relate to other aspects of women's opinions, preferences, and fertility.

3.5 Tables

Table 1: Age and Education (Couples Data)

	Women		Men
Age			
[15,25)	21.7%	[15,30)	9.3%
[25,35)	43.7%	[30,40)	33.5%
[35,50]	34.6%	[40,50)	34.3%
		[50,59]	22.9%
Education			
None	63.0%	None	57.7%
Primary	22.5%	Primary	22.6%
Secondary or higher	14.4%	Secondary or higher	19.7%

Table 2: House and Land Ownership (Couples Data)

Women				
	Land			
House	doesnotown	aloneonly	bothaloneanc	jointlyonly
Alone only	0.8%	0.2%	0.0%	0.1%
Alone and jo	0.5%	0.0%	0.1%	0.0%
Jointly only	6.8%	0.6%	0.1%	2.6%
Does not ow	82.5%	4.0%	0.6%	1.1%
Men				
	Land			
House	doesnotown	aloneonly	bothaloneanc	jointlyonly
aloneonly	12.4%	19.5%	0.1%	1.3%
bothaloneanc	0.2%	0.5%	0.3%	0.1%
jointlyonly	4.9%	4.9%	0.2%	3.6%
doesnotown	39.4%	11.8%	0.3%	0.4%

Table 3: Household Decision-Making (Couples Data)

WOMEN					
	partner	with partner	self	other	
health	76.9%	16.6%	5.1%	1.5%	100.0%
purchases	65.5%	18.5%	2.9%	13.2%	100.0%
spending hus	78.4%	17.6%	2.0%	1.5%	99.5%
MEN					
	partner	with partner	self	other	
health	0.9%	17.0%	80.2%	2.0%	100.0%
purchases	0.9%	20.3%	57.5%	21.3%	100.0%
spending wi	0.6%	10.2%	71.9%	0.4%	83.2%

Table 4: Couples Agreement on Household Decision-Making

Health care					
	men's persp.				
Woman's pe	Partner	with partner	self	other	total
partner	0.7%	13.0%	61.7%	1.5%	76.9%
with partner	0.1%	2.0%	14.1%	0.3%	16.6%
self	0.0%	1.1%	3.7%	0.1%	5.1%
other	0.0%	0.2%	1.1%	0.1%	1.5%
Major purchases					
	Men's persp.				
Woman's pe	Partner	with partner	self	other	
partner	0.6%	12.5%	39.4%	13.0%	65.5%
with partner	0.3%	3.5%	11.7%	3.0%	18.5%
self	0.0%	0.8%	1.7%	0.4%	2.9%
other	0.1%	2.9%	5.2%	5.0%	13.2%

Table 5: Justification of Violence Against Women (Couples Data)

	Women			Men		
	No	Yes	Don't know	No	Yes	Don't know
goes out	55.1%	44.7%	0.2%	86.7%	12.9%	0.4%
neglects children	54.5%	45.3%	0.2%	83.3%	16.5%	0.3%
argues	52.6%	47.2%	0.2%	84.2%	15.4%	0.4%
refuses sex	52.9%	47.0%	0.2%	88.9%	10.9%	0.3%
burns dinner	74.6%	25.3%	0.2%	94.3%	5.5%	0.2%
average	**57.9%**	**41.9%**	**0.2%**	**87.5%**	**12.2%**	**0.3%**

Table 6a: Fertility Preference, Want Another Child

Women		Men	
have another	76.7%	have another	84.1%
no more	19.7%	no more	6.4%
undecided	1.5%	undecided	2.8%
infecund	1.7%	infecund	0.9%
sterilized	0.5%	sterilized	0.1%
		never had sex	0.0%

Table 6b: Fertility Preference, Want Another Child Soon

Women		Men	
<2 years	25.8%	<2 years	28.7%
>2 years	48.0%	>2 years	39.5%
infecund	1.7%	infecund	0.9%
no more	19.7%	no more	6.4%
sterilized	0.5%	sterilized	0.1%
undecided	1.5%	undecided	2.8%
unsure timing	2.8%	unsure timing	16.0%
		never had sex	0.0%

Table 6c: Couples Agreement on Wanting Another Child

	Men					
Women	have another	no more	un-decided	infecund	sterilized	never had sex
have another	68.5%	1.9%	1.6%	0.4%	0.1%	0.0%
infecund	1.1%	0.5%	0.0%	0.1%	0.0%	0.0%
no more	13.2%	3.7%	1.0%	0.4%	0.0%	0.0%
sterilized	0.2%	0.2%	0.1%	0.1%	0.0%	0.0%
undecided	1.1%	0.1%	0.1%	0.0%	0.0%	0.0%

Table 6d: Couples Agreement on Wanting Another Child Soon

	Men							
Women	<2 years	>2 years	infecund	no more	sterilized	un-decided	unsure timing	never had sex
<2 years	13.2%	5.9%	0.1%	0.6%	0.0%	0.4%	4.1%	0.0%
>2 years	9.6%	25.9%	0.2%	1.3%	0.0%	1.1%	7.3%	0.0%
infecund	0.6%	0.2%	0.1%	0.5%	0.0%	0.0%	0.2%	0.0%
no more	4.1%	5.9%	0.4%	3.7%	0.0%	1.0%	3.2%	0.0%
sterilized	0.0%	0.0%	0.1%	0.2%	0.0%	0.1%	0.1%	0.0%
undecided	0.3%	0.5%	0.0%	0.1%	0.0%	0.1%	0.3%	0.0%
unsure timing	0.7%	1.1%	0.0%	0.1%	0.0%	0.0%	0.7%	0.0%

Table 7: Women's Agreement with Justifications of Violence by Education Level

	Women's education			
violence	None	Primary	Secondary	total
0	17.9%	12.2%	18.4%	48.6%
1	3.2%	1.8%	2.7%	7.7%
2	3.0%	1.5%	1.8%	6.3%
3	3.9%	1.5%	1.8%	7.3%
4	8.7%	2.7%	2.0%	13.4%
5	11.9%	2.9%	2.0%	16.8%
total	48.6%	22.6%	28.8%	

Table 8: Summary of Significant Model Results

3.6 Figures

Figure 1: Men and Women's Support of Justifications of Violence (Couples Data)

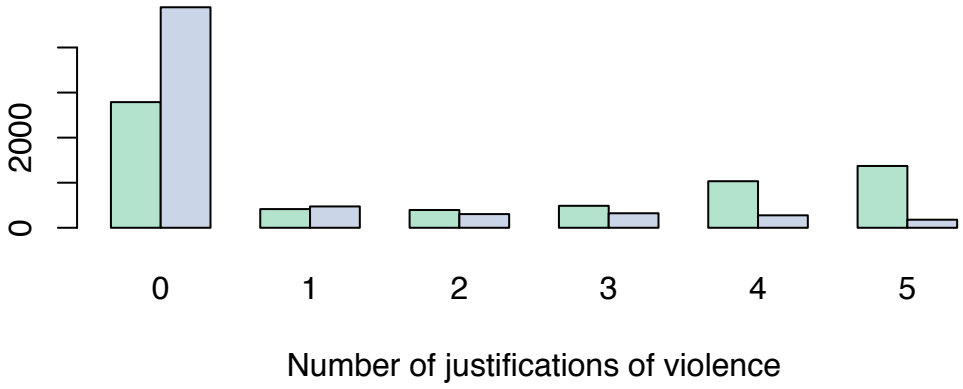
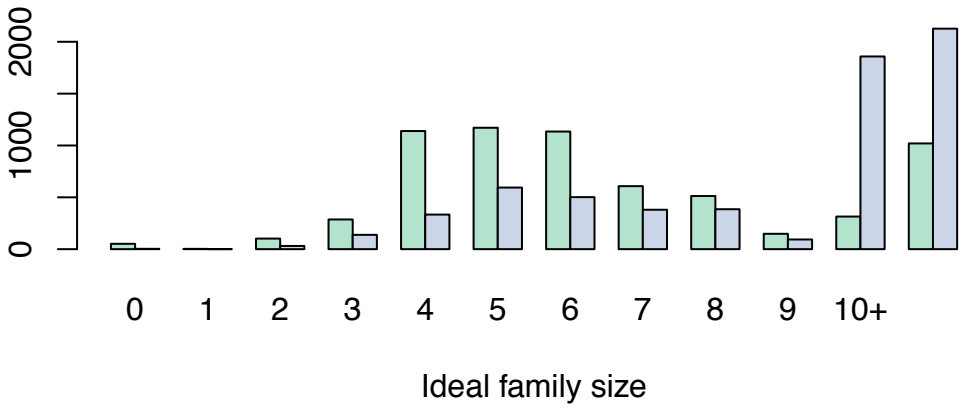


Figure 2: Men and Women's Ideal Family Size (Couples Data)



Chapter 4: Partner Cooperation, Family Planning and Contraceptive Effectiveness in West Africa

4.1 Abstract

For women in West Africa, access to contraception is not the only obstacle impeding women from using contraception successfully. In a place where men and women have very difference fertility preferences and the costs of childbearing are disproportionately borne by women, there is much at stake in the negotiations and compromises that family planning entails. While partners both gain from reaching an agreement, there is a cost to executing one's fertility preferences unilaterally and surreptitiously. This is particularly because the most popular contraceptive methods in this region may require cooperation to work most effectively. In this study I use data from Demographic and Health Surveys conducted in 14 West African countries to investigate how cooperation between partners/spouses may be associated with both women's contraceptive use and, more interestingly, its effectiveness at preventing unwanted pregnancy in West Africa. The results indicate that while relationship cooperation may not be associated contraceptive effectiveness, it is significantly associated with lower risk of pregnancy. The results suggest that women in more cooperative relationships may be more able to effectively prevent pregnancy regardless of contraceptive method.

4.2 Introduction

Within the field of demography, it has become axiomatic that women's empowerment is linked with population fertility decline. Although the concept is often called by other names like "women's status", "autonomy", or "gender equality", many demographers and social scientists have attempted to show empirically and argue the idea that an improvement in women's

subordinate status, relational power or individual agency or autonomy causes population level fertility decline (Hartman 2016, Doepke and Tertilt 2018, Presser and Sen 2000, Upadhyay et al 2014). However, this literature falls short because it fails to properly operationalize the meaning of women's empowerment, it fails to provide a convincing causal mechanism for the proposed relationship, and it universalizes the construct of empowerment across geographic space where in reality, it is likely to take on different meanings and causal pathways in different places (Malhotra and Schuler 2005, Duvendack and Palmer-Jones 2017). This study is part of a larger project to interrogate the putative relationship between women's empowerment and fertility change in West Africa. The West African region is characterized by some of the highest fertility rates and lowest levels of economic development in the world and is the focus of much research, policy, and intervention aimed at women's empowerment, often with the explicit or implicit goal of fertility decline. After the International Conference on Population and Development in 1994 in Cairo, women's empowerment became the publicly stated goal of global population and development policy (United Nations 2014, Presser and Sen 2000). However, the spirit of this shift -- from policy focused on population control to policy focused on women's empowerment -- was intended to improve the well-being of women globally. Yet, what women want and need, and what is required for women to realize these goals, are not universal and should not be subjected to uniformly devised and applied policies. It is important to consider the implications of geographic place in understanding both how the meaning of women's empowerment varies by place and context and how the pathways linking empowerment to individual and population level fertility are embedded in place.

In this study I use a conceptualization of women's empowerment specific to the West African context. Rather than comparing more or less "empowered" women, in a West African setting

it is more useful to look at differences between women who have more cooperative relationships with their partners compared with women in less or non-cooperative relationships. In this study, I investigate how the level of cooperation that women have in their relationships with their male partners may influence whether they use contraception, what type of contraceptive methods they will choose to use, and even the effectiveness of their contraception.

4.3 Background

Amidst the difficulties in measuring fertility preferences among populations in sub Saharan Africa, a few things have been made clear: Men generally want more children than women do, and men and women generally do not have a fixed "ideal family size" (Doepke and Tertilt 2018, Bankole and Singh 1998, Johnson-Hanks 2007). People in this region often claim that the total number of children they will have is up to God (Bankole and Audam 2011). However, there is evidence to show that despite this common belief, people do have fertility preferences and exercise control over the timing of their fertility in relation to things other than an "ideal family size" such as their health status, economic circumstances, or the time elapsed between births (Johnson-Hanks 2007). In some places, the intentional "spacing" between births, using either natural methods or modern contraception, is not only *not* stigmatized, it is valued, and having children too close in succession *is* stigmatized (Adjamagbo and Koné 2013). Over the past several years the stigma surrounding modern contraception has declined and the proportion of married women using modern methods has increased in the region (Behrman et al 2018). Generally, couples who discuss family planning decisions together are more likely to use contraception than individuals who make these decisions unilaterally (Feyisetan 2000).

It is purported in the international development sector and also in the demographic literature on fertility that women who are more empowered will have fewer children (Hartman 2016, Presser and Sen 2000). Empowerment is an elusive concept that is difficult to measure directly; indirect measures or proxies are often based on education, employment, and income. Kabeer's (1999, 2001, 2005) definition of empowerment, as a process by which women achieve agency, where agency is defined as the ability to make meaningful decisions, is widely accepted. However, this definition does not provide a forthright operationalization of empowerment or an easy way to measure it. A common approach follows that of Kishor (2000), which is generally the approach used by the Demographic and Health Survey (DHS).

The DHS is conducted in cooperation with local governments in most developing countries across the globe, including West African countries, contains several questions that are explicitly intended to measure empowerment. These questions, which ask who in the household makes certain household decisions, are asked of both men and women respondents. The three basic question forms are whether the individual makes household decision X alone, with their partner, or neither (meaning that the decision is made by someone else, typically their partner). The standard interpretation by the designers of the survey module and researchers using the data has been that a woman who says she makes a decision alone or with her partner is considered "empowered" (PAMBÉ et al 2014, Kishor and Subaiya 2008).

If the original purpose of the interest in and promotion of women's empowerment was to promote women's well-being, value, and freedom of choice, then in this spirit we should consider whether women's individual autonomy actually promotes improvements in the conditions of women and aligns with what women say they want. Results from my qualitative fieldwork in Dakar, Senegal, described in the previous chapter, indicate that, when asked

whether women who makes household decisions alone are “empowered” (or “autonomous” -- which accords more closely to the translation into French), both men and women stated that they thought it was bad for anyone to make household decisions alone without consulting one’s spouse and ideally men and women should consult their partners before making household decisions. An empowered person, according to interviewees, is not defined as someone who can do whatever they want, rather, it was consistently defined as someone who has the ability to take care of themselves and their family, usually financially, and empowerment involved discussion and cooperation between partners.

An experimental study in Lusaka, the capital region of Zambia, demonstrated that whether couples make family planning decisions cooperatively versus uncooperatively affects both contraceptive use and marital tension (Ashraf et al 2014). It was shown that if a woman is required to have her husband’s consent in order to use contraception that she will be less likely to use it, and if she has the option to use contraception covertly without her husband’s consent she will be more likely to use it; however, this will incur a psychic cost that results in both her and her husband being worse off in the sense of overall well-being. In this scenario, the option to make a decision unilaterally and bypass collective bargaining results in inefficient outcomes. This is because while a woman has more bargaining power if she can carry out her preference surreptitiously, this option increases men’s distrust, such that husbands may refuse to give permission in order to increase their own bargaining power, even if they do not want children at that time. After the experiment concluded, the women who had used contraception surreptitiously stopped using the contraception and there is no evidence that the intervention resulted in lower overall fertility for these women. The distrust created by the availability of the covert option creates martial tension that leads to lower happiness and wellbeing for the

woman. Bawah et al. (1999) also document conflict in marital relations arising from the introduction of family planning and contraceptives due to men's anxieties particularly when women take contraception without their husband's consent.

Drawing from the results of Ashraf et al (2014), Bawah et al (1999) and the early findings of my field work in Dakar (see chapter 2), it seems plausible that in West Africa there is a preference for cooperative decision-making regarding family planning that women may value over their ability to unilaterally choose contraception surreptitiously, likely because of the psychic cost of the latter. However, one could expect that women for whom cooperation with their partners is not possible would be more likely to use contraception secretly and the type of contraception used would be something that could be used secretly such as a contraceptive pill, an implanted device, or injections. However, certain methods inherently require partner cooperation, or would be less effective without partner cooperation. Natural methods such as periodic abstinence and withdrawal, which are generally preferred by women in the region because they are less stigmatized and seen as less invasive than modern methods, would likely be less effective without partner cooperation. Given the changing state of attitudes surrounding family planning in Dakar, where natural methods are still preferred over modern ones, but modern ones are being used more and more, it is worth investigating how cooperative decision-making relates to contraceptive use and effectiveness in West Africa.

4.4 Research Question

Given the discussion and review in the previous section, my research question is: How is being in a relationship where decisions are made cooperatively associated with contraceptive use and its effectiveness in West Africa? The first testable hypothesis is that women who are in less cooperative relationships are more likely to choose contraceptive methods that allow them to

more easily use contraception surreptitiously than women who are in more cooperative relationships. Table 1 presents a summary of the contraceptive methods considered in this study, the potential for each one to be used surreptitiously, and some sources documenting evidence of each methods surreptitious use. While it is known that covert contraceptive use happens, the magnitude of this phenomenon is unclear. Few studies have quantified covert contraceptive use and often rely on indirect measures, such as discrepancies between men's and women's reported use (Becker et al 2005). Choiriyyah and Becker (2018) suggest that previous estimates of surreptitious use derived from indirect measures are underestimates and actual surreptitious use is likely much higher than expected. The relative use prevalence reported in Table 1 is based on the statistics for contraceptive use displayed later in the results section of this paper and Table 2.

The second hypothesis is that the family planning methods used by women in cooperative relationships are more likely to effectively prevent pregnancy. In this context family planning methods refer to either *natural methods* (including periodic abstinence/rhythm method, or withdrawal); or modern methods (e.g. condoms, contraceptive pill, IUD, Norplant, or injectable contraceptives). Some methods inherently require the partner's cooperation to be used effectively. For example, many women say they count the days since their period and abstain from sex during their estimated period of ovulation. This is what researchers call *periodic abstinence* or *rhythm method*. If she has a partner who is unwilling to cooperate in abstaining during this period, then that method is less effective. For abstinence to work she would need to be able to refuse sex during her fertile period.

The conceptual framework for this proposed study builds on the collective bargaining model. I assume that both men and women prefer cooperation over unilateral decision-making. I also

assume that men are always open to having a child soon conditioned on their partner being open to having a child soon. The reason I say open to having a child soon is because it has been shown that in Islamic West Africa, people are unlikely to say that their children are "unwanted" because they believe that God gives people children and they always want to accept God's gifts; however, children can be mistimed or not expected (Bongaarts 1990). Thus, it is more informative to ask, "Do you want to have a child in the near future or would you prefer to wait until later?" than to ask, "Do you want to have children?" or "How many children would you like to have in your life?" If the man and the woman in a relationship are both open to having another child in the near future, then they will discuss family planning and decide to use no contraceptive method. If they are both wanting to "space" births or they both want to avoid having a child in the near future, meaning they don't want to have a child, then they will discuss family planning and decide to use a contraceptive method cooperatively. In this case, if the perceived cost of having a child soon is greater than the perceived cost associated with a modern method then the couple will choose a modern method because of its greater effectiveness. Here, the cost of a pregnancy is greater when the perceived risk to the woman's health is greater, when the time since the most recent birth is less, or when the couple perceives themselves to be less able to afford it financially. If only the woman wants to "space" or delay having a child, meaning they are not open to pregnancy now, but their husband is, then the woman can choose to either discuss it with her husband or to use contraception covertly. If she chooses to discuss it with her husband then he can either cooperate in avoiding pregnancy now, or he can reject the offer and refuse to cooperate. If he refuses to cooperate than the woman can choose to either take no action and risk becoming pregnant or she can take contraception covertly. In this case, if she chooses to use a method covertly, because she has already tried to

discuss it with her husband, he is already aware of her preferences so he will be more distrustful and the psychic cost of using contraception will be greater than if she had just decided to use a method covertly without attempting to discuss with her partner, and lead to greater marital tension. Thus, if a woman believes, before discussing with her husband, that her husband is likely to cooperate then she will choose to discuss it with him and will only choose not to discuss it if she believes that he is more likely to be uncooperative. Given that she believes he will likely refuse to cooperate, she will avoid the discussion in order to either reduce the psychic cost of using any method and/or to increase the effectiveness of a natural method she may use.

4.5 Data and Methods

The aforementioned research question and associated hypotheses will be addressed using Demographic and Health Survey (DHS) data. My statistical analyses use data from one survey from each of nine West African countries from 2010-2015: Burkina Faso (2010), Benin (2011), Ghana (2014), Gambia (2013), Liberia (2013), Mali (2012), Nigeria (2013), Sierra Leonne (2013), and Senegal (2015). Several questions regarding household decision-making are included in the survey. As explained already the questions are designed to provide a composite indicator of women's empowerment. Women were asked who in the household had the final say regarding a) the respondent's own health care, b) making large household purchases, c) visits to family or relatives, d) deciding what to do with the money their partner earns, and e) deciding what to do with the money they earn themselves. For each question the possible responses include either that the respondent alone has the final say in that decision, that she and her partner make that decision together, or that her partner or another person makes that decision. I consider a woman to be in more cooperative relationship if she said that she makes

more of these decisions together with her partner. Relationship cooperation is operationalized as a variable where the "level" of relationship cooperation reflects the number of household decisions respondents say they make together with their partner.

The DHS also includes a contraceptive calendar for each respondent that indicates for every month for the previous up to five years whether the respondent was using a contraceptive method, using no method or if the respondent was pregnant. For each pregnancy it also indicates if the pregnancy resulted in a birth or was terminated (which includes either an induced or natural abortion). For the women using a contraceptive method, the calendar indicates which contraceptive method was used from a list including: Pill, IUD, injection, diaphragm, condom, female sterilization, male sterilization, periodic abstinence/rhythm/standard days/cyclebeads, withdrawal, Norplant, lactational amenorrhea method (LAM), female condom, foam/jelly, other modern methods, or other traditional methods. I use survival analysis to estimate the relationship between a set of covariates and the time elapsed between a penultimate birth until the beginning of the last pregnancy before the survey. If the woman has had only zero or one pregnancies in the 5-year window, then I treat the interval as left-censored. The models provide us a means to test which methods were more "effective" in the sense that they correspond to longer interbirth intervals. The idea is that if a method is more effective, then it would delay a pregnancy longer than another method would. Similarly, if women in more "cooperative" relationships were more effective in their efforts to delay pregnancy then I would observe longer interbirth intervals among women with higher levels of relationship cooperation.

I evaluate two different modeling frameworks for survival data. The semi-parametric Cox proportional hazard model provides a parsimonious approach to assess the direction and

significance of covariate effects. It does however impose the assumption of proportionality and that covariate effects are fixed through time. An alternative framework, Aalen's additive hazard model, provides a more general approach with few assumptions and allows for time-varying covariate effects. The Aalen models are more cumbersome to specify and interpret, and given the larger number of parameters estimated, have less statistical power, Both frameworks allow for time-dependent covariates -- that is, the value of the covariate can change over the period of exposure before the event or censoring occurs (Aalen 1989, Aalen et al 2008, Martinussen and Scheike 2006). Using both frameworks I test the hypothesis that for women in cooperative relationships, their efforts to prevent pregnancy will be more effective than women in uncooperative relationships, particularly if they are using methods that are less able to be used surreptitiously. The level of relationship cooperation is indicated by a covariate in the model. The type of contraceptive method used will be represented in the model as a time-dependent covariate such that, when a woman switches contraceptive methods or switches to non-use of contraception, or a state of pregnancy, the values of the covariates representing the use of these contraceptive methods (or non-methods) change. This type of model will provide estimates of the effect of each contraceptive method during the time it is being used and allows the estimation of these effects among women who may be changing methods or between using a method and no method during the interbirth interval of interest.

Here, I define contraceptive effectiveness as how effective the use of a particular contraceptive method is at preventing pregnancy. The integral piece of this definition is that contraceptive effectiveness is about how the *use* of the particular method affects the probability of a conception. In other words, it involves both how effective the contraceptive technology is when used correctly, and the user's ability to use the contraceptive method efficiently, appropriately,

and consistently. For example, a contraceptive pill may be considered 99.9% effective according to clinical trials, but for women who aren't able to take it at the same time every day, or where her motivation to take the pill consistently is hampered by psychic stress or social pressure, the contraceptive effectiveness of this method may be well below 99.9%. In this study I measure contraceptive effectiveness using estimates of birth hazards. This can be understood as the instantaneous rate of pregnancy occurrence at time *t* while using contraceptive method type *m,* given that a pregnancy has not occurred up until that. This study aims to compare the effectiveness of contraceptive methods relative to each other and to compare this contraceptive effectiveness between women in more or less cooperative relationships. This study does not claim to be able to accurately and precisely calculate the effectiveness of each contraceptive method in terms of the probability of becoming pregnant while using the method. Thus, the measure is relational: I can tell if a contraceptive method was *more* effective or *less* effective by comparing the time elapsed while using the method until a pregnancy occurs. Thus, while there may be some measurement issues in precisely calculating the effectiveness of a particular method, since I am comparing the difference between two groups, if that error is the same in both groups then it is a wash. For instance, if a woman became pregnant in the first month trying to conceive, I cannot tell by looking at this data if this person became pregnant because of failed contraception or because they stopped using the contraception. However, since I am comparing categories of women, I am assuming that the number of women in each group who experience an occurrence like this would be random thus resulting in a relatively equal proportion of them in each category and I would still witness the same difference in observed contraceptive effectiveness between the categories of interest.

One drawback of this method is that the respondent's fertility intention is not known at the times that are being modeled. Using only the DHS contraceptive calendar it is not possible to know if a woman wants to have a child or wants to prevent a child. Here, one could assume that if a woman is contracepting that this means that she is trying to avoid becoming pregnant and that if she is not contracepting that she is open to becoming pregnant. However, it is possible that a woman is not contracepting even though she would not want to become pregnant at that time or for another reason such as: not having access to contraception, a fear of or stigma associated with contraception, a medical concern, or because she is acquiescing with her partner's preference. To mitigate this measurement issue, I consider another variable included in the DHS contraceptive calendar. For some women who were using a method and stopped using that method, they were asked why they discontinued use. Possible responses include: "wanted to become pregnant", "became pregnant while using", "husband disapproved", "side effects", "health concerns", "access/availability" among many others. However this variable has a major limitation, there are many missing values and most respondents did not provide a reason when discontinuing a method. In order to compare women using no method who said they discontinued because they "wanted to become pregnant" with the rest of the women in the sample using no method I fit additional models with a proxy variable constructed from this survey question.

It is also worth noting that many women may have ambivalent feelings regarding whether a child would be wanted or not and may have vague fertility preferences. While women who have a strong preference to not become pregnant at that time are the most likely to use a method, those with weaker, little, or no fertility preferences will be more likely to not use a method. It is also possible that the use of contraception on the contraceptive calendar is

underreported. Some women might not perfectly remember their contraceptive use over the past five years, or for some reason they fail to tell the interviewer. This is part of the reason why I am only using the most recent interbirth interval, as opposed to all birth intervals on the contraceptive calendar. Another source of underreporting could be contraceptive use that is not recognized as such by the user. It is likely that there are women who have occasionally or for periods of time avoided becoming pregnant by avoiding sex, requesting withdrawal, or using another traditional method but did not consider their effort to be a contraceptive method when communicating to the interviewer.

4.6 Results

Table 2 contains the estimated prevalence of contraceptive use in each country according to their corresponding survey. Prevalence is calculated using the sampling weights and on a person-months basis, as the number of months women purportedly used a particular contraceptive relative to the person-months of the women's exposure. Overall, contraceptive use is low, but not rare with an average of 11.8% of women using any method in any particular month in the West African Region. Reported contraceptive use is highest in Ghana at 19.5% and lowest in Gambia at 5.1%. It is evident that there is considerable geographic variation in contraceptive use. The pill, injections, and Norplant appear to be the most popular contraceptive methods reported, however some studies have shown that natural methods such as withdrawal and periodic abstinence/rhythm methods are popular options in the region and are likely underreported in the DHS (Rossier et al 2014, Bledsoe et al 1998, Mathe et al 2011)

Table 3 shows a summary of responses to the women's empowerment decision-making variables, by country as a percentage of the women in each country calculated using weighted means. The responses of women in different countries vary significantly. In general, few

women make household decisions regarding their own health care, major purchases, or visiting relatives alone (11.4% on average), about half say their partner makes these decisions (51.9%), and more than a third of couples make these decisions together (35.6%). Unsurprisingly, most women who answered the question regarding how husband's earnings are spent said that their husband makes this decision alone and among the women who had earnings the majority said they themselves make decisions regarding how their earnings are spent.

The fourth and fifth questions are less reliable as indicators of women's empowerment because not all the women in the sample answered them, and for many of these women one or both of the questions were not relevant either because their husband had no earnings, or they had no earnings. I restricted the sample to only include women who answered the first three questions, so I have complete data for the first three questions but not the latter two. Thus, when constructing a statistic to represent "cooperation level" where a woman who makes all five decisions together with her partner has a cooperation level of 4 and a woman who makes none of these decisions together has a level of 0. A woman who makes all decisions together with her partner, and thus has a very cooperative relationship, may only have a cooperation level of "3" if she didn't answer the fourth and fifth question for whatever reason. I conducted the entire analysis presented in this paper twice: Once using all five household decision-making variables and once using only the first three where there is complete data. Based on those analyses, I concluded that the results did not significantly differ whether including the latter two questions or not. Thus, the results presented in this paper only use the first three questions, and our variable reflecting relationship cooperation has four levels: 0 (no cooperation), 1, 2, or 3 (full cooperation).

As shown in Table 4, the proportion of women at each cooperation level has significant geographic variation. Mali, Senegal, and Burkina Faso appear to have the highest proportion of women in "uncooperative" relationships with 80.7%, 78.1% and 70.4% of women making none of the three household decisions with their partner. Liberia and Ghana appear to have the most women in cooperative relationships to any degree. Note that these levels reflect decisions that women report making *together with their partners* to reflect the operationalization of women's empowerment as described in the background section. However, even if one were to consider a woman who makes one or more of these household decisions *alone*, the same countries exhibiting low cooperation also exhibit a low proportion of women making these decisions themselves. As evident in Table 3, in Mali, Senegal, and Burkina Faso only 7.4%, 4.7%, and 15.6% of women make these household decisions alone, respectively. On the other hand, in Ghana and Liberia it is 25.6% and 19.7% respectively. Countries where women have greater autonomy tend to be the same ones where women and men make more decisions cooperatively.

Table 5 depicts contraceptive prevalence at the four levels of cooperation as previously defined. It is clear that contraceptive use is positively correlated with relationship cooperation. In other words, women in more cooperative relationships use contraceptive methods at higher rates. This relationship generally holds for every contraceptive method as well with the notable exception of Norplant which is used at roughly equal rates across all relationship cooperation levels. The largest jump in contraceptive use is between those women who make no decisions with their partner and those who make at least one, and less of a difference among the other levels. Among women in the least cooperative relationships (level 0), injections, the pill, and Norplant are the most commonly used methods, at 2.8%, 1.9%, and 1.2% respectively, which

is to be expected given that these methods are most able to be used surreptitiously as described in Table 1.

Survival curves for the birth interval data, as described in the methods section, are displayed in Figures 1 and 2. It is clear in Figure 1 that there are noticeable differences in the survival times among women at the different levels of relationship cooperation. This suggests that relationship cooperation effectively is associated with longer inter-birth intervals in the way that one could expect given the conceptual framework of this study. Women who say they make more household decisions together with their partner exhibit longer birth intervals, which indicates that they are more effective at delaying a second pregnancy than women who reportedly make fewer of these household decisions cooperatively. Survival curves also vary by contraceptive method, as one can see in Figure 2. As expected, the women using no contraceptive method have the fastest rate of transition into pregnancy, followed by the other non-modern methods: withdrawal, other traditional methods, and rhythm/periodic abstinence respectively. The modern methods (Norplant, IUD, and Injection) appear to consistently have the highest effectiveness in that these correspond to lower risk of pregnancy over all months in the interval.

The data was fitted to both a Cox proportional hazards model and an Aalen additive hazards model in order to test the effects of relationship cooperation and contraceptive use and method. These models both use a counting process framework to treat contraceptive method as a time-varying covariate to accommodate contraceptive method to vary by month for each individual. While the Cox model assumes that hazards between variables are proportional, meaning that the shape of the hazard curve is the same, the Aalen model does not carry this assumption and allows for varying shaped hazard curves and time-varying covariate effects. The Aalen model

also has the advantage that it provides estimates of the effect of each variable in the model at each time point, instead of just one estimate over the entire time interval. Thus, the Aalen model can be used to test whether variable effects are time-varying, meaning if the effect of each variable differs at different points of the time interval. The results of the Cox and Aalen models are shown in Tables 6 and 7 respectively. These results corroborate the inference made previously based on the survival curves alone.

While the effects of relationship cooperation and contraceptive method appear significant in the separate survival curves, the results of the fitted Cox proportional hazard model shown in Table 6 confirm that both factors significantly affect pregnancy hazard. Both contraceptive type and level of relationship cooperation have significant main effects on interbirth intervals. All contraceptive methods, including natural methods, delay pregnancy significantly more than using no method. More interestingly, even though relationship cooperation is associated with contraceptive use, relationship cooperation effectively lengthens interbirth intervals and the effect of cooperation is significant even having statistically controlled for contraceptive method and use. Cumulative hazard plots from the Aalen additive model (figure 3) show the cumulative risk of a woman becoming pregnant at each month since a previous pregnancy or birth with respect to each variable. In general, women are a greater risk after one to three years, and after that time their risk plateaus.

Interaction terms were included in the hazard models to test the hypothesis that relationship cooperation is associated with certain contraceptive methods, particularly less surreptitious methods, to be more effective than they would be otherwise. The dearth of significant interaction effects in these models indicate that, relationship cooperation has no detectable association with the effectiveness of any particular contraceptive methods. While the Aalen

Additive Hazard Model (table 7) did show significant interactions between relationship cooperation and five modern contraceptive methods (pill, IUD, injections, condoms, and Norplant) these effects were time-varying and cumulative hazard plots shown in figure 4 reveal that these interactions are only significant at later time periods, after two to three years when most of the transitions would have already occurred if they were going to occur at all. Thus, the significant interaction between relationship cooperation and contraceptive effectiveness is only detected among the much smaller sample of women who were using the method and became pregnant only after two to three years. The positive associations are counter to our theoretical framework and would suggest that being in a more cooperative relationship and using one of those methods is associated with a slightly higher risk of pregnancy.

As discussed above, data on fertility intentions when contraceptive methods were discontinued is not complete, however for those who did provide a reason for discontinuing contraceptive use some did state that they did so because they wanted to become pregnant. Figure 5 shows survival curves comparing women who were using no method because they wanted to become pregnant with all other women using no contraceptive method. Among women who stated they wanted to become pregnant, it is apparent that relationship cooperation is actually positively associated with pregnancy risk. In other words, the women in the more cooperative relationships are more likely to become pregnant sooner when they want to become pregnant. This suggests that relationship cooperation may enable women to realize their fertility preferences whether they are trying to become pregnant or avoid becoming pregnant.

4.7 Discussion

While this study failed to show substantial evidence that relationship cooperation is related to contraceptive effectiveness, I have stumbled upon a more interesting result: Relationship

cooperation, somehow, is associated with delays in pregnancy, regardless of contraceptive use. Women who use any form of contraception have a lower risk of pregnancy than women who use no contraceptive method, however modern and/or hormonal methods such as Norplant, IUD, and Injections have the highest effectiveness. While natural methods such as LAM and withdrawal have the lowest effectiveness, they are still significantly associated with a decrease in the risk of pregnancy for women in this region, which shows that they may still be a valid option for women with an aversion towards modern methods. In fact, periodic abstinence/rhythm was very close in effectiveness to two of the modern methods (condoms, the pill).

Certain drawbacks to this dataset exist, which warrants further research into this question on the interaction of contraceptive effectiveness and relationship cooperation before I can rule out the possibility that relationship cooperation could affect the effectiveness of methods which are less able to be used surreptitiously. First, it is most likely that use of natural methods is underreported in the DHS. The fact that I witness differences in interbirth intervals among supposedly non-contracepting women suggests that some of these women are, at least occasionally, using what could be considered natural methods to space their births such as withdrawal or periodic abstinence. Second, the DHS survey questions used in this study to indicate relationship cooperation did not actually include questions about decision-making regarding family planning. Thus, I must assume that the amount of cooperation within relationships is consistent between different domains. In reality, it is possible that couples cooperate on certain decisions, default to one partner on other decisions, or even behave independently on certain decisions. For instance, one could imagine a couple that is highly

cooperative on issues relating to children and family planning, but perhaps make independent decisions with regard to how individual earnings are spent.

More research is needed to investigate the complex ways that women's empowerment and household structure and power dynamics between household members may affect fertility and family size. In particular, there is a need to show the various ways fertility outcomes may be altered in ways other than contracepting as it is currently understood. While the magnitude of the effect of relationship cooperation on risk of pregnancy shown in this study is small, it is significant and is not explained by contraceptive use. Although this could be explained by a mere underreporting of contraceptive use, I suspect it may likely be better explained by more nuanced relationship dynamics where the strategies employed by women to delay a pregnancy are more effective with the support and consent of their spouses whether those strategies involve what researchers would consider to be "contraceptive methods" or not.

Table 1: Contraceptive Methods and Their Ability to be Used Surreptitiously

Method	Notes	Evidence of Surreptitious Use	Ability to be Used Surreptitiously	Relative Use Prevalence
Pill	• Can be hidden and taken secretly • Physical evidence is actual pills • Requires monthly access and secure storage	Castle et al. (1999), Biddlecom and Fapohunda (1998), Ashraf (2004), McCarraher et al (2006), Chikovore (2002), Choiriyyah and Becker (2018), Bawah et al (1999)	High	More common
IUD	• Only requires one clinic visit • Physical evidence is threads in cervix	Biddlecom and Fapohunda (1998), Becker et al (2006), Castle et al. (1999), Choiriyyah and Becker (2018)	High	Rare
Injections	• Dose required every two months, in a clinic • Partner may notice missing periods	Becker et al (2005), Choiriyyah and Becker (2018), Adetunji (2011), Biddlecom and Fapohunda (1998), Bawah et al (1999), Ross and Agwanda (2012)	Highest	Most common
Condoms	• Requires partners participation	--	Low	Somewhat common
Norplant	• Implant in arm is physically evident • Partner may notice missing periods	Biddlecom and Fapohunda (1998), Choiriyyah and Becker (2018)	High	More common
Rhythm or Periodic Abstinence	• Can avoid sex during fertile period • May require partner's cooperation	Biddlecom and Fapohunda (1998), Castle et al. (1999)	Medium	More common
Withdrawal	• Requires partner's participation	Biddlecom and Fapohunda (1998)	Low	Less common
Female Sterilization	• One-time surgery with recovery time • Later, no physical evidence	Becker et al (2006)	High	Rare

Table 2: Contraceptive Prevalence by Country

	Burkina Faso '10	Benin '11	Ghana '14	Gambia '13	Liberia '13	Mali '12	Nigeria '13	Sierra Leonne '13	Senegal '15	**Entire Region**
No method	86.9%	90.6%	80.5%	94.9%	87.6%	94.4%	86.9%	88.8%	83.1%	**88.2%**
Any method	**13.1%**	**9.4%**	**19.5%**	**5.1%**	**12.4%**	**5.6%**	**13.1%**	**11.2%**	**16.9%**	**11.8%**
Pill	2.9%	1.1%	4.3%	1.5%	3.5%	1.8%	1.7%	3.1%	5.0%	**2.4%**
IUD	0.2%	0.5%	0.7%	0.3%	0.0%	0.1%	1.2%	0.2%	0.9%	**0.6%**
Injections	4.3%	1.7%	5.7%	2.3%	6.6%	2.2%	2.8%	4.8%	6.3%	**3.6%**
Condom	1.7%	1.3%	0.9%	0.3%	0.4%	0.1%	1.7%	0.2%	0.4%	**1.0%**
Rhythm	1.0%	2.3%	3.5%	0.1%	1.1%	0.0%	2.3%	0.1%	0.6%	**1.4%**
Withdrawal	0.1%	0.5%	0.9%	0.1%	0.0%	0.0%	1.9%	0.0%	0.3%	**0.7%**
Norplant	2.9%	0.7%	3.1%	0.1%	0.6%	1.1%	0.2%	1.6%	2.8%	**1.3%**
Other modern	0.1%	0.4%	0.3%	0.0%	0.1%	0.0%	0.3%	0.0%	0.0%	**0.2%**
Other traditional	0.0%	0.8%	0.2%	0.2%	0.1%	0.2%	0.9%	1.1%	0.6%	**0.6%**

Table 3: Household Decision Making by Country

	Burkina Faso '10	Benin '11	Ghana '14	Gambia '13	Liberia '13	Mali '12	Nigeria '13	Sierra Leonne '13	Senegal '15	**Entire Region**
Decisions regarding respondent's own health care										
with partner	15.8%	46.5%	49.6%	45.1%	61.2%	8.1%	32.6%	46.2%	13.9%	**33.5%**
partner	75.0%	36.1%	22.5%	27.2%	22.0%	83.6%	60.9%	45.1%	76.7%	**54.5%**
self	7.9%	17.1%	27.4%	26.9%	16.4%	7.2%	6.2%	8.1%	5.9%	**11.2%**
other	1.3%	0.4%	0.5%	0.8%	0.4%	1.1%	0.3%	0.6%	3.6%	**0.8%**
Decisions regarding major household purchases										
with partner	16.4%	47.4%	50.8%	42.2%	58.3%	10.7%	32.1%	48.3%	12.6%	**33.6%**
partner	78.6%	41.9%	25.4%	49.7%	17.0%	80.1%	62.1%	43.4%	63.5%	**56.2%**
self	3.7%	10.4%	22.9%	6.6%	24.4%	7.4%	5.6%	7.6%	4.6%	**8.3%**
other	1.3%	0.3%	0.9%	1.5%	0.2%	1.8%	0.3%	0.8%	19.3%	**1.9%**
Decisions regarding visits to family or relatives										
with partner	17.1%	57.9%	60.4%	53.1%	60.7%	15.2%	39.5%	51.9%	15.3%	**39.6%**
partner	46.7%	30.8%	12.7%	27.8%	20.7%	75.5%	52.4%	37.3%	72.7%	**44.9%**
self	35.3%	11.0%	26.4%	18.3%	18.5%	7.8%	7.9%	10.6%	3.6%	**14.5%**
other	1.0%	0.2%	0.6%	0.8%	0.1%	1.6%	0.2%	0.2%	8.5%	**1.0%**
Average Response										
with partner	**16.4%**	**50.6%**	**53.6%**	**46.8%**	**60.1%**	**11.3%**	**34.7%**	**48.8%**	**13.9%**	**35.6%**
partner	**66.8%**	**36.3%**	**20.2%**	**34.9%**	**19.9%**	**79.7%**	**58.5%**	**41.9%**	**71.0%**	**51.9%**
self	**15.6%**	**12.8%**	**25.6%**	**17.3%**	**19.7%**	**7.4%**	**6.6%**	**8.8%**	**4.7%**	**11.4%**
other	**1.2%**	**0.3%**	**0.7%**	**1.0%**	**0.2%**	**1.5%**	**0.3%**	**0.5%**	**10.4%**	**1.2%**
Decisions regarding how husband's earnings will be used										
with partner	4.6%	22.6%	36.0%	16.3%	63.0%	4.9%	22.7%	36.3%	16.2%	**22.2%**
partner	92.5%	64.4%	54.8%	73.7%	23.8%	84.9%	72.1%	54.9%	78.0%	**70.1%**
self	2.3%	11.5%	7.7%	6.4%	9.4%	9.3%	3.8%	7.4%	2.1%	**6.1%**
other	0.2%	0.1%	0.0%	0.1%	0.1%	0.2%	0.1%	0.2%	1.7%	**0.2%**
no earnings	0.2%	0.7%	0.8%	1.9%	2.1%	0.5%	0.7%	0.8%	1.0%	**0.8%**
Decisions regarding how respondent's earnings will be used										
with partner	1.9%	11.3%	22.7%	6.2%	24.4%	1.9%	12.8%	10.9%	5.5%	**10.1%**
partner	2.5%	7.2%	3.7%	4.1%	6.8%	6.0%	6.7%	9.4%	3.0%	**5.8%**
self	33.3%	43.2%	45.4%	43.5%	13.5%	25.8%	46.5%	14.8%	37.8%	**36.1%**
other	0.0%	0.0%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	1.0%	**0.1%**

Table 4: Relationship Cooperation by Country

Coop. Level	Burkina Faso '10	Benin '11	Ghana '14	Gambia '13	Liberia '13	Mali '12	Nigeria '13	Sierra Leonne '13	Senegal '15	**Entire Region**
0	70.4%	33.8%	26.7%	32.5%	25.7%	80.7%	54.3%	39.9%	78.1%	**51.6%**
1	14.9%	16.0%	19.7%	20.3%	14.6%	9.2%	11.9%	12.1%	9.6%	**13.6%**
2	9.7%	14.9%	19.8%	21.5%	13.3%	5.6%	9.2%	9.6%	4.7%	**11.1%**
3	5.0%	35.3%	33.9%	25.7%	46.4%	4.6%	24.6%	38.3%	7.6%	**23.6%**

Table 5: Relationship Cooperation and Contraceptive Method

	Relationship Cooperation			
	0	1	2	3
No method	91.6%	86.8%	85.4%	84.8%
Any method	**8.4%**	**13.2%**	**14.6%**	**15.2%**
Pill	1.9%	2.7%	3.2%	2.8%
IUD	0.3%	0.6%	0.8%	0.9%
Injections	2.8%	4.2%	4.4%	4.8%
Condoms	0.6%	1.3%	1.2%	1.3%
Rhythm	0.7%	1.4%	1.6%	2.2%
Withdrawal	0.3%	0.7%	0.9%	1.1%
Norplant	1.2%	1.4%	1.7%	1.2%
Other modern	0.1%	0.2%	0.2%	0.3%
Other traditional	0.4%	0.8%	0.6%	0.8%

Table 6: Cox Proportional Hazard Model

	coef	exp(coef)	exp(-coef)	Pr(>|z|)	lower .95	upper .95	
Cooperation	-0.04	0.96	1.04	0.00	0.96	0.97	***
Pill	-1.43	0.24	4.20	0.00	0.20	0.28	***
IUD	-2.85	0.06	17.29	0.00	0.02	0.13	***
Injections	-2.14	0.12	8.52	0.00	0.10	0.14	***
Condoms	-1.55	0.21	4.71	0.00	0.16	0.29	***
Rhythm	-1.06	0.35	2.89	0.00	0.28	0.43	***
Withdrawal	-0.63	0.53	1.87	0.00	0.42	0.68	***
Norplant	-3.44	0.03	31.26	0.00	0.02	0.05	***
Other modern	-1.74	0.18	5.70	0.00	0.08	0.41	***
Other traditional	-0.92	0.40	2.50	0.00	0.30	0.53	***
Coop*Pill	0.02	1.02	0.98	0.64	0.94	1.11	
Coop*IUD	-0.26	0.77	1.30	0.28	0.48	1.23	
Coop*Injections	-0.02	0.98	1.02	0.65	0.88	1.08	
Coop*Condoms	0.13	1.14	0.88	0.07	0.99	1.32	.
Coop*Rhythm	-0.02	0.98	1.02	0.76	0.89	1.09	
Coop*Withdrawal	0.06	1.06	0.94	0.31	0.95	1.19	
Coop*Norplant	0.15	1.16	0.86	0.34	0.86	1.56	
Coop*Other modern	0.08	1.08	0.93	0.70	0.73	1.60	
Coop*Other traditional	-0.03	0.97	1.03	0.74	0.84	1.14	

Table 7: Aalen Additive Hazard Model

Test for nonparametric terms									
Test for non-significant effects				Test for time invariant effects					
	Supremum-test of significance	p-value H_0: B(t)=0		Kolmogorov-Smirnov test	p-value H_0: constant effect		Cramer von Mises test	p-value H_0: constant effect	
(Intercept)	106.00	0.00	***	0.26	0.00	***	1.50	0.00	***
Cooperation	9.27	0.00	***	0.01	0.00	***	0.00	0.00	***
Pill	36.30	0.00	***	0.22	0.00	***	0.99	0.00	***
IUD	40.90	0.00	***	0.24	0.00	***	1.27	0.00	***
Injections	57.90	0.00	***	0.23	0.00	***	1.25	0.00	***
Condoms	26.20	0.00	***	0.20	0.00	***	0.88	0.00	***
Rhythm	21.10	0.00	***	0.18	0.00	***	0.64	0.00	***
Withdrawal	16.60	0.00	***	0.12	0.00	***	0.35	0.00	***
Norplant	73.40	0.00	***	0.25	0.00	***	1.41	0.00	***
Other modern	52.00	0.00	***	0.23	0.00	***	1.11	0.00	***
Other traditional	19.70	0.00	***	0.16	0.00	***	0.46	0.00	***
Coop*Pill	3.69	0.01	*	0.02	0.04	*	0.00	0.06	.
Coop*IUD	3.18	0.05	*	0.01	0.38		0.00	0.28	
Coop*Injections	4.80	0.00	***	0.01	0.20		0.00	0.13	
Coop*Condoms	3.60	0.02	*	0.02	0.05	.	0.01	0.00	**
Coop*Rhythm	2.80	0.17		0.01	0.54		0.00	0.36	
Coop*Withdraw	1.99	0.69		0.02	0.65		0.00	0.49	
Coop*Norplant	6.21	0.00	***	0.01	0.01	**	0.00	0.00	***
Coop*Other mo	2.14	0.59		0.03	0.31		0.01	0.37	
Coop*Other trac	1.42	0.98		0.03	0.22		0.00	0.46	

4.9 Figures

Figure 1

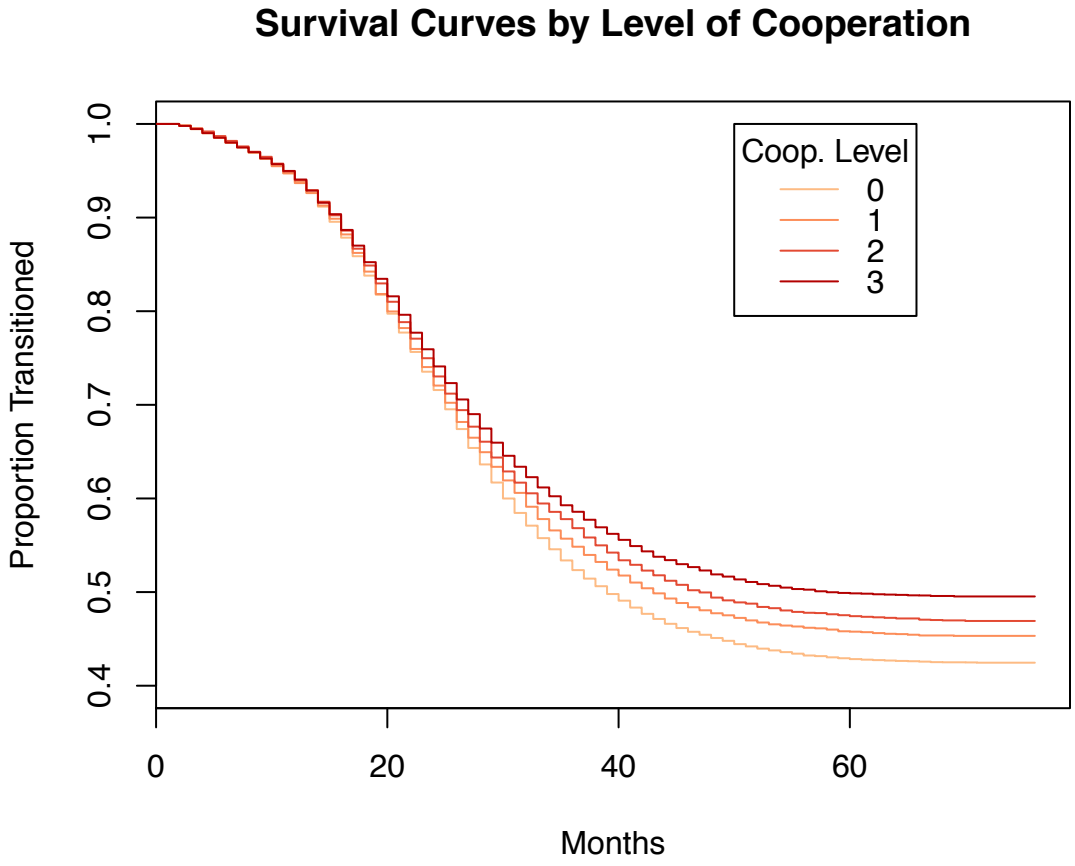


Figure 2

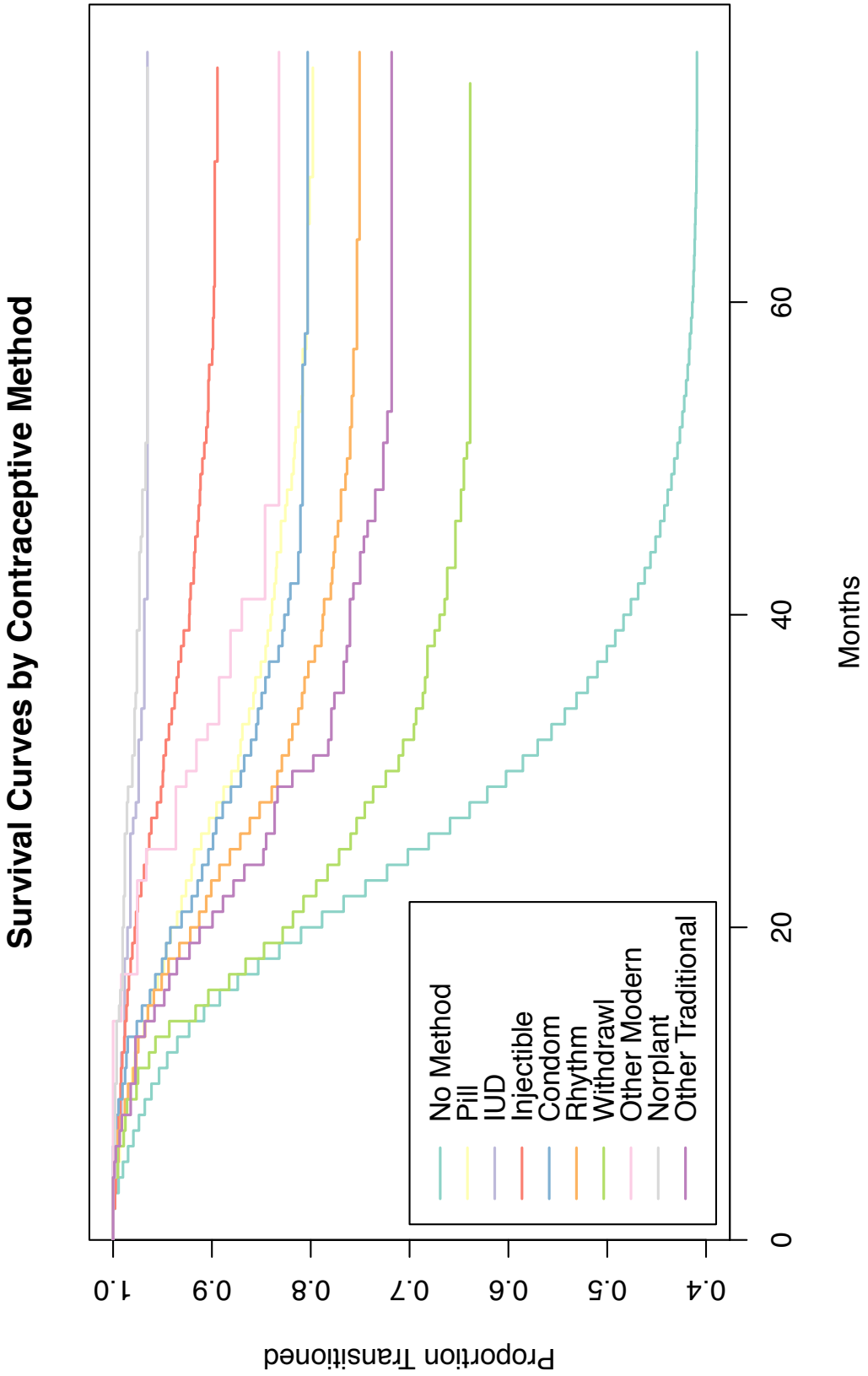

Survival Curves by Contraceptive Method
Proportion Transitioned
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0
20
40
60
Months
No Method
Pill
IUD
Injectible
Condom
Rhythm
Withdrawl
Other Modern
Norplant
Other Traditional

Figure 3

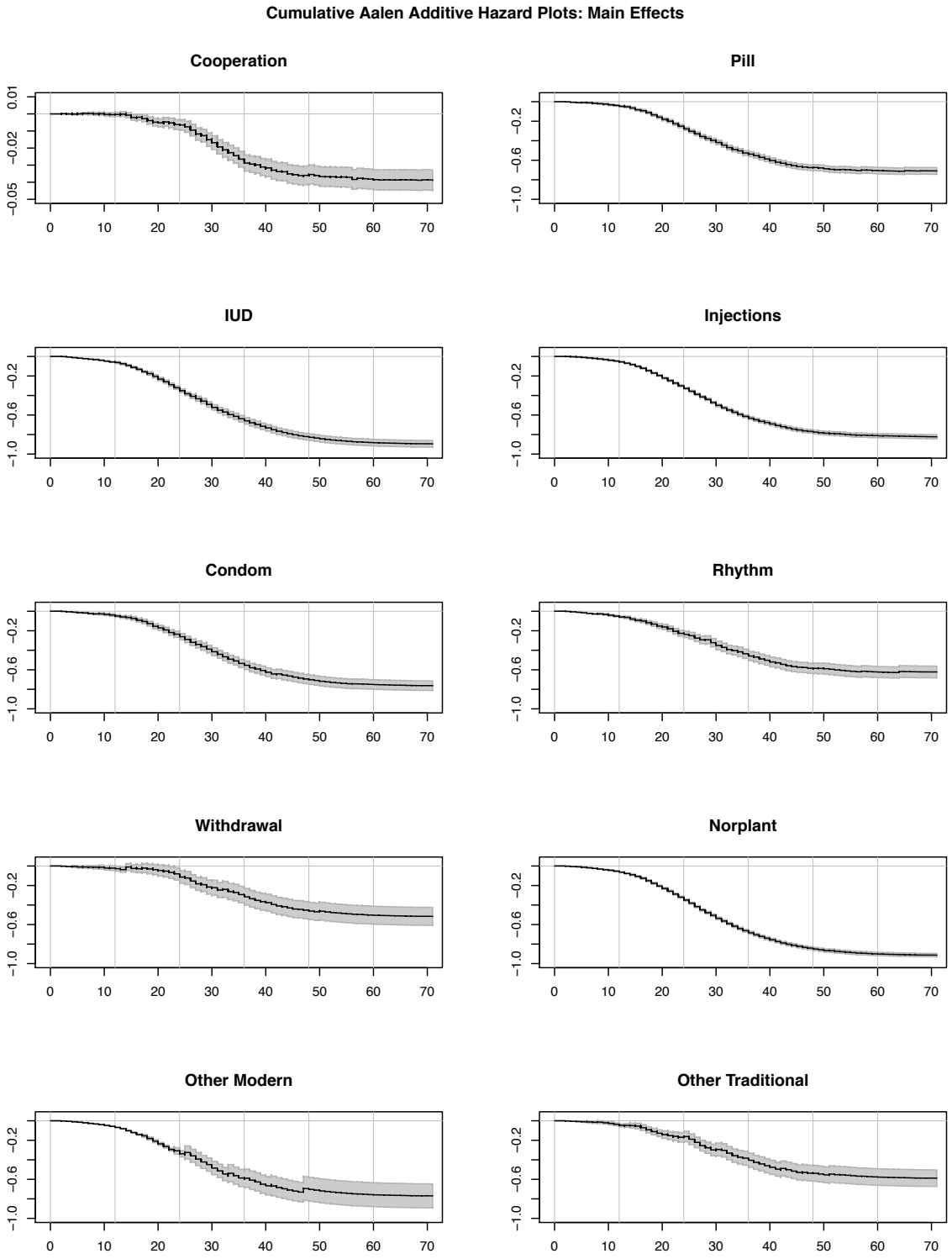

Cumulative Aalen Additive Hazard Plots: Main Effects
Cooperation
Pill
IUD
Injections
Condom
Rhythm
Withdrawal
Norplant
Other Modern
Other Traditional

Figure 4

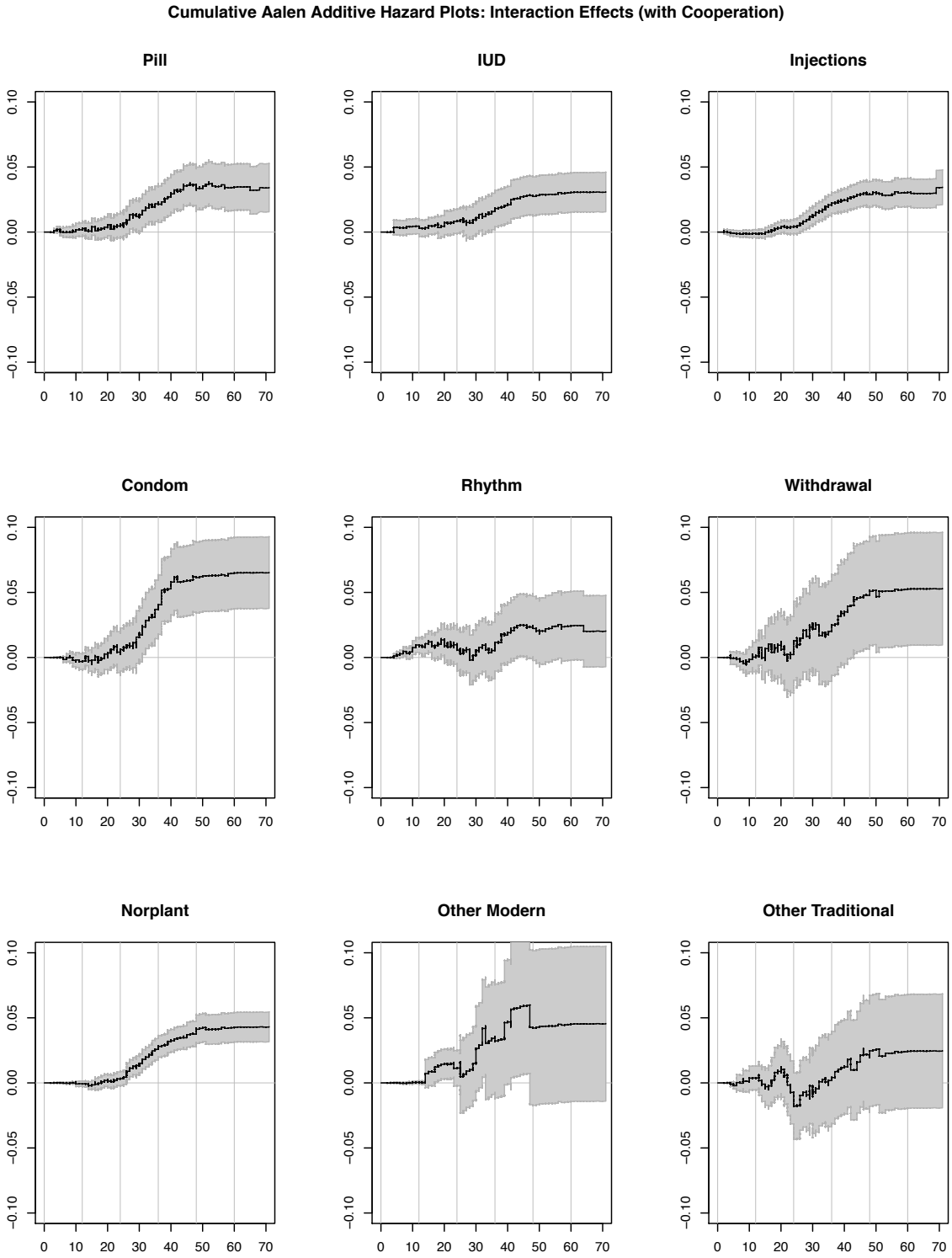
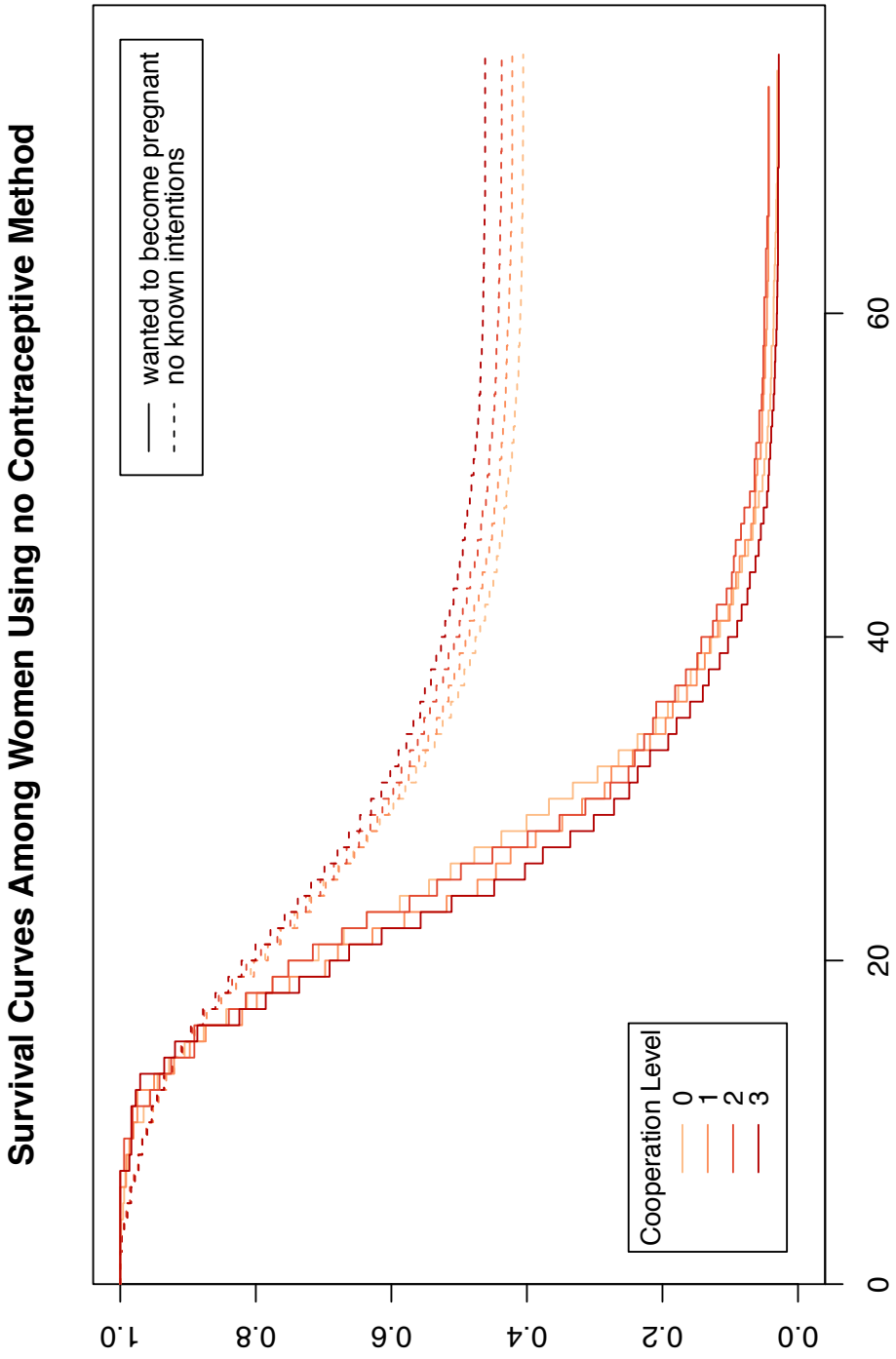

Cumulative Aalen Additive Hazard Plots: Interaction Effects (with Cooperation)
Pill
IUD
Injections
Condom
Rhythm
Withdrawal
Norplant
Other Modern
Other Traditional
0.10
0.05
0.00
−0.05
−0.10
0 10 20 30 40 50 60 70

Figure 5


Survival Curves Among Women Using no Contraceptive Method
wanted to become pregnant
no known intentions
Cooperation Level
0
1
2
3
0.0
0.2
0.4
0.6
0.8
1.0
0
20
40
60

Chapter 5: Conclusions and Recommendations for Future Work

The objective of this dissertation was to challenge the development narrative causally linking women's empowerment to fertility decline in the West African region. Although the results communicated in this dissertation cannot speak to any causalities, I believe the work presented here effectively casts serious doubt on that narrative and lays a foundation to justify future inquiries into fertility in the West African region. This was accomplished despite substantial data limitations through creative use of first and second-hand data sources and advanced statistical methods.

In chapter 2, data containing responses to women's empowerment survey questions from countries across the region were processed and analyzed to identify natural groupings in those responses and test for any spatial effects. This produced evidence suggesting that women's empowerment was not a unidimensional concept in how it manifested in the region, and that women's responses to these survey questions contain significant spatial variation. The way women answer survey questions regarding certain attitudes, beliefs, or practices is associated with where they are even when controlling for certain socio-demographic indicators. The results did identify three distinct classifications of women based on associations in their responses, but the meaning of these classifications does not corroborate with an understanding of empowerment as a spectrum of "more empowered" to "less empowered" because the third category cannot be understood as "medium empowered". Place-based research is necessary to understand the meaning of responses in specific regions.

Chapter 3 follows the recommendation of the previous chapter for place-based contextually embedded research with an iterative mixed-methods study focusing on the country of Senegal

and the capital region, Dakar. First-hand data from interviews and focus groups in Dakar confirmed the importance of geographic context in interpreting empowerment data. This data also suggested the unlikelihood of finding a link between agency and fertility preferences or fertility outcomes both because of the mismatch between empowerment survey questions and local understandings of empowerment, and because many *Dakarois* did not believe there necessarily was a strong causal link. A series of sixteen regression models failed to find a consistent, significant association between indicators of men's and women's agency and women's fertility preferences or outcomes.

One major finding of this study – that cooperative decision-making is a cultural ideal and preferred over individual autonomy – motivated the fourth chapter of this dissertation. Cooperative decision-making was analyzed in its association with ultimate interbirth intervals and an indicator of contraceptive effectiveness. While this study failed to demonstrate such an association it elucidated an unanticipated phenomenon: Women, when not using any contraceptive method, in more cooperative relationships exhibited significantly longer interbirth intervals than those in less cooperative relationships. This finding suggests that being in a cooperative relationship may help women effectively delay pregnancy, and that couples may employ strategies to delay pregnancy that are not considered to be a contraceptive method.

Overall, the findings of this dissertation compel a reconsideration of the concept of empowerment in order to make any progress in understanding possible drivers of fertility decline, anywhere but particularly in West Africa. "Empowerment" needs to be stripped of its elusiveness and unpacked into very specific, observable constituents for future research. Examples of these possible constituents, things that may be associated with empowerment but

are not empowerment by definition, may include: education, individual autonomy, internalized sexism, gender-based beliefs, experience of gender-based violence (domestic or systemic), economic resources (income, wealth, or capital), realization of goals, status and positions of power, and quality of life indicators. These things may exist and operate at various geographic and social scales, at the level of an individual, couple, household, community or state. Education merits special attention because linkages between education, of both women and men, and fertility have been demonstrated both in this dissertation and in other research (Johnson-Hanks 2006). Yet this dissertation finds no evidence that the association between education level and fertility is in any way mediated by "empowerment".

This dissertation highlights the importance of careful consideration of geographic place in the conduct of research, particularly in the West African region. While there is much utility in standardized cross-country surveys, without proper construct validity testing, the data they yield may pose significant limitations in the interpretations of possible results. It is important to consider whether survey questions properly measure what is intended, and how research participants receive, perceive, and understand survey instruments and the concepts they contain. This is where qualitative research methods can be of particular use to researchers.

Lastly, the data limitations encountered in this dissertation underscore a few important gaps in existing data, naturally leading to recommendations in future data collection. Of highest priority is the paucity of information regarding men and men's fertility. While all adults generally understand that a pregnancy and resulting birth typically requires the contribution of both a man and a woman, demography as a field generally treats women as the sole bearers of children (Watkins 1997). As a result, we lack birth history and contraceptive history data for men. Men's

fertility data is necessary in order to test and analyze how men's fertility preferences may translate into fertility outcomes, important because men's fertility preferences are generally higher than women's in West Africa. Furthermore, the emphasis on *women's* empowerment has neglected the role of poor men in the West African development narrative and the possible need for the amelioration of their situation implicated in the advancement of women. The findings in chapter 3 elucidating the ideal of cooperative decision-making among couples, underscore the importance of including men and women in understanding and bringing about gendered progress.

This dissertation has also taught me that by listening to the preferences, ideals, and desires of the people we study we can work to produce research that is accurate, effective, and ethical in describing the world we live in.

Bibliography

Aalen, Odd O. 1989. “A linear regression model for the analysis of life times.” *Statistics in Medicine* 8: 907–925.

Aalen, Odd O., Ørnulf Borgan, and Hakon K. Gjessing. 2008. *Survival and Event History Analysis: A Process Point of View*. New York: Springer Verlag.

Adamchak, Donald J., and Peggy Gabo Ntseane. 1992. "Gender, education, and fertility: A cross-national analysis of sub-Saharan African nations." *Sociological spectrum* 12, no. 2: 167-182.

Adetunji, Jacob A., 2011. “Rising popularity of injectable contraceptives in sub-Saharan Africa.” *African Population Studies*, 25(2).

Adjamagbo, Agnès, and Thérèse Locoh. 2014. "Gender and Demography, a Fertile Combination." In *Under Development: Gender*, 61-83. London: Palgrave McMillan.

Adjamagbo, Agnès, Pierrette Aguessy Koné, and Amy Jacob. 2013. "Influence of Relationship Situation on Responses to Unintended Pregnancy in Dakar." *Population*, English edition 68.1: 61-88.

Agence Nationale de la Statistique et de la Démographie - ANSD/Sénégal, et ICF. 2018. Sénégal : Enquête Démographique et de Santé Continue - EDS-Continue 2017. Rockville, Maryland, USA : ANSD et ICF.

Ashraf, N., Erica Field, and Jean Lee. 2014. “Household bargaining and excess fertility: An experimental study in Zambia.” *American Economic Review* 104, no. 7: 2210-2237.

Bankole, Akinrinola and Susheela Singh. 1998. “Couples' fertility and contraceptive decision-making in developing countries: Hearing the man's voice.” *International family planning perspectives* 24, no. 1: 15-24.

Bankole, Akinrinola, and Suzette Audam. 2011. “Fertility preferences and contraceptive use among couples in sub-Saharan Africa.” *African Population Studies* 25 no. 2: 556-586.

Bawah, Ayaga Agula, Patricia Akweongo, Ruth Simmons, and James F. Phillips. 1999. “Women's fears and men's anxieties: the impact of family planning on gender relations in northern Ghana.” *Studies in Family Planning* 30, no. 1: 54-66.

Becker, Stan, Mian B. Hossain, and Elizabeth Thomson. 2006. “Disagreement in spousal reports of current contraceptive use in sub-Saharan Africa.” *Journal of Biosocial Science* 38, no. 6: 779-796.

Behrman, Julia Andrea, Kelsey Quinn Wright, Monica J. Grant, and Erica Soler-Hampejsek. 2018. “Trends in Modern Contraceptive Use among Young Adult Women in sub-Saharan Africa 1990 to 2014.” *Studies in Family Planning* 49, no. 4: 319-344.

Belitz, Christiane, Andreas Brezger, Thomas Kneib, Stefan Lang, Nikolaus Umlauf (2017). BayesX: Software for Bayesian Inference in Structured Additive Regression Models. Version 1.1. URL http://www.BayesX.org/

Biddlecom, Ann E. and Bolaji M. Fapohunda. 1998. “Covert contraceptive use: prevalence, motivations, and consequences.” *Studies in Family Planning* 29, no. 4: 360-372.

Bledsoe, Caroline, Fatoumatta Banja, and Allan G. Hill. 1998. "Reproductive mishaps and western contraception: an African challenge to fertility theory." *Population and Development Review* 24, no. 1: 15-57.

Bongaarts, John, and John Casterline. 2013. "Fertility transition: Is sub-Saharan Africa different?" *Population and Development Review* 38: 153-168.

Bongaarts, John. 1990. “The measurement of wanted fertility.” *Population and Development Review* 16, no. 3: 487-506.

Caldwell, John C., Israel O. Orubuloye, and Pat Caldwell. 1992. "Fertility decline in Africa: A new type of transition?" *Population and Development Review* 18: 211-242.

Casterline, John B., and Colin Odden. 2016. "Trends in inter-birth intervals in developing countries 1965-2014." *Population and Development Review* 42, no. 2: 173-194.

Castle, Sarah, Mamadou Kani Konate, Priscilla R. Ulin, and Sarah Martin. 1999. “A qualitative study of clandestine contraceptive use in urban Mali.” *Studies in Family Planning* 30, no. 3: 231-248.

Castro Martin, Teresa. 1995. "Women’s education and fertility: results from 26 demographic and health surveys." *Studies in Family Planning* 26, no. 4: 187-202.

Chikovore, Jeremiah, Gunilla Lindmark, Lennarth Nystrom, Michael T. Mbizvo, and Beth Maina Ahlberg. 2002. “The hide-and-seek game: Men’s perspectives on abortion and contraceptive use within marriage in a rural community in Zimbabwe.” *Journal of Biosocial Science* 34, no. 3: 317-332.

Choiriyyah, Ifta, and Stan Becker. 2018. “Measuring Women's Covert Use of Modern Contraception in Cross-Sectional Surveys.” *Studies in Family Planning* 49, no. 2: 143-157.

Cleland, John, and German Rodriguez. 1988. "The effect of parental education on marital fertility in developing countries." *Population Studies* 42, no. 3: 419-442.

DHS Program, The. 2014. “Gender Q&A with DHS Director, Dr. Sunita Kishor.” *DHS Program*. ICF. Rockville, MD. dhsprogram.com/topics/gender-Corner/index.cfm.

DHS Program, The. “Women’s Status and Empowerment.” ICF. Rockville, MD. dhsprogram.com/Topics/Womens-Status-And-Empowerment.cfm.

Doepke, Matthias, and Michèle Tertilt. 2018. “Women's Empowerment, the Gender Gap in Desired Fertility, and Fertility Outcomes in Developing Countries.” In *AEA Papers and Proceedings* 108: 358-62.

Duclos, Diane, Francesca L. Cavallaro, Tidiane Ndoye, Sylvain L. Faye, Issakha Diallo, Caroline A. Lynch, Mareme Diallo, Adama Faye, and Loveday Penn-Kekana. 2019. "Critical insights on the demographic concept of “birth spacing”: locating Nef in family well-being, bodies, and relationships in Senegal." *Sexual and Reproductive Health Matters* 27, no. 1: 1581533.

Fahrmeir, Ludwig, and Stefan Lang. 2001. "Bayesian semiparametric regression analysis of multicategorical time-space data." *Annals of the Institute of Statistical Mathematics* 53, no. 1: 11-30.

Fahrmeir, Ludwig, Thomas Kneib, and Stefan Lang. 2004. "Penalized structured additive regression for space-time data: a Bayesian perspective." *Statistica Sinica* 14, no. 3: 731-761.

Fellmann, Jerome D., Mark D. Bjelland, Daniel R. Montello, Arthur Getis, and Judith Getis. 2013. “Roots and Meaning of Culture”. In *Human Geography: Landscapes of Human Activities,* 33-59. New York: McGraw Hill.

Feyisetan, Bamikale J. 2000. “Spousal communication and contraceptive use among the Yoruba of Nigeria”. *Population Research and Policy Review* 19, no. 1: 29-45.

Hartmann, Betsy. 2016. *Reproductive rights and wrongs: The global politics of population control*. Chicago: Haymarket Books.

Huang, Z. 1997. “A Fast Clustering Algorithm to Cluster Very Large Categorical Data Sets in Data Mining.” In *KDD: Techniques and Applications*: 21-34.

ICF. 2004-2017. Demographic and Health Surveys (various) [Datasets]. Funded by USAID. Rockville, Maryland: ICF [Distributor]

Johnson-Hanks, Jennifer. 2007. "Natural intentions: fertility decline in the African Demographic and Health Surveys." *American Journal of Sociology* 112, no. 4: 1008-1043.

Johnson-Hanks, Jennifer. 2006. “Introduction.” In *Uncertain honor: Modern motherhood in an African crisis*: 1-26. Chicago: University of Chicago Press.

Kabeer, Naila. 2005. “Gender equality and women’s empowerment: A critical analysis of the third millennium development goal.” *Gender & Development* 13.1: 13-24.

Kabeer, Naila. 1999. “Resources, agency, achievements: Reflections on the measurement of women’s empowerment.” *Development and Change* 30.3: 435-464.

Kammann, E. E., and Matthew P. Wand. 2003. "Geoadditive models." *Journal of the Royal Statistical Society: Series C (Applied Statistics)* 52, no. 1: 1-18.

Kandeh, Jimmy D., and Joyce A. Kannan. 2005. "State-building, national integration, gender and economic development in emergent regional democracies." *West African Worlds: Paths Through Socio-economic Change, Livelihoods, and Development 6*: 233.

Kazembe, Lawrence N., and Jimmy J. Namangale. 2007. "A Bayesian multinomial model to analyse spatial patterns of childhood co-morbidity in Malawi." *European Journal of Epidemiology* 22, no. 8: 545-556.

Kishor, Sunita, and Lekha Subaiya. 2008. “Understanding Women's Empowerment: A Comparative Analysis of Demographic and Health Surveys (DHS) Data.” *DHS Comparative Reports* 20. Calverton, MD: Macro International.

Kishor, Sunita. 2000. “Empowerment of women in Egypt and links to the survival and health of their infants.” In *Women’s Empowerment and Demographic Processes*, edited by Harriet B. Presser and Gita Sen, 119–158. Oxford University Press.

LeGrand, Thomas, Todd Koppenhaver, Nathalie Mondain, Sara Randall. 2003. "Reassessing the insurance effect: A qualitative analysis of fertility behavior in Senegal and Zimbabwe." *Population and Development Review* 29.3: 375-403.

MacQueen, J. 1967. “Some methods for classification and analysis of multivariate observations.” In *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*, edited by L. M. Le Cam & J. Neyman, 281-297. Berkeley, CA: University of California Press.

Malhotra, Anju and Sidney Ruth Schuler. 2005. “Women’s empowerment as a variable in international development.” In *Measuring empowerment: Cross-disciplinary perspectives*, edited by Deepa Narayan-Parker, 71–88. Washington, DC: The World Bank.

Martinussen, Torben and Thomas H. Scheike. 2006. *Dynamic Regression Models for Survival Data*. New York: Springer Verlag.

Mason, Karen Oppenheim. 1986. "The status of women: Conceptual and methodological issues in demographic studies." *Sociological forum* 1, no. 2. Netherlands: Springer Netherlands.

Mathe, Jeff K., Kennedy K. Kasonia, and Andre K. Maliro. 2011. “Barriers to adoption of family planning among women in Eastern Democratic Republic of Congo.” *African Journal of Reproductive Health* 15, no. 1: 69-77.

McCarraher, Donna R., Sandra L. Martin, and Patricia E. Bailey. 2006. “The influence of method-related partner violence on covert pill use and pill discontinuation among women living in La Paz, El Alto and Santa Cruz, Bolivia.” *Journal of Biosocial Science* 38, no. 2: 169-186.

McOmber C, T. d’Auria Ryley T, McKune, S., and S. Russo. 2015. “Community Concept Drawing: Application of a participatory tool for analyzing empowerment across African contexts.” *CCAFS Working Paper no. 136*. Copenhagen, Denmark: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). www.ccafs.cgiar.org

Montello, Daniel, and Paul Sutton. 2006. *An introduction to scientific research methods in geography and environmental studies*. Thousand Oaks, CA: Sage.

Nichols, Douglas, Salif Ndiaye, Nadine Burton, Barbara Janowitz, Lamine Gueye, and Mouhamadou Gueye. 1985. "Vanguard family planning acceptors in Senegal." *Studies in Family Planning* 16, no. 5: 271-278.

Onuoha, Nelson. 1992. "Contributions of the proximate determinants to fertility change in Senegal." *Social Science & Medicine* 35, no. 10: 1317-1320.

Wayack-Pambè, Madeleine, Bilampoa Gnoumou, and Idrissa Kaboré. 2014. "Relationship between women's socioeconomic status and empowerment in Burkina Faso: A focus on participation in decision-making and experience of domestic violence." *Etude de la Population Africaine* 28, no. 2: 1146.

Posner, Jill K., and Fara Mbodji. 1989. "Men's attitudes about family planning in Dakar, Senegal." *Journal of Biosocial Science* 21, no. 3: 279-291.

Presser, Harriet, and Gita Sen. 2000. *Women's empowerment and demographic processes: Moving beyond Cairo*. Oxford University Press.

Randall, Sara, and Thomas LeGrand. 2003. "Reproductive strategies and decisions in Senegal: the role of child mortality." *Population* 58, no. 6: 687-715.

Réseau Siggil Jigéen. siggiljigeen.wordpress.com/.

Ross, John A.,and Alfred T. Agwanda. 2012. “Increased use of injectable contraception in sub-Saharan Africa.” *African Journal of Reproductive Health* 16, no. 4: 68-80.

Rossier, Clémentine, Leigh Senderowicz, and Abdramane Soura. 2014. "Do natural methods count? Underreporting of natural contraception in urban Burkina Faso." *Studies in Family Planning* 45, no. 2: 171-182.

Schuler, Sidney Ruth, Farzana Islam, and Elisabeth Rottach. 2010. "Women's empowerment revisited: A case study from Bangladesh." *Development in Practice* 20, no. 7: 840-854.

Spiegelhalter, David J., Nicola G. Best, Bradley P. Carlin, and Angelika Van Der Linde. 2002. "Bayesian measures of model complexity and fit." *Journal of the Royal Statistical Society: Series B (statistical methodology)* 64, no. 4: 583-639.

Umlauf, N., Adler, D., Kneib, T., Lang, S., & Zeileis, A. 2015. "Structured additive regression models: An R interface to BayesX." *Journal of Statistical Software* 63, no. 21: 1-46

United Nations. 2014. *International Conference on Population and Development Programme of Action*. Twentieth Anniversary Edition. UNFPA.

Upadhyay, Ushma D., Jessica D. Gipson, Mellissa Withers, Shayna Lewis, Erica J. Ciaraldi, Ashley Fraser, Megan J Huckhko and Ndola Prata. 2014. "Women's empowerment and fertility: a review of the literature." *Social Science & Medicine* 115: 111-120.

Van de Walle, Francine, and Nassour Ouaidou. 1985. "Status and fertility among urban women in Burkina Faso." *International Family Planning Perspectives* 11, no. 2: 60-64.

Weitzman, Abigail. 2014. "Women's and Men's Relative Status and Intimate Partner Violence in India." *Population and Development Review* 40, no. 1: 55-75.

Appendix A: Quotes from interviews and focus groups in Senegal, sorted by theme

Defining empowerment

- At the time where we are there, there is parity in Senegal. Well, we talk about women's empowerment on a professional level but women were autonomous in their households when they were taking care of their families. Men worked, women stayed home and took care of children. It was women's responsibility. Even if today women looked to empower themselves and work like men. They were empowered in the households when they took care of the family (woman, student)
    - *A l'heure où nous en sommes on il y a la parité au Sénégal. Alors, on parle d'autonomisation des femmes sur le plan professionnel mais les femmes étaient autonomes dans leur ménage quand elles prenaient soin de leur famille. Les hommes travaillaient la femme restait s'occuper des enfants. C'était une responsabilité des femmes. Même si aujourd'hui la femme cherche à s'émanciper travailler comme l'homme. Elles étaient responsabilisées dans les ménages quand elles s'occupaient de la famille*
- First of all why this question? Are women not already empowered? This is maybe to have more freedom, more independence same as men and about social constraints. If I must define it, I would say that this is to give more freedom to women. (man student)
    - *D'abord pourquoi cette question ? Est-ce que les femmes ne sont pas déjà autonomes ? C'est peut-être pour avoir plus de liberté, plus d'indépendance vis-à-vis des hommes et des contraintes sociales. Si je dois le définir je dirais que c'est pour donner plus de libertés aux femmes.*
- Empowerment cannot be defined by the society in which we live. The term empowerment is a bit large. There are criteria to be considered empowered. If one is, empowered one is free. We should look for another term I think. (man, student)
    - *L'autonomisation ne peut être définie que par la société dans laquelle on vit. Le terme autonomisation est un peu large. Il y a des critères à remplir pour être considéré comme autonome. Si on est autonome on est libre. On devait chercher un autre terme je pense.*
- I would define women's empowerment as first being a concept but equally a practice, a vision which permits many women who want to undertake and want to become entrepreneurs to be empowered in regards to all they set forth to do. (woman, activist)
    - *Je définis l'autonomisation des femmes comme étant d'abord un concept, mais également une pratique, une vision qui permet à beaucoup de femmes qui veulent entreprendre qui veulent devenir entreprenante, d'être autonome par rapport à toute la démarche.*
- Today in 2016 we talk about empowerment, financial independents, entrepreneurship. Me, I have capitalized on my experience in regards to fighting violence against women and the result convinced me that in order to end the violence against women the facts must change. Why they are victims of violence? Because they are too dependent, because they don't have enough means to express themselves, enough financial means to participate (woman, activist)

- *Aujourd'hui en 2016, on nous parle d'autonomisation, d'indépendance financière, d'entreprenariat. Moi j'ai capitalisé une expérience par rapport au combat sur la violence faite aux femmes et le résultat final m'a convaincu que pour que les violences cessent au niveau des femmes il faut que la donne change. Pourquoi elles sont violentées parce qu'elles sont trop dépendantes, parce qu'elles n'ont pas assez de moyens pour s'exprimer, assez de moyens financiers pour participer.*

- To be empowered, you have to be free to do what you want to do, to be empowered financially. To be empowered you have to work, to be involved in making decisions. Woman must be equal to man. (woman, activist)
  - *Pour être autonome il faut être libre de faire ce que l'on veut faire, être autonome financièrement. Pour être autonome il faut travailler, être dans les instances de décisions. La femme doit etre égale à l'homme.*
- For me, empowerment is permitting someone to lead themselves… its letting women to arrange material and financial resources to be able to blossom, to realize their projects but equally to allow blossoming of their family (woman, leader of women's org)
  - *Pour moi l'autonomisation c'est permettre à quelqu'un de s'autogérer… c'est permettre aux femmes de disposer de ressources matérielles et financières pour pouvoir s'épanouir, réaliser ses projet mais également permettre l'épanouissement de sa famille.*
- A autonomous woman need to trust herself, respect herself, and her job. Be independent, take care of herself. She needs to be calm and know her limits. Follow what your authority tells you. (woman, 30, market/restaurant vender, married, one child)
  - *Djiguène bou autonome dal Djiguuène Bobou da wara gueum boppam, respecter boppam, ligguèye. Meunal boppam, di défaral boppam. Dafa wara téy, wara yam. Degg ndigual*
- Being autonomous means providing for your own needs (woman, 27, fabric vender)
- An empowered woman is someone who has a job and is payed at the end of every month. If you have a job that pays monthly you can take care of your family and be in charge of yourself. (woman, no occupation)
  - *Une femme qui peut se prendre en charge, c'est celle-là qui a un travaille et qu'on paye chaque fin du mois. Si tu as un travail payé chaque fin du mois alors tu peux t'occuper de ta famille et de toi-même*

Comments about the concept of empowerment

- I think that in Senegal we are already for empowerment. We don't have a gender problem. Senegal is one of the few countries to adopt parity [laws] while this is not the case even in some powerful nations like France or the United States (man, student)
  - *Je pense qu'au Sénégal on y est déjà pour l'autonomisation. On n'a pas de problème de genre. Le Sénégal fait partie des rare pays à avoir adopter la*

parité alors que c'est pas le cas même dans certaine puissance comme la France ou les Etats Unis.

- Is a man not naturally empowered? Society has made sure that man is always autonomous. I have never heard talk of men's empowerment, men's day, etc… There is a reason we talk about women's day.
    - *Est qu'un homme n'est pas naturellement autonome. La société a fait en sorte que l'homme est toujours autonome. Je n'ai jamais entendu parler d'autonomisation de l'homme, de journée de l'homme etc… Ce n'est pas pour rien qu'on parle de journée de la femme.*
- (on measuring women's empowerment) Me, I critique this because if you take the Ministry of Women, of the family who is in charge of this matter, with a department who promotes women's entrepreneurship. This department has to give the numbers, the statistical data, which shows that in 2014 to 2016, look X women who have been affected, who have succeeded, who have become empowered. There is no such thing, maybe its done in an informal way. They don't give it the time to do this research in order to make this statistical data available.
    - *Moi je critique cela parce que si on prend le Ministère de la femme, de la famille qui a en charge cette question, avec un département qui promeut l'entreprenariat féminin. Ce département devrait donner les chiffres, des données statistiques qui montrent que de 2014 à 2016, voilà x femmes qui ont été encadrées qui ont réussi, qui sont devenues autonomes. Il n y a pas cela, peut être que c'est fait de façon informelle. Il ne se donne pas le temps de faire cette recherche pour mettre à disposition ces données statistiques*
- Yes, an empowered woman, this is a woman who has financial resources first of all, but equally who could be in any case in harmony with society. And when I say society this is to say to be in tune with the culture and the religion. (man, community org leader)
    - *Oui une femme autonome, c'est une femme qui dispose de ressources financières d'abord, mais également qui puisse en tout cas être en harmonie avec la société. Et quand je dis société c'est-à-dire être en phase avec la culture et la religion.*
- Take the example of emancipation; we say it but we have to start it with actions because we only talk about it on one side. Because when it's really hard, they leave emancipation aside and share with men, but when it's easy, they take their own way. It is when it's going well for them that we think of emancipation. The emancipated woman ... But here in Africa, for example it is not.... I was lucky to travel around the world. I know that the mentality is not the same elsewhere, but here, when we speak of emancipation, it is when woman is comfortable, she can buy what she needs or do her shopping as she feels. But when she is in trouble the first person she thinks is the man who is the closest to her. We live it here, for example, you live it with your girlfriend. They are the crafty but when it's a little hard, they say they will call them crazy. (man, 29, fabric vender)
    - *Kholal émancipation da gnou koy wakh mais da gnou ko wara commencé di djeufé parce que si bène coté rek laay nékhé. Parce que sou deugueuré torop*

émancipation da gnou koy bayi feulé gneuw bokk lepp ak goor gni, wayé sou easy wé rek gnom gnoul dieul sène yonou bopp. Sou nékhé rek lagnouw khalat affairou émancipation. La femme émancipée…. Mais fi en Afrique, par exemple ce n'est pas,…, mane j'ai eu la chance de voyager un tout petit peu dans le monde, je sais que la mentalité n'est pas pareil ailleurs, mais fi, quand on parle d'émancipation c'est quand la femme est à l'aise, meuna kheuy, diendeu lou ko nekh, guisss bène affaire dème djeundeu ko, wala deff ay coursam. Mais quand elle est dans la merde rek la première personne bou mouy khol moy goor bou ko gueuna djégué. Nous on le vit, par exemple da ngua koy doundeu ak sa copine. Taay dji dagnouy doff doff lou rek mais sou deugueuré touti rek gnouné sama doff bi lay wo

What is an empowered woman?

- [An empowered woman is] a responsible woman, financially and morally (woman, student)
    - *Une femme responsable financièrement et moralement*
- Me, I have a word: competence…. There are men who aren't compotent but they are empowered. In general, women who have certain positions this is because they are compotent. It is because of this that I am against parity [law] which kind of killed competence. (man, student)
    - *Moi j'ai un mot la compétence… Il y a des hommes qui ne sont pas compétents mais qui sont autonomes. En général les femmes qui ont certaines postes c'est parce qu'elles sont compétentes. C'est pour ça je suis contre la parité qui tue un peu la compétence.*
- For me, a woman cannot be empowered. Even if she is independent, she is only at 80%. The other 20% should be allocated to the man. A woman must submit. (man, student)
    - *Pour moi une femme ne peut pas être autonome. Même si elle est autonome elle ne l'est qu'à 80%. Les 20% doivent être alloué à l'homme. Une femme doit subir.*
- In the professional domain, a woman can be empowered. But when she comes home, she isn't anymore. (man, student)
    - *Sur le plan professionnel, une femme peut être autonome. Mais arrivé au foyer, elle ne l'est plus.*
- In general, if you can measure it, an empowered woman expresses herself more, and participates in financial matters, when there are actions, activities that are lead in her neighborhood, in her community, she participates. She commands more or less the question of the problem on which she intervenes. Because empowerment is not only financial, there is the aspect of ideas, reflection, vision… You have to do it because the leadership is there. In empowerment there is leadership, there is innovative action, there is capacity, there is vision, there is idea and there is a way. (woman, activist)
    - *En général, si on peut le mesurer, une femme autonome s'exprime plus, participe aussi delà de l'aspect financier, quand il y a des actions, des activités qui sont menées au niveau de son quartier, de sa commune, elle participe. Elle*

maitrise plus ou moins la question ou la problématique sur laquelle, elle intervient. Parce que l'autonomie n'est pas seulement financière, il y a l'aspect idée, réflexion, vision…. Il faut le faire parce que le leadership est là. Dans l'autonomie, il y a leadership, il y a action innovatrice, il y a capacité, il y a vision, il y a idée et il y a moyen.

- That [decision-making] is perhaps a good indicator of empowerment the fact of making a decision without having to have the approval of another person. This enables one to measure that this person within their relationship, their community, has a say in the matter. (woman, leader of women's org)
    - *Ça [prise de decisions] peut être un bon indicateur d'autonomie le fait de prendre une décision sans avoir besoin de l'assentiment d'une autre personne. Cela permet de mesurer que cette personne au sein de son couple, de sa communauté a voix au chapitre.*
- They [empowered women] look like us. You know it's hard here, all the dust that is here. Whoever living this, if you find another job, you will keep it. A woman needs to be proactive, serious and respected. If you see the ones working in restaurants, many think of them as people that want to have fun. Men want to play with you. Sometimes a man will come and propose something that youre not interested in. (woman, 25, market/restaurant vender)

What is a disempowered woman?

- A woman who lets herself go, does whatever without considering anything. This situation is worst for a man. (woman, student)
    - *Une femme qui se laisse aller, qu'on ne considère en rien. Cette situation est pire pour un homme*
- A woman dependent on everyone for everything(woman, student)
    - *C'est une femme dépendante sur tous les plans.*
- This is a woman who is reserved. She doesn't have a word to say (woman, student)
    - *C'est une femme qui est réservée. Elle n'a pas son mot à dire*
- Can someone deprive someone of empowerment? Empowerment is already acquired. Empowerment is just a choice, a person decides to be or not to be empowered. (woman, student)
    - *Est-ce qu'on peut priver quelqu'un d'autonomie. L'autonomie est déjà acquise. L'autonomie est juste un choix une personne décide d'être ou de na pas être autonome*
- This is a woman who doesn't have a say in her decisions. Generally we have realized that this is the primary cause of maternal mortality. Even if they know that they have to go to the health facilities, they can't go there alone. They need the consent of either their husband or another person who serves as their sponsor.
    - *C'est déjà une femme qui n'a pas de voix pour ses décisions. Généralement on s'est rendu compte que c'est la première cause de mortalité maternelle. Même si elles savent qu'elles doivent aller dans les structures de santé, elles ne*

peuvent pas y aller d'elles même. Elles ont besoin de l'assentiment soit du mari ou soi d'une autre personne qui sert de marraine ou de parrain.

Reflections on DHS decision-making questions

Les femmes qui décident du nombre d'enfants sont plus autonomes bien sûr.

Le choix du nombre d'enfants est un consensus entre l'homme et la femme la femme doit convaincre l'homme du nombre d'enfants selon leur situation financière.

Les hommes veulent en général plus d'enfants.

Il faut reconnaitre aussi que le fait d'avoir un enfant vient naturellement et aussi parfois il y a des accidents même si on utilise une méthode contraceptive

Women who decide the number of children are more empowered, of course

The choice of the number of children is a consensus between the man and the woman, the woman must convince the man of the number of children according to their financial situation

Men want in general more children.

You also have to understand the fact that having a child comes naturally and also sometimes there are accidents even if you use a contraceptive method (women, students)

- Yes, it's the case but this is not the empowerment that we await for women. We are talking about equality between men and women and talking about empowerment not superiority or inversion of roles.
    - *Oui c'est le cas mais, ce n'est pas cette autonomie qu'on attend des femmes. On parle surtout d'égalité entre homme et femme en parlant d'autonomie pas supériorité ou inversion des rôles.*
- There has to be a dialogue between the man and the women. Organizations intervene a lot on this question about reproductive health and family planning, they put down a lot of resources. Unfortunately, there are still pockets of resistance… But this is over now, given the context, men no longer decide as far as their input is concerned, everything has to be shared. Now, I have not yet seen a man who says, 'look at all that I earned' and puts it all on the table. When we women do this. He always hides it. There are things that they don't want their children or their wives to know. (woman, activist)
    - *Il doit y avoir de la concertation entre l'homme et la femme. Les organisations interviennent beaucoup sur cette question de la santé de la reproduction, de la planification familiale, ils mettent beaucoup de moyens…*
    - *Mais cela est révolu maintenant, compte tenu du contexte, les hommes ne décident plus en matière de contribution, il faut que les choses soient partagées. Maintenant, j'ai pas encore vu un homme qui dit voilà ce que je gagne il met ça sur la table. Alors que nous les femmes on le fait. Toujours il se cache. Il y a des choses qu'ils ne veulent pas que ses enfants ou ses femmes comprennent.*

- This is not empowerment. But there is a minimum of respect towards your husband. You have to inform him but you don't have to ask for his permission. Hence, these questions are not really appropriate. For me, empowerment is about being in charge of yourself. (woman, activist)
    - *Ce n'est pas de l'autonomie. Mais il y a un minimum de respect envers son conjoint. Il faut l'informer de cela mais c'est pas demander la permission. Donc ces questions ne sont pas trop appropriées. Pour moi l'autonomie c'est la prise en charge de soit même*
- These decisions are important for the women living in Dakar because more and more we realize that they contribute half to two-thirds of the management of the family. Therefore, they have to have a say on how this money is used. (woman, leader of women's org).
    - *Ces décisions sont importantes pour les femmes vivant à Dakar car de plus en plus on se rend compte qu'elles contribuent à moitié ou aux deux tiers de la gestion de la famille. Elles doivent donc avoir leur mot à dire sur comment cet argent est utilisé.*
- I don't think that that could be an indicator of empowerment because even when the woman whatever it may be her financial resources or her power politically, she always has to in any case when she is in the family or household environment to discuss with her partner. (man, leader of community org)
    - *Je ne pense pas que ça soit un indicateur de l'autonomisation parce que quand même la femme quelles que soient ses ressources financières ou son pouvoir au plan politique a toujours besoin, en tout cas quand elle est dans le cadre familial ou dans le cadre du ménage de discuter avec son partenaire.*
- You know all that is because they have different husbands. You can encounter a good one as you can encounter a bad one. When you in agreement with your husband, you will ask for permission whatever you do. But the same way you have bad men, you also have bad women that don't ask their husbands when they go out. There are some that don't dare going out without asking their husband. When you sick, when you going you know your husband is suppose to take care of you, he needs to know that you sick. If it is not really working between you. There are people that are with their husband but one go this way and the other the other way. her at that moment can go to the hospital without her husband knowing. But here most of the time, if you sick it's your husband that take care of you. (woman, market vender)
- It depends, if the husband has, if the husband works, what is better, even if you have your own money, is to ask permission. It's prettier. It's not because you have everything you can do what you want. It is not a question of independence (woman, 32, fabric vender)
- That is not a sign of autonomy … It's a lack of respect for your husband. When you're with someone, the least you can do is to tell the person when you go out that you are going out. You cannot just go out like that, nobody does that (woman, 27, fabric vender)

- It's not the same thing as being autonomous (empowered). You can ask for permission at the same time that he is giving you enough to live and money to go to the market; that does not stop you from being autonomous. It matters what is right for the couple. As a man, when I have to go somewhere or in a village, I'll tell my wife that have to go somewhere. And it's reciprocal; it has nothing to do with being dependent on me. (man, 30, fabric vender)
- No, no since you have a husband, if you must go visit your parents you go see him and you tell him I going to see my mother, im going to see my father. If he gave you permission you can leave, you know in Africa with the state of mind that we have, if you go out without warning your husband to go see your mom or your dad, if he returns and that happened, you will surly have problems with him. If you must go out you warn your husband, if you are in a home with your husband and as you know how the world is hard right now, your husband can do half and you can do half. You understand. But you don't get up in the morning and buy something without asking permission of your husband. Or just as well, if you buy something, you show him when he comes home and you tell him or is it that you have taken the money to buy that. and you know he will ask you about it (young woman, no occupation)
    - *Non non des que tu as un mari, si tu dois aller visiter tes parents tu vas le voir et tu lui dis, je vais aller voir ma mère, je vais aller voir mon père. S'il te donne l'autorisation alors tu peux partir, tu sais en Afrique avec l'état d'esprit qu'on a. si tu sors sans prévenir ton mari pour aller voir ta maman ou ton papa, s'il rentre et qu'on le prévient, tu auras surement des problèmes avec lui. Si tu dois sortir tu avertis ton mari. Si tu es ménage avec ton mari, et comme vous savez comment le monde est difficile maintenant, ton mari peut faire la moitie et toi aussi tu peux faire la moitie. Tu as compris. Mais tu ne lèves pas un matin et tu achètes quelque chose sans demander l'autorisation à ton mari. Ou bien si tu achètes quelque chose, tu montres sa a ton mari quand il rentre à la maison et tu lui dis ou est-ce que tu as pris l'argent pour acheter sa. Et tu sais il va te le demander*

Ideal of consensus decision-making

- As an intellectual, its too selfish to make a decision alone. The facts have changed. We cant be a boss like that. Even women refuse this. (man, student)
    - *En tant qu'intellectuel, c'est trop égoïste de prendre une décision seule. Les données ont changé. On ne peut pas être un chef comme ça. Même les femmes refusent cela*
- Me, I won't say that I am for contraceptive methods but if that comes up that will become a conversation (man, student)
    - *Moi je ne dis pas que je suis pour les méthodes contraceptives mais si ça devait arriver ça devrait être une concertation*
- This is not a thing that is appreciated in a marriage or not. Marriage is a cooperation and for that there must be a leader and a follower for this to work. (man, student)

    - *Ce n'est pas une chose apprécié que ça soit dans le mariage ou pas. Le mariage est une coopération et pour cela il faut un dirigeant et un dirigé pour que ça marche*
- A woman who goes out without asking permission does not have respect, There are minimums of value and respect. It is enough just to ask and respect the protocols. And the husband will be understanding. (man, student)
    - *Une femme qui sort sans demander la permission c'est pas du respect. Il y a des minimums de valeurs à respecter. Il suffit juste de demander, et respecter les protocoles. Et le mari sera compréhensif.*
- For me, the relationship will be more harmonious if the husband and the wife decide together (man, student)
    - *Pour moi le couple serait plus harmonieux si l'homme et la femme décident ensembles*
- [In my family] we plan together and this is how we were taught by our parents. Nobody has the right to make a decision without consent or consulting everyone. … In general, in the families, it's the men who decide and the women follow, but this is starting to change. But there is a lot still left to do. The evidence when you do a little survey we see that a lot of men don't work anymore, have resigned, are retired, have lost their job. It is the women who bend over backwards and take charge of the house. Sometimes they [these men] are embarrassed but sometimes they admit that the women are taking charge. But in terms of power, they don't let go of control, they say 'I am the head of the family, I am the husband' while they don't do anything. (woman, activist)
    - *On se concerte et cela est une éducation qu'on a reçu de nos parents. Personne n'a le droit de prendre une décision sans le consentement ou la concertation tout le monde. … En général dans les familles, c'est les hommes qui décident et les femmes suivent mais ça commence à changer. Mais il reste encore beaucoup de choses à faire. La preuve quand tu fais une petite enquete on voit que beaucoup d'hommes ne travaillent plus, soit ils ont démissionnés, soit ils sont à la retraite, soit ils ont perdu leur boulot. C'est les femmes qui se décarcassent et prennent en charge le ménage. Dès fois ils sont gênés , mais dès fois ils l'avouent que les femmes prennent en charge. Mais en termes de pouvoir, ils ne lâchent pas prise, ils disent je suis le chef de famille, je suis le mari alors qu'ils ne font rien.*
- For the most part, in Senegalese families it's the man who makes these decisions. But I think that this is old-fashioned and women also have their word to say. So that means it is imperative to have a discussion between the two concerned. (woman, activist)
    - *Dans la majeure partie des familles sénégalaises c'est l'homme qui prend ces décisions. Mais je pense qu'on est plus à l'ère de l'ancien temps , et les femmes ont aussi leur mot à dire. Du coup il faut impérativement une discussion entre les deux concernés*
- In any case, as we always say, in the tradition even for when you have to make a decision you take time in order to discuss with your pillow. But 'pillow' in quotation

marks is what? It's the lady. The adage demonstrates this well: 'behind every great man is a great lady'. (man, leader of community org).

  - *Ou en tout cas, comme on dit toujours, dans la tradition même pour quand on doit prendre une décision on te disait de donner le temps pour discuter avec son oreiller. Mais l'oreiller entre guillemets c'est qui ? C'est la dame. L'adage le montre si bien : « derrière tout grand homme il y a grande dame »*

- (on deciding what the family has for lunch) The woman doesn't do what she wants. She also hears the husband's and the children's opinions. And all of that is in order to have a blossoming, harmonized family. Because me, I don't see empowerment in terms of freedom, that is to say someone who is that who we call 'falléwouma kène'. 'I do what I want'. And when they do it they pay cash. Because everything we do, in any case, we consider our society. And when we talk about society we begin with the family and the family in a broad sense. (man, leader of community org).
  - *Ce n'est pas la femme qui fait ce qu'elle veut. Elle recueille l'avis du mari et des enfants également. Et tout ça c'est pour avoir une famille épanouie, harmonisée. Parce que moi je ne vois pas l'autonomisation en termes de liberté, c'est-à-dire quelqu'une qui est la qui se dit falléwouma kène. Je fais ce que je veux. Et quand on le fait on paie cash. Parce que tout ce que nous faisons, en tout cas, on prend en compte notre société. Et quand on dit société, on commence par la famille et la famille au sens large*
- According to me a woman should be living at peace with her husband in a way that if she asks him when she wants something, that he agrees… she need to ask whoever you are with because when you are with someone you should be able to ask to know what he will say (woman, 25, market/restaurant vender)
- Here you know how we live, there are grandparents and there are parents. The biggest decisions are made by the patriarch, the oldest in the household. Making a decision without discussing it with the people of the household is what brings fights. But when you have an agreement between you, it make the house even more enjoyable (woman, market/restaurant vender)
- Asking for permission is not about being independent, when you're with a person you have to have an authority. In our culture, it is man who is the authority. Before you get into something, you have to ask permission. When you go out, you have to ask him, when you get into something, he must be informed, that's it… As far as I'm concerned, I talk to my husband before. He makes the decisions. It is imperative to discuss it with him because you are together (Does he listen to you) Of course he does. When he says a decision you disagree with, you show him that you disagree (woman, fabric vender)

Making decisions covertly

- The decisions I took for the future of my children. Open bank accounts and so… I took [these decisions] alone, you know men if they know your everything, you tell them somethings and omit others, plan for your family…. regarding my bank account, he doesn't know anything about it (woman, 30, market/restaurant vender, married, one child)

- I wasn't involve in those things [family planning]. With my husband, it's with the medicine bill that we started having problems. Because I was pregnant, which never happened to me, and I told him I needed to go do some ultrasound and he replied that there was no need for that. I repeated myself but he refuse and didn't give me the money. So I took my money and did it. Now you know if you keep the relationship with that person, you could have problems in the future. And pregnancy is a danger. I knew it wasn't going to work. When I had the kid he wanted to continue and I told him no. He try hard with no success, because the person that show you how they are without being that last no with them, if you continue he is going to burden you (woman, 25, market/ restaurant vender, divorced)
- It's an agreement between the two of us. Sit and discuss. There are women whose husbands want a lot of children, other who do family planning in secret without their husband knowing. They take them together because a discussion should please the husband (woman, fabric vender)
- (first woman) If we discuss [contraception] and he refuses, we make our own decisions. Because there are men who don't want you to use methods for spacing births. (second woman) In any case, for me, if he agrees I will do it, and if he doesn't agree I won't do it (two young women, no occupation)

Men's perceptions of empowered women

- In a society a man who lets himself be led by a woman is seen frowned upon (man, student)
    - *Dans une société un homme qui se laisse mener par la femme est vu d'un mauvais œil*
- Take the example of emancipation; we say it but we have to start it with actions because we only talk about it on one side. Because when it's really hard, they leave emancipation aside and share with men, but when it's easy, they take their own way. It is when it's going well for them that we think of emancipation ... But here in Africa, for example it is not.... I was lucky to travel around the world. I know that the mentality is not the same elsewhere, but here, when we speak of emancipation, it is when woman is comfortable, she can buy what she needs or do her shopping as she feels. But when she is in trouble the first person she thinks is the man who is the closest to her. We live it here, for example, you live it with your girlfriend. They are the crafty but when it's a little hard, they say they will call them crazy. (man, 29, fabric vender)

Decisions about having children

- It is selfish to use [contraceptive] methods unbeknownst to one's partner (woman, student)
    - *C'est égoïste d'utiliser des méthodes à l'insu de son partenaire.*
- There are women who use contraceptive methods without the husband knowing(woman student)
    - *Il y a des femmes qui utilisent des méthodes contraceptives sans que l'homme ne le sache.*

- In the home it's the man who must decide. For muslims at least… Because women are the ones who move to live in the man's home. (man, student)
    - *Dans le foyer c'est l'homme qui doit décider. Pour les musulmans du moins… Car la femme se déplace pour aller vivre chez l'homme*.
- According to me, beyond dialogue and communication between spouses it's a question of choice. You shouldn't impose on people. A person can decide to have 10 children its their choice. There are also governmental politics which decide all this. The government must define its natalist politics. It shouldn't always follow the politics of westerners
    - *Selon moi, au-delà de la concertation et de communication entre époux, c'est une question de choix. Il ne faut pas imposer eux gens. Une personne peut décider d'avoir dix enfants c'est leur choix. Il y a aussi la politique gouvernemental doit orienter tout cela. Le gouvernement doit définir sa politique nataliste. Il ne faut pas toujours suivre les politiques des occidentaux.*
- That depends on the [time] period. At times there are are conversations between husband and wife. There are periods where you can not do children. In this case the man can permit the woman to use contraception (man, student)
    - *Ca dépend de la période. Des fois il y a des concertations entre marie et femme. Il y a des périodes où vous ne pouvez pas faire d'enfants. Dans ce cas l'homme peut permettre à la femme d'utiliser la contraception*.
- That depends on the cause which pressures the woman to want to use this method If its linked to her health I would be ok with it. If not, I refuse categorically.
    - *Ça dépend des causes qui poussent la femme à vouloir utiliser cette méthode. Si c'est lié à sa santé je serai d'accord. Sinon je refuse catégoriquement.*
- I am against "how many children". I wasn't raised to be married for five years and have two children. Only God gives children. But according to my means, I will see the conditions in which I could put my children. When it comes to my children I would take whatever God gives me. But I'm going to assure that I could raise them regardless of their number. If my means don't permit me to have ten then I won't have ten children. (woman, activist)
    - *Je suis contre Le nombre d enfant moi. On ne m'a pas eduqué pour me marier pour 5 ans et y avoir deux enfants. Seul dieu donne des enfants. Mais selon mes moyens je verrai les conditions dans lesquelles je pourrais mettre mes enfants. en ce qui concerne les enfants Je prendrais ce que dieu me donnera Mais Je vais m assurer que Je pourrai les entretenir peu importe leur nombre. Si mes moyens ne me permettent pas d en avoir dix, Je n aurai pas dix enfants*
- You know, that can cause problems in the marriage…. If this is not agreed upon. For example, when you wake up one beautiful morning and you say 'I'm going to stop having children' while the gentleman, he still wants them. You see what this does. Thus, in a marriage you cannot unilaterally say 'no, I'm stopping'. You have to do it with the consent of your partner. (man, leader of community org).
    - *Vous savez, ça peut être source de problème dans le ménage… Si ce n'est pas concerté. Par exemple quand vous vous levez un beau matin vous dites j'arrête*

de faire des enfants alors que le monsieur il en veut encore. Vous voyez ce que ça fait. Donc vous ne pouvez pas dans le mariage unilatéralement dire non moi j'arrête. Il faut le faire avec le consentement du partenaire.

- My kid has 2 years old... I wanted to wait until he is 5 but [my husband] told me it would be too far. In fact 5 years is a lot. I ask the doctor if I could remove it once my kid has 2 years and he replied yes. I told my husband to wait until our kid is 3 years old but he said no to remove it. Now I want to trick him and tell him that I removed it and wait until our kid is 3 to remove it. But it's unsafe, trick him them have problems. (woman, 30, market/restaurant vender)
- That I will decide because I am the one giving birth… [empowered women] they don't give birth to many kids, but if you encounter a husband that wants to have kids, you can't do anything about it. (woman, 39, market vender)
- First of all, it is not I who give birth therefore, her opinion counts first because only the person who tastes something can know the taste of that thing (man, 29, fabric vender)
- It also depends. If one refers to the religion. We have an idea only, but it is God who decides. That means we do the necessary to fecundate the purpose of having children. But it is God who gives the children. This decision has no reason. It is Westerners who tend to say how many children they want to have. With us, we let nature decide, whatever God decides you will take (man, 30, fabric vender)
- You can want two children and God gives you only one. You ask for five children and God gives you two. The children, its God who gives them (young woman, no occupation)

Contraception and natural methods

- I am not going to use artificial methods, but natural, and I am going to decide with my husband about adopting natural methods(woman, student)
    - *Je ne vais pas utiliser des contraceptions artificielles, mais naturelle, et je vais décider avec mon mari des méthodes naturelles à adopter*
- Because of the consequences of artificial methods, I prefer natural methods. For example, I can use the method of taking bodily temperature to know my ovulation period. And if need be I would ask my husband to use a condom. Coitus Interruptus is an old method. (woman student)
    - *A cause des conséquences des méthodes artificielles je préfère les méthodes naturelles. Par exemple je peux utiliser la méthode de la prise de température corporelle pour connaitre la période d'ovulation. Et le cas échéant je demanderai à mon mari d'utiliser un préservatif. Le coït interrompu est une méthode ancienne.*
- The reason I forbid my daughter-in-laws [to use contraception] is because they had complications. Those who have had complications are more numerous than those who don't have complications. I never used them because my husband wasn't there. But our ancesters we have left the methods like calculating your 14th day, the day of your ovulation.

    - *Li takkh makkoy térré sama goro yi c'est parce qu'elles ont eu des complications. Gni ma thi guiss gni ame complication gno eup gni thi amoul complication. Mane meussou ma ko utilisé nak parce que sama dieukeur nékou fi wone. Mais sougnou mame yi bayi wone nagnou fi ay méthode comme calculer sa 14 ème jour. Sa jourou ovulation*
    - *La raison pour laquelle Je l interdis a mes Belles filles, c'est parce qu'elles ont eu des complications. Celles qui ont eu des complications sont plus nombreuse que celles qui n'en ont pas eu. Je ne l'ai jamais utilisé parce que mon mari n'etais pas la. Mais nos ancetres nous ont laissés des méthodes comme calculer son 14 ème jour, Le jour de ton ovulation*
- The way to see it is very simple. Some want children and others do not want them. Some others control their birth, by breast-feeding the child until the age of two, and staying with him until he begins school before they decide to have other children. Some say they prefer to have the children first and then they will regularize. They have 2, 3 or 4 before stopping. You white people, you decide when and how many children you will have. I am referring to the person who controls the number of children he will have, he is under the influence of too much modernization. He believes that 1 + 1 equals 2 but sometimes one plus one does not make two. (man, 30, fabric vender)
- There are some that use contraceptive methods but hide it to their husband and that is not good. anything could happen to them. Contraceptives methods are things that you can do and have problems with it, as you can do it and have none. because I saw people that did it then got sick from it. you see women that don't have a husband or anything and do it. do you think that's right? You know that means you just want to have fun. A women, when you don't have a husband, you need to stay (woman, 25, market/restaurant vender)
    - *Ame na gno khamni dagnouy deff planning diko neub sène dieukeur té lolou bakhoul. Louné meuna lène thi fekk. Planning nek na lo khamné meun ngua ko déf am thi problème, meun ngua ko déf bagn thi ame problème. Ndakh mane guiss na ay niit you ko deff ba paré dieulé thi fébar. Da nguay guiss ay diguène yo khamné amo gnou dieukeur amou gnou dara di deff planning. Esk lolou yone la. Khma ngua lolou da ngua beugua fo rek. Djiguène kay so amoul djuekeur da ngua wara tokk*
- We, we are Toucouleur; we say that every mouth that God creates, he has something to put in it. We do not know birth control. It is Black toubab who do that. My husband is a real Pulaar. They would like you to fill the house with many children (woman, 32, fabric vender)

Reasons women want to limit births

- At this moment, when you have two kids, you won't be able to do your job, you won't have anybody to look after them. In my case, right now my kid is with my mom. I can't have him here the road is too narrow. When I was carrying my baby still in my back, I stayed home until he was weaned before I started… In my case I prefer having offsprings but when I was having my kid I was really tired and then after his birth my

breast we hurting. He hasn't breastfed yet. Also my wedding was exhausting. That's why I told myself to work since I haven't met a good man until the day I meet another one (woman, 25, market/restaurant vender)

    - *Fimou tolleu so kheussé ame gnari dome gnat do meuna deff sa ligguèy do am kou la koy téyyél. Mane fimou né sama dome mou ngui thi sama yaye. Meunou ma ko yorr fi ak taal yi dafa khat. Bamay bott dama toggone ba mou ferr ma sogga commencé.*

- Spacing the birth is important these days, you take it yourself. Even your husband won't be against it because these days life is hard. You can't have a kid every year or every two years. For some people it's the doctor who tells them not to space the birth. Times are hard. You see some women live with their husband in one room. That person can't have kids every two years. No one dislikes having kids but the times we are living in are hard (woman, market vender)
    - *Sorril ndiour mome thi diamono bi la bokk. Ya kooy dieulal sa boop. Meme sa dieukeur sakh dou ko bagn ndakh diamono bi da méti. Meuno chaque année wala chaque deux ans ngua ame domme. Amna gno khamné médecin yi gno lène di wakh bou lène ssorril sène ndiour. Diamono mo méti da ngaay guiss ko nekk ak dieukeur ram thi bène nek kokkou meunoul chaque deux ans mou ame doom. Domm kène bagnou ko mais deuk bi mométi*
- If you have a child, you breastfeed the child until they're weaned, you have to remake your body. You continue your work a little until giving birth to another child. A woman who regularly gives birth without spacing, your body is destroyed. A woman, if you have a child, you rest yourself, you take good care of yourself, you remake your body. You take care of yourself and take care of your child, later you could have another child, But you don't have to be in the process of having children all the time, this is not good for your health. (young woman, no occupation)
- You look at your situation, look at where you live, look at your husband's situation. Because as a woman if you are pregnant you need money. You look at the state of your health. You look at the situation of your family, because you don't give birth to a child and bring it into a really difficult situation. You and your child will have a lot of difficulties. (young woman, no occupation)

Link between empowerment and fertility

- However, fertility alone does not define empowerment(woman student)
    - *Toutefois, la fécondité seule ne définit pas l'autonomie*
- Men don't necessarily want to have more children, especially educated men(woman student)
    - *Les hommes n'ont pas forcément envie d'avoir plus d'enfants surtout les hommes éduqués.*
- This touches on a tiny minority of educated women who have a level of understanding relatively empowered in regards to their maternal health. They can play in their relations with men, decide to have two or three children. Me, I did this and I did not have any problems maybe because I was lucky to have an intellectual husband who

understands these things. But in the heart of Senegal the women don't have this, they maybe do it in hiding and with risk because they could even lose their marriage. (woman, activist)

  - *Cela touche une infime minorité de femmes instruites qui ont un niveau de connaissance sont relativement autonome par rapport à leur santé maternelle. Elles peuvent jouer sur leur relation avec les hommes, décider d'avoir deux ou trois enfants. Moi je le fais et je n'ai pas de problème peut être j'ai la chance d'avoir un mari intellectuel qui comprend les choses. Mais au fin fond du Sénégal, les femmes n'ont pas cela, elles le font peut être en cachette et avec risque car elles peuvent même perdre leur ménage.*

- Not necessarily because we see a lot of women who don't want to have more children but who don't use contraceptive methods for one reason or another. Hence, it's not an absolute relation, but it is true there are empowered women who are more inclined to use contraception because they want to decide the number of children they will have and the size of their household… In general [an empowered woman] would have fewer children. But there can be exceptions. There are some very empowered woman, great intellectuals but who choose to have a lot of children, to have a big family. These are women who refuse to accept that there are advantages to spacing births. They think they are capable of taking good care of their health and finances and sending their children to the best schools and there is no reason to reduce the number of children. (woman, leader of womens org)
  - *Pas forcément parce qu'on voit beaucoup de femme qui ne veulent pas avoir plus d'enfants mais qui n'utilisent pas des méthodes de contraception pur une raison ou une autre. Donc ce n'est pas une relation absolue, mais il est vrai il y a des femmes autonomes sont plus enclines à utiliser la contraception car elles veulent décider du nombre d'enfants qu'elles ont, de la taille de leur ménage.*
  - *En général elle peut avoir mois d'enfants. Mais il peut y avoir des exceptions, on a des femmes très autonomes, de grandes intellectuelles mais qui choisissent d'avoir beaucoup d'enfants, d'avoir une grande famille. C'est des femmes qui quels que soit les avantages qu'on leur donne sur l'espacement des naissances n'acceptent pas. Elles pensent que si elles ont la capacité d'une bonne prise en charge sanitaire et financière et d'envoyer leurs enfants dans les meilleures écoles, rien ne les oblige à réduire le nombre d'enfants*
- The tendency is that empowered women more and more are having fewer children. What explains this now? Maybe its for economic reasons, an issue of outlook etc. I remember when we went to advocate for family planning. An old man was telling me 'yes, the one who has the means puts their children in a good place, he has a way of blossoming and everything while the one who is impoverished only has the woman hence he doesn't control anything. (man, leader of community org).
  - *La tendance est que ces femmes autonomes font de plus en plus moins d'enfants ? Qu'est ce qui l'explique maintenant ? peut que c'est pour des raisons économiques pour des questions de vision etc.. Je me rappelle quand nous*

sommes allées faire le plaidoyer pour la planification familiale. Un vieux qui me disait : « oui celui qui a les moyens met son enfants dans un bon cadre, il a sa manière de s'épanouir et tout alors que celui qui est démuni n'a que ça femme pour s'épanouir donc il ne contrôle pas.

- The other ones have more kids. But many kids is exhausting. Only God knows, right now the country is hard, if you have many kids you will be tired even more with the type of job we have. You going to exhaust your kid and yourself (woman, 30, market/restaurant vender)
    - *Gnénéne gni gno eup dom. Mais domm you barri da lay sonal. Yalla rek mo kham instant yi deuk bi daffa métis o amé dome you bari da nguay sone sourtou ma liggèy bi gnou yorni. Da nguay sonnal khalé bi sonnal sa bopp*
- If one refers to reality, women who are autonomous often have few children. Unlike those who stay at home, they do not have the time to bear children and to look after those children. There is a saying that the only consolation of the poor is sex, it's natural and it's free. A couple who does not have the means even though he is a worker, the only entertainment they have is sleeping together. I do not have any money to take him to the cinema. There are even more expenses because you have to take a taxi to a residential area. If you have just 2000 francs you have to use for your daily expenses, the only entertainment you have is to sleep together, and if there is too much sex there will be a lot of children (man, 30, fabric vender)
- The women who are considered empowered have more children because they have the ability to take care of them well. If you cannot take charge, you don't want to have a lot of children because you cannot take care of them well. Because if you can take charge then you can have a big family and you can take good care of them (woman, no occupation)
    - *Les femmes qui sont en mesures de ses prendre en charge, ont beaucoup plus d'enfants par ce qu'elles sont en mesures de bien s'en occuper. Si tu ne peux pas te prendre en charge tu ne voudras pas avoir beaucoup d'enfants parce que tu ne pourras pas bien t'en occuper. Parce que si tu peux te prendre en charge tu peux alors avoir une grande famille parce que tu pourras bien t'en occuper*

Obstacles:

- If you have a husband that won't let you work and also don't have the means to take care of you is the obstacle (woman 39, restaurant vender)
- Its means that prevent you. For example first obstacle for women is her family. Once she has a husband and a kid, that's already an obstacle. You won't able to do many things. If it is in this society we living because once a men have kids, they want the mother to always be home to take care of them. To pay attention to their education (woman, restaurant vender)
    - *Manam gnou lay empécher quoi. Par exemple premier contrainte djiguène par exemple mooy famille yam. So kheussé ma ame dieukeur ame doom déjà lolou contraite la. You beuri doto ko meunati. Sou féké société bi gnou nek ni parce*

goor gni sougnou démé ba ame dome da gnouy beugu sène yaay tout le temps mou nek thi keur gui di lène topato. Di veiller thi sene éducation.

Women who are autonomous because they don't have a husband around

- One woman (age 32) talks about being in charge because her husband is in France and has no job

    - What are the characteristics of a woman who is autonomous, independent and not dependent on anyone?
    - It is God who does that on a person. A woman who does not depend on anyone is the will of God.
    - Is that a good thing?
    - This is what is happening now in the world today. God gave women the chance. We are young women and our husbands have gone into immigration, and they are not doing very well over there. On top of that, you look after your mother, your brothers, yourself and your family
    - Who makes the decisions in your house? Decisions related to the household?
    - My mother gathers everyone and talks with us and the person who is skilled in doing it will do it, because I have brothers who are abroad. We are all of the same mother and the same father; therefore, we are all alike. My mother gives respect to everyone and treats everyone the same way.

Table 1: Fertility Preferences (Couples Data)

Woman wants a child in the next two years						**Man wants a child in the next two years**					
	Estimate	Std. Error	z value	Pr(>|z|)			Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	-0.8365	0.11692	-7.154	8.41E-13	***	(Intercept)	-0.6501	0.11529	-5.639	1.71E-08	***
agecat.w[25,35)	-0.3824	0.0761	-5.025	5.04E-07	***	agecat.w[25,35)	-0.2044	0.0767	-2.665	0.00769	**
agecat.w[35,50]	-0.5369	0.09776	-5.491	3.99E-08	***	agecat.w[35,50]	-0.1159	0.09619	-1.205	0.2283	
agecat.m[30,40)	-0.0948	0.09917	-0.956	0.33921		agecat.m[30,40)	-0.1728	0.09933	-1.739	0.08195	.
agecat.m[40,50)	0.02916	0.11202	0.26	0.79464		agecat.m[40,50)	-0.0554	0.11183	-0.495	0.62045	
agecat.m[50,59]	-0.1811	0.12907	-1.403	0.1606		agecat.m[50,59]	-0.2528	0.12692	-1.991	0.04643	*
educ.wPrimary	-0.0281	0.0738	-0.381	0.70308		educ.wPrimary	-0.0688	0.07205	-0.955	0.33954	
educ.wSecondary o	-0.0383	0.09785	-0.391	0.69551		educ.wSecondary	-0.0568	0.09563	-0.594	0.55253	
educ.mPrimary	-0.0182	0.07357	-0.247	0.80472		educ.mPrimary	-0.0537	0.07088	-0.757	0.44892	
educ.mSecondary o	0.10424	0.0856	1.218	0.22336		educ.mSecondary	-0.1818	0.08437	-2.155	0.03116	*
ownsany.wTRUE	-0.0037	0.07003	-0.052	0.95815		ownsany.wTRUE	0.17051	0.06716	2.539	0.01112	*
ownsany.mTRUE	0.03545	0.06394	0.554	0.57927		ownsany.mTRUE	0.30851	0.06314	4.886	1.03E-06	***
simp.healthcooperat	0.22722	0.07978	2.848	0.0044	**	simp.healthcoope	0.26142	0.07785	3.358	0.00079	***
simp.healthdont coo	0.28275	0.10945	2.583	0.00979	**	simp.healthdont c	0.14172	0.10822	1.31	0.19034	
simp.purchasecoope	0.10252	0.08883	1.154	0.24845		simp.purchaseco	0.01923	0.08574	0.224	0.82256	
simp.purchasedont c	0.07986	0.07649	1.044	0.29643		simp.purchasedo	-0.1411	0.0744	-1.897	0.05786	.
numvio.w	0.01923	0.01394	1.38	0.16765		numvio.w	-0.0129	0.01351	-0.955	0.33937	
numvio.m	0.03128	0.01907	1.64	0.10095		numvio.m	0.05227	0.01851	2.824	0.00474	**

(Table 1 continued)

Woman wants to have another child						**Man wants to have another child**					
	Estimate	Std. Error	z value	Pr(>|z|)			Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	4.40444	0.30499	14.441	< 2e-16	***	(Intercept)	4.92223	0.3618	13.605	< 2e-16	***
agecat.w[25,35)	-1.4597	0.21864	-6.676	2.45E-11	***	agecat.w[25,35)	-0.676	0.20608	-3.28	0.00104	**
agecat.w[35,50]	-3.2853	0.22263	-14.76	< 2e-16	***	agecat.w[35,50]	-1.3941	0.21827	-6.387	1.69E-10	***
agecat.m[30,40)	0.07777	0.30037	0.259	0.79571		agecat.m[30,40)	-0.664	0.35364	-1.878	0.06044	.
agecat.m[40,50)	-0.6902	0.29862	-2.311	0.02081	*	agecat.m[40,50)	-1.0208	0.36146	-2.824	0.00474	**
agecat.m[50,59]	-1.2115	0.30336	-3.994	6.51E-05	***	agecat.m[50,59]	-1.8859	0.36722	-5.136	2.81E-07	***
educ.wPrimary	-0.1768	0.10119	-1.747	0.08068	.	educ.wPrimary	-0.2314	0.12361	-1.872	0.06124	.
educ.wSecondary or	-0.0489	0.14759	-0.331	0.74065		educ.wSecondary	-0.2425	0.16449	-1.474	0.1404	
educ.mPrimary	-0.0512	0.09962	-0.514	0.60731		educ.mPrimary	-0.2472	0.12616	-1.959	0.05007	.
educ.mSecondary or	0.02265	0.11325	0.2	0.84147		educ.mSecondary	-0.6308	0.13078	-4.823	1.41E-06	***
ownsany.wTRUE	0.09033	0.08917	1.013	0.31107		ownsany.wTRUE	-0.0162	0.11231	-0.144	0.88517	
ownsany.mTRUE	-0.1796	0.09313	-1.928	5.38E-02	.	ownsany.mTRUE	-0.2026	0.11842	-1.711	0.08707	.
simp.healthcooperate	-0.1791	0.10878	-1.646	0.09968	.	simp.healthcoope	-0.0569	0.13539	-0.421	0.67407	
simp.healthdont coo	-0.5784	0.14545	-3.976	7.00E-05	***	simp.healthdont c	-0.3215	0.17246	-1.864	0.06226	.
simp.purchasecoope	0.02455	0.11286	0.218	0.8278		simp.purchaseco	-0.2607	0.14208	-1.835	0.06655	.
simp.purchasedont c	0.30821	0.11178	2.757	0.00583	**	simp.purchasedor	-0.0489	0.13873	-0.353	0.72424	
numvio.w	-0.0059	0.01832	-0.325	0.74541		numvio.w	0.01144	0.02358	0.485	0.62761	
numvio.m	-0.0135	0.02617	-0.517	0.60528		numvio.m	-0.0037	0.03469	-0.108	0.91412	

(Table 1 continued)

Woman's ideal family size (numeric)						**Man's ideal famiy size (numeric)**					
	Estimate	Std. Error	z value	Pr(>|z|)			Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	1.78188	0.02419	73.65	< 2e-16	***	(Intercept)	2.24249	0.02116	105.98	< 2e-16	***
agecat.w[25,35)	-0.003	0.01562	-0.189	0.84974		agecat.w[25,35)	0.01109	0.01373	0.807	0.41958	
agecat.w[35,50]	0.01851	0.01958	0.945	0.34452		agecat.w[35,50]	0.0138	0.01703	0.81	0.41801	
agecat.m[30,40)	0.01278	0.02101	0.608	0.543		agecat.m[30,40)	0.01034	0.01836	0.563	0.5731	
agecat.m[40,50)	0.00438	0.02339	0.187	0.85153		agecat.m[40,50)	0.0961	0.0204	4.71	2.48E-06	***
agecat.m[50,59]	-0.0006	0.02622	-0.023	0.98169		agecat.m[50,59]	0.10784	0.02283	4.724	2.31E-06	***
educ.wPrimary	-0.0789	0.01474	-5.353	8.67E-08	***	educ.wPrimary	-0.0985	0.01332	-7.398	1.39E-13	***
educ.wSecondary or	-0.1568	0.02013	-7.786	6.92E-15	***	educ.wSecondary	-0.1899	0.01825	-10.41	< 2e-16	***
educ.mPrimary	-0.0449	0.01454	-3.086	0.00203	**	educ.mPrimary	-0.2353	0.01298	-18.13	< 2e-16	***
educ.mSecondary or	-0.1346	0.01755	-7.67	1.72E-14	***	educ.mSecondary	-0.3584	0.0158	-22.69	< 2e-16	***
ownsany.wTRUE	0.03581	0.01321	2.712	0.00669	**	ownsany.wTRUE	0.00523	0.01181	0.442	0.65823	
ownsany.mTRUE	0.03364	0.01281	2.625	0.00866	**	ownsany.mTRUE	0.12209	0.0117	10.439	< 2e-16	***
simp.healthcooperate	0.00794	0.01607	0.494	0.62122		simp.healthcoope	0.10479	0.01398	7.497	6.51E-14	***
simp.healthdont coo	-0.0164	0.02239	-0.734	0.4631		simp.healthdont c	0.03898	0.01908	2.043	0.04107	*
simp.purchasecoope	-0.0243	0.01761	-1.378	0.16819		simp.purchaseco	-0.0931	0.01512	-6.159	7.31E-10	***
simp.purchasedont c	-0.0224	0.01509	-1.485	0.13759		simp.purchasedo	-0.0659	0.01307	-5.046	4.52E-07	***
numvio.w	0.01531	0.00276	5.54	3.03E-08	***	numvio.w	0.00869	0.00236	3.681	0.00023	***
numvio.m	0.00188	0.00385	0.488	0.62584		numvio.m	0.02325	0.00309	7.523	5.33E-14	***

(Table 1 continued)

Woman's ideal family size (non-numeric)						**Man's ideal famiy size (non-numeric)**					
	Estimate	Std. Error	z value	Pr(>|z|)			Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	-1.5402	0.14668	-10.5	< 2e-16	***	(Intercept)	-0.8163	0.11829	-6.901	5.16E-12	***
agecat.w[25,35)	0.00418	0.09837	0.042	0.96613		agecat.w[25,35)	0.09791	0.0775	1.263	0.20647	
agecat.w[35,50]	0.26237	0.11837	2.217	0.02666	*	agecat.w[35,50]	0.02019	0.09547	0.211	0.83254	
agecat.m[30,40)	-0.0504	0.13188	-0.382	0.70211		agecat.m[30,40)	0.11994	0.10545	1.137	0.25537	
agecat.m[40,50)	-0.0936	0.14552	-0.643	0.52018		agecat.m[40,50)	0.32219	0.11637	2.769	0.00563	**
agecat.m[50,59]	-0.0374	0.15965	-0.234	0.81498		agecat.m[50,59]	0.70543	0.12851	5.489	4.04E-08	***
educ.wPrimary	-0.4247	0.09396	-4.52	6.18E-06	***	educ.wPrimary	0.14644	0.07052	2.076	0.03785	*
educ.wSecondary or	-0.9466	0.15469	-6.119	9.40E-10	***	educ.wSecondary	-0.1918	0.10077	-1.903	0.05703	.
educ.mPrimary	-0.1442	0.08902	-1.62	0.10527		educ.mPrimary	-0.283	0.0709	-3.992	6.57E-05	***
educ.mSecondary or	-0.4144	0.1158	-3.579	0.00035	***	educ.mSecondary	-0.6429	0.08771	-7.33	2.31E-13	***
ownsany.wTRUE	-1.264	0.11137	-11.35	< 2e-16	***	ownsany.wTRUE	-0.183	0.06769	-2.703	0.00687	**
ownsany.mTRUE	0.24944	0.08015	3.112	0.00186	**	ownsany.mTRUE	-0.4785	0.0617	-7.755	8.84E-15	***
simp.healthcooperate	0.28324	0.09523	2.974	0.00294	**	simp.healthcoope	0.42612	0.07627	5.587	2.31E-08	***
simp.healthdont coop	0.00753	0.13805	0.055	0.95652		simp.healthdont c	-0.0794	0.111	-0.715	0.47451	
simp.purchasecoope	0.23084	0.10372	2.226	0.02604	*	simp.purchaseco	0.18028	0.08435	2.137	0.03259	*
simp.purchasedont c	0.05086	0.09405	0.541	0.58868		simp.purchasedor	0.04126	0.07448	0.554	0.57962	
numvio.w	-0.0012	0.01629	-0.072	0.94258		numvio.w	0.01589	0.01331	1.194	0.23259	
numvio.m	0.00274	0.0221	0.124	0.90151		numvio.m	-0.0343	0.01874	-1.827	0.06766	.

Table 2: Fertility Preferences (all women data)

Wants a child in the next two years						**Wants to have another child**					
	Estimate	Std. Err	z value	Pr(>|z|)			Estimate	Std. Err	z value	Pr(>|z|)	
(Intercept)	-0.769	0.036	-21.39	< 2e-16	***	(Intercept)	4.145	0.106	39.04	< 2e-16	***
agecat[25,35)	-0.239	0.033	-7.287	3.16E-13	***	agecat[25,35)	-1.953	0.106	-18.48	< 2e-16	***
agecat[35,50]	-0.36	0.036	-9.917	< 2e-16	***	agecat[35,50]	-4.147	0.103	-40.12	< 2e-16	***
educ.fPrimary	0.031	0.034	0.918	0.35864		educ.fPrimary	0.102	0.046	2.195	0.02818	*
educ.fSecondary or higher	0.002	0.042	0.056	0.95569		educ.fSecondary or higher	0.37	0.067	5.556	2.77E-08	***
ownsanyTRUE	0.065	0.035	1.85	0.06433	.	ownsanyTRUE	0.067	0.044	1.523	0.12765	
healthother	-0.093	0.083	-1.119	0.26295		healthother	-0.767	0.118	-6.509	7.58E-11	***
healthself	-0.103	0.075	-1.386	0.16564		healthself	-0.57	0.082	-6.934	4.08E-12	***
healthwith partner	0.066	0.057	1.144	0.25282		healthwith partner	-0.264	0.07	-3.793	0.00015	***
purchaseother	0.118	0.038	3.076	0.0021	**	purchaseother	0.406	0.063	6.442	1.18E-10	***
purchaseself	-0.035	0.096	-0.366	0.71464		purchaseself	-0.153	0.101	-1.517	0.12937	
purchasewith partner	0.05	0.056	0.882	0.37752		purchasewith partner	-0.064	0.067	-0.961	0.33677	
visitother	0.02	0.055	0.358	0.72042		visitother	0.415	0.096	4.318	1.57E-05	***
visitself	0.179	0.064	2.811	0.00494	**	visitself	-0.083	0.074	-1.12	0.26261	
visitwith partner	-0.008	0.047	-0.178	0.85852		visitwith partner	0.016	0.057	0.28	0.7796	
spendMnoearn	-0.367	0.146	-2.513	0.01198	*	spendMnoearn	-0.076	0.177	-0.43	0.66745	
spendMother	-0.25	0.124	-2.02	0.04334	*	spendMother	0.238	0.196	1.212	0.22555	
spendMself	0.089	0.099	0.902	0.36682		spendMself	0.068	0.12	0.563	0.57328	
spendMwith partner	-0.094	0.045	-2.062	0.0392	*	spendMwith partner	0.178	0.058	3.078	0.00208	**
numvio	0.007	0.007	1.134	0.25694		numvio	-0.003	0.009	-0.372	0.70988	

(Table 2 continued)

Ideal Family Size (numeric)						**Ideal family size (non-numeric)**					
	Estimate	Std. Err	z value	Pr(>|z|)			Estimate	Std. Err	z value	Pr(>|z|)	
(Intercept)	1.786	0.007	238.2	< 2e-16	***	(Intercept)	-1.258	0.043	-29.36	< 2e-16	***
agecat[25,35)	-0.015	0.007	-2.225	0.0261	*	agecat[25,35)	0.031	0.041	0.759	0.44802	
agecat[35,50]	0.009	0.007	1.235	0.2167		agecat[35,50]	0.439	0.042	10.36	< 2e-16	***
educ.fPrimary	-0.116	0.007	-16.62	< 2e-16	***	educ.fPrimary	-0.492	0.042	-11.65	< 2e-16	***
educ.fSecondary or higher	-0.221	0.009	-24.92	< 2e-16	***	educ.fSecondary or higher	-1.028	0.064	-16.05	< 2e-16	***
ownsanyTRUE	0.03	0.007	4.339	1.43E-05	***	ownsanyTRUE	-0.924	0.05	-18.36	< 2e-16	***
healthother	-0.02	0.017	-1.148	0.2509		healthother	0.416	0.087	4.758	1.95E-06	***
healthself	-0.008	0.015	-0.522	0.6018		healthself	0.232	0.084	2.753	0.0059	**
healthwith partner	-0.001	0.012	-0.087	0.9305		healthwith partner	-0.097	0.071	-1.37	0.1708	
purchaseother	0.004	0.008	0.486	0.6268		purchaseother	-0.019	0.047	-0.406	0.68469	
purchaseself	-4E-04	0.019	-0.018	0.9853		purchaseself	0.052	0.108	0.485	0.62796	
purchasewith partner	0.01	0.011	0.888	0.3743		purchasewith partner	0.073	0.068	1.083	0.27879	
visitother	-0.024	0.012	-2.064	0.039	*	visitother	0.157	0.064	2.44	0.01469	*
visitself	-0.122	0.013	-9.242	< 2e-16	***	visitself	-0.724	0.086	-8.466	< 2e-16	***
visitwith partner	-0.046	0.009	-4.928	8.31E-07	***	visitwith partner	-0.559	0.061	-9.183	< 2e-16	***
spendMnoearn	0.02	0.028	0.694	0.4878		spendMnoearn	0.003	0.142	0.023	0.98171	
spendMother	-0.009	0.024	-0.35	0.7263		spendMother	-0.294	0.146	-2.009	0.04452	*
spendMself	0.006	0.02	0.312	0.7553		spendMself	-0.217	0.126	-1.718	0.08587	.
spendMwith partner	-0.021	0.009	-2.278	0.0227	*	spendMwith partner	0.189	0.054	3.472	0.00052	***
numvio	0.02	0.001	14.69	< 2e-16	***	numvio	-0.003	0.008	-0.375	0.70731	

Table 3: Fertility Outcomes (all women data)

Interval between last and penultimate birth							**Number of births by age 25**				
	coef	exp(coef)	se(coef)	z	Pr(>|z|)		Estimate	Std. Erro	z value	Pr(>|z|)	
							0.30021	0.01355	22.152	< 2e-16	***
agecat[25,35)	-0.1209	0.88609	0.02239	-5.4	6.58E-08	***	0.47349	0.01246	38.007	< 2e-16	***
agecat[35,50]	-0.3254	0.72227	0.02317	-14	< 2e-16	***	0.33685	0.0133	25.326	< 2e-16	***
educ.fPrimary	-0.1395	0.86979	0.018	-7.75	9.10E-15	***	-0.2063	0.01185	-17.405	< 2e-16	***
educ.fSecondary or higher	-0.3638	0.69505	0.02625	-13.9	< 2e-16	***	-0.6307	0.01823	-34.597	< 2e-16	***
ownsanyTRUE	0.00564	1.00566	0.01772	0.318	0.7502		0.05752	0.01136	5.062	4.16E-07	***
healthother	0.00132	1.00132	0.04888	0.027	0.9785		0.06081	0.0298	2.04	0.041302	*
healthself	-0.0436	0.95733	0.03609	-1.21	0.227		0.03594	0.024	1.498	0.134219	
healthwith partner	-0.0215	0.97876	0.02896	-0.74	0.4585		0.07077	0.01872	3.78	0.000157	***
purchaseother	-0.0311	0.96937	0.02258	-1.38	0.1682		-0.1827	0.0142	-12.864	< 2e-16	***
purchaseself	-0.0988	0.90596	0.04476	-2.21	0.0273	*	0.09807	0.02916	3.364	0.000769	***
purchasewith partner	0.01664	1.01678	0.02784	0.598	0.5499		0.03895	0.0181	2.152	0.031387	*
visitother	-0.218	0.80409	0.03427	-6.36	1.99E-10	***	-0.2283	0.02168	-10.532	< 2e-16	***
visitself	-0.0664	0.93579	0.03192	-2.08	0.0376	*	-0.0619	0.02127	-2.911	0.003602	**
visitwith partner	-0.01	0.99002	0.02352	-0.43	0.6697		-0.0484	0.01544	-3.131	0.001741	**
spendMnoearn	0.05065	1.05196	0.07476	0.678	0.4981		0.06927	0.04656	1.488	0.136794	
spendMother	0.17624	1.19272	0.06931	2.543	0.011	*	-0.0447	0.04275	-1.045	0.295935	
spendMself	0.0023	1.0023	0.05027	0.046	0.9635		-0.0459	0.0328	-1.401	0.16132	
spendMwith partner	-0.0229	0.97741	0.02321	-0.98	0.325		-0.066	0.01519	-4.343	1.40E-05	***
numvio	0.02744	1.02782	0.00339	8.087	6.66E-16	***	0.03696	0.00216	17.097	< 2e-16	***

(Table 3 continued)

	Average Interbirth Interal					**Number of births 36 months after first birth**				
	Estimate	Std. Error	t value	Pr(>|t|)		Estimate	Std. Error	z value	Pr(>|z|)	
(Intercept)	31.1474	0.38198	81.543	< 2e-16	***	-0.9094	0.0277	-32.835	< 2e-16	***
agecat[25,35)	5.18628	0.3584	14.471	< 2e-16	***	0.45348	0.02585	17.545	< 2e-16	***
agecat[35,50]	9.23744	0.36652	25.203	< 2e-16	***	0.47274	0.02672	17.692	< 2e-16	***
educ.fPrimary	2.58918	0.28886	8.963	< 2e-16	***	-0.1325	0.02204	-6.012	1.84E-09	***
educ.fSecondary or higher	5.83437	0.42237	13.813	< 2e-16	***	-0.486	0.03432	-14.16	< 2e-16	***
ownsanyTRUE	0.77746	0.28461	2.732	0.00631	**	-0.0123	0.02154	-0.571	0.568	
healthother	-0.2535	0.77736	-0.326	0.74436		0.02506	0.05764	0.435	0.664	
healthself	0.42606	0.58258	0.731	0.46458		0.01831	0.04402	0.416	0.677	
healthwith partner	-0.0836	0.46268	-0.181	0.85658		0.03308	0.03488	0.948	0.343	
purchaseother	0.04908	0.36114	0.136	0.8919		-0.0639	0.02678	-2.387	0.017	*
purchaseself	0.80325	0.72108	1.114	0.26531		0.06758	0.05349	1.263	0.206	
purchasewith partner	0.13691	0.4451	0.308	0.7584		-0.0054	0.0337	-0.16	0.873	
visitother	2.55918	0.54556	4.691	2.74E-06	***	-0.1732	0.04177	-4.146	3.38E-05	***
visitself	0.55384	0.51541	1.075	0.28258		-0.0171	0.03868	-0.442	0.659	
visitwith partner	0.5284	0.37792	1.398	0.16207		-0.021	0.02867	-0.734	0.463	
spendMnoearn	-1.187	1.20471	-0.985	0.32449		0.04921	0.08714	0.565	0.572	
spendMother	-1.0277	1.11454	-0.922	0.35648		0.01671	0.08183	0.204	0.838	
spendMself	-0.364	0.80758	-0.451	0.65217		-0.0271	0.06051	-0.448	0.654	
spendMwith partner	0.09799	0.37383	0.262	0.79324		-0.0145	0.02827	-0.512	0.608	
numvio	-0.5142	0.05454	-9.428	< 2e-16	***	0.02224	0.00406	5.475	4.37E-08	***